

London School of Economics and Political Science

**Behavior Change Literacy: Improving
Explanations of Parental Mediation
Behaviors in a Digital Age**

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of the London School of Economics and Political Science for the
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Abstract

Researchers have long studied parental behaviors that support their children in navigating the media and technology landscape. Yet, they still struggle to explain why skills and knowledge in this area do not consistently translate into actual behaviors. To address this issue, a new explanation for this specific set of behaviors, known under the umbrella term parental mediation behaviors, was explored.

In this process, the dissertation made three contributions. First, it introduced and conceptualized Behavior Change Literacy (BCL) as an entirely new construct, defining it as an individual's ability to effectively initiate and sustain desired behavioral changes in themselves and others. BCL is a broad concept, applicable across various behaviors and contexts, and it varies among individuals. Second, a reliable and valid scale to measure BCL was developed and rigorously validated using cognitive interviews and statistical analysis. The cognitive interviews affirmed the three-component conceptualization of BCL: individuals had (a) different emotional, cognitive, and operational BCL levels related to (b) themselves, their children, and significant others for (c) habitual and non-habitual behaviors. Furthermore, they helped develop an empirically sound scale by resolving issues related to cognitive effort, behavior landscape breadth, consistent understanding of terms, consistent recall timeframes, and accurate response caption. The pilot survey affirmed the statistical validity of BCL's proposed three-fold theoretical structure. Third, a comprehensive survey demonstrated BCL, parental mediation intentions, and digital skills as promising independent explanations for parental mediation behaviors. More granularly, it revealed that particularly operational, child-related, and habit-related BCL were promising subcomponents.

The BCL scale can be leveraged to identify and address gaps in personal BCL by creating a record of successful behavior change (operational BCL), cultivating a strong sense of self-efficacy and a positive attitude towards behavior change (emotional BCL), and gaining declarative and procedural knowledge about behavior change theory and techniques (cognitive BCL).

Keywords: Digital behaviors, behavior change literacy, intention-behavior gap, parental mediation, internet use, smartphone use, and social media use

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Chapter 1 — Introduction

The digital age has ushered in unprecedented challenges and opportunities for children's well-being, placing parents at the forefront of navigating this complex landscape. This doctoral thesis addresses a critical gap in our understanding of parental mediation behaviors in the context of children's digital media use, offering a novel integration of media and communication research with behavioral science.

There is a consensus on the importance of digital technology and digital media in influencing the trajectories of children's well-being (e.g., Dienlin & Johannes, 2020; Hollis et al., 2020; Kalmus et al., 2013). Vulnerable young people are increasingly spending their leisure time with screens, and scholars are voicing growing concerns about the connections between excessive intense use, addictive digital affordances, and lower well-being for young people (e.g., Bhargava & Velasquez, 2020; Helsper & Smahel, 2020; Kalmus et al., 2015, 2024; Twenge et al., 2019).

Scholars have an ongoing debate on the relationship between children's digital behaviors and a set of diverse life outcomes, such as well-being, mental health, and educational achievement (e.g., Dienlin and Johannes, 2020; Jansen and Reid, 2020; Lux and Escobar, 2019; Naslund et al., 2019; Twenge et al., 2019; Wongkoblap et al., 2017). This complex relationship between digital behaviors and child outcomes aligns with broader research on developmental trajectories, which suggests that early experiences can have lasting implications for children's well-being and achievement (Gutman et al., 2019; Gutman & Codioli McMaster, 2020). The evidence shows that theories and statements directly linking a specific digital behavior (e.g., scrolling social media) with a poor or good outcome (e.g., depression) are highly questionable (Orben & Przybylski, 2019a, 2019b; Twenge et al., 2018; Twenge & Campbell, 2018; Viner et al., 2019). Therefore, several scholars have argued for a more nuanced understanding, focusing on developing better theories that explain why digital behaviors lead to good outcomes for some children and negative outcomes for others (e.g., Livingstone, 2020; Orben & Przybylski, 2019). Researchers offered a promising explanation: children's digital literacy levels strongly influence how well they can capture digital opportunities/benefits and cope with digital risks/harms (e.g., Livingstone et al., 2017).

One key explanation for the different levels of digital literacy among children is related to the primary agents of children's socialization (Kalmus, 2007). Parents play the predominant role in the process through which children acquire and develop social attitudes and behaviors (Maccoby, 2007). Parents strongly influence the child's media "diet" and usage (Chen & Shi, 2019). Parents shape children's relationship with digital media and technology – and hence, promote their children's well-being (e.g., Brito et al., 2017; Jordan, 2014; Livingstone & Blum-Ross, 2020; Scott, 2021). Livingstone and Blum-Ross (2020) provided clear qualitative evidence from the lives of families, showing that the amount of time families spend with digital technology and media is relatively unimportant and uninformative – unless the time spent is triangulated with *how* parents and children spend their time with digital technologies and media. Cross-sectional evidence suggests that how parents mediate the technology and media use of their children is associated with the children's exposure to online risk and opportunities, problematic and addictive internet use, and online relational aggression independent of the children's time spent online (Chandrima et al., 2020; Chen & Shi, 2019; Leung & Lee, 2012; Livingstone et al., 2017; Martins et al., 2019; Nielsen et al., 2019; Zhang et al., 2019). Moreover, similar evidence indicates that how parents themselves use digital technology and media (e.g., "phubbing" or "technoference") influences children's externalizing and

internalizing of behavior problems, depression, and psychosocial difficulties (McDaniel & Radesky, 2018; Wong et al., 2020; Xie & Xie, 2020).

Parental mediation is the umbrella term for this specific subset of parental behaviors related to media and technology, which is relevant to individual and family well-being yet potentially difficult to enact (Aierbe et al., 2019; de Ayala López et al., 2020; Moreno et al., 2021). Enabling parents to enact parental mediation behaviors has been chosen as a suitable subject for behavior change research and interventions because it has shown associations with beneficial outcomes. In particular, active parental mediation has been consistently associated with positive outcomes for children, such as safer online behaviors and more positive experiences with media content (Livingstone et al., 2017; Nikken & Schols, 2015). By contrast, the evidence for restrictive parental mediation appears more mixed (Lee, 2013; Livingstone et al., 2017). Under certain circumstances, restriction of screen time or technological access may indeed protect children—especially younger children—from harmful content or excessive use. However, in other cases, harsh restrictions can undermine trust or drive children’s behavior underground, highlighting the complexity and possible unintended consequences of a “one size fits all” approach (Chen & Shi, 2019). These divergent outcomes imply that a third variable—such as the child’s developmental stage, broader family communication patterns, or parental self-efficacy—may moderate whether restrictive mediation leads to positive results. While future parental mediation research should investigate under which specific conditions restrictive approaches are beneficial, the processes and outcomes of parental mediation have been studied more extensively than new explanations (Evans, 2014; Hudders & Cauberghe, 2018; Livingstone et al., 2017; Naderer et al., 2018; Vanwesenbeeck et al., 2016). Scholarly discourse on the effects of parental mediation becomes somewhat less relevant if the behavior fails to materialize (Hong, 2021; de Ayala López et al., 2020). Therefore, understanding the execution of parental mediation has been prioritized over exploring the relationship between positive and negative outcomes of parental mediation. The present dissertation is less concerned with these processes and outcomes and more interested in contributing to improving our explanation of parental mediation behaviors.

Various theorizations have been explored for parental mediation behaviors, especially parental media and digital literacy, yet they offer only limited explanations (e.g., Jeong et al., 2012). This gap in understanding echoes challenges seen in other areas of parenting research, where there is a need for more comprehensive frameworks to design and evaluate interventions (Younas & Gutman, 2022).

This thesis brings together theories and understandings of parental mediation research and behavior change research – both have long but separate histories – to examine the extent to which behavior-specific intentions and the newly developed concept of Behavior Change Literacy (BCL) might improve our theoretical understanding of parental mediation behaviors. BCL is defined as the literacy that enables individuals to initiate and sustain desired behavioral changes in themselves and others effectively, leveraging operational, emotional, and cognitive literacies across habitual and non-habitual behaviors. By drawing on behavioral science to study parental mediation (Fishbein & Ajzen, 2010), a key digital behavior in media and communication research, this thesis takes an interdisciplinary approach to addressing an important societal issue (Livingstone & Blum-Ross, 2020).

Behavioral science focuses on identifying theories that explain behavioral enactment (Hallsworth, 2023; Sanders et al., 2018). This thesis explores a new approach to explaining parental mediation behaviors by using behavior-specific intentions as a proven strong explanation for behaviors and BCL as an additional new explanation. Research shows that

people differ in their ability to enact their desired behaviors (e.g., Sheeran & Webb, 2016). The BCL concept offers a new explanation for this observation inspired by the fruitful leverage of the literacy concept in other fields, such as health literacy (Nutbeam, 2008) and well-being literacy (Oades et al., 2021).

The central research question guiding this thesis is:

What roles do behavior-specific intentions and Behavior Change Literacy play in explaining parental mediation behaviors?

Compared to established explanations for parental mediation behaviors like gender or age (Sonck et al., 2013; Nikken & Schols, 2015), BCL may be especially promising because it can be actively taught and developed. Moreover, it empowers individuals more broadly to perform behaviors associated with important outcomes like well-being, physical health, and mental health (Michie 2014). The BCL concept provides behavioral science with a new direction to complement the dominant paternalistic research, which typically focuses on supporting institutions to more effectively change the behaviors of specific populations, with non-paternalistic research direction, which seeks ways to empower people to engage in their desired behavior change and become their own agents of change (Hansen, 2016; Krpan & Urbaník, 2024; Thaler & Sunstein, 2009).

The organization of this thesis reflects a logical progression from theory to practice, in line with established guidelines for research design (Creswell & Creswell, 2018). Each chapter builds on the insights of the preceding sections—first establishing theoretical foundations, then detailing the conceptual model and methodology, and finally testing and refining the proposed models—to ultimately inform effective interventions and future research directions.

Chapter 2 presents the theoretical framework, discussing parental mediation, the Theory of Planned Behavior, and Behavior Change Literacy. This chapter lays the groundwork for understanding how BCL and intentions might explain parental mediation behaviors. Chapter 3 outlines the conceptual framework, detailing the research questions and hypotheses that guide the empirical investigation. Chapter 4 describes the methodology, including ethical considerations and the two-phase research design: the development and validation of the BCL scale, and the testing of theoretical hypotheses. Chapter 5 focuses on testing the conceptualization of BCL and developing the BCL scale. It presents the findings from cognitive interviews and the study's pilot survey, providing qualitative and quantitative validation of the BCL construct. Chapter 6 examines the BCL-modified intention-behavior model for parental mediation. It explores the relationships between BCL, its various components, and parental mediation behaviors, offering insights into how BCL influences parental practices in the digital realm. Chapter 7 concludes the thesis by synthesizing the findings and discussing their implications. It addresses theoretical and methodological contributions to both parental mediation research, behavioral science, and field-specific literacy research, offers practical implications, acknowledges limitations, and suggests directions for future research.

This thesis makes several original contributions: First, it introduces and validates the BCL concept, offering a new theoretical lens for understanding behavior change across domains. Second, it provides a novel explanation for variability in parental mediation behaviors, potentially resolving long-standing questions in media and communication research (Clark, 2011). Third, it bridges behavioral science and media studies, demonstrating the value of interdisciplinary approaches to complex social phenomena.

The implications extend beyond academia. By elucidating factors enabling effective parental mediation, this thesis offers insights for developing interventions and policies to promote positive digital experiences for families (Livingstone & Blum-Ross, 2020). It provided a foundation for empowering parents with skills and knowledge to guide children through the digital landscape. Ultimately, this thesis advanced the theoretical understanding of parental mediation in the digital age while paving the way for practical applications to enhance family well-being in an increasingly digital world.

Chapter 2 — Theoretical framework: leveraging Behavior Change Literacy and intentions to explain parental mediation behaviors

2.1 Introduction

This chapter presents a comprehensive theoretical framework aimed at providing a promising explanation for parental mediation behaviors in the digital age. The framework integrates insights from two distinct yet complementary fields: parental mediation literature and behavior change research. These perspectives are combined to develop a more nuanced and robust understanding of how and why parents engage in specific mediation practices to address their children's digital media use (Livingstone & Helsper, 2008). Parental mediation is a behavior first and foremost, but theories from behavioral science have not yet been systematically applied to explain this phenomenon (Clark, 2011; Jiow et al., 2017).

Before proceeding, it is important to clarify the distinction between two key terms used throughout this thesis: theoretical framework and conceptual/statistical model. A theoretical framework represents a broader structure that organizes and integrates multiple theoretical perspectives, concepts and relationships to guide research and understanding of a phenomenon (Jabareen, 2009; Nilsen, 2015). It provides an overarching way of thinking about the relationships between different theoretical components without necessarily specifying precise mechanisms or measurable predictions. In contrast, a model refers to a more specific, often mathematical or visual representation that details particular variables and their hypothesized relationships, typically making explicit, testable predictions about how those variables interact (Creswell & Creswell, 2018; Nilsen, 2015). In this thesis, 'framework' is used when discussing the broader theoretical structure integrating multiple perspectives on behavior change literacy and parental mediation, while 'model' is reserved for specific representations of relationships between variables, such as the Theory of Planned Behavior model or the COM-B model of behavior change.

The theoretical foundation in this chapter is built upon two unexplored constructs in the context of explaining parental mediation:

1. The behavior-specific intention construct that has been a well-established predictor of behaviors in numerous domains (Ajzen, 1991; Sheeran, 2002)
2. The novel concept of Behavior Change Literacy (BCL) that was developed in this thesis based on two key insights: (a) research demonstrating that people differ in their ability to enact their desired behaviors (Sheeran & Webb, 2016) and (b) the explanatory utility of the literacy concept for other cross-disciplinary phenomena, such as medicine or psychology (Nutbeam, 2008; Oades et al., 2021)

This chapter is structured in three parts, according to the key concepts: parental mediation, behavior, and literacy. First, the parental mediation literature is reviewed to understand the various types of parental mediation behaviors and their frequently researched antecedents, such as digital and media literacy, parental gender, children's age, and attitudes toward media (Nikken & Jansz, 2014; Livingstone et al., 2017). This review provides context-specific insights into the challenges and dynamics of digital parenting. Second, the behavior change literature is examined, focusing on the concept of behavior itself and its prominent antecedents, with particular attention to the intention construct (Fishbein & Ajzen, 2010). This section offers a broader, non-behavior-specific perspective on human behavior and change. Third, the concept of Behavior Change Literacy is introduced and theoretically developed. Inspired by multi-

component models of literacy (Bröder et al., 2017; Domanska et al., 2020), a three-component model of BCL is constructed.

By integrating these diverse strands of research, this chapter provides a theoretical framework that can offer a more comprehensive and nuanced explanation of parental mediation behaviors in relation to managing children's digital behavior. This framework informs the research questions, hypotheses, and subsequent empirical work presented in later chapters, ultimately contributing to understanding how parents can more effectively navigate the challenges of digital parenting in an increasingly digitalized world (Livingstone & Blum-Ross, 2020).

2.2 Parental mediation

Parental mediation, as the umbrella term for the specific subset of parental behaviors that are related to media and technology, has emerged as an important area of study within media and communication research, focusing on how parents navigate and manage their children's interactions with digital media and technology (e.g., Clark, 2011; Jiow et al., 2017; Kalmus et al., 2015; Livingstone & Helsper, 2008; Robertson, 1979). This section explores the conceptualization and explanations of parental mediation, highlighting its significance in shaping children's digital experiences and well-being.

The digital age has brought unprecedented challenges and opportunities for children's development, placing parents at the forefront of navigating this complex landscape (Evans, 2014; Hudders & Cauberghe, 2018; Kalmus et al., 2009; Kalmus & Ólafsson, 2013; Livingstone et al., 2017; Naderer et al., 2018; Vanwesenbeeck et al., 2016). As digital technologies become increasingly integrated into children's lives, understanding how parents mediate these interactions becomes paramount. Parental mediation strategies not only influence children's immediate digital behaviors but also play an important role in developing their long-term digital literacy and resilience.

This section begins by examining how parental mediation has been conceptualized in existing literature, tracing its evolution from traditional media contexts to today's complex digital landscape. Then, it explores relevant explanations of parental mediation behaviors and avenues for further research contribution.

2.2.1 Conceptualizing parental mediation

Parental mediation has been conceptualized as “the way parents teach children how to cope with media content and prevent negative consequences of media use on their psychological and mental health” (Hudders & Cauberghe, 2018, p. 199) or as “the strategies that parents introduce to maximize the benefits and minimize the risks (potential negative impacts) of media influence” (Jiow et al., 2017, p. 310). In this thesis, parental mediation refers to the set of parental behaviors aimed at maximizing the opportunities/benefits and minimizing the risks/harms of technology and media for children.

Parental mediation tends to be clustered around broad mediation strategies regardless of media type (Daneels & Vanwynsberghe, 2017; Domoff et al., 2019; Evans et al., 2011; Palaigeorgiou et al., 2018; Shin, 2015; Symons et al., 2017; Vaterlaus et al., 2014; Vijayalakshmi et al., 2019; Zaman et al., 2016). While these strategies have different typologies, most of them show three types of parental mediation: active mediation (i.e., “consists of talking about media content while the child is engaging with the medium”), restrictive mediation (i.e., “involves setting rules that restrict the use of the medium”), and co-use (i.e., “signifies that the parent remains

present while the child is engaged with the medium without commenting on the content or its effects”) (Livingstone & Helsper, 2008, p. 583). More recently, Kuldás et al. (2021) have reviewed ten scales and developed a three-fold typology made of restrictive parental mediation (composed of rule-setting-restriction, monitoring restriction, and technical restriction), enabling parental mediation (composed of parent-initiated enabling and child-initiated enabling), and observant parental mediation (e.g., “watching when the child uses the Internet”).

However, recent research on parental digital mediation of young children (under 8) revealed that rather than using one strategy cluster, parents tend to utilize several strategies of different styles, such as limiting screen time and participating in co-use (e.g., playing together but only for 30 minutes) (Ponte et al., 2019). Moreover, parental mediation is an ongoing and evolving process and depends on negotiation with the child, the child’s development level, and previous mediation experiences (e.g., if limiting screen time did not work, another strategy is tried) (Livingstone et al., 2017).

The different conceptualizations of parental mediation provide a foundation for understanding the current organizations for the examined behavior. Current relevant explanations of parental mediation behaviors need to be explored to identify avenues for contribution.

2.2.2 Explaining parental mediation

Researchers have often used and/or reported different conceptualizations of parental mediation ranging from findings based on a composite parental mediation variable or different decomposed variables according to their preferred theory (e.g., two types, such as restrictive and active, or three types, such as restrictive, active, and co-use). These variations make the interpretation, comparison and synthesis of the findings difficult (e.g., Dens et al., 2007; Lin et al., 2019). Causality is not often established because the data is predominantly collected at one point in time instead of through longitudinal or experimental methods.

Mothers are more likely than fathers to engage in co-use, active, and restrictive parental mediation (Warren, 2005). Mothers were also more likely than fathers to engage in television and computer co-use (Connell et al., 2015). Parents with a university degree are more likely to control their children’s internet use and co-watch television than parents with a lower educational level (Valcke et al., 2010). Conversely, parents with limited education are more likely to co-play video games with their children than parents with a higher level of education (Connell et al., 2015). Parents who believe that the media negatively affects their children are more likely to use mediation methods, especially restrictive mediation (Lee, 2013). A similar trend is evident in studies of video games. Parents who believe that video games negatively impact their children are inclined to limit their participation in these games (Shin & Huh, 2011).

The children's age influenced parental mediation. Higher mediation of social media influencer (SMI) content marketing was found for children in earlier grade levels (Lin et al., 2019). Parents of older children use more active T.V. advertising mediation, while those of younger children use more restrictive mediation (Soni & Singh, 2012). Parental mediation declines as children age, which means that parents of older children are likely to report less mediation than parents of younger children (Böcking & Böcking, 2009). Younger children are monitored more intensively and restricted more often in their internet use (Sonck et al., 2013).

The explanation of media and digital literacy has attracted significant attention (e.g., Austin et al., 2018; Daneels & Vanwysberghe, 2017; Livingstone et al., 2017; Rodríguez-de-Dios et al., 2018). There are many conceptualizations of media and digital literacy. Media literacy has been

described as “the ability to access, analyze, evaluate, and create messages in a variety of forms” (Livingstone, 2004, p. 5). This literature has developed considerably in the last decade, especially the literature on digital media literacy, which has done much work, to be more precise. Importantly, media literacy today is not only about messages but also about social interactions and self-presentation (Helsper, 2021). The 2.1 version of the Competence Framework for Citizens (DigComp) conceptualizes digital literacy as the (critical) knowledge, (functional) skills, and attitudes applicable to 5 high-level areas: information and data literacy, communication and collaboration, digital content creation, safety, and problem-solving (Carretero et al., 2017; Vuorikari et al., 2016). Overall, a distinction is made between access, motivation, and skills (with critical awareness/knowledge and functional technical/navigation components), whereas literacy includes all of these factors (Deursen & van Dijk, 2010; Helsper et al., 2020; van Deursen et al., 2016).

Parents with high (predominantly critical) social media literacy tend to favor active mediation strategies instead of restrictive or technical approaches (Daneels & Vanwynsberghe, 2017). Similarly, more digital skills in parents and children were associated with more enabling mediation (Livingstone et al., 2017). Interestingly, in another study, digital literacy also moderated the impact of restrictive (though not active) parental mediation on online risks and opportunities (Rodríguez-de-Dios et al., 2018). Parents who are skilled and frequent active users of the internet are more likely to mediate their children’s media use and prefer active co-use over technical restrictions, interaction restrictions, and monitoring practices (Kirwil, 2009; Lin et al., 2019; Livingstone & Helsper, 2008). Passive use was not linked to more parental mediation (Lin et al., 2019). Parents’ active social media use was directly related to more intrapersonal empowerment, which was directly linked to more parental mediation, whereas passive-use parents felt more interactional empowerment, which did not change the level of parental mediation (Lin et al., 2019).

However, digital literacy alone does not appear especially promising. Digital skills had only a small positive association with the intention to engage in active and restrictive parental mediation (Hong, 2021). The first meta-analysis of 51 media literacy interventions for nine outcomes (i.e., knowledge, criticism, influence, realism, beliefs, attitudes, norms, self-efficacy, and behaviors) found that the “interventions may have greater effects on media-relevant outcomes (e.g., knowledge and realism) than on behavior-relevant outcomes (e.g., attitudes and behaviors)” (Jeong et al., 2012, p. 9). Xie et al. (2019) conducted another meta-analysis on the effect of 23 media literacy interventions for problematic behaviors (i.e., alcohol, smoking, other drugs, body dissatisfaction, eating disorders) and found a small to moderate average effect ($d = -.32$). Lastly, Vahedi et al. (2018) performed another meta-analysis for the effect of 19 media literacy interventions on attitudes and intentions towards risky behaviors (i.e., substance use/drinking alcohol, smoking/tobacco use, and risky sexual behavior) and found a small significant effect size of the interventions on attitudes and intentions. Media and digital literacy alone do not appear to sufficiently support enacting the desired behaviors.

While this thesis focuses primarily on micro-level explanations, macro-level factors may impact parental mediation behaviors through their influence on digital literacy, parents’ intentions, and ability to bridge the intention-behavior relationship. The broader cultural and societal context shapes parenting norms and expectations around digital media use (Clark, 2011; Livingstone & Blum-Ross, 2020). Institutional arrangements, such as work schedules and childcare availability, affect parents’ time resources and how socialization tasks are delegated across family members and institutions (Bianchi & Milkie, 2010). Additionally, parental values and beliefs about child development influence how parents approach digital mediation (Clark, 2012; Livingstone et al., 2018), while general parenting styles may shape the

specific tactics parents employ in managing children's media use (Valcke et al., 2010). These factors likely contribute to both the formation of parental mediation intentions and parents' ability to act on those intentions. However, these broader contextual factors are less amenable to direct behavior change interventions compared to more proximal factors like digital skills or behavioral intentions. Moreover, limited experimental research exists examining how modifications to these contextual factors impact parental mediation behaviors, making their potential as intervention targets unclear (Warren, 2020; Xie et al., 2019). While acknowledging the importance of these broader explanatory factors, they remain outside this thesis's primary scope, which focuses on more directly malleable determinants of parental mediation behavior.

Overall, evidence shows that parents might have difficulties changing or undertaking certain behaviors when it comes to parental mediation. In interview studies, parents reported difficulty living up to their ideal parental mediation approaches (Aierbe et al., 2019; de Ayala López et al., 2020). Similarly, one experimental study examined how well parents can translate the intentions formulated in the Family Media Plan into behavior change, finding “no statistically significant changes in media rule engagement” (Moreno et al., 2021, p. E1).

The exploration of parental mediation behaviors has revealed the limited promise of the current explanations to resolve the challenge of enacting parental mediation behaviors consistently. The difficulty to enact intended behaviors is a well-evidenced issue across many behaviors (e.g., Sheeran & Webb, 2016), so it is not a problem exclusive to parental mediation. Behavioral science, as an academic field focused on explaining behavior, appears intuitively well-suited to discovering promising explanations. This will help to develop a more comprehensive understanding of how to support parents in effectively mediating their children's digital experiences.

2.3 Behaviors

Research on various digital behaviors, such as the use of consumer protection tools, engaging with mobile phones while walking, and adolescents' interaction with social networking platforms, has shown that intentions significantly influence these behaviors (Baker & White, 2010; Jiang et al., 2017; Procter et al., 2019). Despite this evidence, only one study (Hong, 2021) has examined intentions specifically in the context of parental mediation.

The theoretical landscape of behavior change is much more than classical behaviorism (stimulus-response and reward-punishment). It is a nuanced body of theoretical work, incorporating cognitive theories, like the dual-system model of judgment, and emotion-focused theories. A recent review has identified 83 theories of behavior change across social and behavioral sciences (Michie et al., 2011, 2014). Recent theoretical contributions have made behavior change theory more accessible, coherent, comprehensive, and clear by synthesizing these theories, especially the Behavior Change Wheel (BCW) and the COM-B model (capability, opportunity, motivation, and behavior; Michie et al., 2011, 2014).

In theory, researchers are interested in explaining how to increase the frequency of behaviors like exercise that are closely associated with important positive outcomes, such as well-being, and decrease behaviors linked to negative outcomes across behavioral domains (Abraham & Michie, 2008; Gutman et al., 2019; Sheeran et al., 2017; Younas & Gutman, 2022). Scholars advocate for leveraging theories to design more effective behavior change interventions that achieve desired outcomes in the world (Gutman & Schoon, 2015; Sheeran et al., 2017).

Among the different candidates to explain behavior, intentions emerged as one of the strongest explanations, compared to alternatives like perceptions of risk and severity (e.g., Sheeran & Webb, 2016) or personality factors (Chiaburu et al., 2011). Chapman (2001, p. 811) defined intentions as “unique memorial structures that, once accessible, have profound influences on information processing and behavior”. This conceptualization emphasizes the role of intentions as memory-based mechanisms that influence how individuals interpret and respond to information, guiding their actions. Two broad types of intentions have been researched more extensively: goal intentions and behavioral intentions. Goal intentions are self-instruction to achieve desired outcomes (e.g., “I will improve my health”), while behavioral intentions are self-instruction to perform specific behaviors to attain goals, e.g., “I intend to run for 45 minutes each day” (Sheeran & Webb, 2018). Although people’s behaviors may involve responses triggered automatically by situational cues (usually referred to as habits), intentional control is vital to ensure the achievement of long-term goals (e.g., Baumeister & Bargh, 2014). The concept of intention has been especially valuable for researchers concerned with behavior change and interventions designed to promote desirable outcomes like physical health, using intentions as a key determinant of behavior change (e.g., Ajzen & Kruglanski, 2019; Steinmetz et al., 2016).

The Theory of Planned Behavior (TPB) is a well-evidenced theory that explains the relationship between intentions and behaviors across many social science domains (Ajzen, 2015a; Armitage & Conner, 2001).

2.3.1 Theorizing behavior through the Theory of Planned Behavior

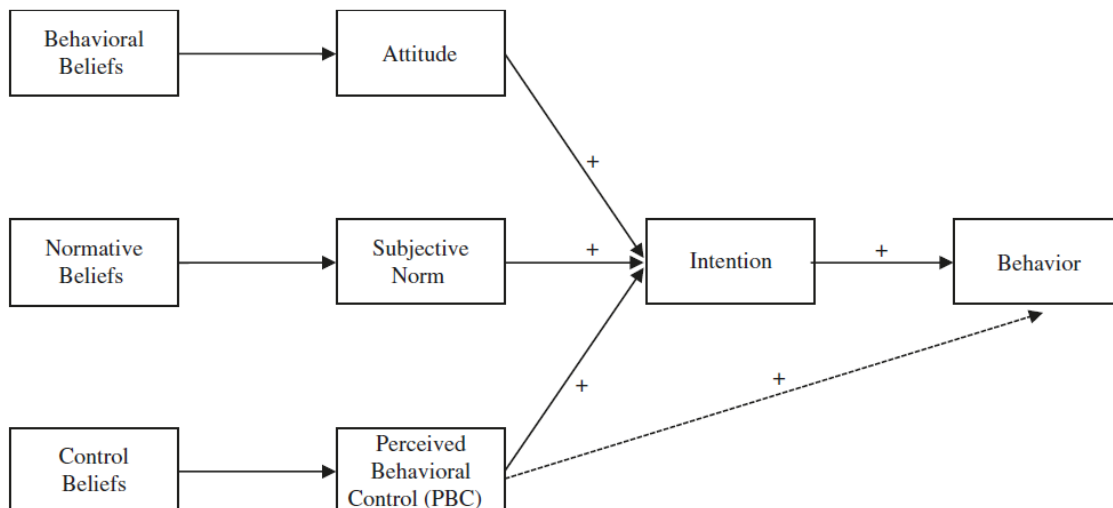
TPB was developed by theorizing, modeling, and testing different relationships between key psychological concepts as antecedences of behaviors (Fishbein & Ajzen, 2010). More specifically, meta-analyses found that the three key concepts proposed by the TPB (i.e., attitude, subjective norm, and perceived behavioral control) could explain between 30% to 50% of the variance in intentions and intentions themselves could explain a similar degree of variance in behavior (Armitage & Conner, 2001; Steinmetz et al., 2016).

TPB proposes that the person’s *intention* (e.g., “I intend to do X”) and *perceived behavioral control* are the best combined predictors of behavioral performance (Fishbein & Ajzen, 2010). The three most important predictors of intention strength are (a) people’s evaluations of the behavior (theoretical focus on *attitudes*; e.g., “doing X would be good/bad”), (b) the perceived social pressure to perform it (theoretical focus *subjective norm*; e.g., “people who are important to me think that I should do X”), and (c) people’s actual control over the behavior or its proxy, the perceived control over the behavior (theoretical focus *perceived behavioral control*; e.g., “doing X would be easy/difficult”) (Fishbein & Ajzen, 2010). Additionally, all other factors that are not specified are assumed to have only indirect effects on behavior as moderators or mediators of the three base constructs (Ajzen, 2011a).

In sum, beliefs influence the attitude toward the behavior, the subjective norms regarding the behavior, and the perceived control over the behavior, all of which influence the intention to perform the behavior. Intentions and PBC, in turn, influence the actual performance of the behavior (Figure 1).

Figure 1

The theory of planned behavior (Ajzen, 1991)



The TPB is empirically supported, parsimonious, and easily operationalized (Ajzen, 2015b). It proposes a relatively small number of constructs to accurately predict behavior.

While the TPB provides a robust model for understanding the antecedents of behavior, including the important role of intentions, it does not fully account for the often-observed discrepancy between intentions and actual behavior (Sheeran & Webb, 2016). This intention-behavior gap is particularly relevant in the context of parental mediation, where parents may have strong intentions to mediate their children's digital media use but struggle to consistently implement these intentions. To address this limitation and gain a more nuanced understanding of behavior change, researchers have begun to explore additional factors that may explain the complex relationship between intentions and actions (Sheeran et al., 2017).

2.3.2 Explaining the intention-behavior relationship

Various explanations for the intention-behavior relationship have been examined in the literature (Ajzen & Kruglanski, 2019; Fishbein & Ajzen, 2010; Morwitz & Munz, 2021; Sheeran, 2002; Sheeran & Webb, 2016, 2018). Explanatory factors include characteristics of the behavior itself (e.g., amount of control, ease or difficulty of performance, and level of prior experience), type of measurement used for intentions and behaviors (e.g., wording and range of points for the intention scales, dichotomous measures, self-reported versus independently observed behavior), the relationship between the two measures (e.g., degree of match between the measures, the length of time between measurement, and the mere act of measurement), features of intention itself (e.g., its certainty, confidence, stability, accessibility or speed, degree of deliberation), and characteristics of the respondent (e.g., need for cognition). However, while many factors are known to influence the intention-behavior relationship, “many other factors that likely play a role have yet to be explored” (Morwitz & Munz, 2021, p. 9).

The intention-behavior relationship has been conceptually decomposed into a two (intend to act vs. do not intend to act) by two (subsequently act vs. do not act) matrix (e.g., Rhodes & de Bruijn, 2013). Evidence shows that individuals who intend to act but fail to do so (termed inclined abstainers) are mainly responsible for the intention-behavior gap (Godin & Conner, 2008). A few studies have focused on understanding why some people with strong intentions fail to act and why other people with equivalent intentions succeed (i.e., differences between inclined abstainers and inclined actors) (Sheeran, 2002; Sheeran & Webb, 2018).

The exploration of various factors influencing the intention-behavior relationship has significantly advanced our understanding of why individuals may or may not act on their intentions. However, these explanations still leave room for further investigation, particularly in understanding why some individuals are consistently more successful in translating their intentions into actions across various behavioral domains. This gap in our knowledge calls for a novel approach that focuses on the individual's ability to effectively initiate and sustain the intended behavioral change. Drawing inspiration from literacy research in other domains (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018), this thesis proposes the development of a new concept: Behavior Change Literacy. This new construct might offer a more holistic explanation for the intention-behavior relationship, with potential applications not only in parental mediation but across a wide range of behavioral contexts.

2.4 Behavior-related literacy

The concept of behavior-related literacy, particularly Behavior Change Literacy, presents a promising new avenue for understanding and explaining human behavior. By drawing on established literacy models, such as health literacy (e.g., Nutbeam, 2008) or media literacy (e.g., Livingstone, 2004), from different fields, a theoretical foundation for BCL has been constructed. BCL is defined as the literacy that enables individuals to initiate and sustain desired behavioral changes in themselves and others effectively, leveraging operational, emotional, and cognitive literacies across habitual and non-habitual behaviors. This section introduces, justifies, and develops the three-fold conceptualization of BCL (i.e., type, referent, and behavior class).

This conceptualization, while broadly applicable, is particularly relevant to the context of parental mediation of children's digital media use. Parental mediation is a complex behavior that often requires sustained effort and adaptation. It is a highly social behavior, as it involves the parent's own actions as well as influencing the behaviors of their children and potentially other family members (Livingstone & Blum-Ross, 2020; Talves & Kalmus, 2015). Thus, a parent may need to be literate across all three components of BCL—understanding the type of literacy required (emotional, cognitive, operational), the referent of the behavior change (self, child, other), and the behavior class (habitual or non-habitual)—to be truly effective. As digital technologies continue to evolve and become increasingly integrated into family life, BCL may become even more critical for parents to successfully navigate this complex landscape.

2.4.1 Conceptualizing behavior change

Nishiyama et al. (2016, p. 755) defined behavior change intuitively as “changing the behavior pattern with which one was originally accustomed to a new one”. Strong evidence exists that different behaviors are associated with positive and harmful outcomes, making behavior change highly relevant to attaining desirable outcomes (Michie & Abraham, 2004).

Understanding what can and should be measured and changed requires a conceptualization of behaviors. A common conceptual distinction exists between habitual and non-habitual behaviors. To be more logically consistent (i.e., not use the term “habit” as a type of behavior and the cause of a behavior), Gardner and Rebar (2019) proposed a distinction: a habit is a “process whereby exposure to a cue automatically triggers a non-conscious impulse to act due to the activation of a learned association between the cue and the action (Gardner, 2015)” (p. 2) and “habitual behavior [is] any action that is either instigated or executed habitually” (p. 3).

Consequently, non-habitual behavior may be conceptualized as a behavior that is neither instigated nor executed habitually. For some behaviors, like a single vaccination, yielding immunity to disease, one performance is sufficient to attain desired health outcomes (e.g., Harper et al., 2004). However, for many behaviors, achieving meaningful outcomes depends on repeated performance. For example, it is not enough to go for a run once to achieve meaningful health outcomes; instead, regular activity over a prolonged period is needed (e.g., Erikssen et al., 1998). Similarly, it is unlikely that one discussion about social media marketing leads to a sufficient change in the child's media literacy. Generally, individuals are more often able to change their behaviors once but have more difficulty sustaining those behaviors over time usually relapse into old, habitual behaviors (Dombrowski et al., 2014; Foxx, 2013).

Behavior change theories usually differentiate between stages of initiation and maintenance (Gardner et al., 2022). Theories of behavior change usually focus on behavior initiation, whereas theories of habit formation focus on the combination of behavior initiation and behavior maintenance. The explanation for behavior initiation and behavior maintenance is rooted in the preferred theory. Gardner et al. (2022, p. 7) use the COM-B model as an explanatory lens: "Increases in behavioral repetition must be brought about by changes to one or more of three fundamental determinants: motivation, capability, and opportunity".

A skilled individual could use behavior change techniques to target different behavioral constructs they are aware of, such as motivation, capability, or opportunity purposefully. For example, they might enhance their capability by watching instructional parental mediation videos. They could increase their opportunity by restructuring their environment, such as leaving work earlier than normal to allow more time to discuss how different social media platforms attempt to capture the users' attention. They might boost their motivation by reading success stories from other parents about managing children's technology use. This multifaceted approach aligns with the COM-B model's emphasis on these three distinct but interrelated components of behavior change (Michie et al., 2014). Similarly, with an awareness of the TBP constructs, Individuals can use techniques to ensure the performance of intentions (e.g., implementation intention technique; Gollwitzer, 1999) or increase their perceived social norms (e.g., reading about other parents' perspectives on parental mediation; Cialdini & Goldstein, 2004), behavioral control (e.g., remembering past successful parental mediation experiences; Bandura, 1997), or attitudes (e.g., listening to a podcast on parental mediation) towards the desired behavior (Ajzen, 2015b).

2.4.2 Theorizing Behavior Change Literacy

The concept of literacy has become central to much theoretical and empirical work in several disciplines, leading to conceptualizations such as health literacy (e.g., Nutbeam, 2008), media literacy (e.g., Livingstone, 2004), psychological literacy (e.g., Newell et al., 2020), advertising literacy (e.g., Livingstone & Helsper, 2006), financial literacy (e.g., Zait & Berteau, 2015), well-being literacy (e.g., Oades et al., 2021), and science literacy (e.g., Laugksch, 2000). Literacy is a popular cross-disciplinary concept because it can be taught and because it aids people in navigating specific parts of their experiences. Inspired by this work, this thesis develops the concept of Behavior Change Literacy.

Instead of behavior literacy, Behavior Change Literacy emphasizes a focus on changing behavior. 'Change' in behavior science literature commonly refers to establishing and maintaining new behaviors, modifying existing behaviors, and discontinuing undesirable behaviors (Hagger et al., 2020). There are several reasons to prefer literacy over concepts like knowledge or motivation. The primary reason is that single concepts like knowledge or

motivation are less accurate in predicting a phenomenon than a combination of relevant concepts such as perceived control, attitudes, social norms, and intentions (Steinmetz et al., 2016). Literacy is closely related to multiple psychological concepts, including knowledge, confidence, skill, and many more, and has been used as a multi-component concept composed of the previously mentioned constructs (e.g., Gutman & Schoon, 2016; Helsper et al., 2020; Schreurs & Vandenbosch, 2020; Vidgen & Gallegos, 2014) – granting it the power to explain phenomena of interest. For example, a behavior change literate individual is expected to not only know behavior change theories and techniques but also to have the confidence and ability to successfully change their own behavior and the behavior of others.

To my knowledge, there is no work explicitly conceptualizing literacy in relation to behaviors and behavior change. One problem with conceptualizations of literacy is considerable variation in the subcomponents they identify, which can make the term an empty vessel. For example, Domanska et al. (2020, p. 4) described health literacy as having composed of four dimensions: “cognitive, behavioral, behavioral/communicative, and affective/conative competencies”, while Van Dam and Van Reijmersdal (2019) outlined advertising literacy to be made of five dimensions: conceptual advertising literacy, moral advertising literacy, attitudinal advertising literacy, dispositional advertising literacy, and situational advertising literacy.

An extensive review of the various conceptualizations and typologies of literacies across different domains (see Table B1 and Table B2, Appendix B) revealed two especially important theoretical components¹: different types of a literacy (i.e., *Type component*), such as cognitive or emotional, and the object to which the literacy is applied (i.e., *Referent component*), such as oneself or other people. A third nuance was added, informed by the behavioral science literature related to the nature of behaviors (Gardner et al., 2022). Since most literacies are interested in behaviors, it might be relevant to examine their relationship to non-habitual and habitual behavior (i.e., *Behavior class component*).

This thesis proposes a three-component model of BCL, encompassing: (1) the type of literacy, (2) the referent or target of the behavior change, and (3) the class of behavior being addressed. Each of these components will be discussed in turn.

Type component

Most literacy models show three basic theoretical dimensions: emotion, cognition, and performance/operation/behavior (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). Consequently, Behavior Change Literacy conceptualizes these three dimensions within the BCL type component. The Type BCL is conceptualized as managing internal processes related to behavior change by understanding the principles (cognitive BCL), cultivating the emotional drive (emotional BCL), and executing the necessary action (operational BCL). BCL's emotional, cognitive, and operational dimensions explain why some individuals are better than others at enacting their desired habitual and non-habitual behaviors. The concrete

¹ The theoretical framework of Behavior Change Literacy presented in this thesis employs a three-level hierarchical structure, using the terms "component", "dimension", and "subdimensions" to denote primary, secondary and third levels of conceptualization, respectively (Bagozzi & Edwards, 1998; Edwards, 2001; MacKenzie et al., 2011). The term "component" was selected for the primary level (type, reference, and behavior class) relating to the foundational parts of the BCL construct. "Dimension" was chosen for the secondary level to indicate different aspects within each component (e.g., operational, emotional, and cognitive), and "subdimension" for the third level, indicating different elements within each dimension (e.g., self-efficacy and attitude within the emotional dimension).

operationalization of these dimensions within the type component has co-evolved with the empirical work (see Chapter 4 – Methodology).

Emotional dimension

Bröder et al. (2017, p. 16) defined the emotional and conative attributes of health literacy as “*dimensions that evolve around the experience of feeling or emotions (affective attribute) or describe personality traits and mental states that influence how individuals strive towards action and direct their efforts (conative attributes)*”, while Schreurs and Vandenbosch (2020, p. p. 3) referred to social media literacy as the “*sets of organized emotions in the users’ memory which guide (spontaneous) emotions in response to using social media*”. Domanska et al. (2022)’s emotional dimension covered five concepts: self-awareness, self-control, self-efficacy, motivation, and interest.

For the sake of simplicity, the first version of emotional BCL is focused on two subdimensions: behavior change self-efficacy and behavior change attitude. Emotional BCL is defined as the literacy that enables an individual to maintain self-efficacy and a positive attitude towards behavior change. It is comprised of two key subdimensions: (a) behavior change attitude, which is adopting a positive evaluative orientation toward behavior change (e.g., perceiving it to be important to become better at avoiding bad actions) and (b) behavior change self-efficacy, which is about believing in one’s ability to execute behavior changes successfully (e.g., having confidence in one’s ability to establish good habits). Beyond the literacy context, self-efficacy and attitude are two well-established concepts in relationship to behavior and parent-children dynamics (e.g., Ajzen & Fishbein, 2000; Albanese et al., 2019). For example, a parent might have a positive attitude towards limiting screen time, believing it is beneficial, but lack self-efficacy in enforcing those limits.

While self-efficacy and attitudes are often characterized as motivational constructs in behavior change literature (Michie et al., 2011), their classification under the emotional dimension in this thesis aligns with conceptualizations in literacy research (Bröder et al., 2017; Domanska et al., 2020). This classification reflects how these constructs operate through emotional pathways - self-efficacy involves feelings of confidence and capability, while attitudes encompass affective evaluations of behaviors. This approach also provides theoretical continuity with the Theory of Planned Behavior, as these subdimensions map onto two of its key constructs: attitudes and perceived behavioral control (Ajzen, 2011). However, future research could expand this dimension to include other emotional and motivational aspects, such as curiosity, and consider a combined label, such as “motivational-emotional” dimension.

Cognitive dimension

Bröder et al. (2017, p. 9) defined cognitive attributes of health literacy as “*the mental abilities and actions that enable a person to think, learn and process information are attributed to this category*”, while Schreurs and Vandenbosch (2020, p. p. 3) referred to it in the context of social media literacy as the “*sets of organized knowledge in the user’s memory that provide the user with sufficient resources to process social media content adequately*”.

Informed by the different conceptualizations of the cognitive dimension, cognitive BCL is defined as the literacy that enables individuals to acquire, understand, and use knowledge about behavior change to analyze situations, consider potential interventions, and understand possible consequences. It is conceptualized across two subdimensions: declarative knowledge (e.g., knowing about the COM-B model or different behavior change techniques) and procedural

knowledge or skill (e.g., implicitly knowing how to make oneself do difficult actions) related to behavior change. This distinction is a well-established distinction, even beyond the context of literacy (Ten Berge & Van Hezewijk, 1999). Cognitive BCL is literacy that enables individuals to acquire, understand, and use knowledge about behavior change to analyze situations, consider potential interventions, and understand possible consequences.

Knowledge BCL refers to the breadth and depth of an individual's understanding of behavior change theories, concepts, principles, and techniques. It represents the declarative knowledge ("knowing what") about the field of behavior change, encompassing facts, models, and established strategies, as described in the literature (Michie et al., 2008, 2013). For example, a parent with high knowledge BCL might be able to define and explain concepts like self-efficacy, reinforcement, and implementation intentions. They could describe different models of behavior change, such as the Transtheoretical Model or the COM-B model, and articulate the core tenets of each. They could list various behavior change techniques and explain the theoretical rationale behind them, demonstrating a comprehensive understanding of the "what" of behavior change.

In contrast, skill BCL represents the procedural knowledge ("knowing how") related to behavior change (Saks et al., 2021). It refers to the intuitive and often implicit ability to apply behavior change knowledge to analyze situations, consider potential interventions, and reason through the likely consequences of different approaches. It is the cognitive application of behavior change knowledge, distinguished from the actual implementation of those strategies (which is operational BCL). For example, a parent with high skill BCL, when presented with a scenario of their child struggling to limit screen time, could use their knowledge of behavior change principles to quickly identify potential triggers and maintaining factors without consciously recalling specific theories. They can mentally compare and contrast different potential intervention strategies and explain why one might be more appropriate, drawing on their theoretical knowledge, but they are not yet implementing any solution. It is acknowledged that the term "skill" can sometimes imply practical application. However, in the context of cognitive BCL, "skill" refers specifically to the cognitive process only.

Operational dimension

Bröder et al. (2017, p. 15) defined behavioral or operational attributes of health literacy as “*all dimensions referring to actions that take place outside of the individual’s mind were assigned to be behavioral attributes*”, while Rozendaal et al. (2016, p. 3) described advertising literacy performance as “*the ability to actually use the conceptual advertising knowledge when confronted with advertising*”.

Building on these foundations, the operational dimension of BCL refers to the extent to which behavior change attempts have been successful², involving the practical application of knowledge (cognitive dimension) and emotional drivers (emotional dimension) to achieve

² Some digital literacy models propose that the operational or performative dimension is the result of the cognitive (knowledge and skill) and emotional dimension (attitude) (Vuorikari et al., 2016). For example, an individual is perceived to be literate if they know the meaning of words (declarative knowledge) and can read (procedural knowledge or skill). However, as argued, this is not enough to be literate to this extent because if the individual knows, can, and wants to read more (motivation/attitude), they can still be unable to actually read more (establish and maintain a reading habit) because they forget about their behavioral intentions. The same holds true for BCL if the individual knows how to (install reminders), can (has installed an alarm on their phone previously), and wants to change the capability, motivation, and opportunity for a particular digital behavior but is not able to do so, then they are not considerate behavior change literate. A literate individual needs to be able to close the gap between their intentions and their actual digital behaviors.

observable behavior change. Operational BCL is defined as the literacy that enables an individual to translate intentions into behavior change and consistently maintain these behaviors over time. Explicit subdimensions were not delineated because the operational dimension, by its nature, focuses on the tangible application and execution of behavior change strategies. This directness and practicality lend themselves to a more unified, singular dimension rather than one with multiple subdimensions.

Critically, the ability to implement these changes is not solely dependent on an individual's literacy. As emphasized by Michie et al. (2014) in their COM-B model, external structural constraints can significantly influence whether and how behaviors are actualized. For instance, a parent's cognitive understanding of excessive screen time's negative impacts and emotional sense of responsibility (Livingstone & Blum-Ross, 2020) may lead to setting specific screen-free times during family meals. However, the operational execution of this intention may be impeded by external factors such as oppressive relationships, irregular job schedules, or living arrangements (Bronfenbrenner, 1979).

In constructing the operational dimension of BCL, explicit subdimensions were not established. This decision was driven by two factors: the inherent straightforwardness of the operational dimension, which focuses on the recognizable successful behavior change, and the observation that relevant literature typically treats operational behaviors as a unified concept without further subdivision. This approach aligns with the practical, holistic nature of applying theoretical knowledge and emotional readiness in observable actions.

In sum, effective behavior change requires a synergy of emotional, cognitive, and operational BCL. Literate individuals are characterized by a track record of successful behavior change (operational BCL), a strong sense of self-efficacy and a positive attitude toward behavior change (emotional BCL), and comprehensive declarative and procedural knowledge about behavior change theory and techniques (cognitive BCL). This three-dimensional model serves to balance focus across all components, mitigating the risk of overemphasizing one aspect (e.g., cognitive knowledge) at the expense of another (e.g., operational success). Such a balanced approach ensures a comprehensive cultivation of conceptual understanding, theoretical models, and practical implementation skills in behavior change literacy.

Referent component

Referent BCL is the literacy that enables an individual to adapt and apply type and behavior class BCL effectively across different relational contexts, whether the target is oneself, one's children, or significant others. This component acknowledges that behavior change processes operate at both individual and social levels, aligning with conceptualizations of other literacy models in the literature (Domanska et al., 2020; Rozendaal et al., 2016; Schreurs & Vandenbosch, 2020).

At the individual level, BCL involves the acquisition and application of knowledge and skills to modify one's own behavior. This self-directed aspect of BCL, termed self-related BCL, is defined as enacting effective behavior change in one's own life. This concept aligns with theories of self-regulation and self-efficacy in behavior change (Rothman et al., 2011; Schwarzer, 2008; Sedikides & Hepper, 2009). For instance, an individual might employ self-regulation techniques to improve their digital habits, demonstrating self-related BCL in practice. Socially, BCL extends to how individuals interact with and influence others. This involves understanding and navigating the dynamics of behavior change in a more complex setting. For example, a parent employing BCL to negotiate screen time rules with their children

or partner exemplifies BCL's referent social dimension. This concept is supported by social learning theory (Bandura, 1977) and research on social influence in behavior change (Cialdini & Goldstein, 2004).

The integration of individual and social processes in BCL is particularly relevant in contexts such as parental mediation of children's technology and media use. Effective BCL in this context involves not only a parent's self-related BCL but also their ability to influence the behaviors of their partner and child. This holistic approach aligns with family systems theory (Bregman & White, 2010) and ecological models of child development (Bronfenbrenner, 1979), emphasizing the interconnected nature of behaviors within family units. For example, a parent utilizing BCL to negotiate screen time rules with their children or partner exemplifies this social dimension.

In the context of parental mediation, this thesis distinguishes between three types of BCL: self-related, child-related, and other-related. Other-related BCL focuses on significant people self-selected by individuals, such as partners, specific friends, or grandparents. This categorization is supported by research on the influence of social networks on behavior change (Christakis & Fowler, 2013). Child-related BCL specifically refers to supporting and facilitating behavior change in children, which aligns with literature on parenting practices and child development (Darling & Steinberg, 1993).

This multi-faceted conceptualization of BCL's referent component supports understanding behavior change processes within complex social contexts. It acknowledges that Behavior Change Literacy is not solely an individual attribute but a dynamic capability that operates across various relational domains.

Behavior class component

Gardner and Rebar (2019) proposed to distinguish between habitual and non-habitual behaviors to emphasize two non-identical change paths. The behavior class component of BCL involves applying tailored behavior change strategies depending on whether the behavior is habitual or action-oriented. Habitual behaviors are characterized by a high degree of automaticity and regularity (i.e., daily or weekly), often triggered by contextual cues rather than deliberate decision-making (Wood & R nger, 2016). Habit-related BCL refers to the literacy that enables individuals to establish, maintain, and modify habitual behaviors. For instance, a parent consistently enforcing a "no phones at the dinner table" rule might initially start as a conscious action, but over time, it may become a habitual part of the family routine, requiring little thought or effort to maintain (Rothman et al., 2011). This habitual aspect of BCL may be important in parental mediation of digital behaviors, ensuring consistency and persistence in the practices that parents wish to instill in their family dynamics (Livingstone & Blum-Ross, 2020). Habit-related BCL refers to the literacy that enables individuals to establish, maintain, and eliminate habitual behaviors in themselves and others effectively (Gardner et al., 2022).

In contrast, non-habitual behaviors are characterized by their deliberative and bounded nature. These behaviors are performed once, rarely, or infrequently, but not habitually. They often represent the initial steps in the process of behavior change, requiring conscious effort and intention (Gardner, 2015). Action-related BCL refers to the literacy that enables individuals to execute deliberate, one-time, or infrequent behaviors through conscious planning and effort. In the context of digital parenting, such actions might include setting up a new app for monitoring screen time or having a first-time discussion about cyberbullying with a child (Nikken & Jansz, 2014). These behaviors are pivotal as they lay the groundwork for future habitual behaviors and

can be instrumental in addressing immediate concerns or introducing new concepts and rules within the family (Clark, 2011). Action-related BCL refers to the literacy that enables individuals to effectively enact desirable and avoid undesirable non-habitual behaviors in themselves and others.

When repeated consistently in response to specific cues, non-habitual behavior can gradually become habitual (Wood & Rüniger, 2016). Understanding how to transition certain non-habitual digital parenting behaviors into habitual behaviors is essential for parents. This process might involve recognizing the right cues and reinforcements to facilitate this transition, ensuring that beneficial digital parenting practices become ingrained in the family's daily life (Clark, 2011).

For parental mediation, it is important to strategically integrate both habitual and non-habitual behaviors into the conceptualization of BCL. While non-habitual behaviors address immediate and specific parenting decisions or changes, habitual behaviors ensure the long-term sustainability and effectiveness of these decisions (Rothman et al., 2011). Parents skilled in BCL will adeptly navigate between implementing new non-habitual behaviors and fostering the development of positive habitual behaviors, tailoring their approach to their family's evolving needs and circumstances (Livingstone & Blum-Ross, 2020).

It is important to acknowledge that parental mediation, the context in which BCL is being examined here, is fundamentally an interactive and bi-directional process. Research has demonstrated that children are active agents who shape their parents' digital mediation practices through their own developing digital skills, negotiating power, and evolving needs as they age (Livingstone & Blum-Ross, 2020; Mascheroni et al., 2018). Children often possess advanced digital competencies that can exceed their parents' skills, leading to reverse socialization, where children become teachers of digital literacy within the family (Clark, 2011; Correa, 2014). This dynamic relationship means that the development and application of BCL in parental mediation cannot be viewed as simply a top-down process where children are passive recipients of parental behavior. Instead, BCL must be understood within the context of ongoing parent-child negotiations and mutual influence, where children's agency and digital expertise actively shape how parents approach and implement mediation strategies (Livingstone et al., 2017; Talves & Kalmus, 2015).

BCL Framework

The theoretical framework depicted in Figure 2 posits that Behavior Change Literacy (BCL) consists of three interlocking components that collectively determine how effectively individuals can initiate and sustain behavioral changes (Bröder et al., 2017; Domanska et al., 2020). The Referent component addresses *who or what is being targeted* for change: self-related BCL (changing one's own behaviors), child-related BCL (supporting behavior change in children), and other-related BCL (facilitating behavior change in partners, friends, or other adults) (Nutbeam, 2008; Livingstone & Blum-Ross, 2020). Within each referent category, BCL is further divided by the *type of behavior* targeted for change. Action-related BCL addresses one-time or infrequent behaviors that require conscious decision-making (Gardner & Rebar, 2019), while habit-related BCL focuses on routine behaviors that become automated through repetition (Wood & Rüniger, 2016). Beneath both the referent and behavior class dimensions is the Type component, which addresses *how* behavior change is enacted. Operational BCL involves translating intentions into actions, emotional BCL encompasses the attitude and self-efficacy that drive motivation (Ajzen & Fishbein, 2000; Bandura, 1997), and cognitive BCL involves the knowledge and skills necessary to plan and execute change (Seger, 1994).

Figure 2

BCL framework

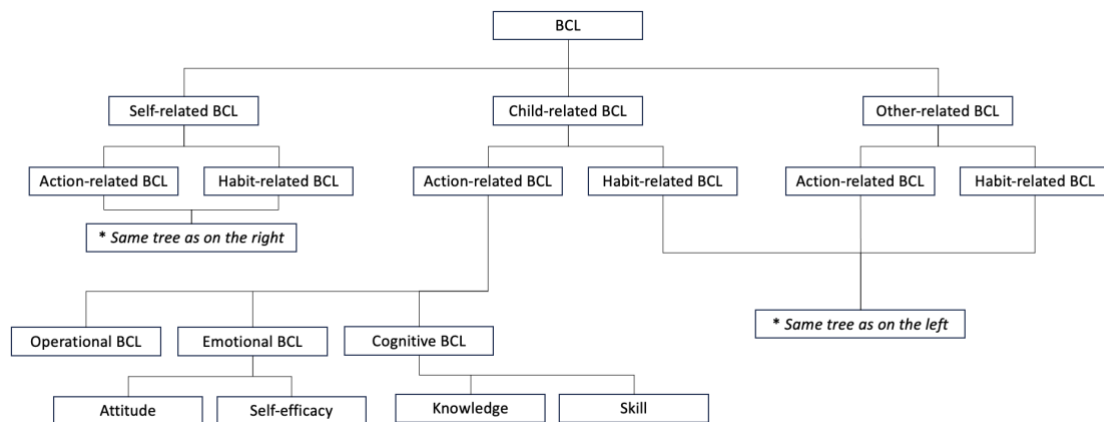


Table 1 provides a comprehensive taxonomy of Behavior Change Literacy (BCL) by defining each of its core components, corresponding dimensions, and subdimensions. Grounded in behavioral science and literacy research (Bröder et al., 2017; Domanska et al., 2020; Nutbeam, 2008), these definitions illustrate how BCL comprises operational, emotional, and cognitive capacities that collectively enable individuals to initiate and sustain desired behavior changes across various contexts and relationships. Specifically, the type component addresses the internal processes that guide behavior change, the referent component clarifies how these processes shift depending on the social target (oneself, children, or other significant individuals), and the behavior-class component highlights whether the behaviors in question are habitual or action-oriented. Taken together, the table underscores the distinct yet interrelated aspects of BCL and demonstrates how a strong command of each component contributes to an individual’s overall ability to effect and maintain meaningful changes in behavior.

Table 1

Clarifying the BCL taxonomy

Level 1 (concept)	Level 2 (components)	Level 3 (dimensions)	Level 4 (subdimensions)	Definition: The literacy that enables individuals to ...
BCL				... initiate and sustain desired behavioral changes in themselves and others effectively, leveraging operational, emotional, and cognitive literacies across habitual and non-habitual behaviors
	Type BCL			... manage internal processes related to behavior change
		Operational BCL		... translate intentions into behavior change and maintain the change over time.
		Emotional BCL		... maintain self-efficacy and a positive attitude towards behavior change
			Behavior change attitude	... adopt a positive evaluative orientation toward behavior change
			Behavior change self-efficacy	... believe in their ability to execute behavior changes successfully
		Cognitive BCL		... acquire, understand, and use knowledge about behavior change to analyze situations, consider potential interventions, and understand possible consequences
			Knowledge BCL	... understand behavior change theories, concepts, principles, and techniques

	Skill BCL	... apply behavior change principles to analyze situations, consider potential interventions, and reason through likely consequence
Referent BCL		... adapt and apply behavior change strategies across different relational contexts
	Self-related BCL	... enact effective behavior change in their own lives
	Other-related BCL	... influence and support behavior change in significant others (e.g., partners, friends, family)
	Children-related BCL	... support and facilitate behavior change in children
Behavior-class BCL		... apply tailored behavior change strategies depending on whether the behavior is habitual or non-habitual
	Habit-related BCL	... establish, maintain, and modify habitual behaviors
	Action-related BCL	... execute deliberate, one-time, or infrequent behaviors through conscious planning and effort

2.5 Conclusion

Chapter 2 presented a comprehensive theoretical framework for understanding parental mediation behaviors by integrating parental mediation literature, the TPB, and the novel BCL concept. This approach offers a nuanced perspective on why some parents are more successful in mediating their children's digital media use.

The literature review highlights the complexity of parental mediation, encompassing various strategies and influenced by factors such as parental characteristics and children's age (Livingstone & Helsper, 2008; Clark, 2011; Warren, 2005; Valcke et al., 2010; Sonck et al., 2013). While digital literacy is valuable, it alone is insufficient for effective parental mediation (de Ayala López et al., 2020; Xie et al., 2019).

The introduction of TPB (Ajzen, 1991) provides a model for understanding the intention-behavior relationship. However, recognizing that intentions alone do not guarantee behavior change (Sheeran & Webb, 2016), the BCL concept is developed. BCL, now clearly defined and conceptualized along its three components (type, referent, and behavior class), offers a powerful new lens for understanding an individual's capacity to initiate and sustain behavioral changes. BCL, conceptualized along emotional, cognitive, and operational dimensions (Domanska et al., 2020), offers a new perspective for understanding an individual's capacity to initiate and sustain behavioral changes. It distinguishes between self-related, child-related, and other-related BCL, as well as habitual and non-habitual behaviors (Gardner & Rebar, 2019). This integrated approach recognizes that effective parental mediation requires more than knowledge or intentions; it necessitates a complex set of skills enabling parents to translate intentions into consistent behaviors (Livingstone & Blum-Ross, 2020). It also accounts for interpersonal dynamics in family-based digital media use (Talves & Kalmus, 2015). By combining TPB and BCL, this theoretical framework offers a new direction for research on parental mediation of children's digital media use, considering the full range of factors influencing behavior change (Clark, 2011; Livingstone & Blum-Ross, 2020).

Chapter 3 will transition to the conceptual model guiding the empirical investigation, presenting hypotheses that operationalize the theoretical constructs and focus on relationships between parental mediation intentions, behaviors, BCL, and digital skills. This transition bridges theory and practice, setting the stage for the methodological approach and subsequent analysis (Creswell & Creswell, 2018).

Chapter 3 — Conceptual model

3.1 Introduction

This chapter presents the conceptual model that guides this thesis's empirical investigation into the role of Behavior Change Literacy (BCL) in parental mediation of children's digital media use. Building on the theoretical foundations outlined in Chapter 2, the conceptual model synthesized insights from parental mediation literature, the Theory of Planned Behavior (TPB; Ajzen, 2011), and the novel concept of BCL, defined as the literacy that enables individuals to initiate and sustain desired behavioral changes in themselves and others effectively, leveraging operational, emotional, and cognitive literacies across habitual and non-habitual behaviors.

The chapter is structured in two parts: research questions and hypothesis development. First, it presents the core research questions that emerge from the theoretical background and the identified research gaps. These questions guide the investigation into BCL's explanatory power on various conceptual levels of depth in the context of parental mediation. Second, it outlines the hypotheses developed to test the proposed relationships between parental mediation intentions, BCL, digital skills, and parental mediation behaviors. These hypotheses aim to extend the understanding of factors influencing effective digital parenting. A visual model of the conceptual model is presented, illustrating the proposed relationships between key constructs (see Figure 3). By developing this conceptual model, the thesis provides a solid foundation for examining the complex dynamics of parental mediation in the digital age (Livingstone & Blum-Ross, 2020). This model serves as a roadmap and sets the stage for the methodological approach and empirical investigation in the following chapters.

3.2 Research questions

The theoretical framework has been developed based on the relevant theoretical thinking and empirical research on the intention-behavior relationship related to parental mediation presented in the previous chapter. Before understanding the role of BCL in explaining parental mediation, it is necessary to answer the following questions:

RQ1. How can BCL be measured with high content validity?

RQ2. What are BCL scales with desirable statistical properties?

These foundational questions, addressed in Chapter 5, establish the measurement validity necessary to explore the core inquiry of this doctoral research:

RQ3. To what extent can parental mediation intentions and Behavior Change Literacy explain parental mediation behaviors?

To comprehensively examine the nuanced model of BCL in explaining parental mediation behaviors, this core question is further elaborated into three specific components:

RQ4. To what extent does BCL's *type* component (i.e., operational, emotional, cognitive) matter for the strength of the relationship between intention and behavior for parental mediation?

RQ5. To what extent does BCL's *referents* component (i.e., self, children, and others) matter for the strength of the relationship between intention and behavior for parental mediation?

RQ6. To what extent does BCL's *behavior class* component (i.e., actions and habits) matter for the strength of the relationship between intention and behavior for parental mediation?

Additionally, given the importance of digital skills in the conceptual model:

RQ7. How do digital skills interact with BCL and parental mediation intentions in explaining parental mediation behaviors?

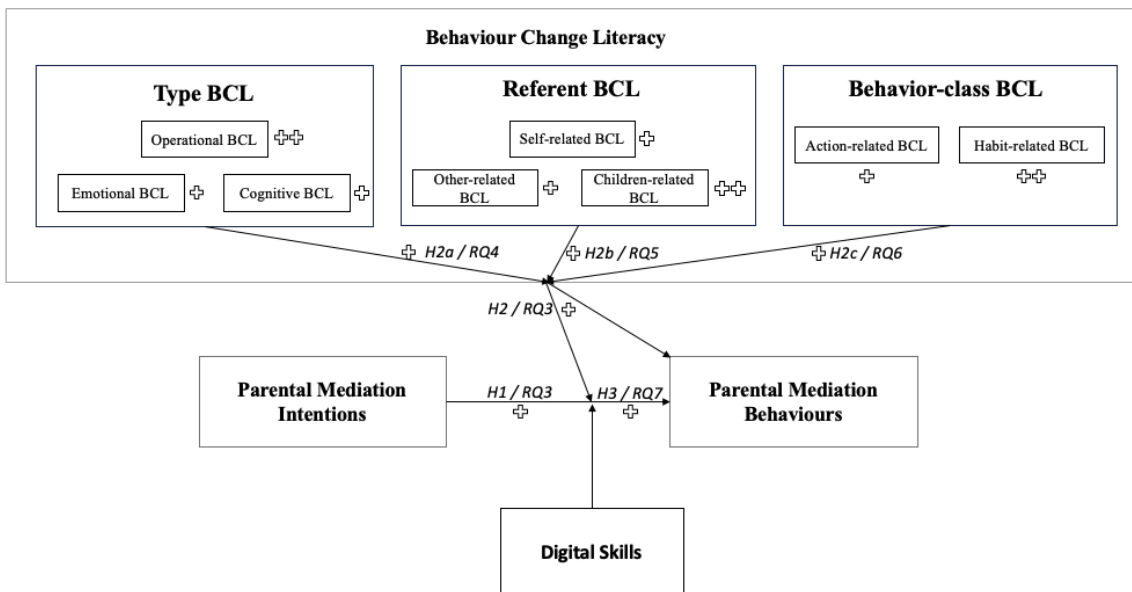
The research questions presented form a solid foundation for developing specific hypotheses, aligning with established practices in social science research (Creswell & Creswell, 2018). This hypothesis-driven approach enables a systematic examination of the proposed relationships between BCL, parental mediation intentions, digital skills, and parental mediation behaviors. By formulating clear hypotheses based on these research questions, researchers can operationalize abstract concepts and test specific predictions derived from the conceptual model (Bryman, 2016). The focus on examining the relationships between BCL, parental mediation intentions, digital skills, and parental mediation behaviors reflects the multifaceted nature of digital parenting in contemporary society (Livingstone & Blum-Ross, 2020). This approach enables rigorous testing of the conceptual model and contributes to a deeper understanding of the factors influencing parental mediation.

3.3 Hypothesis development

The conceptual model focuses on four core concepts: parental mediation intentions and behaviors, digital skills, and BCL. Three hypotheses are at the model's core and are visualized in Figure 3.

Figure 3

Conceptual model of hypothesized relationships between core constructs



Parental intentions and behaviors

In line with the Theory of Planned Behavior (TPB), it is hypothesized that parental mediation intentions are associated with parental mediation behaviors (Fishbein & Ajzen, 2010). High-intention parents should show higher parental mediation behaviors compared to low-intention parents. Intentions capture the motivational factors (i.e., attitudinal considerations, perceived social norms, and perceived control) that are typically present immediately before a behavior is performed (Armitage & Conner, 2001; Steinmetz et al., 2016).

H1: Parental mediation intentions will have a positive association with parental mediation behaviors

BCL and intentions

Parents with high intentions to mediate their children's behavior are expected to convert these intentions into concrete mediation behaviors as established in various domains (e.g., Steinmetz et al., 2016). However, the strength of this relationship may be influenced by the overall level of a parent's BCL. When researchers and intervention recipients have a more comprehensive understanding of the behavior change process, it has been argued that they are more likely to engage in successful behavior change (e.g., Dong et al., 2020; Michie et al., 2011; White et al., 2007). High-BCL parents have a multifactorial understanding of behavior change across multiple components and dimensions, including operational, emotional, cognitive, self-related, child-related, other-related, action, and habit-related aspects of BCL. The literature shows that multi-factorial behavior change interventions tend to be more effective than single-factor interventions (e.g., Albarracín et al., 2024; Glanz & Bishop, 2010; Wiecek et al., 2019). Since behavior change often involves habitual and deliberate actions (Gardner, 2015; Wood & R nger, 2016), high-BCL parents should be able to enact a more well-rounded approach to behavior change, including implementing habitual behaviors with minimal conscious effort and taking deliberate actions requiring intentionality and effort. Both emotional and cognitive factors play roles in successful behavior change (Bandura, 2004; Webb & Sheeran, 2006). High-BCL parents score high on emotional and cognitive BCL, representing their ability to empathize with their children's emotions and understand the cognitive aspects of behavior change.

In contrast, parents with a low overall BCL may lack a well-rounded understanding of behavior change across the three components. They may struggle to consistently enact their mediation intentions due to deficiencies in one or more aspects of their BCL. They may also lack an understanding of practical techniques for implementing change, have difficulty maintaining constructive emotions, or have had little success in previous attempts to change behavior.

Therefore, while parental mediation intentions are expected to have a positive association with parental mediation behaviors overall, this relationship may be stronger for parents with high BCL compared to those with low BCL. High-BCL parents have a more comprehensive set of tools and skills for implementing behavior change, making them more successful at actualizing their mediation intentions.

H2: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL compared to those with low BCL

BCL types

The literacy literature has shown that the three basic theoretical literacy components of emotion, cognition, and performance/operation/behavior explain relevant literacy-specific phenomena (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). Consequently, parents with high type-related BCL, characterized by a robust track record of effective implementation of behavior change (operational BCL), a keen awareness of and ability to manage emotions related to behavior change (emotional BCL), and a profound comprehension of the cognitive underpinnings of behavior change (cognitive BCL), are more likely to translate their intentions into concrete mediation actions successfully.

Operational BCL, in particular, should be pivotal in this translation. Operational BCL, as a track record of successful behavior change, may have the strongest association with the intention-behavior relationship based on the research showing that past behavior is often a stronger predictor of future behavior than intentions alone and the TBP-based emotional and cognitive antecedents (e.g., Ouellette & Wood, 1998; Sheeran & Webb, 2016). Parents with high operational BCL demonstrate a proven track record in applying their understanding and emotional insights into effective, real-world digital parenting strategies. This proficiency enables them to adeptly navigate the intricacies of behavior change, applying their skills in practical, emotionally intelligent, and cognitively informed ways. While emotional and cognitive dimensions lay the groundwork for understanding and preparing for behavior change, the operational dimension actualizes these intentions into tangible actions. Parents with lower levels of operational BCL may find it challenging to actualize their mediation intentions effectively, regardless of their emotional readiness or cognitive understanding.

H2a: Parental mediation intentions will have a positive association with parental mediation behaviors, but this effect will be strongest for individuals with high operational BCL compared to those with high emotional and cognitive scores

BCL referent

Self-related BCL parallels personal health literacy, which focuses on an individual's capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Nutbeam, 2008). Self-related BCL focuses on a parent's internal understanding and management of their behavior change processes. It involves personal insight into behavior change's cognitive, emotional, and operational aspects. While self-related BCL is foundational for a parent's ability to initiate and sustain behavior change efforts, its primary influence on the parent's own behavior may not directly translate into effective mediation of children's digital interactions, similar to how personal health literacy does not necessarily equate to effective health management for others (e.g., Batterham et al., 2016).

Behavior change interventions become more effective when tailored to a smaller, homogenous group based on specific criteria such as age, lifestyle, or socioeconomic status (e.g., Noar et al., 2007). Given that children are the most direct social group related to parental mediation and that child-related BCL can be conceptualized as the ability to provide effective behavior change interventions to one's children, it is expected to have the strongest effect on the parental mediation intention-behavior relationship. It enables parents to tailor their strategies precisely to their children's unique digital realities, making such parents more influential in their children's digital behaviors and habits. Conversely, other-related BCL addresses the dynamics within the family system, encompassing a parent's ability to navigate and influence the broader

interpersonal aspects of behavior change. While the social system (e.g., partner, parental siblings, grandparents) has shown to be important for child development (Gregory et al., 2004), this social dimension is less directly linked to parental mediation and, thereby, is expected to be a less strong explanation.

H2b: Parental mediation intentions will have a positive association with parental mediation behaviors, but this relationship will be strongest for individuals with high child-related BCL compared to those with high self-, and other-related scores

BCL behavior class

Parents exhibiting high habit-related BCL possess a specialized skill set in forming and consistently maintaining essential habits for effective parental mediation. This entails operational, emotional, and cognitive BCL related to habit formation (Gardner et al., 2022). These parents excel in transitioning their mediation intentions into ingrained habits, requiring minimal conscious effort over time. In contrast, high action-related BCL represents a parent's capability to execute deliberate, well-considered actions in the realm of parental mediation. For some behaviors, like a single vaccination, yielding immunity to disease, one performance is sufficient to attain desired health outcomes (e.g., Harper et al., 2004). However, for many behaviors, achieving meaningful outcomes depends on repeated performance. For example, it is not enough to go for a run once to achieve meaningful health outcomes; instead, regular activity over a prolonged period is needed (Erikssen et al., 1998). Habitual behaviors often have strong longevity and impact (Ekman et al., 2022). Habitual behaviors should be more important for parental mediation. Installing a monitoring app alone or one discussion on marketers' intentions is unlikely to lead to lasting changes in the child's digital behaviors, literacy, or harm coping (Livingstone et al., 2017; Livingstone & Blum-Ross, 2020).

H2c: Parental mediation intentions will have a positive association with parental mediation behaviors, but this relationship will be strongest for individuals with high habit-related BCL compared to those with high action-related scores.

BCL, intentions, and digital skills

Parents with high BCL and high parental mediation intentions but low digital skills may have a limited ability to implement digital parental mediation behaviors. They might only be aware of or able to execute a limited number of relevant digital behaviors or phenomena in the context of parental mediation (Livingstone et al., 2017). Thus, they engage less frequently in parental mediation behaviors. When high BCL is coupled with high digital skills, parents can use their nuanced understanding of digital behaviors and parental mediation to inform their behavior change attempts. This is supported by the technology acceptance model, which posits that technology's perceived ease of use influences its adoption and use (Davis et al., 1989).

*H3: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL **and** high digital skills compared to those with high BCL and low digital skills*

3.4 Conclusion

The conceptual model and hypotheses presented in this chapter lay the groundwork for a comprehensive investigation into the role of BCL in parental mediation of children's digital

media use. By proposing specific relationships between parental mediation intentions, behaviors, BCL, and digital skills, this model sets the stage for empirical testing and analysis.

To move forward, these theoretical constructs must be translated into measurable variables. The next chapter discusses the methodological approach adopted to operationalize these concepts, focusing on the development and validation of a BCL measurement instrument. This step is essential to address the research questions and test the above hypotheses.

Chapter 4 details the research design, data collection methods, and analytical strategies employed to examine the proposed relationships empirically. It also presents the process of developing and validating the BCL scale, a critical tool for assessing the multi-component nature of BCL. By bridging the gap between theory and empirical investigation, Chapter 4 paves the way for a deeper understanding of how BCL influences the enactment of parental mediation behaviors in the digital age.

Chapter 4 — Methodology

4.1 Introduction

This chapter outlines the comprehensive methodological approach employed to address the research questions and test the hypotheses developed in the previous chapters. The thesis's primary aim is to investigate the role of Behavior Change Literacy (BCL) in explaining parental mediation behaviors, particularly in the context of children's digital media use. In this process, an important contribution of the thesis in its own right is to develop the conceptualization and measurement of BCL. To achieve this, a multi-phase, mixed-methods research design was implemented, combining qualitative and quantitative techniques to develop and validate a new measurement instrument for BCL and test its explanatory power concerning parental mediation intentions and behaviors (Creswell & Creswell, 2018; Tashakkori & Teddlie, 2010).

The methodology is structured into two main phases:

1. Development and validation of the BCL scale: This phase involved three distinct steps: a) Item pool generation based on theoretical considerations and literature review, b) Cognitive interviews to refine and validate the items qualitatively, and c) Quantitative validation of the scale through exploratory and confirmatory factor analyses
2. Testing of theoretical hypotheses: This phase utilized the validated BCL scale in conjunction with measures of parental mediation intentions, behaviors, and digital skills to test the proposed hypotheses through survey research

Each phase of the research was designed to build upon the findings of the previous stage, ensuring a robust and comprehensive approach to addressing the research questions. Each phase of the research was designed to build upon the findings of the previous stage, ensuring a robust and comprehensive approach to addressing the research questions. This sequential approach, where scale development precedes hypothesis testing, is a standard practice in psychometric research (Hinkin, 1998; DeVellis, 2016). By combining scale development with hypothesis testing, this thesis contributes both a new measurement tool and empirical insights into the field of parental mediation research.

The following sections will elaborate on the ethical considerations, research design, data collection methods, and analytical procedures used in each research phase. This comprehensive methodology establishes a foundation for the results and discussion presented in subsequent chapters.

4.2 Ethical standards

The research design received LSE ethics approval. Participants could partake in the study only after the LSE ethical approval and signing the informed consent document. The data was stored on a secure hard drive and LSE server-based cloud service, directly accessible to only the primary investigator and supervisors. When quoting from the cognitive interviews, pseudonyms were used. Qualtrics on the LSE server was used to collect survey responses, and no individuating information was gathered adhering to ethical best practices for social science research (Israel & Hay, 2006).

4.3 Research design

The primary objectives of this research were twofold: first, to develop and validate a robust measure of BCL, and second, to empirically test the hypothesized relationships between BCL, parental mediation, and digital skills. The research design unfolded in two distinct yet synergistic phases – scale development and hypothesis testing – with the former providing the necessary foundation for the latter (DeVellis, 2016). This sequential, mixed-methods approach was meticulously aligned with the theoretical framework and research questions (Creswell & Creswell, 2018), offering a comprehensive exploration of BCL within the context of digital parenting.

Phase 1: Scale development

The initial phase involved the construction of the BCL scale, which was informed by the theoretical framework. This process began with a theory- and literature-driven generation of the item pool to capture all the theoretical nuances of BCL. Next, cognitive interviews were used to increase the validity of scales by asking people to reflect on their understanding of the survey questions and items (García, 2011), indicating the extent to which their understanding reflects the components of the construct (Desimone & Le Floch, 2004). Subsequently, the scale underwent quantitative validation through factor analysis, assessing its structure and psychometric properties. The mixed-methods approach, integrating qualitative insights with quantitative analysis, enhanced the validity and reliability of the BCL scale, ensuring it is a robust measure (Creswell & Clark, 2018; Creswell & Creswell, 2018). The scale development focuses on the BCL scale's empirical operationalization and statistical validation. Thereby, it addressed the first two research questions (RQ1 and RQ2).

Phase 2: Hypothesis testing

The second phase focused on testing the theoretical hypotheses through a survey method (Fowler, 2014). This phase was designed to collect quantitative data on BCL, parental mediation practices, and digital skills from a broader population. The survey method was chosen for its ability to generalize findings, facilitating the exploration of relationships between these variables in a statistically robust manner (Rindfleisch et al., 2008). The choice of a survey measure, as opposed to other methodologies, was driven by the need to evaluate the explanatory power of BCL. The hypothesis testing, guided by research questions RQ3 through RQ7, examined the types, referents, and behavior classes of BCL in relationship to parental mediation behaviors.

The two-phase design, involving initial scale development followed by hypothesis testing using the newly developed scale, is a well-established and methodologically sound approach in social science research (DeVellis, 2016; Hinkin, 1998). This sequential approach ensures that the constructs of interest are accurately and reliably measured before investigating their relationships, thereby enhancing the validity of the overall study (Clark & Watson, 1995). This design is particularly appropriate for this research as it allows for the in-depth exploration of the novel BCL construct and its subsequent application in understanding parental mediation behaviors.

Furthermore, the mixed-methods approach, integrating qualitative (cognitive interviews) and quantitative (survey) methods, provides a more comprehensive understanding of BCL and its implications in digital parenting than either approach could achieve in isolation (Creswell & Clark, 2018; Tashakkori & Teddlie, 2010). The qualitative phase allowed for a nuanced exploration of the BCL construct from the perspective of the target population, while the

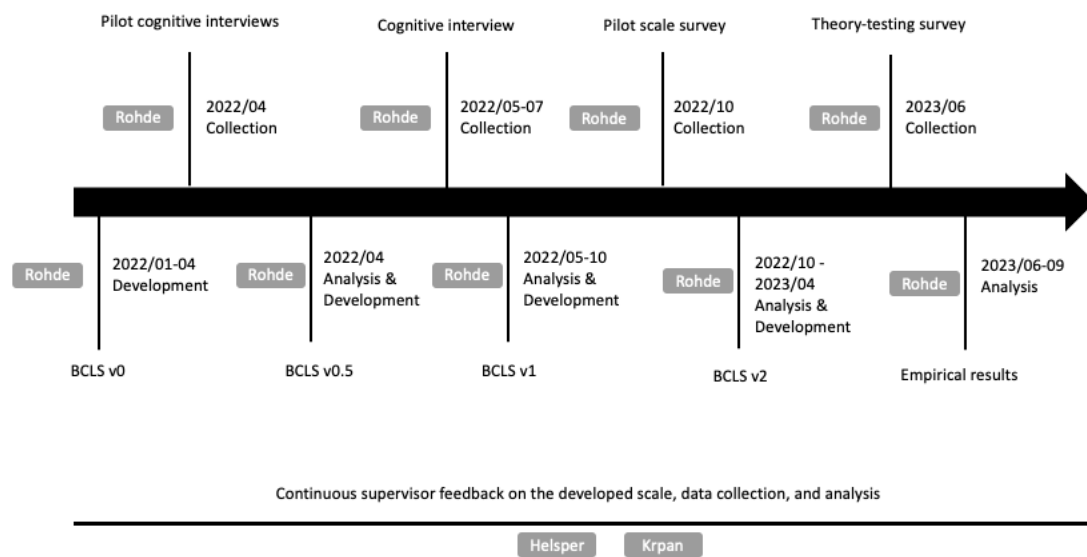
quantitative phase provided statistical evidence for the scale's validity and the proposed relationships.

Timeline

Figure 4 illustrates the key milestones in the iterative development of the Behavior Change Literacy Scale (BCLS) from January 2022 to mid-2023. Moving from left to right, it shows how I (Rohde) began by devising a preliminary BCLS version (v0) in early 2022, followed by pilot cognitive interviews and subsequent refinements (v0.5). Between April and May 2022, additional cognitive interviews helped shape BCLS v1, whose items were then tested in a pilot-scale survey collected in October 2022. Analysis and further revisions continued through early 2023, resulting in BCLS v2. Finally, a larger survey to test the conceptual model was conducted in June 2023, followed by the final analysis phase. Throughout each step, my supervisors (Dr. Helsper and Dr. Krpan) provided continuous feedback on how best to refine the scale, guide data collection, analyze the data, and interpret results. The figure highlights these interconnected activities—development, data collection, and analysis—demonstrating how feedback at each stage informed the next round of BCLS refinement.

Figure 4

Research overview



4.3.1 Development and validation of a Behavior Change Literacy scale

The methodological approach was informed by popular scientific procedural recommendations for developing and validating scales (Boateng et al., 2018). The process had three steps (DeVellis, 2016). First, a theory- and literature-informed item pool was generated (Flaughner, 2000). Second, cognitive interviews were conducted to understand the participant's cognitive processing of the items and evaluate the extent to which their understanding reflected the theoretical background (García, 2011). Finally, to rigorously assess the scale's structure and dimensionality, both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were employed (Fabrigar & Wegener, 2012; Kline, 2014). EFA was used to initially explore the underlying factor structure, while CFA was used to confirm the hypothesized structure and refine the scale (Hurley et al., 1997).

Phase 1 – Item pool generation

Purpose

The initial phase aimed to develop a comprehensive item pool for BCL across its three theoretical components based on the academic literature focused on literacy measurement and measures related to relevant concepts, such as self-efficacy (Flaughner, 2000). This phase was foundational in establishing a robust basis for the subsequent development of the BCL scale.

Approach

Given the absence of existing measures for BCL, the item generation involved an iterative process that integrated theory and empirical evidence (Boateng et al., 2018). The theoretical framework provided a foundation for phrasing items, guided by best academic practices (Gideon, 2012). The focus was on the three-component conceptualization of BCL: type (operational, emotional, cognitive), referent (self, children, others), and behavior class (habits, actions), including the subdimensions for emotional and cognitive BCL. A structured approach was adopted, beginning with a table that cross-referenced two of BCL’s three theoretical components, initially focusing on the self-referent dimension.

The structure presented in Table 2 served as a top-down framework for item generation, systematically covering the combinations of the three theoretical components. The item formulation drew from academic literature, focusing on scales measuring similar concepts in literacy and related fields (e.g., Ajzen, 2006; Clifford et al., 2020; Domanska et al., 2020; Helsper et al., 2020). This approach ensured the items were contextually relevant and grounded in established research.

Table 2

Top-down structure for self-related item generation

Type	Behavior class	Subdimension
Emotional	Habits (behavior maintenance)	Attitude Self-efficacy
	Actions (behavior initiation)	Attitude Self-efficacy
Cognitive	Habits (behavior maintenance)	Knowledge Skill
	Actions (behavior initiation)	Knowledge Skill
Operational	Habits (behavior maintenance)	
	Actions (behavior initiation)	

BCL types

Emotional BCL

Aligned with the literature-informed BCL theory (Domanska et al., 2020), emotional BCL items measured two concepts: **self-efficacy** and **attitudes** towards behavior change related to themselves, their children, and significant other people. To formulate items and response scales grounded in best practices, the academic literature was examined with a focus on literacy scales, containing an emotional dimension or literacy-unrelated scales that measure attitude and self-efficacy (see Table B3, Appendix B).

For the emotional dimension, an item such as “it is important to me to become better at getting rid of bad habits” was included to assess attitude related to habits. Meanwhile, one of the items for action-oriented self-efficacy was “*if I keep trying, I'll figure out a way to successfully do a difficult action*”. The emotional dimension was assessed with a 5-point scale of agreement (1 = Strongly disagree, 2 = Somewhat disagree, 3 = Neither agree nor disagree, 4 = Somewhat agree, 5 = Strongly agree, 0 = I don't know), which is most frequently used for attitude and self-efficacy scales (e.g., Chen et al., 2001).

Cognitive BCL

Informed by the literature on cognitive literacy-relevant constructs (Michie et al., 2011; Saks et al., 2021; Schreurs & Vandenbosch, 2020; Ten Berge & Van Hezewijk, 1999), the cognitive items measured two concepts: **skill** and **knowledge** about behavior change related to themselves, their children, and significant other people. To formulate items and response scales grounded in best practices, the academic literature was examined with a focus on literacy scales containing a cognitive dimension that measures skill and knowledge (see Table B4, Appendix B).

For the cognitive dimension, an item such as “I know *practical techniques* that help me establish good habits” was included to assess knowledge related to habits. Meanwhile, one of the items for action-oriented skills was “*I know how to ensure that I do difficult actions*”. The cognitive dimension was assessed with a 5-point scale of identification or truth (1 = Not at all true of me, 2 = Not very true of me, 3 = Neither true nor untrue of me, 4 = Mostly true of me, 5 = Very true of me, 0 = I don't know), which showed favorable properties for knowledge and skill items in previous research (Helsper et al., 2020). The 5-point scale is known for its balance between response precision and respondent ease (Lozano et al., 2008).

Operational BCL

The operational dimension captured the extent to which behavior change attempts have been successful. The operational dimension is the least empirically measured dimension. For example, Rozendaal et al. (2016) discussed its possibilities as a conceptual dimension but decided to develop a measurement in a later work (which had not yet been published). Domanska et al. (2020) proposed one approach to measurement, which is asking about the difficulty of performing a specific behavior (i.e., how difficult/easy is X?).

Behavior change literature has explored how to measure successful behavior change and performance, which closely points in the same direction as the operational dimension (Schwarz & Oyserman, 2011). The best practice is to ask about behavioral performance for a specific time in the past (e.g., “in the last three months, I ran every day/every other day,” etc.). Asking how successful respondents have been in bridging the gap for a specific time in the past is strongly aligned with the concept of BCL. For example, the item, “*in the last 5 years, I've been*

successful in establishing better habits”, was included to assess operational BCL related to habits. One of the items for action-oriented operational BCL was “*in the last 12 months, I managed to do important actions*”. The selection of specific timeframes for operational BCL items (12 months and 5 years) was directly informed by cognitive interview findings. Participants, when not provided with explicit timeframes, exhibited significant variability in their recall periods, often defaulting to recent years or the onset of the COVID-19 pandemic. This variability, consistent with the availability heuristic (Tversky & Kahneman, 1973), threatened the validity of self-assessments. However, when presented with defined timeframes, participants provided more nuanced and specific responses, aligning with research on autobiographical memory and cue-dependent recall (Conway & Pleydell-Pearce, 2000). The dual timeframe approach—12 months for actions and 5 years for habits—was adopted to balance the need for capturing both recent and longer-term behavior change efforts, enhancing the scale's reliability and encouraging critical reflection (DeVellis, 2016; Schwarz, 1999). In the development of the operational dimension of BCL, explicit subdimensions were not delineated, which differs from the approach taken for the emotional and cognitive dimensions. This decision was grounded in the operational dimension, by its nature, being inherently straightforward and unambiguous. It focuses on the tangible application and execution of behavior change strategies. This directness and practicality lend themselves to a more unified, singular dimension rather than one with multiple sub-components. The operational dimension was assessed with a 5-point truth scale (1 = Not at all true of me, 2 = Not very true of me, 3 = Neither true nor untrue of me, 4 = Mostly true of me, 5 = Very true of me, 0 = I don't know), which showed favorable properties for knowledge and skill items in previous research (Helsper et al., 2020).

BCL referent

Similar to other literacies (Domanska et al., 2020; Rozendaal et al., 2016; Schreurs & Vandenbosch, 2020), the concept of BCL encompasses both individual and social processes. The referent component is critical as it acknowledges the relational dynamics in behavior change, especially in parental mediation contexts. Behavior change interventions become more effective when tailored to a smaller, homogenous group based on specific criteria such as age, lifestyle, or socioeconomic status (e.g., Noar et al., 2007). Social BCL can be conceptualized as the ability to provide tailored, effective behavior change interventions to different audiences. Items were crafted to capture BCL related to oneself, one's children, or other significant people. This distinction allows for a nuanced understanding of BCL in various relational contexts, capturing the parental literacy to provide effective behavior change intervention to different audiences.

For instance, items like “In the last 5 years, I've been successful in establishing better habits” (self-related referent) and “In the last 5 years, I've successfully helped my child(ren) establish good habits” (child-related referent) illustrate how the scale measures BCL in different relational contexts. These items are designed to assess the respondent's perceived capability to influence their own behavior change as well as that of their children and other significant people.

BCL behavior class

The distinction in the behavior literature between establishing and maintaining habits and initiating specific actions (Gardner et al., 2022) inspired the behavior-class distinction for BCL. Parents skilled in BCL will adeptly navigate between implementing new non-habitual behaviors

and fostering the development of positive habitual behaviors, tailoring their approach to their family's evolving needs and circumstances.

Items were formulated to capture both aspects of behavior change. For example, “In the last 12 months, I intentionally formed good new habits” addresses behavior maintenance, while “In the last 5 years, I managed to do the difficult actions I intended to do” pertains to behavior initiation. This differentiation is important in understanding the comprehensive nature of BCL, as it encompasses both the formation of lasting habits and the ability to initiate specific, deliberate actions.

BCL scale v1

The initial development of the 72-item Behavior Change Literacy Scale version 1 (BCLS-72 v1) followed the previously detailed considerations (see Table B11, Appendix B, for all items). First, 24 self-related items were developed across the three types and two behavior classes. Second, these self-related items were adapted to the child-related referent and other-related referent, totaling 72 items. Table 3 and Figure 5 below show the general structure of the scale. The scale's structure maintained a balanced representation across types, referents, and behavior classes with 24 items per dimension (emotional, cognitive, operational), 36 items each for habits and actions, and 24 items each for self-related, child-related, and other-related BCL.

The BCLS-72 v1 was the foundation for subsequent cognitive interviews, allowing further refinement based on respondent feedback. This iterative approach ensured that the scale not only adhered to theoretical constructs but also resonated with the target population's practical understanding and experiences.

Table 3

Final set of items and associated structure

Type	Behavior class	Referent
Emotional (24 items)	Habits (behavior maintenance; 12 items)	Self (4 items)
		Children (4 items) Significant people (4 items)
	Actions (behavior initiation; 12 items)	Self (4 items)
		Children (4 items)
Cognitive (24 items)	Habits (behavior maintenance; 12 items)	Self (4 items)
		Children (4 items) Significant people (4 items)
	Actions (behavior initiation; 12 items)	Self (4 items)
		Children (4 items) Significant people (4 items)

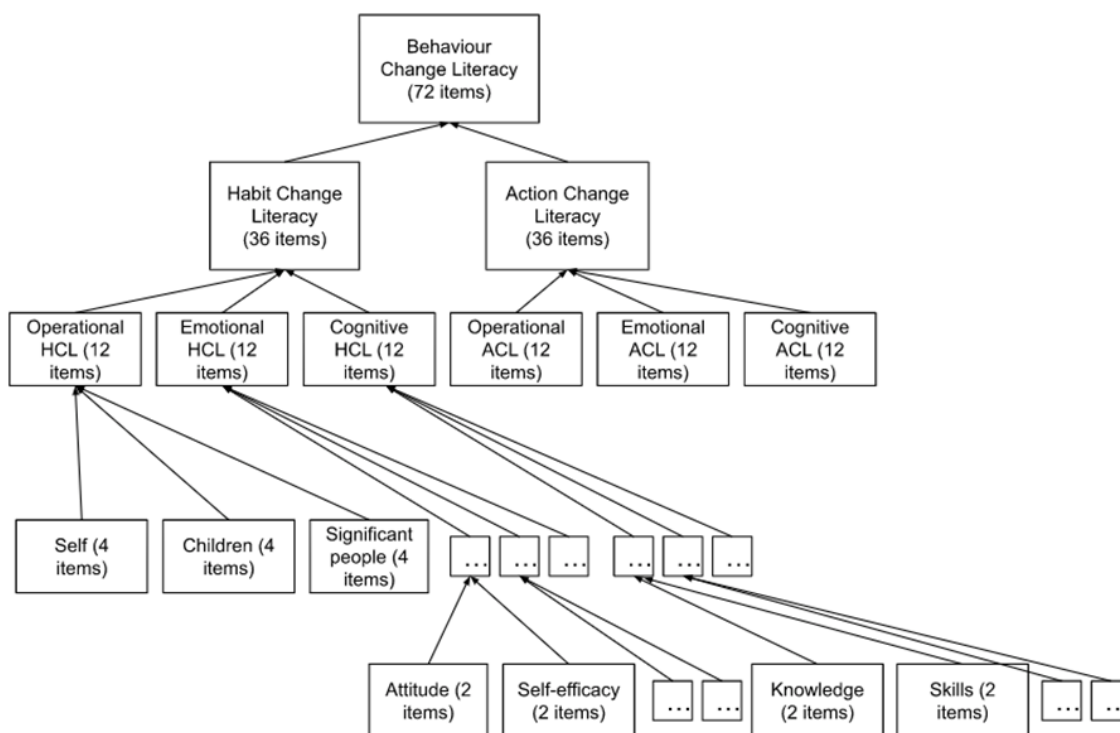
Table 3

Final set of items and associated structure

Type	Behavior class	Referent
Operational (24 items)	Habits (behavior maintenance; 12 items)	Self (4 items) Children (4 items) Significant people (4 items)
	Actions (behavior initiation; 12 items)	Self (4 items) Children (4 items) Significant people (4 items)

Figure 5

Theoretical scale structure



Note. Ellipses “...” indicate the structure from the left being repeated.

Bias in self-reporting

The thesis mitigated the challenges related to self-reporting biases through a rigorous scale validation process (DeVellis, 2016).

Social desirability bias, in particular, can lead respondents to present themselves in a more favorable light, potentially inflating their reported competence in managing behaviors (Grimm, 2010; Krumpal, 2013). To address these concerns, several strategies were employed during the scale development process, drawing on best practices in psychometric research (Podsakoff et al., 2011). First, items were carefully worded to minimize the potential for socially desirable responses, a technique known as indirect questioning (Fisher, 1993). For example, instead of asking directly about success in changing behaviors, items focused on specific actions or experiences, such as "In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals." This approach encourages more objective reflection rather than general self-assessment, potentially reducing the impact of social desirability bias (Nederhof, 1985). Second, the use of specific timeframes (e.g., "In the last 5 years") and concrete outcomes (e.g., "establishing better habits") in these items aims to reduce social desirability bias by encouraging respondents to reflect on actual experiences and behaviors rather than general self-perceptions (Tourangeau & Yan, 2007). Third, the item pool included both positively and negatively worded and reverse items to reduce acquiescence bias and encourage more thoughtful responses, a strategy supported by research on survey design (Weijters et al., 2013). Fourth, the response scale for these items was carefully designed to capture varying degrees of success, ranging from "Not at all true of me" to "Very true of me.", allowing respondents to report partial success or challenges, potentially reducing the pressure to present an overly positive self-image (Krosnick, 2018). Finally, participants were assured of the anonymity and confidentiality of their responses to encourage honest reporting, a practice shown to reduce social desirability bias in self-report measures (Tourangeau & Yan, 2007).

The Dunning-Kruger effect, which suggests that individuals with low ability in a domain tend to overestimate their competence, is another potential source of bias in self-reported BCL measures (Dunning, 2011; Kruger & Dunning, 1999). This effect could lead to paradoxical results where individuals less skilled in behavior change report higher levels of BCL due to their lack of awareness of their limitations. Conversely, highly skilled parents might underestimate their abilities due to a more nuanced understanding of the complexities involved in behavior change, a phenomenon known as the "expert's dilemma" (Kahneman & Klein, 2009). Several steps were taken during the cognitive interview phase to mitigate these biases and assess their potential impact, drawing on techniques from cognitive psychology and survey methodology (Beatty & Willis, 2007; Willis, 2004). First, participants were asked to provide concrete examples of their behavior change efforts, allowing for a more accurate assessment of their actual BCL levels. This think-aloud protocol helps to uncover cognitive processes underlying responses and can reveal discrepancies between perceived and actual abilities (Ericsson, 2017). Second, the interviewer specifically probed for instances where participants struggled with behavior change, encouraging a more balanced self-assessment. This technique, known as probing, helps to elicit more detailed and accurate responses (Collins, 2003). Finally, participants were asked about their confidence in their responses, helping to identify potentially overconfident individuals. This metacognitive approach can provide insights into the accuracy of self-assessments and has been used effectively in studies of self-knowledge and competence (Ehrlinger et al., 2008).

These strategies helped to uncover potential biases and informed subsequent refinements to the scale items, following best practices in scale development (DeVellis, 2016). For instance, items that consistently elicited overly positive responses without corresponding behavioral evidence were either revised or eliminated from the final scale, enhancing the overall validity of the measure (Furr, 2011). In the final scale, the inclusion of items assessing operational BCL (e.g., "In the last 5 years, I've been successful in establishing better habits") serves as a partial check against overconfidence, as these items require reflection on actual behavioral outcomes rather

than just perceived competence. This approach aligns with recommendations for assessing competence through a combination of self-report and performance-based measures (Dunning et al., 2004).

By employing these methodological strategies and grounding them in established psychological and psychometric research, the thesis aimed to mitigate the challenges related to self-reporting through a rigorous scale validation process. However, it is important to acknowledge that no self-report measure is entirely free from bias, and future research could benefit from complementing these measures with objective behavioral assessments or informant reports to further validate the BCL construct (Vazire, 2010).

Phase 2 - Cognitive interviews

Purpose

Cognitive interviews have been used to increase the validity of scales by asking people to reflect on their understanding of the survey questions or items (García, 2011) and the extent to which their understanding reflects the components of the construct (Desimone & Le Floch, 2004).

Data collection

Informed by interpretivism and social constructivism, cognitive interviews focus on the interpretation and construction of meaning as shared by the participants (Saldana & Omasta, 2017). To minimize the risk of the researcher's positioning influencing data collection (i.e., reactivity), the later section provides a reflexive and transparent account of how the data for this research was collected and analyzed (Flick, 2017). Semi-structured interviews diminish the reactivity risk since the researcher has fewer degrees of freedom to influence the interview (Brinkmann & Kvale, 2018). Semi-structured interviews are useful for achieving the double purpose of probing pre-defined aspects of construct validity in a structured way while remaining flexible and open to the interviewer's responses (Kallio et al., 2016). The cognitive interviews followed best practices in interviewing, which included taking field notes, recording conversations, and taking notes during the interview (Emerson et al., 2011).

Sampling

Purposeful sampling was used to ensure that the scale was developed and validated on a sample of mothers and fathers with different socioeconomic backgrounds (i.e., professional and educational), capturing the diversity of parental viewpoints and obtaining consistency in scale interpretation (Patton, 2014; Suri, 2011). The recruiting strategy followed scholarly recommendations for recruiting parents (Dworkin et al., 2016; Hull et al., 2004; Lewis, 2009). A professional recruiting service (Panelbase.com) provided access to a large and diverse professional panel of adults. The participants received a reward of £15 for the 45- to 60-minute interview.

Procedures. To pilot the interview protocol, the first five cognitive interviews were conducted with acquaintances of the researcher, including two parents and three adults without children, to pilot the interview (Presser et al., 2004). Afterward, Panelbase was used to recruit people for the cognitive interviews. The following inclusion criteria were used for the parents: (a) they had at least one child aged between 12 and 18, (b) they spoke English fluently, and (c) they lived in the United Kingdom.

During adolescence, parents face unique challenges as their children seek greater autonomy while showing increased vulnerability to problematic screen use (Nielsen et al., 2019). This creates a complex situation where parents must adapt and change their mediation behaviors - traditional restrictive approaches often become ineffective or counterproductive, requiring parents to develop new strategies (Symons et al., 2017). The necessity to adapt parental behaviors flexibly while dealing with resistance and influencing increasingly independent adolescents makes this age group suitable for studying BCL's primary emphasis on effectively initiating and maintaining behavioral changes in oneself and others.

The research was conducted in English, requiring proficiency in the language to ensure that participants can fully understand and express their thoughts on the complex concepts within the

BCL scale, free from language barriers that could hinder the cognitive interview process (Willis, 2004). The selection of the United Kingdom as the focus of this study is attributed to several factors: its status as an English-speaking nation, the prominent role that digital technology occupies in family dynamics (Livingstone & Blum-Ross, 2020), and the relative ease of recruitment due to the research being conducted at a university within the UK.

Potential participants qualified for a screener survey by indicating their demographical information and their children's ages and consent to be contacted for a follow-up interview (Table B5, Appendix B). The parents who gave consent were contacted by email. When new participants were invited, their potential impact on the diversity of the sample was carefully considered. For example, the respondents were primarily females after the first two rounds, so more males were invited in the subsequent rounds. The email they received (Table B6, Appendix B) included a brief study description, a request for consent, a link to a scheduling website to book the interview, and a participant information sheet (Table B7, Appendix B). Not everyone returned the consent form, so another form was given out at the beginning of the cognitive interviews. The remaining procedures are described in the interview section.

35 qualified participants were contacted, and 17 interviews were conducted. The first round included 3 participants (May), while the second had 5 (early June). The third round had 6 (mid-June), and the last had three (July). Of the parents, 7 were male and 10 were female. 10 participants had a university degree, while 7 participants did not. The participants had, on average, two children, with at least one child between 12 and 18 years old. They were working as paid employees (11), were self-employed (2), homemakers (3), or students (1). Their ethnic background was White (13), Asian (3), and Black or African American (1). Their marital status was married (11), divorced (3), and never married (3). Their ages ranged from 39 to 50 (with an average age of 44).

It is important to note that there might have been a bias in the sample, with interviewees having higher-than-average levels of BCL, which enabled them to decide to participate and follow through with an appointment compared to those who did not attend the interviews.

Interview

Procedures. The data collection followed the recommendations for using cognitive interviews in diverse populations (Nápoles-Springer et al., 2006). The participants were met in a digital room on the Zoom platform. The interview began by giving the participants a short description of the study and the task they were asked to perform. Participants were sent a link to the questionnaire using the Zoom chat feature and asked to share their screen with the researcher. The link forwarded participants to an introduction page, which again described the purpose of the interview and asked for their consent (Table B8, Appendix B). They were additionally asked verbally if they consented to the interview being recorded. Next, they started engaging with the scale, which they were asked to do in one of two fundamental ways: by responding to questions after each item or after they completed all items on a page. This was determined in advance according to the present need for understanding. For example, participants were asked to go through the items individually when changes were made until a sufficient representation of their item understanding was achieved. Once they finished the questionnaire, participants were asked if they had any comments regarding the interview experience or the scale. Afterward, more background was shared on the research, and the participants were thanked for their participation.

Guide. The interview guide included the steps above and specific questions for each block or item (García, 2011). The questions were continually updated based on what appeared most important to understand. Best practice questions were asked, such as “did you have any difficulties understanding any item?”, “what do you think the item means?”, “what were you thinking about when you gave the answer?”, and “can you give an example?” (see all predefined questions in Table B8, Appendix B). The responses enabled the researcher to increase content validity by revealing the extent to which the intended meaning of the item was reflected in the interviewee’s interpretation. Based on these responses, the items were modified by changing the wording and by removing or adding new items.

Data analysis

Knafl et al. (2007)’s recommendation for the analysis and interpretation were followed. The interviews were video recorded since audio recordings would have made it difficult to know which item the participants reacted to (e.g., they only sometimes read the item). Structured transcripts were created for all participants, which enabled the comparison of item-specific responses across participants. Individual documents were created that contained one column for the items and one column with the participant's reactions to the items and questions (see Table 4). Moreover, the interviewer added additional observations in the individual documents based on the parent’s reactions to the questionnaire. For example, when some items took them longer to understand than others.

Table 4

Example of structured transcript

Items	Reactions
I’ve successfully helped significant people stop bad habits	Yeah, again, in the same sort of way, I would tick “true.” My wife used to smoke, and I tried to give her the moral support and encouragement that I could help her stop. So that makes sense there.

The transcripts were further used in two ways: a spreadsheet with all the responses to compare them easily and a qualitative coding project in NVivo (Bazeley & Jackson, 2013). The spreadsheet structure is illustrated in Table 5 below.

Table 5

Exemplified structure of the comparison spreadsheet

	Component	
	Item 1	Item 2
Person A	Reaction X1	Reaction Y1
Person B	Reaction X2	Reaction Y2

This process helped the researcher search for keywords and more readily identify patterns across the respondent pool. NVivo had a similar purpose, but it enabled the use of more refined codes (Saldaña, 2013). On the highest level, the codes were structured around habits, actions, confusions, misunderstandings, and suggested changes. Within the habits and actions categories, reactions were structured around ‘good habits,’ ‘bad habits,’ ‘cognitive dimension,’

‘operational dimension,’ and ‘emotional dimension.’ Furthermore, these responses were unpacked into comments about self, others, and children. While these were the most important categories, several other minor codes and sub-levels were included in the codebook. The results of the cognitive interviews are described in Chapter 5. The BCLS-72 v1 was used and refined over time. The BCLS-72 v2 was the final version after the cognitive interviews (see B12, Appendix B)

Phase 3 – Scale validation

Purpose

A pilot survey was used to establish the construct validity and reliability of the BCLS v2 using best-practice statistical procedures before investing more resources into the larger research question and conceptual model (Thabane et al., 2010). More specifically, the goal was to improve the quality of subsequent data collection by confirming the coverage and relevance of the BCLS, identifying necessary modifications, and deciding if another pilot was needed or if the scale was ready to be used in the next step of the research.

Data collection and sampling

Qualtrics on the LSE server was used to collect responses, which could not then be associated with individuating information about the respondents. A crowdsourcing sample was used to obtain reliable results with a low rate of errors and a more diverse sample pool and to conduct high-quality research at a higher speed and at a lower cost compared to university lab samples and commercial survey research companies (Buhrmester et al., 2011; Kees et al., 2017). A professional recruiting service (*Prolific*) provided access to a large and diverse professional panel of adults (Peer et al., 2017). The participants received the recommended average reward of £9 per hour for the pre-screener and pilot survey. The participant responses were measured with a digital self-administered questionnaire (Bourque, 1995).

The pilot and pre-screen survey asked for participant consent. If they did not give consent, they were redirected to the recruiting service. After confirming consent, as recommended to ensure data quality (Meade & Craig, 2012), one attention check was added: “I read instructions carefully. To show that you are reading these instructions, please leave this question blank” (Maniaci & Rogge, 2014).

Pre-screen survey

A pre-screen survey that does not provide any information about the target demographic of the follow-up survey is recommended to avoid untruthful participant reporting (Chandler & Paolacci, 2017). The pre-screener survey was framed as a “1-to-3-minute survey about personal characteristics, with follow-up surveys, and being interested in understanding how different personal characteristics are related to each other“. It contained measures for education, employment, child-related information (only if they said yes to having children), ethnicity, gender, marital status, age, type of university degree (if applicable), and job characteristics. It was difficult to guess that the follow-up survey was for parents specifically. Additionally, survey access filters from Prolific were applied to the pre-screener to further ensure the suitability of participants: they had at least an 80% approval rating, did not partake in the cognitive interview, and should have (a) had at least one child aged 12 to 18, (b) were US or UK nationals, and (c) had English as their first language.

The sampling criteria were mostly the same as in the cognitive interviews. This study permitted participation from not only UK participants but also those in the US. Compared to cognitive interviews, time zone differences do not affect the ease of conducting an asynchronous study survey. High approval rates indicated that participants had a track record of engagement and compliance with study instructions, which increased the likelihood of obtaining high-quality data (Buhrmester et al., 2011). Excluding participants from the cognitive interviews helped maintain the study results' independence and validity by avoiding potential biases or carry-over

effects from previous exposures to the research topic or survey items (Fowler, 2014). The pre-screener survey captured information from 802 participants.

Pilot survey

The pilot survey contained the full 72-item scale. A subsample was created based on quotas for gender, education (university | non-university), job characteristics (technical | physical | social/communicative), age (below 35 | 35 and above), ethnicity (others | White), and number of children (one | more than one). This system created a quota sample of 300 participants. 256 responses were collected from the possible 300 participants. The quota sampling approach employed in this study was designed to ensure demographic diversity rather than strict representativeness of a national parent population. This strategy aligns with the principles of theoretical sampling, which prioritizes variability in constructs of interest over population-level representativeness (Eisenhardt & Graebner, 2007). As noted by Teddlie and Yu (2007), purposive sampling techniques, including quota sampling, are particularly useful in mixed methods research where the goal is to generate a sample that will address specific research questions.

The final sample exhibited sufficient demographic diversity across relevant factors, with crosstabs confirming a reasonable distribution of characteristics (see Table B9, Appendix B). The diversity in the sample allows for a more robust examination of how BCL and parental mediation practices may vary across different demographic groups, potentially uncovering important moderating factors. While this sampling approach may limit generalizability to the broader parent population, this trade-off is preferable given the study's focus on theory testing rather than describing general levels of mediation and BCL. This perspective is further supported by Blair and Zinkhan (2006), who contend that non-probability samples can be appropriate for theory testing when the focus is on the relationships between variables rather than population parameter estimates.

47% of the participants had one child, and 53% had more than one child. The average number of children per participant was 1.77. Participants with children having special needs accounted for 14% of the sample. In terms of age, the participants were relatively evenly distributed across younger and older age groups, with 46% being 35 years and below, and 54% being above 36 years. The average age of the parents in the sample was 40 years.

The gender distribution was predominantly female, constituting 57% of the sample, while males comprised 43%. In terms of educational background, the sample was almost evenly split between those with non-university (49%) and university education (51%). The largest single category for education was bachelor's degree holders (37%), followed by high school diploma/A-levels (17%).

Ethnically, the majority of the sample identified as White (64%), with other ethnic groups including Black (16%), Asian (11%), Mixed (6%), and Hispanic or Latino (1%). The division between White and other ethnic backgrounds was 64% to 36%. Regarding employment status, most participants worked as employees (86%), with a smaller portion self-employed (12%). Marital status showed that most participants were married (63%), followed by those who had never been married (28%).

Data analysis

The analyses were performed on a sample of 221. In total, 35 cases were removed from the 256 responses, where 22 were removed due to missing values and 13 according to the following approach. First, 2 participants failed the attention check, and 3 refused consent. Second, the duration in seconds for the remaining 251 respondents had the following characteristics: minimum value of 172 seconds (2.9 minutes), maximum value of 5157 (86 minutes), mean of 796 (12.3 minutes), median of 682 (11.4 minutes), and a standard deviation of 521 (8.7 minutes). The standard deviation was relatively large because of numerous tail-end responses. Yan and Tourangeau (2008) note that extreme response times can be indicative of various respondent behaviors, including speeding through the survey or taking excessive breaks. The decision to implement a lower cut-off point at 279 seconds (4.7 minutes) based on an examination of the distribution aligns with best practices in survey methodology. Excluding speeders or respondents who complete the survey unrealistically quickly is essential for maintaining data quality (Greszki et al., 2015). 7 participants were excluded based on the lower cut-off. The absence of an upper cut-off point is justified by the qualitative feedback received from participants, with two respondents reporting interruptions by children or calls. This approach acknowledges the real-world conditions under which surveys are often completed and is consistent with the findings of Stieger & Reips (2010), who note that longer response times do not necessarily signal problematic responses. Finally, the “I don’t want to answer” option was recoded as missing values. This approach recognizes that such responses represent a deliberate non-response rather than a measurement of the construct, and treating them as missing allows for more accurate analysis (Schafer & Graham, 2002). A participant was removed if they had one missing value, which led to the deletion of 22 cases. The relatively small proportion of missing data in this study supports the use of listwise deletion. However, it is important to acknowledge that this approach may slightly reduce statistical power and could potentially introduce minor bias if the missing data mechanism is not missing completely at random (Dong & Peng, 2013). Future research might consider more advanced techniques such as multiple imputation or full information maximum likelihood estimation, especially if dealing with larger proportions of missing data or when population-level inferences are a primary goal (Eekhout et al., 2014). Two types of transformations were conducted on the items. First, the “I don't understand what this means” option for cognitive items was recoded as 0 as recommended in previous studies (Helsper et al., 2020). Second, the reverse items were recoded inversely (e.g., 5 → 1) to ease the interpretation of the calculations.

Different factor combinations of relationships based on the theoretical model and item design were evaluated in the factor analysis (see Figure 5). First, items were formulated to distinguish between habit-related and action-related BCL. Second, the statements were phrased to capture three referent groups (self, children, and others). Third, the items should capture the three literacy types (operational, emotional, and cognitive). Last, items should capture the distinct subdimensions: attitudes and self-efficacy for the emotional dimension and skills and knowledge for the cognitive dimension.

The first analytical step was calculating the descriptive statistics, including means and standard deviations as indicators of central tendency and variability and skewness and kurtosis as measures of deviation from the normal distribution (Tabachnick & Fidell, 2019). Skewness and kurtosis were used to check the extent to which each item deviated from the theoretical normal distribution in the horizontal (i.e., skewed) or vertical direction (i.e., high/low excessive kurtosis levels, bi- or polymodality) (DeCarlo, 1997; Kim, 2013). Means and standard deviations were used to understand the extent to which items had the same characteristics across gender, age, and education groups (DeVellis, 2016).

The decision to retain four items per category (e.g., Operational-Habits-Self) within the BCL scale was driven by a need to balance content validity, reliability, parsimony, and structural symmetry, adhering to best practices in scale development (Boateng et al., 2018; DeVellis, 2016; Hinkin, 1998). Specifically, the emotional and cognitive BCL types are each comprised of two established sub-dimensions: attitudes and self-efficacy for emotional BCL, and knowledge and skills for cognitive BCL. Established practice suggests a minimum of two items per construct to ensure adequate content coverage and internal consistency (Costello & Osborne, 2005; Hair et al., 2013). Therefore, to represent both sub-dimensions within emotional and cognitive BCL, a minimum of four items was required. To maintain structural symmetry across all BCL types, and given that the operational BCL type also benefits from the representation of both habit and action contexts, four items were likewise retained for the operational dimension. Exploratory and confirmatory factor analyses in the pilot study (Chapter 5) confirmed that these four-item subscales demonstrated strong factor loadings, acceptable model fit (CFI > 0.9, RMSEA < 0.08), and good internal consistency (Cronbach's alpha generally > 0.7), while minimizing respondent burden and item redundancy (Fabrigar & Wegener, 2012; Kline, 2014; Stanton et al., 2002).

The second analytical step was to use exploratory factor analysis (EFA) to uncover the underlying relationship and latent constructs of a set of measured variables (Fabrigar & Wegener, 2012; Watkins, 2021). SPSS Statistics (v27) was used for the EFA. Informed by the literature (e.g., Di Franco, 2014; Dien, 2010), the following analytical specifications were selected: (a) maximum likelihood as the extraction method, (b) extraction based on latent root criteria (Eigenvalue of 1) or theory-informed fixed number of factors, and (c) Promax with a kappa of 4 as the rotation method. Maximum likelihood as the extraction method is a widely used and recommended method for EFA when data are approximately normally distributed, as it provides robust estimates of factor loadings and standard errors (Costello & Osborne, 2005; Fabrigar & Wegener, 2012). The eigenvalue-greater-than-one rule, also known as the Kaiser criterion, is a common approach for determining the number of factors to retain (Hayton et al., 2004; Zwick & Velicer, 1986). In this case, theoretical considerations also played a role in determining the number of factors, aligning with a theory-driven approach to EFA (Costello & Osborne, 2005). Promax is an oblique rotation method that allows factors to be correlated, which is often a more realistic assumption in social science research compared to orthogonal rotations that assume factors are uncorrelated (Osborne, 2015). A kappa value of 4 is a standard setting for Promax, representing a moderate degree of correlation between factors (Finch, 2006). The results are reported according to three levels of abstraction: (1) 12 items constituting an individual dimension (operational habits, emotional habits, cognitive habits, operational actions, emotional actions, and cognitive actions), (2) 36 items comprising a behavior type (habit vs. actions), and (3) all 72 items representing the full scale. Additionally, reduced-item models were reported. The factor loadings were reported for the pattern and factor matrix. The factorability of the item correlation matrix was tested using the Kaiser–Meyer–Olkin (KMO) index and Bartlett's test of sphericity (Tabachnick & Fidell, 2007). Communality values indicated the association between item variance and the factors. The optimal number of factors was determined by combining latent root criteria (eigenvalues >1.0), scree plot, and theory. Interfactor correlations, interitem correlations within a factor, and cross-loading were examined to determine the appropriateness of including an item in the factor. These procedures are consistent with best practices in EFA (Hair et al., 2013). Coefficients below .3 were suppressed. The following guidelines were used to interpret the magnitude of factor loadings: >.71 excellent, >.63 very good, >.55 good, >.45 fair (Comrey & Lee, 2013).

The third analytical step was to employ confirmatory factor analysis (CFA) to test the hypothesis that a relationship exists between the observed variables and their underlying theory-

based latent constructs (e.g., operational, emotional, and cognitive BCL) (Kline, 2014). The items that did not load onto the associated dimension were removed from the pool. Factorial invariance tests were used to examine if items and groups of items had different meanings across sociodemographic groups. SPSS Amos (v27) was used to conduct the CFA and compare models in terms of fundamental structure, the number of factors, and items. The model exploration started by examining the full 72-item scale and the different plausible basic model structures (unidimensional, correlated, hierarchical, and bifactor). Each CFA had covariances between the error terms of the reverse items. Later, reduce-item variations were compared based on insights from the EFA and previous CFA. In evaluating each model, the model chi-square values and associated p-values were reported for completeness. With respect to global fit, i.e., how well the data fit the predictions of the model, root mean squared error of approximation (RMSEA) and comparative fit index (CFI) were reported. Hu and Bentler (1999) recommended to note the absolute index of fit, the RMSEA, where a model is compared against a perfectly fitting model, and a relative index of fit, the CFI, where a model is compared against a baseline or null model. The RMSEA should be below 0.06 for an acceptable fit, while the CFI should be greater than 0.90 (Hu and Bentler, 1999). Given that the performance of fit indices can vary according to aspects of the model, it is generally recommended that a range of fit statistics be considered when determining model appropriateness (Brown, 2015).

The last step was to assess the reliability of the final subscales by calculating Cronbach's alpha (Sijtsma, 2009), a widely used measure of internal consistency reliability (Tavakol & Dennick, 2011). The discriminant validity of the scale was examined by investigating whether men and women differ in their scores on BCL. For a new measure, it is important to demonstrate that any differences between groups detected with the scale are unbiased. To this end, measurement invariance analysis was conducted to discern whether the underlying construct is equally represented (Meredith, 1993). The factor structure was constrained to be equivalent across sexes to test for configural invariance (Millsap, 2011). Measurement invariance was assessed by testing whether the scale's factor structure, factor loadings, intercepts, and residuals were the same for men and women. Changes (Δ) in the CFI and RMSEA indicated violations of measurement invariance. The differences between the fit indices of two nested models suggest a violation of measurement invariance when Δ CFI exceeds .010 and Δ RMSEA exceeds .007 (Chen, 2007; Meredith, 1993).

4.3.2 Testing the theoretical hypotheses

Purpose

The large-scale survey study tested the hypotheses of the relationship between BCL, parental mediation intentions, and parental mediation behaviors. Surveys enable the testing of theoretical claims in terms of validity and generalizability to broader populations by using quantitative modeling techniques and statistical comparisons based on individual characteristics (Fowler, 2014). These analyses were used to answer the main research question:

To what extent are parental mediation intentions and Behavior Change Literacy explanations of parental mediation behaviors?

Data collection

Qualtrics on LSE servers was used to collect responses, where data could not be associated with any personally identifiable information. A crowdsourcing sample was employed through a professional recruiting service (Prolific), which has been shown to provide high-quality data comparable to traditional samples (Peer et al., 2017), provided access to a large and diverse professional panel of adults. The participants received the recommended average reward of £9 per hour for the pre-screener and pilot surveys. The pre-screen and large-scale surveys began by asking for participant consent.

If they did not consent, they were redirected to the recruiting service. After confirming consent, one attention check was added to ensure participants paid attention to the survey instructions and questions (Maniaci & Rogge, 2014). A single page with the following text was shown: “I read instructions carefully. To show that you are reading these instructions, please enter Q&G&pvFZ89w&K7.” It is shown below:

I read instructions carefully. To show that you are reading these instructions, please enter Q&G&pvFZ89w&K7

Moreover, a common check to ensure the validity of the responses was included: “In your honest opinion, should we use your data in our analysis in this study? (Do not worry, this will not affect your payment; you will receive the payment code either way)” (DeSimone et al., 2015). The response categories were yes, no, and not sure.

Sampling

The sampling criteria were the same as for the scale validation survey except for not having participated in the pilot validation study. A pre-screener survey was administered for the same reasons discussed previously. It ensured all participants met the essential inclusion criteria, capturing information from 1546 participants.

This study examined the relationship between parental mediation behavior and 9 independent variables (i.e., BCL, parental mediation intention, and digital skills, as well as interactions between these variables) and 2 control variables (i.e., education and gender). Given the complexity of the model, determining an appropriate sample size is important to ensure that the findings are both statistically significant and practically meaningful. A power analysis was conducted using G*Power 3.1 (Faul et al., 2009) to understand the statistical power for

detecting small to moderate effect sizes in this complex model. The analysis revealed that a sample size of 850 participants would be required to detect a small effect size ($f^2 = 0.02$) with a power of 0.80, while a medium effect size ($f^2 = 0.15$) would necessitate 123 participants. This study ensured robust statistical analysis while efficiently utilizing available resources by targeting a sample size of around 500. This sample size is sufficiently large to remain sensitive to potentially subtle but important relationships that could have meaningful implications for theory and practice while accommodating the practical constraints.

The targeted sample was based on quotas for gender (female and others | male; roughly 1:1), education (university | non-university; roughly 1:1), and ethnicity (others | white; roughly 1:3). For the same reasons as in the pilot, purposeful quota sampling was chosen to examine theoretical relationships between variables, which requires variability in the constructs of interest rather than population-level representativeness (Teddlie and Yu, 2007).

The final study sample comprised 513 participants (see Table B10, Appendix, for a full overview), predominantly from the UK (80%) and the US (20%). The gender distribution was nearly even, with 52% male and 48% female respondents. The respondents' age range was varied, with 88% being 35 years or older and the average age being 44. In terms of educational background, a significant proportion of the sample (37%) held a university first degree, followed by high school or equivalent (27%), and a smaller percentage (11%) held master's degrees. About 51% of the sample had university-level education.

Ethnically, a majority of the respondents (72%) identified as White, with 28% representing other ethnic backgrounds. The employment status of the majority (66%) was full-time work, with 19% working part-time. Most respondents were married (64%), and the predominant family configuration was a married couple family (64%).³

Regarding family employment status, 37% of the families had both partners working full-time, and 24% of households were opposite-sex couples, with one person working full-time and another working part-time. About 10% had one person doing housework and looking after children or other persons. Regarding family size, most respondents had more than one child (78%), with an average of 2 children per family. About 21% of the families had children with special needs.

Measures

The questionnaire was partly based on existing and partly on measures explicitly designed for this survey. A brief description of the measures used to test the hypotheses and the model in the large-scale survey follows. The survey duration goal was to be at most 20 minutes to avoid a strong response burden and fatigue (Yan et al., 2020). The actual median time was around 10 minutes. A single survey, an acceptable practice in the published intention-behavior relationship literature (e.g., Finke et al., 2015; Phau et al., 2014; Wang et al., 2023; Zarei et al., 2019), was used. This allows for efficient data collection on the intention to perform a behavior

³ The scales for marital status and family configuration varied across the study phases due to evolving methodological considerations. In the initial cognitive interviews and pilot survey, marital status was captured using the Prolific platform's standard categories for demographic profiling. For the main theory-testing survey, the marital status measure was adapted from the From Digital Skills to Tangible Outcomes project (Helsper et al., 2015) to enhance precision and comparability with established research. Family configuration was not included in the initial cognitive interviews or pilot survey because its potential relevance only emerged later from discussions with the supervisors. While both variables were collected, they were not central to the core hypotheses focused on individual-level factors (BCL, digital skills, intentions) and were therefore not included as control variables in the primary analyses to maintain model parsimony.

in the future and the frequency of past behavioral performance at the time of the measurement. While it is preferable to measure future intentions and then measure past behavior once the timeframe specified in the intentions has elapsed, measuring them simultaneously is common because past behaviors are among the strongest predictors of future behaviors (Sheeran & Webb, 2016).

Demographics

The demographics were captured in the pre-screener survey. They include education, employment status, children's characteristics, ethnicity, sex, marital status, age, and job characteristics. Moreover, relevant variables were included from the data provided by Prolific on each participant. After deliberation, two multiple-choice questions related to family life were inserted in the main survey: (1) how would you describe your family configuration? And (2) which statement best describes the current occupational status of the family?

Behavior Change Literacy

The questionnaire used the CBCLS-41, validated at step one (see Table B14, Appendix; Chapter 4.2 for a description of the results). One goal of the questionnaire was to examine the relationship between the composite variable of BCL and other variables. Subscales were also examined as part of the analysis.

Parental Mediation: Intention and Behavior

The 20-item parental mediation scale used in this thesis to measure parental mediation and intentions and behaviors was based on two validated scales: the parental mediation interactive media scale (Nimrod et al., 2019) and the Predicting Parental Mediation Questionnaire (PPMQ; Hong, 2021). Both scales were modified to match the context of this thesis (see Table 6). The rationale for these modifications is described in the following paragraphs.

Previous researchers have developed several different scales to measure parental mediation behaviors (e.g., Kuldass et al., 2021; Livingstone et al., 2017; Nikken & Jansz, 2014; Nimrod et al., 2019). For the present study, an 8-item parental mediation scale for interactive media was used because it has been validated and has a length that can be integrated without many changes (Nimrod et al., 2019). It also measures the increasingly prevalent engagement in interactive media. The scale enabled the researcher to examine the theoretical distinction between restrictive and active parental mediation (and an even finer 4-fold distinction) as well as general parental mediation of interactive media. There were two items for each theoretical distinction: restrictive (e.g., “Specify when and for how long your child(ren) can play and/or use software and/or apps.”), instructive (e.g., “Talk with your child(ren) about something specific s/he does with digital media.”), supervision (e.g., “Stay in the same room and keep an eye on the screen when the child(ren) uses games, websites, and/or apps.”), and co-use (e.g., “Do something together with a media device that your child(ren) wants to do and have you join in.”). As discussed in Chapter 2, these theoretical boundaries are debated based on empirical evidence (Clark, 2011). However, researchers often subsumed instructive and co-use under active parental mediation and supervision under restrictive parental mediation (Livingstone et al., 2017). Overall, the scale provided one composite variable and two to four sub-variables for the analysis.

The following changes were made to the items: (1) replacing “grandparent” with “parent” and “grandchild” with “my child(ren)”, (2) adding a specific time window, namely “in the past 4

weeks” to each item, and (3) changing the sentence time to past tense instead of present tense. These changes align with best practices for adapting existing scales, ensuring contextual relevance and clarity (DeVellis, 2016). To test the intention-behavior relationship, it is recommended to be specific about the time frame in the items (Ajzen, 2006, p. 2). As suggested by Hong (2021), who applied a 6-month timeframe, this thesis used a shorter 4-week timeframe to enhance recall accuracy and minimize potential memory biases (Schwarz, 1999). More importantly, people are more likely to remember accurately what they have done in the past month compared to the past half year.

Additionally, two items were adopted from the PPMQ (Hong, 2021) because they have been validated and developed based on recommendations for TPB scale development (Ajzen, 2002). Previous scholars have strongly recommended using behavior items phrased exactly like the intention items to achieve the most accurate representation of the relationship (Ajzen, 2011b), following the principle of compatibility to “be defined in terms of exactly the same elements” (Ajzen, 2006, p. 2). However, Hong (2021) did not follow that recommendation and used different behaviors and intention items. A three-item intention scale appeared useful for integrating to enable valid comparisons to Hong's (2021) pioneering work. The scale combines one item for active mediation (i.e., “I want to manage my child’s technology use in the next 6 months”) and two for restrictive mediation (i.e., “I will try to restrict my child’s technology use in the next 6 months” and “I expect to restrict my child’s technology use in the next 6 months”). Due to their high similarity, one restrictive item was removed. This decision to remove a redundant item is consistent with recommendations for scale parsimony and reducing respondent burden (Stanton et al., 2002). The two intention items were rephrased into behavior items according to the principle of compatibility: “in the past 4 weeks, I managed my child’s technology use” and “in the next 4 weeks, I will try to restrict my child’s technology”. To ensure compatibility with the other scales, a 5-point instead of a 7-point frequency response scale is used (i.e., never = 1, rarely = 2, sometimes = 3, often = 4, almost always = 5).

According to the principle of compatibility, the eight items from the interactive media parental mediation scale were reformulated as intention items, replacing “the last four weeks” with “in the next four weeks” and changing the sentence time to future tense (i.e., “in the next four weeks, I want to ...”). As for the two PPMQ intention items, the timeframe was changed from 6 months to four weeks. Last, a 5-point instead of a 7-point agreement scale was used to ensure compatibility with the other scales (i.e., strongly disagree = 1, somewhat agree = 2, neither agree nor disagree = 3, somewhat agree = 4, strongly agree = 5) (Lozano et al., 2008). Overall, the intention scale provided one composite variable and two to four sub-variables for the analysis.

Table 6*Parental Mediation Scale Adaptation*

Construct	Subdimension	Original item	Source	Adapted item
Behavior	Restrictive	Specify when and for how long your grandchild can play and/or use software and/or apps.	Nimrod et al., 2019	In the past 4 weeks, I have specified when and for how long your child(ren) can play and/or use software and/or apps.
		Specify in advance what games, websites, and/or apps can be used.		In the past 4 weeks, I have specified in advance what games, websites, and/or apps can be used.
	Instructive	Talk with your grandchild about something specific s/he does with digital media.		In the past 4 weeks, I have specified talked with my child(ren) about something specific s/he does with digital media.
		Talk with your grandchild about games, websites, and/or app usage in general.		In the past 4 weeks, I have specified talked with my child(ren) about games, websites, and/or app usage in general.
	Supervision	Stay in the same room and keep an eye on the screen when the child uses games, websites, and/or apps.		In the past 4 weeks, I have stayed in the same room and kept an eye on the screen when my child(ren) uses games, websites, and/or apps.
		Ask the child what he/she is doing when he/she uses		In the past 4 weeks, I have asked my child(ren) what

Table 6*Parental Mediation Scale Adaptation*

Construct	Subdimension	Original item	Source	Adapted item
		games, websites, and/or apps.		they are doing when they use games, websites, and/or apps.
	Co-use	Do something together with a media device that your grandchild wants to do and have you join in.		In the past 4 weeks, I have done something together with a media device that my child(ren) wanted to do and have me join in.
		Do something together with a media device that you want to do and have your grandchild join in.		In the past 4 weeks, I have done something together with a media device that I wanted to do and had my child(ren) join in.
	Active	<i>Derived from equivalent intention item</i>	Hong, 2021	In the past 4 weeks, I managed my child's technology use
	Restrictive	<i>Derived from equivalent intention item</i>		In the past 4 weeks, I restricted my child's technology use
Intention	Restrictive	<i>Derived from equivalent behavior item</i>	Nimrod et al., 2019	I want to specify when and for how long your child(ren) can play and/or use software and/or apps in the next 4 weeks
		<i>Derived from equivalent behavior item</i>		I want to specify in advance what games, websites, and/or apps can be used in the next 4 weeks

Table 6*Parental Mediation Scale Adaptation*

Construct	Subdimension	Original item	Source	Adapted item
	Instructive	<i>Derived from equivalent behavior item</i>		I want to talk with my child(ren) about something specific s/he does with digital media in the next 4 weeks
		<i>Derived from equivalent behavior item</i>		I want to talk with my child(ren) about games, websites, and/or app usage in general in the next 4 weeks.
	Supervision	<i>Derived from equivalent behavior item</i>		I want to stay in the same room and keep an eye on the screen when my child(ren) uses games, websites, and/or apps in the next 4 weeks.
		<i>Derived from equivalent behavior item</i>		I want to ask my child(ren) what they are doing when they use games, websites, and/or apps in the next 4 weeks
	Co-use	<i>Derived from equivalent behavior item</i>		I want to do something together with a media device that my child(ren) wants to do and have me join in the next 4 weeks
		<i>Derived from equivalent behavior item</i>		I want to do something together with a media device that I want to do and have my

Table 6*Parental Mediation Scale Adaptation*

Construct	Subdimension	Original item	Source	Adapted item
				child(ren) join in the next 4 weeks
	Active	I want to manage my child's technology use in the next 6 months	Hong, 2021	In the next 4 weeks, I want to manage my child's technology use
	Restrictive	I will try to restrict my child's technology use in the next 6 months	Hong, 2021	In the next 4 weeks, I will try to restrict my child's technology use

Digital skills

Digital skills are a well-researched explanation for parental mediation and might complement BCL. Consequently, the 25-item youth digital skill indicator (ySKILLS; Helsper et al., 2020) was included to examine these relationships since it has been validated in both cross-cultural research and for the adult populations. To reduce survey length and respondent burden (DeVellis, 2016), the skill items were reduced to two items per subdimension, selecting the two items with the highest factor loadings in the original validation study (Helsper et al., 2020). This approach is consistent with recommendations for creating concise scales while maintaining content validity (Stanton et al., 2002).

Data analysis

The data analysis was carried out in two main stages: preliminary analysis and main analysis. In the preliminary stage, data was cleaned and examined for missing values, outliers, and assumptions of normality. Descriptive statistics were computed to provide an overview of the sample characteristics and the distribution of the key variables. In the main analysis stage, linear regression, moderation analysis, and interaction analysis were employed to test the thesis's hypotheses (see Chapter 6). The software used for the data analysis was SPSS Statistics (v27) and AMOS (v27).

Preliminary analysis

556 responses were collected in total. First, the data set was examined for invalid responses. 38 cases were removed due to missing values and 5 due to questionable response time, indicating potential inattentive responding (Meade & Craig, 2012; Greszki et al., 2015). As mentioned in the pilot survey, the same listwise deletion approach was used to deal with missing values, a common method when the proportion of missing data is low (Allison, 2001; Schafer & Graham, 2002). The duration in seconds for the remaining 518 respondents had the following characteristics: (a) minimum value of 230 seconds (3.8 minutes), maximum value of 8612 (144 minutes), mean of 828 (13.8 minutes), median of 673 (11.2 minutes), and a standard deviation of 669 (11.2 minutes). The lower cut-off point was set to 284 seconds (4.8 minutes) based on an examination of the distribution, following recommendations to use data-driven, rather than

arbitrary, cutoffs for response time (Greszki et al., 2015; Leiner, 2019). 5 participants were excluded based on the lower cut-off. There was no upper cut-off point similar to previously due to participants potentially being interrupted by children or calls. The analyses were performed on a sample of 513. Second, the thesis's critical variables were tested for the assumptions of normality, linearity, and homoscedasticity, which are prerequisites for linear regression analysis (Tabachnick & Fidell, 2019). Third, the different composites and subscales were calculated for each scale following the creators' recommendations. Lastly, the interaction terms were calculated through multiplications of assumed moderating variables, a standard approach for testing interaction effects in regression (Aiken et al., 2012; Jaccard & Turrisi, 2003).

Main analysis

Explanations of the intention-behavior relationship can be analyzed using two distinct methodological approaches: (1) regression of BCL and factors on the relationship between intention and behavior or (2) the regression of BCL and other factors on behavior minus intention. In the first approach, researchers conduct a straightforward regression analysis where the intention is treated as an independent variable, while behavior is the dependent variable (e.g., Bhattacharjee & Sanford, 2009). The focus here is on quantifying how much of the variance in behavior can be explained by the stated intentions. This method is direct and intuitive, providing a clear picture of the relationship between what people intend to do and what they actually do. The strength of this association – typically measured in terms of correlation coefficients or R-squared values – indicates the strength of the intention-behavior relationship (Sheeran & Webb, 2016). A strong positive association suggests a smaller gap, indicating that intentions are promising explanations of behavior. The second approach has not appeared in existing research, where intention was regressed on the difference between intention and behavior (behavior minus intention), which more intuitively reflects the conceptualization of a gap.

Employing the first approach, which involves direct regression between parental mediation intention (PMI) and parental mediation behavior (PMB), is favorable in examining BCL as a moderator for several reasons (Fishbein & Ajzen, 2010). First, this method offers a straightforward and clear analysis of the direct relationship between PMI and PMB, providing a baseline understanding of how intentions translate into actions in the realm of digital parenting. This clarity is important for establishing the foundational dynamics between these variables. Second, by using this approach, the potential moderating role of BCL in this relationship can be more directly assessed. It allows researchers to examine whether and how the presence and level of BCL alters the strength or nature of the intention-behavior link. This is particularly important in digital parenting since the role of BCL and intentions in explaining parental mediation behaviors is a new area of investigation. The simplicity and directness of this method make it particularly suitable for teasing out these complex relationships in a clear and interpretable manner, providing valuable insights for both theoretical understanding and practical application to enhance effective parental mediation.

Linear regression was employed to model the relationship between the dependent variable (parental mediation behavior) and the independent variable (parental mediation intention) (Montgomery et al., 2021). The analysis was designed to establish baseline associations between these variables – an association linked directly to the first hypothesis (H1), which postulates a positive relationship between parental-mediation intentions and behaviors. Understanding these relationships allowed for insights into patterns and informed subsequent analyses. Hierarchical regression analysis was used to examine whether the relationship between the two key variables – parental mediation intention and behavior – is influenced by

other variables, namely BCL literacy and digital skills (Gelman & Hill, 2007). BCL and digital skills are hypothesized as moderators of the relationship between intention and behavior. The study also hypothesized (H2a, b, c) that different facets of BCL have varying moderating effects on the relationship between parental mediation intention and behavior. Similarly, digital skills were hypothesized to moderate the intention-behavior relationship (H3a, b, c). The moderating effects were evaluated by adding the interaction terms as the last step of the hierarchical regression. Throughout the data analysis, gender and education level were used as control variables to account for potential confounding effects (Becker, 2005).

The results of these analyses, presented in Chapter 6, provided insights into the relationships between parental mediation intention, behavior, BCL, and digital skills. They contributed to a more comprehensive understanding of the factors influencing parental mediation practices and informed directions for future research, including interventions to promote parental mediation behaviors.

4.4 Conclusion

This chapter outlined the thesis's comprehensive mixed-methods methodological approach designed to address the research questions and test the hypotheses developed in the conceptual model (Creswell & Creswell, 2018). The methodology was structured into two main phases: developing and validating the BCL scale and testing theoretical hypotheses regarding the relationship between BCL, parental mediation intentions, and behaviors.

The first phase employed a mixed-methods approach, combining qualitative cognitive interviews with quantitative validation techniques (Creswell & Clark, 2018). This process aimed to create a robust and valid measurement instrument for BCL. The cognitive interviews provided valuable insights into participants' understanding of the scale items, ensuring content validity (García, 2011). The subsequent quantitative validation through exploratory and confirmatory factor analyses established the scale's psychometric properties (Thabane et al., 2010), resulting in the development of the CBCLS-41.

The second phase utilized the validated BCL scale and measures of parental mediation intentions, behaviors, and digital skills to test the proposed hypotheses through survey research (Fowler, 2014). This phase employed a carefully selected sample of parents, with quotas ensuring demographic diversity. The data analysis plan, incorporating linear hierarchical regression and moderation analysis (Gelman & Hill, 2007), was designed to examine the complex relationships between BCL, parental mediation intentions, and behaviors. The methodological approach established BCL's role in parental mediation, focusing on the three BCL components: types (operational, emotional, cognitive), referents (self-, children-, other-related), and behavior classes (habit- and action-related). This multi-component approach provided a comprehensive framework for understanding the various theoretical nuances of BCL and their potential impacts on parental mediation behaviors.

By combining scale development with hypothesis testing, this thesis contributes both a new measurement tool and empirical insights to the field. As presented in subsequent chapters, the results and implications of this methodological approach offer a comprehensive examination of how BCL influences parental mediation in the digital age, with particular emphasis on the differential impacts of various BCL components and their interactions with parental intentions and digital skills.

Chapter 5 — Testing the conceptualization of Behavior Change Literacy and developing the scale

5.1 Introduction

The theoretical chapter has developed a three-component theoretical model of Behavior Change Literacy (i.e., type, referents, behavior class) to explain parental mediation behaviors. A validated measurement instrument for Behavior Change Literacy (BCL) is required to test the hypothesized relationship with parental mediation behaviors. Therefore, the BCL scale must undergo rigorous qualitative validation and testing for reliability and statistical validity (DeVellis, 2016). In the language of questions, this means that the following questions require clarification:

RQ1. How can BCL be measured with high content validity?

RQ2. What are BCL scales with desirable statistical properties?

Chapter 5 answered these questions by employing cognitive interviews for qualitative validation (García, 2011) and a pilot survey for quantitative validation (Thabane et al., 2010).

The items for the BCLS v1 were created based on the theoretical framework for BCL and literacy-relevant literature (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). The cognitive interviews helped to develop a more empirically validated version of the BCLS – referred to as BCLS v2 – by uncovering and resolving scale issues related to managing cognitive effort, broadening the behavior landscape, understanding terms consistently, encouraging consistent recall timeframe and capturing responses accurately (i.e., the sequence of sections, descriptive text for each section, wording of items, and response scale all lead to high-quality responses). These resulting interviews ensured that the respondents' understanding was aligned with the intended components of the construct and that the BCLS v2 accurately captured the nuances of BCL in the context of parental mediation.

The pilot survey aimed to assess the initial reliability and validity of the BCLS v2 and develop the statistically validated BCLS v3 (Thabane et al., 2010). After evaluating reliability, discriminant validity, and measurement invariance, three validated 24-item scales (i.e., T-BCL, R-BCL, and B-BCL) were identified to answer research questions related to each theoretical component. These shorter scales are suitable for researchers who are only interested in one specific theoretical aspect of BCL or need to manage limited survey space. For example, the referents-based scale is useful for those studying social behaviors, as it provides insights into the relationship between a specific social actor (e.g., romantic partner, grandparent, or children) and the examined behavior. The Comprehensive Behavior Change Literacy Scale (CBCLS) was developed to answer research questions related to all three aspects of BCL. This latter (longer) scale is suitable for researchers interested in an in-depth understanding of the influence of all BCL nuances as they relate to a particular behavior. The comprehensive scale also provides researchers with a single scale that can be employed when they are still determining which specific scale to use.

Chapter 6 uses the CBCLS to test BCL's hypothesized influence on the link between parental mediation intention and behaviors.

5.2 Cognitive interviews: Qualitatively validating the conceptualization of Behavior Change Literacy

5.2.1 Introduction

Cognitive interviews were employed to provide a more empirically validated version of the BCLS v1 (García, 2011), created based on the theoretical framework for BCL and literacy-relevant literature, before proceeding to a statistical validation of the scale. The BCLS v2 has been refined by engaging participants in a reflective process about their comprehension of the survey items, ensuring that respondents' understanding aligns with the intended components of the construct and the nuances of BCL in the context of parental mediation (Desimone & Le Floch, 2004). The findings shed light on the underlying theory and its subtleties while also contributing to a deeper understanding of important concepts in behavioral science as well as media and communication.

5.2.2 Findings

This chapter describes the problems encountered during the cognitive interviews and explains the solutions tested and refined during the cognitive interviews. The issues and solutions are structured according to the following headings: managing cognitive effort, broadening the behavior landscape, understanding terms consistently, encouraging consistent recall timeframe for operational BCL, and capturing responses accurately (i.e., the sequence of sections, descriptive text for each section, the wording of items, and the response scale leading to high-quality responses).

Managing cognitive effort

The cognitive interviews revealed insights into optimizing the survey structure to manage participants' cognitive effort effectively. Two key ordering configurations were explored:

1. Behavior class BCL ordering: habits before actions versus actions before habits.
2. Type BCL ordering: operational items before cognitive items and vice versa.

The findings consistently indicated that beginning with habit-related questions was more effective, as participants found these more accessible to contemplate compared to action-related items. This preference was clearly articulated by one participant, Ru, who stated:

"I think that it's harder to think about one-time actions with significant others than habits" and "I remember more examples of trying to change habits than one-time actions."

Ay attributed the relative recall difficulty to the difference in frequency of undertaking a behavior, where actions are more rarely performed compared to habits. This observation aligns with the availability heuristic, a cognitive shortcut (Tversky & Kahneman, 1973). It describes the tendency to judge the likelihood or frequency of an event by how easily examples come to mind. In the context of behavior change, this means that more frequently experienced behaviors (like habits) are more easily recalled and considered than less frequent ones (like one-time actions). This might influence participants' ability to reflect on and answer questions about these different types of behaviors.

In terms of low-level ordering, the operational dimension emerged as a more suitable starting point compared to the cognitive dimension. This finding is consistent with the concreteness fading principle, which suggests that learning is more effective when instruction begins with concrete examples before moving to more abstract concepts (Fyfe et al., 2014). The concreteness fading principle is a pedagogical concept where learners initially grasp ideas better through tangible, specific examples. Gradually, the instruction transitions to more abstract representations of the same concepts. In the context of the BCL survey, operational items, which deal with real-world actions, serve as the concrete starting point, making it easier for participants to subsequently understand the more abstract cognitive aspects of behavior change.

These findings have implications for the design and structure of the BCLS and related scales. By prioritizing habit-related questions and leading with operational items, the survey can potentially reduce respondents' cognitive burden, leading to more thoughtful and accurate responses. This approach aligns with the concept of cognitive economy, which suggests that people tend to minimize cognitive effort when processing information (Fiske & Taylor, 2013; Rosch, 1978). Cognitive economy refers to the human tendency to favor the least demanding cognitive pathways when solving problems or making decisions. By structuring the survey to begin with more easily accessible questions (about habits and operational aspects), the survey design respects this principle, reducing the cognitive load on participants and potentially improving the quality of their responses (Krosnick, 1991).

Broadening the behavior landscape

The cognitive interviews revealed a significant challenge in conceptualizing and measuring BCL: participants predominantly associated habits with nutrition and exercise. This narrow focus threatened the intended general nature of BCL, which aims to encompass a broad spectrum of behaviors across various life domains. Participants' responses consistently gravitated towards diet and physical activity, as exemplified by the following quotes:

Changing my eating window by reducing my dinner (Seb)

I'd like to stop eating chocolate (Ang)

Every day, I think of doing lots of exercises (Mad)

So then now, I stopped completely having the tea with my meal (Aye)

My first thought is: running and exercise (Ste)

I tend to find myself in the kitchen eating biscuits, and I'm trying to minimize that (Sey)

My main bad habits are not exercising and probably eating habits (Jo)

To address this limitation and ensure a more comprehensive understanding of BCL, explanatory texts were introduced that explicitly highlighted diverse behavior categories:

Habits can be related to the **digital** (e.g., placing the phone in the living room before entering the bedroom for sleep), **physical activity** (e.g., going for a walk after lunch), **nutrition** (e.g., buying fruits instead of snacks), **relationships** (e.g., asking a significant other how they are doing every day), **finances** (e.g., reviewing your monthly expenses on the last Sunday of the month), or **learning** (e.g., doing a lesson on a foreign language before you go to work every day).

This approach effectively broadened participants' perspectives, encouraging them to consider a wider range of habits beyond the initial focus on diet and exercise. This approach is rooted in the principle of context effects in survey research, where providing respondents with a broader frame of reference can significantly impact their cognitive processing and subsequent

responses (Sudman et al., 1996). By offering examples across multiple domains such as digital behaviors, relationships, finances, and learning, the explanatory texts aimed to activate a wider range of cognitive schemas, thus encouraging participants to consider a more diverse set of behaviors (Krosnick, 1999).

Similarly, to address the overreliance on exercise and nutrition when discussing actions, an additional explanatory text was introduced:

Actions can be related to the **digital** (e.g., installing an app), **physical activity** (e.g., signing up for gym sessions), **nutrition** (e.g., putting motivational post-its on the fridge), **supporting** (e.g., reminding people of something) or **appreciating others** (e.g., writing a thank you note), **finances** (e.g., doing taxes), **health** (e.g., scheduling a doctor's appointment), or **learning** (e.g., borrowing a book from somewhere).

These explanatory texts effectively guided participants to consider a more diverse range of behaviors. Participants actively engaged with these examples while thinking aloud about different behaviors, as evidenced by Br's reflection:

"The explanations at the start were perfect. They were really good; they gave you examples that get you thinking about yourself and how you can relate to them."

This comment demonstrates how the explanatory text prompted participants to think more critically and broadly across various domains.

The implementation of explanatory texts with diverse behavior categories represents a methodological improvement in measuring BCL. This approach addresses the cognitive tendency to over-rely on health-related behaviors, an important theoretical discovery for researchers interested in interdisciplinary behavioral phenomena. The risk of overreliance on a single domain has been mitigated by explicitly presenting a wide array of behavior categories. However, it is important to consider the potential impacts of providing examples in survey design. As Tourangeau et al. (2000) note, the introduction of examples can frame questions in ways that may inadvertently exclude other options in respondents' minds. While offering a wide range of examples can mitigate this issue, it may also increase cognitive load and potentially lead to confusion among respondents (Dillman et al., 2014). Schwarz and Oyserman (2001) suggest that careful consideration must be given to the balance between providing sufficient context and avoiding undue influence on responses. The current approach struck this balance, resulting in a BCLS that captures a more comprehensive and accurate representation of individuals' BCL across diverse life domains. Future iterations of the scale may benefit from further refinement of these explanatory texts, considering the ongoing discourse in survey methodology literature on the optimal presentation of examples and contextual information.

Understanding terms consistently

Providing examples and clear definitions as an essential strategy

Providing examples and clear definitions emerged as an essential strategy for ensuring consistent interpretation of abstract concepts. This approach is supported by research on concept formation and understanding, describing the cognitive process by which we learn to categorize and understand the world around us (Engeström & Sannino, 2012). Rosch (1978) argued that concepts are often understood through prototypical examples rather than abstract definitions alone. Similarly, Lakoff (1987) emphasized the role of concrete examples in

grounding abstract concepts. In the context of survey design, Tourangeau et al. (2000) highlighted the importance of providing clear definitions and examples to reduce measurement error arising from respondent misinterpretation. The subsequent sections discuss this approach in greater depth. Overall, participants consistently emphasized the need for concrete examples to grasp abstract concepts such as "principles and ideas" related to behavior change techniques:

"Sometimes it's as if you need an example for some things to understand them, and this [principles and ideas] is one of those cases in which I would need an example." (Je)

The difficulty participants experienced in understanding abstract terms without examples echoes findings from cognitive interview studies in various fields. For instance, in health literacy research, Baker (2006) found that providing concrete examples significantly improved respondents' comprehension of complex medical terms. By including examples in explanatory texts for complex terms, the measurement instrument can more accurately capture participants' true levels of BCL. This enhancement ensures that responses reflect genuine understanding rather than confusion about terminology.

Explanatory texts for all terms that participants found challenging were systematically incorporated with examples. This methodological refinement ensures a more accurate and consistent measurement of BCL across its dimensions, aligning the empirical operationalization more closely with the theoretical framework.

Specifying the social referents (referent-related BCL)

The cognitive interviews provided important insights into the referent component of BCL, a fundamental aspect of the proposed BCL model. This theoretical component distinguishes between self-related, child-related, and other-related BCL. This is aligned with research on social cognitive theory, which shows that individuals learn behaviors, norms, and attitudes through observing and imitating others, especially significant people as role models (Bandura, 2001; Christakis & Fowler, 2013). Notably, participants demonstrated ease in understanding self-related and child-related items but struggled with other-related items. Initially, they struggled with other-related items, particularly the term 'significant others', which led to an overly narrow focus on romantic partners. Pa's comment illustrates this: "And again, 'significant others', I'm thinking about my wife there, on that." This limited interpretation risked undermining the broader social context that other-related BCL aims to capture.

To address this issue, several key changes were implemented, drawing on best practices in survey design and cognitive interviewing (Tourangeau et al., 2000; Willis, 2004). First, the term 'significant people' was adopted instead of 'significant others' to encourage a broader perspective, aligning with research on social networks and behavior change (Smith & Christakis, 2008). Second, the following introductory text was added: "Here are a number of people that you might think of as significant others. Would you personally consider these significant people in your life aside from your child(ren)?" followed by multiple-choice options, including various family members, friends, and colleagues. Third, continuous reminders on relevant item pages (i.e., "These are the current significant others in your life: {Selected Choices}. Please keep them in mind when you think about your responses" were implemented, a technique shown to improve response consistency in longitudinal surveys (Lavrakas, 2008).

These modifications ensured a more consistent understanding of other-related BCL across participants. While most participants still focused on partners, a minority provided more diverse responses based on the reminders. Notably, a participant without a partner focused more on

friends, validating the broader conceptualization of other-related BCL. Participants reported slight variations in behavior change influence and success depending on the significant other or child considered. This aligns with the conceptualization of BCL as general literacy applicable across referents while acknowledging nuanced applications. Participants reported that the influence and success of behavior change varied slightly but not substantially depending on which significant other or child they considered. This observation aligns with the thesis's conceptualization of BCL as a general literacy that can be applied across different referents (self, children, others), while acknowledging potential nuances in its application.

These findings have important implications for the theoretical framework. First, they highlight the importance of clearly defining the 'others' in other-related BCL to ensure consistent measurement across participants, an important aspect of construct validity (Messick, 1995). Second, they suggest that while individuals may experience varying degrees of influence from different social relationships, they can provide meaningful aggregate assessments of their other-related BCL, supporting the use of composite measures in social influence research (Valente, 2012).

The refinement of the 'significant people' concept marks an advancement in accurately capturing BCL's referent component, addressing potential limitations in social network measures (Marsden, 2011). This enhancement lays the groundwork for more nuanced investigations into how BCL operates across different referents, strengthening the thesis's theorization of BCL and contributing to the broader literature on social influence in behavior change (Latkin & Knowlton, 2015).

Separating non-habitual and habitual behaviors (behavior class-related BCL)

The framework distinguishes between behavior initiation and behavior maintenance, reflecting the behavioral science categorization of high-impact one-time behaviors like vaccination and high-impact habitual behaviors like exercising (Harper et al., 2004; Rothman et al., 2011). The challenge of operationalizing this distinction in the context of BCL aligns with broader issues in behavior change research.

Initially, various terms were considered to capture this distinction, including behaviors, habits, actions, activities, and practices. Activities and practices were excluded early on due to poor contextual fit. The interviews revealed that participants found it most intuitive to conceptualize behaviors as either habits or actions, aligning with the theoretical framework's binary classification. However, the empirical observations highlighted some initial challenges in operationalizing this distinction. Some participants had difficulty differentiating between the two when probed for examples and ended up answering the questions about actions in the same way they had answered the questions about habits. More specifically, actions were generally more difficult for participants to conceptualize and think of examples compared to habits, suggesting a potential bias in the ease of accessing habit-related versus action-related BCL.

"I think that it's hard because these are things are not habits. It's a bit harder to come up with these sorts of actions that you do because it's things that you do rarely." (Jenny)

Several refinements were made to address these challenges and align the operationalization with the theoretical framework. First, the terms "behavioral habits" and "actions" were adopted to delineate the two behavior classes clearly. Second, the definitions of habits and actions in the explanatory text were refined over time to

Behavioral habits refer to behaviors you do regularly (i.e., daily or weekly) with low conscious effort or intentionality.

Actions refer to behaviors that involve some effort, intentionality, and deliberation. Actions are done once, rarely, infrequently, or occasionally, but not habitually. You usually find these on to-do lists.

Lastly, the explanatory text included a general direction for actions (i.e., "You usually find these [actions] on to-do lists") to help participants more effectively identify actions and distinguish between the two behavior classes. These final conceptualizations draw on established definitions in the field. The description of habits as behaviors performed regularly with low conscious effort is consistent with prominent definitions in habit research (Gardner, 2015; Wood & R nger, 2016). Similarly, the characterization of actions as deliberate, infrequent behaviors aligns with conceptualizations of goal-directed behavior in psychological literature (Ajzen, 1991; Bouton, 2021; Gollwitzer, 1999).

These refinements address the empirical challenges while maintaining alignment with the theoretical framework. They clarify the distinction between habit-related and action-related BCL, which supports accurately measuring these constructs.

Two insights can be derived. First, participants can meaningfully differentiate between these behavior classes when provided with clear definitions and examples. This observation empirically supports the theoretical distinction. Second, habitual behaviors are more readily accessible to participants than one-off behaviors. This finding affirms the recommendation to manage cognitive effort by starting with the habitual behavior section.

These refinements in the conceptualization and measurement of habit-related and action-related BCL represent a step forward in accurately capturing the behavior class component of the thesis's theoretical framework. This enhancement sets a foundation for more nuanced investigations into how BCL operates across different types of behaviors, strengthening the BCL's overall theoretical and empirical basis.

Distinguishing behavior valence

The cognitive interviews provided valuable insights into the operationalization of behavior valence within the BCL framework, building on existing literature that classifies behaviors into positive/healthy (e.g., exercise) and negative/harmful (e.g., smoking) categories based on their consequences for specific outcomes like health (Kiviniemi, 2018; Rothman & Salovey, 1997). The theoretical framework of this thesis proposed the nuanced distinctions between discontinuing negative habits, establishing positive habits, avoiding negative actions, and performing positive actions (de Boer et al., 2011).

Various terminological pairs were initially considered to capture this valence: negative-positive, desirable-undesirable, and good-bad, reflecting the ongoing debate in behavior change literature about how to frame behavioral goals (Carver & Scheier, 2001; Higgins, 1997). The cognitive interviews revealed that the good-bad dichotomy resonated most clearly with participants, aligning with research on the intuitive understanding of moral language (Haidt, 2001). However, the interviews also uncovered challenges in operationalizing the concept of "bad" behaviors, consistent with findings on the difficulties of self-assessment in behavior change contexts (Dunning et al., 2004). Participants struggled to conceptualize and provide examples of bad actions, as exemplified by Ang's comment:

“I don't know what an example of a bad action would be. I'd say generally, I don't think I tend to do bad things. I don't know. That's quite --some of the questions are quite difficult.”

This difficulty conceptualizing bad behaviors suggests that individuals may be biased toward perceiving their behaviors as neutral or positive, potentially due to self-serving biases or social desirability effects (Grimm, 2010; Klayman, 1995). It also highlights the subjective nature of behavior valence, which needs to be integrated into BCL measurement theory.

Participants tended to frame the goal as being good at avoiding bad behaviors, as illustrated by Lor's interpretation:

“It means that one-time actions that are bad, so I shouldn't do them. And if I'm good at not doing it, I would do the right thing if I do what is good.”

This framing aligns with the theoretical distinction between approach and avoidance motivations in behavior change literature (Elliot, 2006), suggesting that the BCL scale should account for both types of motivations in assessing literacy. Approach motivation involves striving towards a desired outcome (e.g., establishing a good habit), while avoidance motivation involves moving away from an undesired outcome (e.g., getting rid of a bad habit). Compared to the usage of ‘good habits’, the decision to change the ‘positive’ qualifier for actions and replace it with terms like ‘important’ (e.g., “I manage to do important actions”) reflects research on the varying consequences of actions (Gollwitzer & Sheeran, 2006). For instance, getting vaccinated represents an action with a high expected positive value, while excessive social media browsing might have a low or even negative value. This approach acknowledges that actions can have different levels of expected value, aligning with expectancy-value theory of behavior (Wigfield & Eccles, 2000). Expectancy-value theory proposes that motivation to engage in a behavior is determined by two main factors: the expectancy of success (belief that one can perform the behavior) and the subjective value placed on the outcome of that behavior. In the context of BCL, this means that individuals are more likely to attempt and succeed in actions they believe they can do (expectancy) and that they believe will lead to desirable results (value).

Some participants associated ‘bad’ with immoral actions, as evidenced by Ang's statement that “nobody wants to do bad actions”, reflecting the complex interplay between moral judgments and behavior evaluation (Bandura, 2001; Haidt, 2007). This conflation introduces an additional layer of complexity to the BCL framework, suggesting the need for future iterations of the scale to more explicitly differentiate between actions that are “bad” in terms of personal consequences versus those that are morally questionable, in line with research on moral decision-making (Greene et al., 2001).

To address these challenges and align the operationalization with the theoretical framework, the BCL scale was refined to include items with and without the good-bad qualifiers. This approach allows for a more comprehensive assessment of BCL that captures both valence-specific aspects (e.g., “In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits”), non-valence-specific elements (e.g., “I know how to help my child(ren) do difficult actions”), reflecting the multidimensional nature of behavior (Shuman et al., 2013).

These findings underscore the importance of carefully considering language and framing when assessing BCL, particularly in relation to behavior valence, echoing research on the impact of

framing effects in behavior change interventions (Gallagher & Updegraff, 2012; Rothman & Salovey, 1997). They also highlight the need for the BCL framework to account for the subjective and context-dependent nature of behavior valence, as well as the potential influence of cognitive biases and moral considerations on individuals' perceptions of their own actions and habits, aligning with research on the role of self-perception in behavior change processes (Bem, 1972; Fazio, 1987).

Emphasizing focus on important behaviors

The cognitive interviews provided valuable insights into operationalizing the concept of *importance* within the BCL framework. This refinement aligns with the observation that behaviors vary in expected consequences, ranging from highly to slightly positive or negative outcomes (Gardner et al., 2022; Wigfield & Eccles, 2000). For instance, getting vaccinated represents an action with a high expected positive value, while turning off social media notifications to avoid excessive phone usage might provide only a slight positive benefit since several other types of notifications could trigger a person to use the phone excessively.

The BCL framework aims to capture literacy related to behaviors individuals perceive as significant or impactful, reflecting the subjective nature of behavior evaluation (Ajzen, 2005). It appears considerably less relevant if an individual does not perform behaviors that they perceive to have low importance. Consequently, it is beneficial for BCL to assess the literacy related to important behaviors instead of general behaviors only. The expected value of behaviors varies depending on the specific context (e.g., there is no value in installing parental controls when the child is a toddler and cannot use devices) (Wigfield & Eccles, 2000). The items focused on subjective evaluations of important behaviors (e.g., "I know how to help significant people do important actions"). They appeared to work well in capturing the high contextuality of important behaviors.

Participants' responses during the think-aloud exercises revealed nuanced perspectives on important behaviors. Lor's comment illustrates the complex decision-making process individuals engage in when evaluating the importance and consequences of their behaviors:

"Actually, I think about maybe some things I would say that they're not so good that I shouldn't do them because, I don't know, drinking alcohol is always bad, but sometimes I do. But if they're really bad, I won't do them. But in some cases, there would be things I would consider bad, not good for my health, but sometimes I would do them." (Loreen)

This response highlights the subjective nature of behavior evaluation and the potential conflict between knowledge of a behavior's negative consequences and the decision to engage in it. Such insights are important for the BCL framework, as they underscore the need to assess not only knowledge of what constitutes important behaviors but also the ability to prioritize and execute these behaviors in the face of competing motivations.

The interviews revealed that participants employ various strategies to manage important behaviors, exemplified by Sey's techniques: "jotting them down, verbalizing 'I'm going to do this', and even setting the alarm." These reflect the self-regulation techniques discussed in the literature on implementation intentions and habit formation (Gollwitzer & Sheeran, 2006; Wood & Runger, 2016). These observations suggest an interplay between the cognitive, emotional, and operational BCL for important behaviors by recognizing their significance and implementing practical strategies to ensure their execution.

Interestingly, some participants, like Ang, believed that improving their skills for important behaviors was unnecessary, considering their current performance adequate. The finding aligns with research on optimism bias and the Dunning-Kruger effect in self-assessment (Dunning, 2011; Sharot, 2011). Optimism bias is the tendency to overestimate the likelihood of positive events and underestimate the likelihood of negative events happening to oneself. The Dunning-Kruger effect is a cognitive bias where individuals with low competence in a particular area tend to overestimate their ability, while those with high competence may underestimate their ability. This highlights the challenge of accurately assessing one's own capabilities in behavior change.

The exploration of difficulty as an additional qualifier in BCL assessment is supported by goal-setting theory and research on effortful goal pursuit (Locke & Latham, 2002). The hypothesis that perceived difficulty correlates with importance aligns with theoretical understandings of goal-directed behavior, where important goals often require more effort and resources to achieve (e.g., Aelenei et al., 2017; Oyserman et al., 2018). Examples of difficult yet important actions, such as scheduling and attending medical appointments, illustrate this connection.

The interviews revealed some overlap in participants' understanding of 'important' and 'difficult' actions, supporting the theoretical link between these concepts in the BCL framework. However, when presented without context, the inconsistent interpretation of these qualifiers underscores the need for clear examples and explanations in the BCL scale. The following was added to the introductory text:

Difficult actions are those actions that people are prone to procrastinate on or have to push themselves to do. They depend on the person, but here are some examples of actions that people generally consider difficult: discontinuing romantic relationships or close friendships, sending an application for an educational or career opportunity, quitting a job, or signing up and showing up for the first voluntary workday.

Important actions also depend on the person, and they can overlap with difficult actions, but they do not have to. For example, it might be important for you to apply for a new educational or career opportunity, and you don't find it very difficult, nor are you likely to procrastinate. Whether they are difficult or not, they are important in that they can provide opportunities or prevent negative consequences (harm) for you or your significant others in your life. For example, apologizing for a mistake you made that damaged a relationship, or setting up a filter on a streaming platform like YouTube so that your child can't access adult content.

The refinement of the concepts of importance and difficulty in relation to behavior supports the development of a BCL scale that can more accurately assess individuals' literacy in identifying, prioritizing, and executing actions with significant potential impacts. This approach aligns with contemporary theories of behavior change and motivation, enhancing the theoretical grounding and practical utility of the BCL framework.

Framing improvement (emotional BCL)

The cognitive interviews provided valuable insights into operationalizing the concept of *improvement* in BCL as part of the emotional dimension. The motivation for improvement of BCL was identified as an important quality in assessing the attitude towards behavior change component of emotional BCL, aligning with research on self-improvement motivation and its role in behavior change (Sedikides & Hepper, 2009; Taylor et al., 1995). The initial

operationalization was phrased as “it can have negative consequences if I'm not skilled at establishing good” habits or actions. This framing draws on the concept of perceived consequences, which has been shown to influence attitudes and behavioral intentions in various domains (Fishbein & Ajzen, 2010). However, the interviews highlighted a nuanced challenge in operationalizing this aspect of BCL. Some participants, like Ru, expressed confusion about the term ‘skilled’ in this context:

"What is meant here, with 'skilled'? So, that means I am better at making plans, not to deviate from plans, trying to stick with plans to develop good habits, try not to fall into temptations."

The term ‘better’ emerged as more accessible and less likely to be misinterpreted than ‘skilled’. This refinement helps the BCLS assess an individual's attitude towards behavior change more accurately, which should be closely related to the individual's ability to initiate and maintain behavior change. This adjustment is consistent with principles of cognitive interviewing and scale development, which emphasize the importance of using language that resonates with respondents' understanding and experiences (Tourangeau et al., 2000; Willis, 2004).

By framing improvement in terms of becoming ‘better’ rather than being ‘skilled’, the scale may tap more accurately into individuals' beliefs about their capacity for growth and change, a key aspect of emotional BCL.

Understanding behavior change theory and techniques (cognitive BCL)

The cognitive interviews provided important insights into the operationalization of the cognitive BCL, particularly in distinguishing between knowledge of theory and techniques. This two-fold distinction is fundamental to the BCL framework, which aims to capture both the practical and theoretical aspects of behavior change knowledge, mirroring a popular approach to organizing knowledge in the behavior science field (Michie et al., 2008, 2013).

Participants generally understood the term ‘practical techniques’, which aligned with the intended conceptualization of concrete strategies for behavior change. However, selecting an appropriate term for theoretical knowledge proved more challenging. After considering various options, such as theories, frameworks, models, ideas, and principles, the terms "ideas and principles" were chosen for their inclusivity and accessibility, reflecting recommendations for clear communication in scale development (DeVellis, 2016).

After participants showed initial difficulties, the following explanations were added:

Techniques are related to rewards (e.g., giving "stars" when a child does something good on a board), punishments (e.g., making someone do the dishes if they use their phone at meal time), persuasion (e.g., being clear and motivating when talking to others), designing your environment (e.g., putting sweets in a lockable container), practical solutions (e.g., leaving the phone outside the bedroom and buying a separate alarm if the phone was used as an alarm), reminders (e.g., using a calendar or lists), or constructive role models (e.g., pointing to someone who was not good at math but became really good at it).

Principles and ideas are your understanding and reasoning about why techniques might work or not. For example, you might have heard of the idea that starting with a mini habit that is "too easy to fail" on the road to changing ‘bigger’ habits is more likely

to be successful than starting with the more difficult-to-change bigger habit. Another concrete example is: understanding that not having snacks at home might work as a technique because the principle behind it is that it considerably increases the effort needed to eat a snack.

The interviews revealed a spectrum of understanding regarding this distinction. Most participants, like Laur, demonstrated a clear grasp of the difference:

“Because when I read that part at the top of the explanation, I thought of the technique that I used, and then for principles and ideas, I was thinking about what the reasoning behind that was.”

This response indicates that with proper explanation, individuals can meaningfully differentiate between practical techniques and underlying principles, supporting the validity of this distinction within the BCL framework.

A fundamental issue emerged in distinguishing between explicit and implicit knowledge and in categorizing responses as either practical techniques or theoretical principles. Jo's comment illustrates this difficulty:

“I'm just trying to think of practical techniques that make you act upon your intention. With the practical techniques, I can't think of any. I guess, if I have an intention to do something, I just do it. I don't really think about any techniques or anything.”

This response highlights a key challenge in assessing cognitive BCL: individuals may possess and utilize behavior change knowledge without explicitly recognizing or labeling it as such. This observation aligns with cognitive psychology theories of implicit learning and tacit knowledge (Seger, 1994; Ten Berge & Van Hezewijk, 1999). The observation that individuals may possess and utilize behavior change knowledge without explicitly recognizing it suggests that BCL may operate at both conscious and unconscious levels, consistent with dual-process theories of cognition (Evans, 2008; Kahneman, 2011). Dual-process theories propose that human cognition operates through two distinct systems: System 1, which is fast, intuitive, and unconscious, and System 2, which is slow, deliberate, and conscious. In the context of BCL, this suggests that individuals may have implicit knowledge of behavior change principles (System 1) that they use automatically, even if they cannot articulate them explicitly (System 2). This has implications for how BCL is measured, as it may require assessing both explicit and implicit knowledge.

These findings underscore the need for clear, accessible language and examples when assessing cognitive BCL. While scientifically sound, the distinction between techniques and theory may require additional explanation or contextualization in the BCL scale to ensure accurate responses. Moreover, the operational BCL should ultimately capture the difficulty of articulating implicit knowledge. However, interested researchers could explore developing items that assess not only what individuals can explicitly state about behavior change but also their ability to apply behavior change principles in hypothetical scenarios.

These refinements align the operationalization of cognitive BCL more closely with the theoretical background. This ensures that BCL assesses an individual's behavior change knowledge more accurately, enabling a better approximation of an individual's ability to initiate and maintain behavior change.

Encouraging consistent recall timeframe (Operational BCL)

The cognitive interviews revealed critical insights into the temporal aspects of BCL, particularly in relation to the operational dimension. These findings underscore the importance of specifying consistent recall timeframes to ensure accurate and comparable assessments of BCL across participants. The theoretical framework of BCL posits that operational literacy involves the successful implementation of behavior change strategies over time. However, the interviews uncovered a significant challenge in operationalizing this concept: participants varied widely in their self-selected recall periods when not given specific temporal boundaries. This variability threatens the validity and reliability of BCL measurements, as different timeframes could lead to inconsistent self-assessments (Schwarz & Oyserman, 2001).

Most participants defaulted to recent years or the period since the onset of the COVID-19 pandemic when no specific timeframe was provided. This tendency was exemplified by Jo's initial reflection:

"I'm wondering if I should think about it since adulthood or since the last year, or since COVID. I would think it would be since the pandemic."

This tendency aligns with the availability heuristic, where individuals rely on immediate examples that come to mind when evaluating a specific topic (Tversky & Kahneman, 1973). This observation highlights the potential for external events, such as the pandemic, to serve as temporal anchors in participants' minds, potentially skewing their self-assessments of BCL.

The interviews also revealed that participants could provide nuanced responses when given specific timeframes. Ste's response to a 12-month recall period demonstrates this:

"In the last 12 months, I intentionally formed new good habits. I wouldn't say so over the last 12 months. I don't feel as though I've changed the things that have changed for me in the last 12 months. So I'd say that was 'rarely'."

This level of specificity in response suggests that well-defined timeframes enable participants to more accurately assess their behavior change efforts and successes, aligning with the operational dimension of BCL. This finding is consistent with research on autobiographical memory, which shows that specific cues can enhance the accuracy of recall (Conway & Pleydell-Pearce, 2000).

Based on these findings, the BCL scale was refined to include explicit timeframes for operational items, with two primary reference periods: 12 months and 5 years. This dual timeframe approach serves several purposes:

1. It allows for the assessment of both recent and longer-term behavior change efforts, capturing the multifaceted nature of BCL (Middleton et al., 2013)
2. It provides a standardized basis for comparison across participants, enhancing the scale's reliability (DeVellis, 2016)
3. It encourages participants to reflect more critically on their behavior change experiences, potentially leading to more accurate self-assessments (Schwarz, 1999)

The inclusion of these specific timeframes aligns the operational dimension of the BCL scale more closely with the theoretical framework, which emphasizes the importance of assessing concrete behavior change successes over time (Prochaska, 1991). By standardizing the recall periods, the scale can more accurately capture an individual's track record of successful behavior change, a key component of operational BCL.

This refinement represents a methodological improvement in the measurement of BCL. It addresses the challenge of temporal variability in self-assessment, ensuring that the operational dimension of BCL is measured consistently across participants. This enhancement increases the validity and reliability of the BCL scale, providing a more robust foundation for future research and practical applications.

Capturing responses accurately

The cognitive interviews provided valuable insights into optimizing response options for the BCLs, enhancing its ability to accurately capture the multi-component nature of BCL. These refinements align closely with the theoretical framework, which conceptualizes BCL as comprising cognitive, emotional, and operational dimensions, reflecting established models of literacy (Bröder et al., 2017; Domanska et al., 2020).

For the cognitive dimension, a 5-point identification or truth scale was employed, ranging from "Not at all true of me" to "Very true of me". This scale's effectiveness in assessing knowledge and skills has been demonstrated in previous digital literacy research (Helsper et al., 2020), making it particularly suitable for measuring the cognitive aspects of BCL. This approach is consistent with best practices in psychometric scale development, which emphasize the importance of using appropriate response formats for different types of constructs (DeVellis, 2016). A key enhancement was the inclusion of an "I don't understand what this means" option, which participants found valuable. As Jen noted:

"It's good that I can just select 'I don't understand what this means'. The option is helpful because I genuinely don't understand principles and ideas."

This addition allows for a more nuanced assessment of cognitive BCL by distinguishing between a lack of knowledge and a lack of understanding of the concept itself, addressing a common challenge in cognitive assessment (Tourangeau et al., 2000).

The emotional dimension, which encompasses attitudes and self-efficacy related to behavior change, utilized a 5-point agreement scale. This choice reflects common practices in attitude (e.g., Chen & Wells, 1999) and self-efficacy measurement (e.g., Chen et al., 2001). The scale was refined to use "Somewhat agree/disagree" instead of "Slightly agree/disagree", encouraging more nuanced responses and providing clearer distinctions between levels of agreement.

A modification was made to the operational dimension, shifting from a truth scale to a 5-point frequency scale (Almost never to Almost always). This change better aligns with the theoretical conceptualization of operational BCL as the successful implementation of behavior change over time, reflecting the dynamic nature of behavior change processes (Prochaska, 1991). The frequency scale more accurately captures the regularity of behavior change efforts, consistent with approaches used in habit formation research (Gardner, 2015).

Across all dimensions, the "I don't know" option was replaced with "I don't want to answer". This adjustment clarifies the purpose of the option, moving from an indication of uncertainty to a choice not to disclose information. It respects respondents' autonomy while potentially reducing the likelihood of selecting this option due to mere uncertainty, addressing concerns about response bias in self-report measures (Krosnick et al., 2002).

These refinements in response options enhance the BCLS's ability to accurately measure the different facets of BCL. By providing more nuanced and theoretically aligned response choices, the scale can better differentiate between varying levels of BCL across its cognitive, emotional, and operational dimensions. This improved measurement precision is important for advancing our understanding of BCL and its role in successful behavior change.

Understanding social behavioral perceptions (other- and child-related BCL)

The cognitive interviews provided valuable insights into the complexities of other- and child-BCL, highlighting the nuanced challenges individuals face when attempting to influence or support behavior change in others. These findings offer empirical support for the theoretical distinction between self-related, other-related, and child-related BCL within the framework aligning with social cognitive theory and the concept of reciprocal determinism (Bandura, 1978; Baranowski, 1990). Reciprocal determinism is a key component of social cognitive theory. It proposes that a person's behavior both influences and is influenced by personal factors (like cognitions and emotions) and the social environment. This dynamic interplay is crucial to understanding BCL, as it highlights how an individual's ability to change behavior is not solely determined by internal factors but is also shaped by the social context and, in turn, shapes that context.

Challenges in observing and influencing others' behaviors

Participants consistently reported difficulties in accurately assessing and influencing the behaviors of those not living with them. This challenge aligns with the proximity principle in social psychology, which suggests that our interactions and relationships with those who are physically or emotionally close to us have a stronger influence on our behavior than those who are distant (Thoits, 2011). The COVID-19 pandemic exacerbated this challenge, as Steph articulated:

"I'm not seeing that person a lot, especially during COVID, even the people I live in the same city. I don't know their habits, I don't know what they've been doing, and things like that. I thought about my best friend because I talk to her every single day. But even then, I don't know all her bad habits because I don't observe her behavior; she lives in the US."

This observation underscores the importance of proximity and direct observation in other-related BCL, suggesting that the effectiveness of behavior change support may be limited by physical distance and lack of regular interaction, consistent with research on social support and behavior change (Heaney & Israel, 2008).

The challenge extends to child-related BCL, particularly when children are not consistently in the home environment. Pa's experience with his son living in student dormitories illustrates this:

"He [his son] was aware of it before he went, but since he's been away, as I said, we can't influence it there. And if he chooses to pick up other habits while he's there –

which is, yeah, sleep when he wants to sleep, fall asleep with the TV on, and things like that – he’s got into those new habits.”

This observation is consistent with research on parental influence during the transition to college (Larose & Boivin, 1998). This finding aligns with ecological systems theory, which posits that human development is shaped by a series of nested environmental systems (Bronfenbrenner, 1979). These systems range from the immediate environment (microsystem, such as family and home) to broader societal influences (macrosystem, such as cultural values). The theory emphasizes the interactions between these systems and their combined impact on an individual's growth and behavior. In Pa's case, his son's behavior is being influenced by the microsystem of his dormitory, which is outside of Pa's direct influence.

These insights, from both other-related and child-related BCL contexts, underscore the complex interplay between individual agency, social influence, and environmental factors in behavior change processes. They support the multi-faceted nature of BCL as conceptualized in the theoretical framework, highlighting that BCL is not solely an individual attribute, but is also shaped by the social and environmental context.

Diverse approaches to supporting others' behavior change

The diverse approaches to supporting behavior change in others described by participants align with several established theories and frameworks in behavioral science and parenting literature. These strategies demonstrate the multifaceted nature of other-related and child-related BCL and reflect various evidence-based techniques for promoting behavior change.

Encouraging alternatives, as exemplified by the participant who would not oppose a less optimal habit (e.g., golf) if it is an improvement over a current habit (e.g., excessive video gaming), aligns with the concept of harm reduction in behavioral interventions. Harm reduction is a pragmatic approach to behavior change that prioritizes minimizing the negative consequences of a risky behavior, rather than necessarily eliminating the behavior altogether. In the context of other-related BCL, this means accepting and even encouraging less-than-ideal behaviors if they represent a step in the right direction, reducing overall harm compared to the initial behavior. This approach, often used in addiction treatment, focuses on reducing negative consequences rather than eliminating the behavior entirely (Marlatt, 1996).

Co-participating, such as the participant offering to learn a language alongside their partner to support habit formation, resonates with social learning theory (Bandura, 1977). This theory posits that individuals learn by observing and imitating others, particularly those close to them. In the family context, this approach can be particularly effective as it leverages the power of modeling and shared experiences in behavior change (Sanders & Woolley, 2005).

The use of rewarding strategies, illustrated by the mother using a star chart for homework completion (i.e., “I think the thing with getting my children they do their homework, I've actually got a chart on the fridge and they get a star every time they do their homework on time”), is grounded in operant conditioning principles (Skinner, 1963). This behavioral approach has been widely applied in parenting and education, with research supporting the effectiveness of token economies and positive reinforcement in shaping children's behaviors (Kazdin, 1981).

Creating supportive environments, emphasized by the participant who highlighted the importance of a support network, "I did have that support from people around me. So that

support network. I feel like part of that for a lot of people, and that has helped them to change their good intentions and actions", aligns with ecological systems theory (Bronfenbrenner, 1979). In the context of BCL, this strategy recognizes that successful behavior change often requires a supportive social and physical environment (Sallis et al., 2015).

These diverse approaches suggest that high other-related and child-related BCL involves a repertoire of strategies tailored to specific individuals and contexts. This aligns with the concept of personalized interventions in behavior change science, which recognizes that different individuals may respond better to different strategies (Ajzen, 2005; Stieger et al., 2020). The variety of approaches described by participants also reflects the complexity of behavior change in social contexts, particularly within families.

The findings suggest that individuals with high other-related and child-related BCL are able to draw upon a range of evidence-based strategies, adapting their approach based on the specific person and situation. This flexibility and breadth of knowledge are key components of effective behavior change support, whether in parenting or other interpersonal contexts (Kazdin, 2008).

Recognizing limits of influence and respecting autonomy

The recognition of limitations in influencing others' behavior change and the emphasis on individual accountability align with several theoretical perspectives in behavior change and social psychology literature.

Self-determination theory (SDT) posits that humans have three core needs: autonomy (feeling in control of one's actions), competence (feeling effective), and relatedness (feeling connected to others); satisfying these needs fosters intrinsic motivation and well-being (Ryan & Deci, 2000). In the context of other- and child-related BCL, respecting others' autonomy and avoiding coercive tactics aligns with SDT, as forcing behavior change can undermine intrinsic motivation and long-term adherence. Lor's reflection captures this sentiment:

"I thought about maybe it's not my responsibility to do so. So I don't know if it would have negative consequences. I can't be pressured to do something. If something bad happens to them, it's their thing. I'm not in a position to value if it's bad or good. So for me, that would be different."

The concept of locus of control is also relevant here, which is a personality construct that describes an individual's belief about the causes of events in their lives (Lefcourt, 1991). It refers the degree to which individuals believe that the outcomes of their actions are contingent on their own behaviors and personal characteristics (an internal locus of control) versus being primarily determined by external forces such as luck, fate, or the influence of powerful others (an external locus of control) The participants' emphasis on individual accountability suggests understanding the importance of internal locus of control in behavior change. This perspective aligns with the theoretical emphasis on behavior change requiring self-related BCL. Ang further emphasized this point:

"I think more often it's easy to help somebody talk about their goals rather than actually do it at the end of the day; somebody has to. If somebody wants to stop a habit, whatever it might be, or start the habit, you can only really do that on your own."

This echoes the intention-behavior gap widely recognized in behavior change literature (Sheeran & Webb, 2016). This gap highlights the complex nature of behavior change and the

limitations of external influence. The technique of motivational interviewing, developed by Miller and Rollnick (2012), echoes the importance of eliciting and supporting an individual's intrinsic motivation for change, rather than imposing external pressure. This approach aligns with the participants' recognition of the limits of their influence and the need to respect others' autonomy.

These perspectives collectively suggest that high other-related and child-related BCL involves a nuanced understanding of the balance between supporting others and respecting their autonomy in the behavior change process. This balance is important for effective interpersonal relationships and successful behavior change interventions.

Developmental considerations in child-related BCL

The insights from the cognitive interviews regarding developmental considerations in child-related BCL align with established theories and research in developmental psychology and parenting literature. These observations highlight the need for a dynamic and adaptive approach to child-related BCL that accounts for children's evolving developmental stages and increasing autonomy.

The challenge of adapting parental strategies as children age is well-documented in developmental psychology. Steinberg and Silk (2002) note that as children enter adolescence, they typically seek greater autonomy and may resist parental influence more strongly. This shift is part of the normative developmental process of individuation, where adolescents strive to establish their own identity separate from their parents (Koepke & Denissen, 2012). Tul's observation highlights this challenge:

“You know, because when they reach a certain age; they want to form their own opinions. They want to resist. When they're young, they listen to you when they're older. They want to resist. I think it's the growing-up phase; they want to, and it's like trying to balance that out.”

Pet's comment further illustrates the age-specific nature of child-related BCL:

“I think it would be slightly easier to get rid of the bad habit of my 12-year-old than it would be for the 15-year-old. There is a significant difference between 12 and 15 in their personality and world knowledge or the environment around you.”

These insights suggest that effective child-related BCL must be tailored to the child's developmental stage, a concept supported by Baumrind's (1991) work on parenting styles. As children develop, parents need to adjust their approach from more direct control to a style that supports the child's growing autonomy while still providing guidance (Grolnick, 2009). In the context of digital parenting, these developmental considerations are particularly relevant. As Livingstone and Helsper (2008) note, parental mediation strategies need to evolve as children grow older and become more independent in their digital lives. This evolution requires parents to develop a flexible and adaptive BCL that can respond to their children's changing needs and capabilities.

Generational differences influencing child-related BCL

The generational differences in technology use and their impact on child-related BCL reflect broader trends in digital parenting and intergenerational dynamics. This phenomenon aligns

with the concept of the “digital generation gap” discussed in media and communication research (Bennett et al., 2008; Helsper & Eynon, 2010; Prensky, 2001). Pet's observation of gadget use as a "generational thing" and Laur's comparison of children's YouTube habits to previous generations' cartoon-watching illustrate the evolving landscape of behaviors that parents must navigate, echoing the scholarly discourse on digital natives and digital immigrants (Palfrey & Gasser, 2011).

These generational differences in technology use and understanding can create challenges for parents in effectively mediating their children's digital behaviors. As Livingstone and Blum-Ross (2020) argue, parents often find themselves struggling to keep up with rapidly evolving digital technologies and platforms that their children easily adopt. This dynamic can impact parents' self-efficacy in managing their children's digital behaviors, a key component of child-related BCL.

These generational differences extend to education, as exemplified by Beg's experience with coding homework:

“The other day, my daughter wanted help with coding. I had no idea what coding was, and she told me I was old. ‘You’re so old you don’t know what coding is. I don’t know; I have never studied it. So, most times, I can help; other times, I can’t. ‘Go ask (your) friends.’”

This experience underscores the need for parents to continually update their knowledge and skills, a concept known as "digital upskilling" in the context of parenting (Davies & Eynon, 2018). It also highlights the potential for role reversal in digital contexts, where children may become the experts, challenging traditional parent-child dynamics (Clark, 2011).

These insights reinforce the BCL framework's conceptualization of BCL as a complex, context-sensitive construct that operates differently across self-related, other-related, and child-related dimensions, aligning with ecological systems theory (Bronfenbrenner, 1979). The rapidly evolving digital context creates unique challenges for parents in developing and applying child-related BCL.

Uncovering the impact of the macro environment on behaviors through the COVID-19 pandemic

The cognitive interviews revealed valuable insights into how macro-level events, particularly the COVID-19 pandemic, influenced behavior change processes across different components of BCL. These observations provide empirical support for the theoretical framework of BCL, highlighting the dynamic interplay between environmental factors and individual behavior change efforts. This aligns with ecological systems theory, which posits that human development is shaped by a series of nested environmental systems, ranging from immediate settings (microsystem) to broader societal influences (macrosystem) (Bronfenbrenner, 1979). The pandemic, a macrosystem-level event, clearly impacted individuals' microsystems (e.g., family life, work routines) and, consequently, their behavior change efforts.

The pandemic served as a catalyst for behavior changes, both positive and negative, across self-related, child-related, and other-related BCL. It presented a significant source of stress for many individuals. Stress and coping theory provides a framework for understanding how individuals respond to such stressors (Lazarus & Folkman, 1984). This theory emphasizes the cognitive appraisal of stressors (is it a threat?) and the coping strategies employed. Some participants

described developing negative habits in response to pandemic-related stress, as illustrated by Ste's account of his partner:

“She's had a bad sort of couple of years. She lost her mother, and then with COVID, she was furloughed from her job. And then she lost her job. She lost confidence and became more anxious and nervous in ways I've never seen before. She developed one or two quirky little habits, and I noticed those, and I don't think she noticed them. I've been making her aware. She's got a new job and got better, then those have disappeared.”

This example demonstrates how external stressors can disrupt existing behaviors and lead to the formation of new, potentially maladaptive, habits. Conversely, other participants reported positive habit changes during the pandemic, suggesting adaptive coping mechanisms. Jo stated:

“During the pandemic, I'd say bad habits got so much better, things like not exercising enough, maybe not eating. We go out for a walk every day, cook healthy meals every day, and stop snacking. Over the pandemic, the household as a whole established much better habits.”

These contrasting examples illustrate behavioral plasticity – the capacity of individuals to alter their behavior in response to environmental changes (Bernacer et al., 2015). They also highlight a promising avenue for future research: understanding the factors, potentially including pre-existing BCL levels, that moderate the impact of macro-level events on individual behavior change, similar to how psychological preparedness influences responses to natural disasters (Morrissey & Reser, 2003).

The pandemic also provided numerous examples of individuals actively engaging their BCL to adapt to new circumstances. Pet's account demonstrates this deliberate use of BCL:

“Especially during the pandemic, I started regular physical activity, which was a deliberate, conscious decision because I've put on a lot of weight since I'm not walking two miles from my home to the train station twice a day for work commute.”

This conscious decision to initiate a new habit in response to a changed environment exemplifies high operational BCL – recognizing a need for change and implementing an effective strategy. This aligns with the concept of adaptive capability, highlighting the importance of proactive problem-solving in behavior change (Michie, Atkins, et al., 2014).

The pandemic highlighted unique challenges in child-related BCL. Laur's observation highlights the difficulties in supporting a child's social development during periods of social isolation:

“So helping him to integrate into the new activities that he'd not had the opportunity to try. He was born in 2016. By the time he went to school in 2020, it was COVID. He didn't have all of those friendship groups form and children's parties.”

This underscores the importance of considering *developmental contexts* in behavior change strategies, as emphasized in developmental systems theory (Lerner et al., 2015). Parental mediation strategies, and the BCL required to implement them, must adapt to the child's evolving needs and the changing social environment.

The pandemic brought digital behaviors into sharper focus, presenting both challenges and opportunities for BCL. One participant's account of resisting late-night digital media engagement by using "quiet mode" on devices demonstrates the application of BCL in managing digital temptations. This aligns with research on digital self-control strategies (Lyngs et al., 2019) and highlights the growing importance of digital behavior management as a component of overall BCL.

In summary, these findings contribute to our understanding of *resilience* by highlighting BCL's role in mitigating negative impacts and fostering positive adaptation during a disruptive macro event. This aligns with the concept of *post-traumatic growth*, which describes the potential for positive psychological change following adversity (Tedeschi & Calhoun, 2004). BCL may serve as a crucial resource for individuals navigating challenging circumstances and emerging with enhanced coping skills and a greater sense of personal strength.

5.2.3 Discussion

The cognitive interviews conducted as part of this research have yielded theoretical and methodological contributions to the study of BCL and its measurement. These insights not only refine the conceptualization of BCL but also enhance the validity and reliability of the BCLS, aligning with best practices in scale development (DeVellis, 2016; Willis, 2004).

Theoretical insights

The cognitive interviews provided empirical support for the multi-component nature of BCL, validating the theoretical framework's distinctions. The interviews confirmed the theoretical distinction between BCL's operational, emotional, and cognitive dimensions, reflecting established models of literacy (Bröder et al., 2017; Domanska et al., 2020). Participants' responses demonstrated that these dimensions are distinct yet interrelated aspects of BCL. The research provided strong empirical support for the theoretical distinction between self-related, child-related, and other-related BCL, aligning with social cognitive theory and the concept of reciprocal determinism (Bandura, 1978; Baranowski, 1990). Participants' varied responses to items across these referents highlight the nuanced ways individuals approach behavior change for themselves versus others. This shows that the social context of a behavior matters for the measurement of BCL, consistent with ecological systems theory (Bronfenbrenner, 1979). The interviews corroborated the theoretical differentiation between habit-related and action-related BCL, reflecting distinctions in behavior change literature (Gardner & Rebar, 2019; Wood & Rüniger, 2016). Participants' ability to distinguish between habits and actions, albeit with some initial challenges, supports the inclusion of this distinction in the BCL framework.

The exploration of behavior valence (good vs. bad) within the BCL framework revealed that individuals relate to these two types of behaviors differently and should be both considered in evaluating BCL, echoing research on framing effects in behavior change interventions (Gallagher & Updegraff, 2012; Rothman & Salovey, 1997). The interviews highlighted the importance of temporal factors in assessing BCL, particularly for the operational dimension, aligning with research on autobiographical memory (Conway & Pleydell-Pearce, 2000). This finding enhances our theoretical understanding of BCL as a construct that evolves over time and is influenced by past experiences and future expectations.

The impact of macro-level events, such as the COVID-19 pandemic, on behavior change processes underscores the theoretical conceptualization of BCL as a dynamic construct that interacts with environmental factors, supporting the socio-ecological model of health behavior

(Sallis et al., 2015). This insight enriches our understanding of how BCL operates in real-world contexts and indicates that it should be studied as an influence alongside other external drivers of behavior, consistent with ecological systems theory (Bronfenbrenner, 1979).

Methodological insights

The cognitive interviews led to several methodological refinements that turned the BCLS v1 into the BCLS v2 (see B12, in the Appendix B). The iterative process of refining item wording, response options, and explanatory texts based on participant feedback has resulted in a more precise and accessible measurement tool. This process demonstrates the value of cognitive interviews in enhancing the validity and reliability of complex psychological constructs (García, 2011; Willis, 2004).

Insights into the optimal ordering of items and sections (e.g., habits before actions, operational before cognitive) provide valuable guidance for future scale development in BCL and related fields. This contribution enhances the overall quality of data collection by reducing respondent fatigue and confusion, aligning with principles of cognitive economy (Rosch, 1978) and survey design (Krosnick, 1991). The introduction of explanatory texts to encourage consideration of diverse behavior categories addresses a critical methodological challenge in BCL measurement. This approach mitigates the risk of over-reliance on specific behavior domains (e.g., health), enhancing the scale's generalizability, consistent with research on context effects in survey research (Sudman et al., 1996; Tourangeau et al., 2000).

The refinement of response options for each BCL type (cognitive, emotional, and operational) based on participant feedback and theoretical considerations improves the scale's ability to capture nuanced variations in BCL. This methodological enhancement contributes to a more accurate measurement of the construct, reflecting best practices in psychometric scale development (DeVellis, 2016). The inclusion of specific timeframes (e.g., 12 months, 5 years) for operational items addresses the challenge of inconsistent recall periods among participants, enhancing the comparability and reliability of BCL assessments across individuals and over time (Conway & Pleydell-Pearce, 2000; Schwarz & Oyserman, 2001). The insights gained regarding the impact of major events (e.g., the COVID-19 pandemic) on behavior change processes highlight the importance of considering contextual factors in BCL measurement, aligning with ecological systems theory (Bronfenbrenner, 1979) and the socio-ecological model of health behavior (Sallis et al., 2015).

The cognitive interviews have made contributions to both the theoretical conceptualization and methodological measurement of BCL. These insights not only refine our understanding of BCL as a complex, multi-component construct but also provide practical guidance for its accurate assessment. The iterative process of theory refinement and methodological improvement demonstrated in this research sets a valuable precedent for future studies in behavior change and related fields. By bridging theoretical concepts with empirical observations, this work enhances the robustness and applicability of BCL in both research and practical interventions aimed at fostering effective behavior change.

The findings from this BCL research offer valuable insights for researchers focused on domain-specific literacies such as digital literacy or health literacy. The multi-component approach to BCL, distinguishing between operational, emotional, and cognitive aspects, provides a model for developing more comprehensive domain-specific literacy constructs (Bröder et al., 2017; Domanska et al., 2020). This aligns with Kalmus' (2007) call for a more nuanced understanding of media literacy in changing information environments. Researchers should consider how

these components might manifest in their specific domain and how they might interact to influence behavior and outcomes. Similarly, the distinction between habitual and non-habitual behaviors in BCL measurement suggests that domain-specific literacy measures might benefit from separately assessing competencies related to routine behaviors versus one-off actions or decisions (Gardner & Rebar, 2019). They should consider how these components might manifest in their specific domain and how they might interact to influence behavior and outcomes. This finding contributes to a more nuanced understanding of how individuals conceptualize and approach different types of behavior change. The referent component of BCL (self-, child-, and other-related) offers a framework for considering how domain-specific literacies might operate differently when applied to oneself versus others, aligning with social cognitive theory (Bandura, 2001). This could be particularly relevant in domains like health or digital literacy, where individuals often need to apply their knowledge to support others. For instance, Gutman and Schoon's (2015) work on preventive interventions for children and adolescents could be enhanced by considering how parents' self-related versus child-related literacy impacts their ability to implement intervention strategies effectively. Additionally, the findings on the impact of contextual factors and major events (like the COVID-19 pandemic) underscore the importance of considering how domain-specific literacies might evolve or manifest differently under varying circumstances, consistent with ecological systems theory (Bronfenbrenner, 1979). This aligns with Gutman et al.'s (2019) research on developmental trajectories and cumulative risk, suggesting that literacy assessments should account for changing environmental factors over time. In the context of digital parenting, this could mean examining how parental mediation strategies and their effectiveness shift as children move through different developmental stages or as new technologies emerge.

The discussions surrounding the impact of the COVID-19 pandemic offer valuable insights for future development and refinement of the BCL scale. While the current version prioritizes generalizability across diverse contexts, it is acknowledged that major societal events can significantly shape individuals' behavior change experiences and resources. Future iterations of the BCL scale could explore incorporating items or subscales that specifically address these contextual influences. For example, a 'contextual adaptability' subscale could be developed, capturing an individual's capacity to effectively respond to and manage behavioral change in response to unexpected external disruptions or significant environmental changes. BCL contextual adaptability refers to the cognitive, emotional, and operational flexibility that enables individuals to adjust their behavior change strategies to accommodate changing circumstances. Theoretically, contextual adaptability is grounded in models of psychological flexibility and resilience, drawing from frameworks such as the transactional model of stress and coping (Lazarus & Folkman, 1984).

The validity and utility of such additions could be examined through several research approaches. Longitudinal studies could track BCL levels and behavior change outcomes before, during, and after significant societal or life events, providing insights into the temporal dynamics of BCL. Qualitative research could explore individuals' lived experiences of behavior change during times of crisis, providing rich contextual understanding to complement quantitative findings. Furthermore, future research should also adapt these considerations related to the macro-environment and context to consider how the nuances related to operational, child-related, and habit-related BCL, in addition to digital skills, can be leveraged to refine the BCL scale. This multi-pronged approach would contribute to a more nuanced and context-sensitive understanding of BCL and its role in promoting adaptive behavior change in the face of evolving challenges.

For the purposes of this initial development and validation of the BCL scale, a deliberate decision was made to prioritize the creation of a parsimonious, generalizable instrument that captured the core elements of BCL. While acknowledging the importance of discovered contextual factors, incorporating them directly into the scale at this stage would have significantly increased its complexity and potentially limited its applicability beyond the specific circumstances of the study sample. Therefore, the subsequent quantitative analyses focused on establishing the fundamental structure and validity of the BCL construct, with the understanding that future research could explore these contextual nuances in greater depth.

By applying these insights from BCL research to their respective fields, researchers in domain-specific literacies can enhance the explanatory power of their constructs, potentially leading to more effective interventions and a deeper understanding of how literacy translates into real-world behaviors and outcomes.

5.3 Pilot Survey: Statistically testing the conceptualization of Behavior Change Literacy

5.3.1 Introduction

The pilot survey aimed to assess the initial reliability and validity of the 72-item BCLS v2 (see Table B12, Appendix B) and develop the statistically validated BCLS v3. This approach aligns with best practices in scale development and validation, as outlined by DeVellis (2016) and Boateng et al. (2018). The statistical process for determining the most suitable third version is detailed below based on different theoretical structures (see Figure 5).

Three 24-item scales for each of the theoretical components were validated:

- Type-based Behavior Change Literacy Scale (T-BCLS)
- Referents-based Behavior Change Literacy Scale (R-BCLS)
- Behavior class-based Behavior Change Literacy Scale (BC-BCLS)

This approach of developing multiple scales to capture different aspects of a complex construct is supported by research on multidimensional constructs in psychological measurement (Edwards, 2001; Law et al., 1998). These scales showed good statistical properties in terms of reliability, discriminant validity, and measurement invariance. These shorter validated scales are suitable for researchers who are only interested in one specific theoretical aspect of BCL or who need to manage limited survey space. For example, the referent-based scale is useful for those studying social behaviors, as it provides insights into the relationship between a specific social actor (e.g., romantic partner, grandparent, or children) and the examined behavior. The behavior class-based scale caters to researchers examining the effects of one-off actions versus habitual behaviors, which is important for interventions aiming at behavior modification. Lastly, the type-based scale aids researchers in investigating the intention-behavior relationship for specific behaviors, a critical area for understanding and bridging the disconnect between planned and actual behavior.

The analytical approach focused on three separate factor analyses across the three theoretical components (types, referents, and behavior class) instead of one overarching factor analysis. This decision was informed by the observed strong correlations among these distinctions within several fixed-factor 72-item models, including a fixed 3-factor model (i.e., types, referents, and behavior classes of BCL) and a fixed 8-factor model (i.e., operational, emotional, cognitive, habit-related, action-related, self-related, child-related, and other-related BCL). Such an approach is consistent with recommendations for dealing with complex, multidimensional constructs (Brown, 2015; Kline, 2015).

The process of selecting the highest-loading items through exploratory factor analysis and then confirming the model fit through confirmatory factor analysis follows established practices in scale development (Fabrigar & Wegener, 2012; Thompson, 2004). The choice of 24 items, allowing for the inclusion of the two highest-loading items for each subdimension, reflects a balance between comprehensiveness and practicality in scale length (Worthington & Whittaker, 2006).

The development of specialized scales (T-BCL, R-BCL, and BC-BCL) caters to researchers interested in specific aspects of BCL, while the Comprehensive Behavior Change Literacy Scale 41 (CBCLS-41) provides a holistic measure. The CBCLS-41 was created by combining all unique items from the three individual scales, resulting in 41 items after removing duplicates.

This method of scale integration is consistent with approaches to developing comprehensive measures of multifaceted constructs (MacKenzie et al., 2011).

The pilot survey's methodology for developing and validating the BCLS demonstrates a rigorous approach to scale development grounded in established psychometric principles and practices. The resulting scales provide researchers with versatile tools to investigate various aspects of Behavior Change Literacy, contributing to the advancement of research in this field.

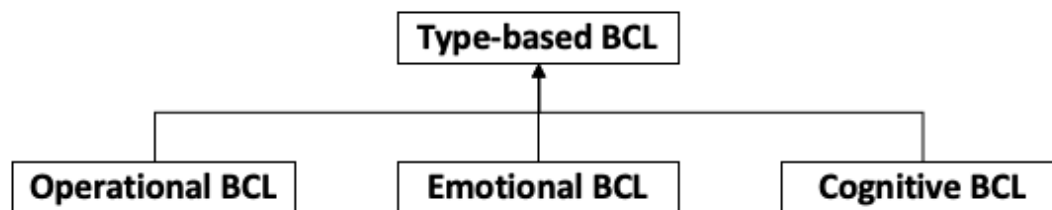
5.3.2 Results

Types-BCL scale

The pilot survey aimed to assess the initial reliability and validity of the BCL-type component, which adopts the tripartite model (see Figure 6 and Section 2.4.2) comprising operational, emotional, and cognitive components informed by the literacy literature (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). This analysis was critical for refining the scale and establishing its psychometric properties before employing it in the main study.

Figure 6

Conceptualization of type-based hierarchical BCL model



The section presents the development and evaluation of the Type-based Behavior Change Literacy Scale (T-BCLS) through a series of rigorous statistical analyses. Beginning with exploratory factor analysis (EFA) to identify the most salient items, the process progressed to confirmatory factor analysis (CFA) to validate the scale's structure. The analyses aimed to create a parsimonious yet comprehensive scale that accurately captures the three dimensions within the type component - operational, emotional, and cognitive.

The methodology involved several key steps: item selection through EFA, model fit evaluation via CFA, reliability assessment using Cronbach's alpha, discriminant validity testing with Heterotrait-Monotrait (HTMT) ratios, and measurement invariance testing across gender groups. This systematic approach thoroughly examined the scale's psychometric properties and alignment with the theoretical conceptualization of BCL.

The results of these analyses provide insights into the validity and reliability of the T-BCLS, offering a foundation for its use in further research on BCL, particularly in the context of parental mediation. The findings presented here validate the scale and contribute to our understanding of how BCL's operational, emotional, and cognitive aspects can be effectively measured and distinguished from one another.

Full-types model results

The CFA results showed that a 3-factor, bi-factor model and a 4-factor hierarchical model fit the data equally well. The following steps were undertaken to arrive at the model.

1. *Item selection*: The highest-loading items were chosen through EFA, resulting in a model with 8 items per dimension, further subdivided into theoretical subdimensions for the emotional and cognitive dimensions
2. *Model fit evaluation*: A CFA was conducted, and the model was adjusted to achieve an acceptable fit (CFI = .92, RMSEA = .07 [90% CI .06–.08; $p < .001$])
3. *Reliability assessment*: Cronbach's alpha was calculated for each subscale, indicating adequate reliability across dimensions, with the emotional dimension having a slightly lower score
4. *Discriminant validity*: HTMT ratios were calculated to establish discriminant validity between the constructs, confirming that the three dimensions evaluate distinct aspects of BCL
5. *Measurement invariance*: Configural invariance was assessed across men and women, with the two-group analysis showing an acceptable model fit

Item selection. The process for developing a fixed 3-factor (operational, emotional, and cognitive), 24-item model began with an Exploratory Factor Analysis (EFA) on all 24 operational items. The four highest-loading operational items within each behavior class (i.e., habits and actions) were selected. The selection process accounted for the two theoretical subdimensions for the emotional and cognitive dimensions. The emotional dimension included the two highest-loading attitude action items and two highest-loading self-efficacy action items, as well as the two highest-loading attitude habit items and the two highest-loading self-efficacy habit items. Likewise, the cognitive dimension comprised the two highest-loading skill action items and the two highest-loading knowledge action items, as well as two highest-loading skill habit items and two highest-loading knowledge habit items. The resulting model included 24 items with 8 items for each dimension (operational, emotional, cognitive) split into four items for habit and action and two items for each theoretical subdimension in the emotional and cognitive dimensions (see Figure 5 for the structure).

The decision to select the two highest-loading items per subdimension was driven by a combination of theoretical and empirical considerations, aiming to balance content validity with scale brevity. Theoretically, retaining items with the strongest loadings ensured that each subdimension was represented by indicators most closely aligned with its underlying construct, thus maximizing content validity (DeVellis, 2016). Empirically, focusing on the highest-loading items helped to purify the scale by minimizing the influence of items that might be less representative of the target construct or potentially introduce noise (Hinkin, 1998). While a single-item-per-subdimension might increase parsimony, using two items provides a more reliable and stable estimate of each facet, allows for internal consistency assessment within each narrow subdimension, and captures nuanced aspects within each, as suggested by the theoretical distinctions (e.g. distinguishing self-efficacy from attitudes within the emotional dimension) (Costello & Osborne, 2005; Worthington & Whittaker, 2006). This two-item approach allows for the calculation of a meaningful subscale that accounts for some degree of multifacetedness within that area of BCL, whereas selecting only one item is less robust and reliable.

Model fit evaluation. A CFA was conducted on the model, allowing covariance between the three factors. The initial model (see Figure A1, in Appendix A) showed poor fit (CFI = .76, RMSEA = .12 [90% CI .11–.13; $p < .001$]). Residual covariances were examined, and covariances for each combination of dimension and behavior type (e.g., all emotional action items) were added based on a score higher than 1.5 or lower than -1.5. The subsequent model (see Figure A2, in Appendix A) demonstrated an acceptable fit (CFI = .92, RMSEA = .07 [90% CI .06–.08; $p < .001$]).

Table 7

Items selected for T-BCLS-24

Behavior Class	Type	Short description
Habit	Operational	In the last 5 years, I've successfully helped significant people establish good habits
		In the last 12 months, my support was instrumental for significant people to form better habits
		In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals
		In the last 5 years, I've been successful in establishing better habits
	Emotional	It is important to me to become better at getting rid of bad habits
		It is important to me to become better at helping my child(ren) to get rid of bad habits
		If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them
		If my significant people keep trying, I can help them figure out a way to get rid of a bad habit
	Cognitive	I know how to help significant people prevent bad habits from developing
		I know how to help significant people establish good new habits
		I know practical techniques that enable me to help significant people establish good habits
		I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people
Action	Operational	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support

Table 7*Items selected for T-BCLS-24*

Behavior Class	Type	Short description
		In the last 5 years, I've successfully helped significant people to not do bad actions
		In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals
		In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support
	Emotional	It is important to me to become better at shaping the actions of my significant people
		It can have negative consequences if I'm not good at helping my significant people with their actions
		If I keep trying, I'll figure out a way to successfully do a difficult action
		If my child(ren) keeps trying, I can help them figure out how not to do bad actions
	Cognitive	I know how to help significant people do difficult actions
		I know how to help significant people do important actions
		I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions
		I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions

Reliability

Cronbach's alpha was calculated to assess the reliability of the final subscales, as illustrated in Table 8.

Table 8*Cronbach's Alpha for type-based subscales*

Constructs	Cronbach's Alpha
Operational BCL	.90
Emotional BCL	.74

The lower score for the emotional BCL dimension can be attributed to the two emotional subscales (attitude and self-efficacy) not being highly correlated ($r = .41, p < .01$). However, despite being lower, the combined Cronbach's alpha is still relatively robust – above .70 is typically considered acceptable in social science research (DeVellis, 2016). Maintaining a single scale simplifies the measurement process (Marsh et al., 2014) and may capture broader aspects of emotional change literacy. In practice, future research may continue investigating the relationship between the two scales.

Discriminant validity

The method proposed by Henseler et al. (2015) was used to evaluate discriminant validity in the 24-item variance-based structural equation model (SEM) for the three subdimensions of BCL. The Heterotrait-Monotrait (HTMT) ratio was a superior alternative to the traditional Fornell-Larcker criterion and cross-loadings assessment. The HTMT ratio is calculated by dividing the mean of the heterotrait-heteromethod correlations by the mean of the monotrait-heteromethod correlations for each pair of constructs. A value less than a predetermined threshold (commonly 0.85 or 0.90) indicates that the constructs are distinct, so discriminant validity is established.

Table 9, which presents the HTMT ratios between the pairs of the three dimensions in the variance-based structural equation model, shows that all the HTMT ratios are below the commonly used thresholds. It can be concluded that the model's constructs exhibit discriminant validity. This means that measures for the operational, emotional, and cognitive dimensions evaluate distinct aspects of BCL, and the relationships between the constructs in the model are valid and accurately represented.

Table 9

Discriminant validity for self-related, child-related, and other-related BCL

	Operational	Emotional	Cognitive
Operational			
Emotional	.62		
Cognitive	.76	.65	

Measurement invariance

Configural invariance was tested to examine if the overall structure of the BCLS measurement model was equivalent across one group distinction, namely gender. The two-group analysis showed an acceptable model fit across men and women, with the unconstrained model (RMSEA = .05, CFI = .88) providing support for being invariant across groups from a configural or structural perspective.

Summary

The 24-item model analysis successfully established a valid and reliable measurement scale for BCL's operational, emotional, and cognitive dimensions. The model, which comprised 24 items divided among the three dimensions, demonstrated acceptable model fit, reliability, discriminant validity, and measurement invariance across groups. These findings provide a solid foundation for the development and application of the BCLS in the main survey, where the hypothesized influence of BCL on the link between parental mediation intention and parental mediation will be tested.

The pilot survey results were instrumental in refining 72-item BCLS v2, reducing it in length, and identifying any necessary revisions to design the three-components comprehensive BCL scale for the final survey, testing the hypotheses based on the theoretical model proposed (see Chapter 3). This final version of the T-BCLS-24 measures BCL's operational, emotional, and cognitive dimensions and accounts for the subdimensions within the emotional and cognitive dimensions. The comprehensive and robust nature of the scale enabled a more nuanced exploration of the intention-behavior relationship in the context of parental mediation.

Individual dimensions results

Operational BCL

Four items are sufficient to measure the operational dimension across the habit and action axis because they have no subconstructs (see Chapter 2, theoretical framework, Section 2.4.2). The four highest-loading items were selected from all habit and action items (see Table 10). The factor matrix in Table C1 in Appendix C shows the factor loadings for all operational items, constraining the model to a 1-factor model. All selected items had a loading higher than .58.

Table 10

Final selection of operational items across habit and action

Behavior class	Short description
Habit	In the last 5 years, I've successfully helped significant people establish good habits
	In the last 12 months, my support was instrumental for significant people to form better habits
	In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals
	In the last 5 years, I've been successful in establishing better habits
Action	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support
	In the last 5 years, I've successfully helped significant people to not do bad actions
	In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals

Table 10*Final selection of operational items across habit and action*

Behavior class	Short description
	In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support

Emotional BCL

The emotional dimension has two theoretical subdimensions: BCL-related attitudes and self-efficacy (see Chapter 2, theoretical framework, Section 2.4.2). The two highest-loading attitude action items and the two highest-loading self-efficacy action items – as well as the two highest-loading attitude habit items and the two highest-loading self-efficacy habit items – were selected from all habit and action items (see Table 11). As illustrated in Table C2 (see Appendix C), all selected emotional items had a loading higher than .40 in the factor matrix for the 1-factor model.

Table 11*Final selection of emotional items across habit and action*

Behavior class	Sub-dimension	Short description
Habit	Attitude	It is important to me to become better at getting rid of bad habits
		It is important to me to become better at helping my child(ren) to get rid of bad habits
	Self-efficacy	If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them
		If my significant people keep trying, I can help them figure out a way to get rid of a bad habit
Action	Attitude	It is important to me to become better at shaping the actions of my significant people
		It can have negative consequences if I'm not good at helping my significant people with their actions
	Self-efficacy	If I keep trying, I'll figure out a way to successfully do a difficult action
		If my child(ren) keeps trying, I can help them figure out how not to do bad actions

Cognitive BCL

The cognitive dimension has two theoretical subdimensions: BCL-related skills and knowledge (see Chapter 2, theoretical framework, Section 2.4.2). The two highest-loading skill action items and the two highest-loading knowledge action items, as well as the two highest-loading skill habit items and the two highest-loading knowledge habit items, were selected from all habit and action items (see Table 12). The factor matrix presented in Table C3 in Appendix C details the factor loadings for all cognitive items under a constrained 1-factor model. All items selected demonstrated loadings exceeding .53.

Table 12

Final selection of cognitive items across habit and action

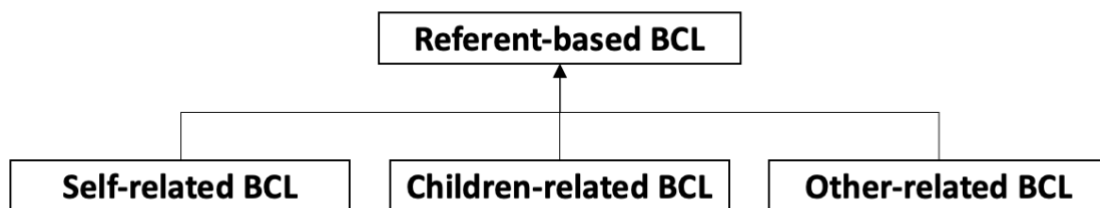
Behavior class	Sub-dimension	Short description
Habit	Skill	I know how to help significant people prevent bad habits from developing
		I know how to help significant people establish good new habits
	Knowledge	I know practical techniques that enable me to help significant people establish good habits
		I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people
Action	Skill	I know how to help significant people do difficult actions
		I know how to help significant people do important actions
	Knowledge	I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions
		I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in helping significant people with important and difficult actions

Referent-BCL scale

This section presents the development and evaluation of the Referent-based Behavior Change Literacy Scale (R-BCLS), focusing on how individuals' BCL varies in relation to themselves, their children, and significant others (Figure 7). The referent component of BCL captures the nuanced ways parents apply behavior change strategies across different relational contexts (see Section 2.4.2 for theoretical underpinnings).

Figure 7

Conceptualization of referent-based hierarchical BCL model



The analysis explores the factorial structure of the R-BCLS through a combination of exploratory and confirmatory factor analyses. This approach validated the theoretical distinction between self-related, child-related, and other-related BCL, providing empirical support for the multi-dimensional nature of the BCL referent component.

This section examines the R-BCLS's psychometric properties, including its reliability, discriminant validity, and measurement invariance, to establish a robust measurement tool for assessing how BCL differs across personal, child-focused, and other significant people. The findings from this analysis provide insights into the complex dynamics of behavior change within family systems, particularly in the realm of digital parenting.

The validated R-BCLS offers researchers and practitioners a nuanced instrument for understanding and potentially enhancing parents' abilities to facilitate positive behavior changes in themselves, their children, and other significant people. This comprehensive approach to BCL measurement aligns with the multifaceted nature of parental mediation in digital environments, where parents must navigate their own behaviors, guide their children's digital habits, and potentially influence the digital practices of other family members or caregivers.

Full-referents model results

A 3-factor, 24-item model fitted the conceptualization and data well in the CFA. An EFA was conducted on all 24 self-related items. The four highest-loading self-related items for habits and actions were selected. This process was repeated for children- and other-related items. The resulting model had 24 items in total, with 8 items across each dimension (i.e., self, children, others) split into four items for habit and action. In the second step, a CFA was conducted on the model with covariance between the three factors, showing poor fit (CFI = .75, RMSEA = .12 [90% CI .11–.13; $p < .001$]). The residual covariances were examined, and covariances for each combination of dimension and behavior type (e.g., all emotional action items) were added based on a score higher than 1.5 or lower than -1.5. The resulting model (see Figure A3, in Appendix A) had an acceptable fit (CFI = .94, RMSEA = .06 [90% CI .05–.07; $p < .001$]).

Table 13*Items selected for the BCLS-R-24*

Behavior class	Referent	Short description
Habit	Self	I know how to establish good new habits
		In the last 12 months, I intentionally formed good new habits
		I know practical techniques that help me establish good habits
		In the last 5 years, I've been successful in establishing better habits
	Children	I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions
		I know practical techniques that help me to close the gap between my intentions and actions
		If I keep trying, I'll figure out a way to successfully do a difficult action
		If I want to do a difficult action, I have confidence in my ability to achieve that
	Others	In the last 12 months, my support was instrumental for my child(ren) to form better habits
		In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals
		In the last 5 years, I've successfully helped my child(ren) establish good habits
		I know practical techniques that enable me to help my child(ren) establish good habits
Action	Self	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals
		In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support
		I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions
		In the last 5 years, I've successfully helped my child(ren) not do bad actions

Table 13

Items selected for the BCLS-R-24

Behavior class	Referent	Short description
	Children	In the last 12 months, my support was instrumental for my child(ren) to form better habits In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals In the last 5 years, I've successfully helped my child(ren) establish good habits I know practical techniques that enable me to help my child(ren) establish good habits
	Others	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions In the last 5 years, I've successfully helped my child(ren) not do bad actions

Reliability

The reliability of the final subscales was assessed by calculating Cronbach's alpha, detailed in Table 14 below.

Table 14

Cronbach's Alpha for referent-based subscales

Constructs	Cronbach's Alpha
Self-related BCL	.86
Child-related BCL	.86
Other-related BCL	.92

Discriminant validity

Table 15, which presents the HTMT ratios between the pairs of the three dimensions in the variance-based structural equation model, shows that all the HTMT ratios fall below the commonly used thresholds. It can be concluded that the constructs in the model exhibit discriminant validity. This means that measures for the operational, emotional, and cognitive

dimensions evaluate distinct aspects of BCL, and that the relationships between the model's constructs are valid and accurately represented.

Table 15

Discriminant validity for self-related, child-related, and other-related BCL

	Self	Children
Self		
Children	.73	
Others	.62	.56

Measurement invariance

This test examined if the overall structure of the BCLS measurement model was equivalent across groups. It assessed the extent to which the same number of factors had an acceptable fit for the data across men and women. The two-group analysis showed an acceptable model fit across men and women with the unconstrained model (RMSEA = .05, CFI = .92), proving that invariance across groups from a configural or structural perspective.

Individual dimensions analysis

People are expected to differ in their levels of BCL related to themselves, their children, and their significant people (see Chapter 2, theoretical framework, Section 2.4.2). People will find different actions and habits difficult as they relate to themselves (e.g., installing a parental control app and the habit of discussing digital engagement regularly), children (e.g., supporting the action of their child changing their privacy settings or encouraging the habit of leaving the phone outside of the bedroom before sleeping), and significant people (e.g., supporting the action of signing up for an educational course or the habit of learning a foreign language daily).

Self-related BCL

The four highest-loading self-related items were selected from all habit and action items (see Table 16). The factor matrix in Table C4 in Appendix C displays the factor loadings for all self-related items within a 1-factor model. Each selected item had a loading of higher than .61.

Table 16

Final selection of self-related items across habit and action

Behavior class	Short description
Habit	I know how to establish good new habits
	I know <i>practical techniques</i> that help me establish good habits

Table 16*Final selection of self-related items across habit and action*

Behavior class	Short description
	In the last 5 years, I've been successful in establishing better habits
	In the last 12 months, I intentionally formed good new habits
Action	I know <i>practical techniques</i> that help me to close the gap between my intentions and actions
	I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions
	If I want to do a difficult action, I have confidence in my ability to achieve that
	If I keep trying, I'll figure out a way to successfully do a difficult action.

Child-related BCL

The four highest-loading child-related items were selected from all habit and action items (see Table 17). All child-related selected items had a loading of higher than .61 in the 1-factor model (see Table C5 in Appendix C).

Table 17*Final selection of self-related items across habit and action*

Behavior class	Short description
Habit	In the last 12 months, my support was instrumental for my child(ren) to form better habits
	In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals
	In the last 5 years, I've successfully helped my child(ren) establish good habits
	I know <i>practical techniques</i> that enable me to help my child(ren) establish good habits
Action	I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions
	In the last 5 years, I've successfully helped my child(ren) not do bad actions

Table 17*Final selection of self-related items across habit and action*

Behavior class	Short description
	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals
	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support

Other-related BCL

The four highest-loading other-related items were selected from all habit and action items (see Table 17). Table C5 in Appendix C presents the factor loadings for all other-related items under a 1-factor model constraint. All selected items had a loading of higher than .61.

Table 18*Final selection of other-related items across habit and action*

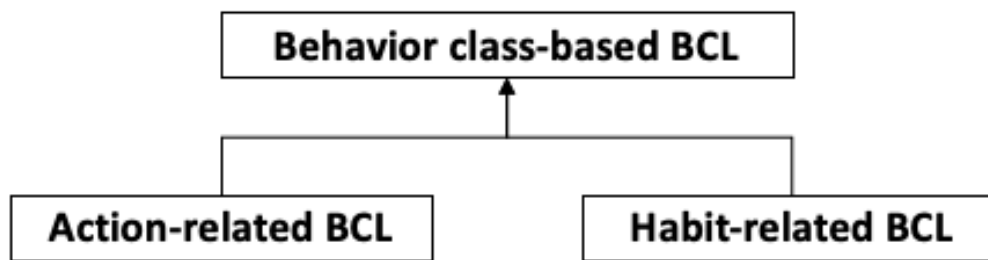
Behavior class	Short description
Habit	In the last 12 months, my support was instrumental for my child(ren) to form better habits
	In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals
	In the last 5 years, I've successfully helped my child(ren) establish good habits
	I know <i>practical techniques</i> that enable me to help my child(ren) establish good habits
Action	I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions
	In the last 5 years, I've successfully helped my child(ren) not do bad actions
	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals
	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support

Behavior class-BCL scale

This section presents the development and evaluation of the Behavior class-based Behavior Change Literacy Scale (BC-BCLS), a step forward in validating the theoretical framework of BCL. It examines the empirical basis for distinguishing between habit-related and action-related BCL (see Figure 8), two fundamental components of producing positive life outcomes.

Figure 8

Conceptualization of behavior class-based hierarchical BCL model



The behavior class component in the proposed model of BCL posits that individuals may possess different literacy levels for habitual behaviors versus non-habitual behaviors (see Chapter 2, theoretical framework, Section 2.4.2). Not everyone will find doing actions (e.g., getting vaccinated) and habits (e.g., exercising regularly every week multiple times) equally difficult or easy. This distinction could be relevant in the realm of parental mediation since consistent, habitual practices often coexist with deliberate, situational interventions in managing children's digital behaviors (Clark, 2011; Livingstone & Blum-Ross, 2020). By empirically testing this theoretical component, the pilot survey established whether parents demonstrate differential literacy in these two domains of behavior change.

This section evaluates the construct validity of the habit-related and action-related BCL scales through exploratory and confirmatory factor analyses. The analysis examines the factor structure, reliability, and discriminant validity of these scales, providing insights into whether they represent distinct, measurable constructs within the broader framework of BCL. Additionally, the section explores measurement invariance across demographic groups, ensuring that the scales function consistently for different subpopulations of parents.

The findings from this pilot survey have implications for understanding the multifaceted nature of BCL and its application in parental mediation practices. Moreover, it contributes to the broader field of behavior change research by offering empirically validated tools for assessing different aspects of BCL.

Full-behavior class model results (BC-BCLS)

A 2-factor, 24-item model fit the data well in the CFA. An EFA was conducted on all 36 habit-related items. The four highest-loading habit-related items across the operational, emotional, and cognitive dimensions were selected. This process was repeated for action-related items. The resulting model had 24 items with 12 items across each dimension (i.e., habit and action) split into four items for operational, emotional, and cognitive. In the second step, a CFA on the

model with covariance between the two factors was conducted, which showed poor fit (CFI = .68, RMSEA = .14 [90% CI .13–.15; $p < .001$]). The residual covariances were examined, and covariances for each combination of dimension and behavior type (e.g., all emotional action items) were added based on a score higher than 1.5 or lower than -1.5. The subsequent model (see Figure A4, in Appendix A) had an acceptable fit (CFI = .91, RMSEA = .08 [90% CI .07–.09; $p < .001$]).

Table 19

Items selected for BCLS-BC-24

Behavior class	Type	Short description
Habit	Operational	In the last 5 years, I've been successful in establishing better habits
		In the last 5 years, I've successfully helped significant people establish good habits
		In the last 12 months, my support was instrumental for significant people to form better habits
		In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals
	Emotional	If I want to establish good habits, I have confidence in my abilities to achieve them
		If I keep trying, I'll figure out a way to successfully stop any bad habit
		If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them
		If my significant people keep trying, I can help them figure out a way to get rid of a bad habit
	Cognitive	I know how to establish good new habits
		I know how to help significant people prevent bad habits from developing
		I know practical techniques that enable me to help significant people establish good habits
		I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people
Action	Operational	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support

Table 19*Items selected for BCLS-BC-24*

Behavior class	Type	Short description
		In the last 5 years, I've successfully helped significant people to not do bad actions
		In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals
		In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support
	Emotional	If I want to do a difficult action, I have confidence in my ability to achieve them
		It is important to me to become better at shaping the actions of my significant people
		If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve them
		If they keep trying, I can help significant people figure out how not to do bad actions
	Cognitive	I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions
		I know how to help significant people do important actions
		I know practical techniques that enable me to help significant people to close the gap between their intentions and actions
		I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions

Reliability

The reliability of the final subscales was assessed by calculating Cronbach's alpha.

Table 20

Cronbach's Alpha for type-based subscales

Constructs	Cronbach's Alpha
Habit change literacy	.90
Action change literacy	.89

Discriminant validity

The HTMT ratios between the pairs of the two dimensions in the variance-based structural equation model show that all the HTMT ratios are below the commonly used thresholds (i.e., .82). It can be concluded that the constructs in the model exhibit discriminant validity. This means that measures for the operational, emotional, and cognitive dimensions evaluate distinct aspects of BCL, and the relationships between the constructs in the model are valid and accurately represented.

Measurement invariance

This test examines if the overall structure of the BCLS measurement model is equivalent across groups. It assesses the extent to which the same number of factors have an acceptable fit for the data across men and women. The two-group analysis shows an acceptable model fit across men and women with the unconstrained model (RMSEA = .06, CFI = .88), which supports the model being invariant across groups from a configural or structural perspective.

Individual dimensions analysis

Habit-related BCL

The four highest-loading habit-related items were selected from the operational, emotional, and cognitive dimensions (see Table 21). The factor matrix in Table C7 in the Appendix shows the factor loadings for all habit-related items based on a 1-factor model. Every selected item had a loading of higher than .46.

Table 21

Final selection of habit-related items across the operational, emotional, and cognitive dimensions

Type	Short description
Operational	In the last 5 years, I've been successful in establishing better habits In the last 5 years, I've successfully helped significant people establish good habits

In the last 12 months, my support was instrumental for significant people to form better habits

In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals

Emotional	<p>If I want to establish good habits, I have confidence in my abilities to achieve them</p> <p>If I keep trying, I'll figure out a way to successfully stop any bad habit</p> <p>If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them</p> <p>If my significant people keep trying, I can help them figure out a way to get rid of a bad habit</p>
Cognitive	<p>I know how to establish good new habits</p> <p>I know how to help significant people prevent bad habits from developing</p> <p>I know practical techniques that enable me to help significant people establish good habits</p> <p>I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people</p>

Action-related BCL

The four highest-loading action-related items were selected from the operational, emotional, and cognitive dimensions (see Table 22). The factor matrix (see Table C8 in Appendix) shows the factor loadings for all action-related items, constraining the model to a 1-factor model. All selected items had a loading higher than .46.

Table 22

Final selection of action-related items across the operational, emotional, and cognitive dimensions

Type	Short description
Operational	<p>In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support</p> <p>In the last 5 years, I've successfully helped significant people to not do bad actions</p> <p>In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals</p>

Table 22

Final selection of action-related items across the operational, emotional, and cognitive dimensions

Type	Short description
	In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support
Emotional	If I want to do a difficult action, I have confidence in my ability to achieve them It is important to me to become better at shaping the actions of my significant people If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve them If they keep trying, I can help significant people figure out how not to do bad actions
Cognitive	I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions I know how to help significant people do important actions I know practical techniques that enable me to help significant people to close the gap between their intentions and actions I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions

Comprehensive BCL scale

Introduction

This section presents the development and validation of the Comprehensive Behavior Change Literacy Scale (CBCLS-41 or BCLS v3), a robust instrument designed to measure BCL across the theoretical components, dimensions, and subdimensions. The CBCLS-41 was created to provide researchers with a versatile tool capable of addressing various aspects of BCL simultaneously, allowing for a more nuanced understanding of behavior change processes. This approach aligns with recent calls in the field for more comprehensive measures of psychological constructs (Flake et al., 2017).

The comprehensive scale was developed by integrating all items from three individual scales that were previously validated to measure different aspects of BCL. This approach ensures that the CBCLS-41 captures the full spectrum of BCL components, including its types (operational, emotional, cognitive), referents (self, children, others), and behavior classes (habits, actions). By combining these elements into a single scale, researchers can explore the interplay between different theoretical nuances of BCL and their collective impact on behavior change outcomes. This multidimensional approach is consistent with contemporary scale development practices in psychology and behavioral sciences (Furr, 2011).

The section begins by detailing the process of item selection and scale construction, highlighting how the final 41 items were chosen to represent a balanced distribution across BCL's theoretical components. Then, the reliability and discriminant validity of the CBCLS-41 were examined, providing support for the scale's desirable psychometric properties and its ability to differentiate between BCL's components, dimensions, and subdimensions (DeVellis, 2016). These analyses are important for establishing the scale's construct validity (Messick, 1995).

Additionally, this section offers guidance on how to use the CBCLS-41, including instructions for calculating scores across different BCL constructs and suggestions for using a reduced version of the scale when necessary. This approach to scale flexibility aligns with recommendations on balancing comprehensiveness and practicality in psychological measurement (Marsh et al., 2005). The comprehensive nature of the CBCLS-41 makes it a valuable tool for researchers seeking to investigate BCL's role in various contexts, particularly in studies where the relative importance of different BCL components may not be known a priori. This versatility addresses the need for measures that can be applied across diverse behavioral domains.

Through the development and validation of the CBCLS-41, this research provided a foundational instrument for future studies on BCL, enabling more sophisticated analyses of how individuals initiate and sustain behavioral changes across different domains of life.

Item selection

All unique items from the three individual scales were combined to create the comprehensive scale. After removing duplicate items, 41 unique items remained. The CBCLS-41 is presented in Appendix B (see Table B14). The CBCLS-41 items have an approximately equal distribution across the type (14-13-14) and behavior class components (21-20). However, the referent component (11-10-20) had an unequal distribution.

To clearly illustrate the composition of the CBCLS-41 and how each item contributes to the various sub-dimensions, Table B13 in the Appendix presents a comprehensive mapping. This table shows the allocation of each item across the three theoretical components: type (operational, emotional, cognitive), referent (self, children, others), and behavior class (habit, action). It also highlights any repetitions of items across different sub-dimensions.

Table 23

Item and count across the three theoretical components

Behavior class	Type			Scales				
	Operational	Emotional	Cognitive	Sum	Self	Children	Others	Sum
Habit	hope1self1 hope3self3 hope5chi1 hope7chi3 hope8chi4 hope9oth1 hope11oth3 hope12oth4	hemo2self2att2 hemo3self3seef1 hemo4self4seef2 hemo6chi2att2 hemo11oth3seef1 hemo12oth4seef2	hcog2self2ski2 hcog3self3kno1 hcog7chi3kno1 hcog9oth1ski1 hcog10oth2ski2 hcog11oth3kno1 hcog12oth4kno2	21	hope1self1 hope3self3 hemo2self2att2 hemo3self3seef1 hemo4self4seef2 hcog2self2ski2 hcog3self3kno1	hope5chi1 hope7chi3 hope8chi4 hemo6chi2att2 hcog7chi3kno1	hope9oth1 hope11oth3 hope12oth4 hemo11oth3seef1 hemo12oth4seef2 hcog9oth1ski1 hcog10oth2ski2 hcog11oth3kno1 hcog12oth4kno2	21
Count	8	6	7	21	7	5	9	21
Action	aope5chi1 aope6chi2 aope8chi4 aope9oth1 aope10oth2 aope12oth4	aemo3self3seef1 aemo4self4seef2 aemo8chi4seef2 aemo9oth1att1 aemo10oth2att2 aemo11oth3seef1 aemo12oth4seef2	acog3self3kno1 acog4self4kno2 acog7chi3kno1 acog9oth1ski1 acog10oth2ski2 acog11oth3kno1 acog12oth4kno2	20	aemo3self3seef1 aemo4self4seef2 acog3self3kno1 acog4self4kno2	aope5chi1 aope6chi2 aope8chi4 aemo8chi4seef2 acog7chi3kno1	aope9oth1 aope10oth2 aope12oth4 aemo9oth1att1 aemo10oth2att2 aemo11oth3seef1 aemo12oth4seef2 acog9oth1ski1 acog10oth2ski2 acog11oth3kno1 acog12oth4kno2	20
Count	6	7	7	20	4	5	11	20

Sum	14	13	14	11	10	20
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Note. See Table B12 in Appendix B for the items in the questionnaire corresponding to the short item handle

Reliability

Cronbach's alpha was used to assess the reliability of the final subscales (Tavakol & Dennick, 2011), and it indicated good reliability for all construct subscales (see Table 24).

Table 24

Reliability of CBCLS-41 subscales

Constructs	Cronbach's Alpha
Behavior Change Literacy	.95
Habit-related BCL	.91
Action-related BCL	.92
Operational BCL	.91
Emotional BCL	.84
Cognitive BCL	.92
Self-related BCL	.86
Child-related BCL	.86
Other-related BCL	.95

Reduced version

In situations where 41 items may be too many to include in a questionnaire, a 24-item version of the scale is recommended. To achieve this, researchers should prioritize one of the three subscales (i.e., BCL type, referent, or behavior class) and use the items that align with the scale deemed most important (see previous sections on separate scales and suggested items).

Calculating scores

Nine scores can be calculated to examine different theoretical questions and empirical phenomena through the lens of the nine BCL constructs (i.e., composite and 8 subscales). The scale does not contain reverse items, and all response scales are 5-point Likert scales, with the first response coded with the value 1 and increased linearly. The "I don't want to answer" option was recoded as missing values, and "I don't understand what this means" option for cognitive items can be recorded as 0 or missing if examining SEMs.

The BCL score can be calculated by adding all 41 items together.

BCLS-T-41. The scores for the BCL-types should be calculated by averaging the scores on all the operational items, repeating this process for the emotional and cognitive items. Since the type scales have differing numbers of total items, the sum score is not useful.

BCLS-R-41. The scores for the referent BCL scale should be calculated by averaging all the self-related items – repeating this process for the children- and other-related items.

BCLS-BC-41. The scores for the behavior class BCL scale should be calculated by averaging all the habit-related items and repeating this process for the action-related items.

Discriminant validity

Correlation analysis was employed to assess the discriminant validity of the CBCLS-41 subscales, acknowledging the complexity of evaluating discriminant validity when subscales share items. More sophisticated methods, such as the Fornell-Larcker criterion or the HTMT ratio, are often recommended for a more robust assessment (Hair et al., 2022). Using correlations was based on simplicity and interpretability, but this decision may be scrutinized. The primary focus was examining the correlations between theoretically distinct dimensions within each component (i.e., types, referents, and behavior class).

Table 25 presents the correlation coefficients between different dimensions within the BCL concept.

Table 25

Correlation table between different scales

	Hab	Act	Ope	Emo	Cog	Sel	Chi	Oth
Habit	1							
Act	.77	1						
Ope	.88	.80	1					
Emo	.78	.80	.63	1				
Cog	.82	.88	.70	.66	1			
Sel	.83	.70	.68	.77	.73	1		
Chi	.71	.71	.79	.57	.61	.64	1	
Oth	.84	.89	.80	.76	.87	.58	.50	1

Note. All correlations were significant at the 0.01 level (2-tailed)

To evaluate discriminant validity, we focused on the correlations between theoretically distinct dimensions within each component (highlighted in bold in Table 1). Following the guidelines proposed by Fornell & Larcker (1981), correlations below 0.85 were considered indicative of discriminant validity. This threshold is more conservative than the often-used 0.90 cutoff (Hair et al., 2013), allowing for a stricter assessment given the shared items between subscales.

The correlation between habit BCL and action BCL ($r = 0.77$) suggests adequate discriminant validity within the behavior class component. The correlations between operational-emotional BCL ($r = 0.63$), operational-cognitive BCL ($r = 0.70$), and emotional-cognitive BCL ($r = 0.66$) all fall below the 0.85 threshold, indicating discriminant validity for the BCL-type component. Similarly, correlations between self-child BCL ($r = 0.64$), self-other BCL ($r = 0.58$), and children-others BCL ($r = 0.50$) support discriminant validity in the referent component. It is

important to note that the high correlations observed between some subscales (e.g., action-other BCL, $r = 0.89$) suggest potential overlaps in measurement. This may indicate that certain dimensional combinations, such as actions related to others, are more heavily represented in the CBCLS-41. Future scale refinement might involve balancing item representation across dimensional combinations to address this potential imbalance.

While the correlations between dimensions are moderately high, they provide evidence for discriminant validity when considering the shared item structure and theoretical relationships. However, the limitations of this approach are acknowledged, and further investigation using more advanced techniques such as multitrait-multimethod (MTMM) in future studies to more rigorously establish the discriminant validity of the CBCLS-41 subscales.

Conclusion

The development and validation of the CBCLS-41 has demonstrated its potential as a robust and reliable instrument for measuring BCL across multiple components. The scale effectively captures unique aspects of BCL and its dimensions, providing researchers with a versatile and comprehensive tool to advance our understanding of behavior change in different contexts.

The analysis of the scale's reliability, discriminant validity, and correlations between dimensions indicates that, despite strong relationships among dimensions, they each contribute valuable insights into the overarching construct of BCL (DeVellis, 2016). This highlights the importance of considering multiple components and dimensions when investigating the intention-behavior relationship.

5.3.3 Discussion

The pilot survey results provide robust empirical support for the theoretical conceptualization of BCL as a multi-component construct. The development and validation of the 41-item Comprehensive Behavior Change Literacy Scale (CBCLS-41) represent an original proposal for measurement based on the theory that has been validated, which can push the field of understanding behavior forward. The statistical analyses using best-practice statistical procedures (Thabane et al., 2010), including EFA, CFA, measurement invariance testing, and reliability assessments, strongly validate the theoretical framework's three-component model of BCL: type (operational, emotional, cognitive), referent (self, children, others), and behavior class (habits, actions). The strong correlations observed among the BCL dimensions, while maintaining discriminant validity, suggest that BCL operates as a coherent yet multifaceted construct. This finding aligns with the theoretical conceptualization of BCL as a general literacy that manifests differently across various contexts and behavior types.

The differentiation between operational, emotional, and cognitive BCL was confirmed, reinforcing the importance of considering the type of literacy when examining behavior change (Domanska et al., 2020). The emergence of distinct sub-literacies within the referent component (self-related, child-related, and other-related BCL) provides empirical support for the theoretical proposition that BCL may vary depending on the target of change (Nutbeam, 2008). This distinction is particularly relevant in contexts like parental mediation, where individuals must navigate behavior change for themselves and others simultaneously. The data supporting the distinction between habit-related and action-related BCL validates the theoretical framework's emphasis on differentiating between ongoing, habitual behaviors and discrete, one-time actions (Gardner & Rebar, 2019). This distinction has important implications for

behavior change interventions, suggesting that different strategies may be required for modifying habits versus initiating specific actions (Gardner et al., 2022).

Developing specialized scales (T-BCL, R-BCL, and BC-BCL) alongside the comprehensive CBCLS-41 offers researchers flexibility in studying specific aspects of BCL while maintaining the option for a holistic assessment. This approach aligns with the theoretical framework's emphasis on the interconnected yet distinct nature of BCL dimensions. The CBCLS-41's strong psychometric properties, including high reliability for all subscales and acceptable discriminant validity within subscales in the same domain, provide a solid foundation for its use in future research. These properties suggest that the scale accurately captures the nuanced theoretical conceptualization of BCL.

Smith et al. (2000) noted that shorter scales can increase response rates and reduce participant fatigue, particularly in studies measuring multiple constructs. While these scales represent a significant reduction from the original 72-item version, there is potential for developing even more concise versions that would be beneficial. Future research could explore developing ultra-short scales of 10-15 items, following approaches similar to those used in creating brief versions of established measures like the Big Five Inventory (Rammstedt et al., 2013). This process would require careful item selection based on factor loadings and item-total correlations followed by rigorous validation to ensure maintained psychometric integrity (DeVellis, 2016). Such refinement could enhance the scales' utility across various research contexts, particularly those with time constraints, while still capturing the essential elements of BCL's theoretical framework.

Moving forward, the CBCLS-41 opens up several promising research directions. First, investigating how much variance in the intention-behavior model across different behaviors can be explained by BCL could provide important insights into the role of literacy in behavior change processes. This line of inquiry directly addresses the theoretical framework's proposition that BCL may help explain individual differences in translating intentions into actions. Second, exploring how BCL relates to other established psychological constructs related to undertaking certain behaviors could help situate BCL within the broader landscape of individual differences relevant to behavior change. This research direction could contribute to a more comprehensive understanding of the factors influencing successful behavior change. The pilot survey results provided strong empirical support for the theoretical conceptualization of BCL and resulted in a validated measurement tool for future research. The CBCLS-41 represents an advancement in our ability to assess and understand the complex processes involved in behavior change, paving the way for more nuanced and effective approaches to promoting positive behavioral outcomes across various domains.

5.4 Conclusion

The development and validation of the Behavior Change Literacy Scale (BCLS) represents a significant advancement in understanding the multifaceted nature of Behavior Change Literacy (BCL). The empirical findings from both the cognitive interviews and statistical analyses provide robust support for the theoretical framework of BCL proposed in this thesis, aligning with best practices in scale development and validation (DeVellis, 2016; Boateng et al., 2018).

The empirical data shows a strong alignment between the 41-item BCLS model and the theoretical conceptualization of BCL. This alignment validates BCL's multi-component and -dimension nature as outlined in the theoretical framework. This aligns with the conceptualization of complex psychological constructs as multidimensional (Edwards, 2001; MacKenzie et al., 2011). The removal of reverse items and those related to 'bad' actions and habits due to poor fit reflects potential challenges in how people conceptualize or interpret negative behaviors in the context of BCL. This finding is consistent with research on the difficulties of measuring negative behaviors and attitudes in survey research (Podsakoff et al., 2003). This suggests that future research and interventions should carefully consider how to frame and assess behaviors perceived as negative or undesirable.

The statistical analyses, including exploratory and confirmatory factor analyses, strongly supported the BCLS's construct validity, following established practices in scale validation (Brown, 2015; Kline, 2014). The high-reliability coefficients indicated that the scale consistently measures the intended constructs, meeting standards for psychological measurement (Nunnally & Bernstein, 1994). The discriminant validity analysis supported the distinctiveness of each aspect of BCL within the subdomains, aligning with methods for establishing construct validity (Fornell & Larcker, 1981; Henseler et al., 2015). This suggests that while the different facets of BCL are interrelated, they each contribute unique information to our understanding of an individual's BCL. The interrelatedness of the components reflects the incorporation of aspects from different domains in the same items, necessitating separate analyses of the different BCL components.

The empirical data strongly supports the theoretical components of BCL, namely types (operational, emotional, and cognitive), referents (self, children, and others), and behavior classes (habits and actions). This multifaceted structure of BCL mirrors the complexity of behavior change processes in real-world contexts, consistent with comprehensive models of behavior change such as the Behavior Change Wheel (Michie et al., 2011) and the COM-B model (Michie et al., 2014). The emergence of distinct components of BCL provides a nuanced understanding of how individuals approach behavior change in different contexts and for different targets, reflecting the contextual nature of behavior change processes (Michie et al., 2014). The differentiation between self-related, child-related, and other-related BCL aligns with social cognitive theories that emphasize the role of social context in behavior change (Bandura, 2001). The statistical validation supports observations from cognitive interviews where participants demonstrated varying confidence levels and strategies when discussing behavior change for themselves versus others, consistent with research on self-efficacy and its domain-specificity (Bandura, 1997). It also highlights the importance of considering the target of behavior change when designing interventions or assessing BCL. The empirical support for distinguishing between habit-related and action-related BCL reflects theoretical understandings that behavior change processes differ for habitual behaviors versus one-off actions (Gardner & Rebar, 2019; Wood & R niger, 2016). This distinction has implications for tailoring behavior change interventions to specific behavior types, aligning with research on habit formation and behavior change techniques (Gardner et al., 2022; Michie et al., 2013).

The cognitive interviews revealed the importance of specifying recall timeframes in BCL measurement, particularly for the operational dimension. This finding aligns with research on the impact of recall periods on self-reported behaviors (Schwarz & Oyserman, 2001). The inclusion of specific timeframes in the BCLS enhances its ability to capture changes in BCL over time and in response to significant events, consistent with recommendations for measuring behavior change over time (Prochaska, 1991). As revealed in the cognitive interviews, the impact of macro-level events on BCL highlights the need to consider environmental factors and societal changes when interpreting BCL scores. This insight aligns with ecological models of behavior change that emphasize the influence of broader contextual factors (Sallis et al., 2015; Stokols, 1996). The development of the BCLS-41 opens up new avenues for research in behavior change. It provides a tool to quantify and explore BCL across different domains. This addresses a critical gap in existing behavior change theories, which have struggled to fully account for individual differences in translating intentions into actions (Sheeran & Webb, 2016). The BCLS makes explicit the often implicit nature of behavior change techniques, allowing for more precise measurement and analysis (Abraham & Michie, 2008). It enables researchers to complement dominant paternalistic approaches to behavior change with bottom-up, empowering research that helps people enact behaviors they deem most beneficial (Hansen, 2016; Krpan & Urbaník, 2024; Thaler & Sunstein, 2009). Future research could explore developing the BCLS into a self-evaluation tool for individuals, with recommendations on how to improve different aspects of BCL based on their scores. Moreover, the validated scale provides a foundation for developing and evaluating interventions aimed at enhancing BCL. By identifying specific dimensions within a component of BCL that may be lacking in individuals or populations, targeted interventions can be designed to improve overall BCL. This aligns with the theoretical framework's emphasis on BCL as a malleable quality that can be developed and enhanced over time.

The development and validation of the BCLS-41 pushes behavior change research forward. While there have been related scholarly contributions, such as the compendium of self-enactable techniques to change and self-manage motivation and behavior v.1.0 (Knittle et al., 2020), a comprehensive measurement scale has not been developed. The testing of the scale provided empirical support for the theoretical conceptualization of BCL as a complex, multifaceted construct. It offered a robust tool for further exploration of behavior change processes across various contexts and populations. The scale's ability to capture the nuanced dimensions within a component of BCL, as revealed through both qualitative and quantitative methods, positions it as a valuable resource for researchers and practitioners seeking to understand and facilitate effective behavior change.

Chapter 6 — Testing the BCL-modified intention-behavior model for parental mediation

6.1 Introduction

This chapter explores the complex relationships between parental mediation intentions, Behavior Change Literacy (BCL), digital skills, and parental mediation behaviors. It builds on established theories and concepts while testing a novel explanatory framework to enhance our understanding of parental mediation practices (Clark, 2011; Fishbein & Ajzen, 2010; Livingstone & Helsper, 2008). While previous research has established the importance of digital literacy in effective mediation (Livingstone et al., 2017), this study explores how digital skills interact with BCL and intentions to influence mediation behaviors.

Parental mediation, which encompasses the strategies parents employ to manage their children's media use, has become increasingly important in the digital age. Research has shown that effective parental mediation is associated with positive outcomes for children's digital experiences, including better online safety practices and more balanced media consumption (Livingstone et al., 2017). However, studies have also revealed that parents often struggle to consistently implement their intended mediation strategies (Aierbe et al., 2019; López de Ayala López et al., 2020). This gap between intention and behavior in parental mediation practices presents a critical area for investigation.

Traditionally, research on parental mediation has focused on factors such as parental attitudes, digital literacy, and demographic variables to explain mediation behaviors (Livingstone & Helsper, 2008; Nikken & Jansz, 2014). However, these explanations have provided limited insight into the variance in parental mediation behaviors (Jeong et al., 2012). To address this limitation, this study incorporates two key theoretical frameworks:

1. *The Theory of Planned Behavior* (TPB): Developed by Ajzen (1991), the TPB posits that intentions are the strongest predictors of behavior. In the context of parental mediation, this theory suggests that parents' intentions to engage in specific mediation practices should be strongly associated with their actual mediation behaviors
2. *Behavior Change Literacy*: This novel concept, developed for this study, draws on broader literacy research (e.g., health literacy, media literacy) and behavior theories (Bandura, 2001; Domanska et al., 2020; Gardner & Rebar, 2019). BCL is defined as the literacy that enables individuals to effectively initiate and sustain desired behavioral changes in themselves and others. It encompasses three key components: type (i.e., operational, emotional, and cognitive), referent (i.e., self-related, child-related, and other-related), and behavior class (i.e., habit-related and action-related BCL)

By integrating these frameworks, this study provided a more comprehensive explanation of parental mediation behaviors. The inclusion of BCL as an explanatory factor is particularly promising, as it captures the complex skills and knowledge required to translate intentions into consistent actions - a key challenge in parental mediation.

The previous chapters have provided the theoretical and empirical groundwork to answer the core questions of this doctoral research to be answered in this chapter:

RQ1. To what extent are parental mediation intentions and BC) promising explanations of parental mediation behaviors? (Section 6.2)

The extent to which a nuanced model of BCL is relevant to explain parental mediation behaviors can be unpacked into three more granular questions:

RQ2. To what extent does the *type component* (i.e., *operational, emotional, cognitive*) of BCL matter for the strength of the relationship between intention and behavior for parental mediation? (Section 6.3)

RQ3. To what extent does the *referent component* (i.e., *self, children, and others*) of BCL matter for the strength of the relationship between intention and behavior for parental mediation? (Section 6.4)

RQ4. To what extent does the *behavior class component* (i.e., *actions and habits*) of BCL matter for the strength of the relationship between intention and behavior for parental mediation? (Section 6.5)

By addressing these questions, this chapter contributed to both theoretical understanding and practical applications in the field of parental mediation. The findings have the potential to inform more effective interventions and support strategies for parents navigating the challenges of digital parenting.

Having established a qualitatively and quantitatively validated BCL scale, this chapter examines the conceptual model that focuses on understanding the relationships between four core concepts: parental mediation intentions and behaviors, digital skills, and BCL. The CBCLS-41 was used to measure BCL, while the modified versions of the Parental Mediation Interactive Media Scale (Nimrod et al., 2019) and the Predicting Parental Mediation Questionnaire (Hong, 2021) were used to create items for parental mediation behaviors and intentions. A shortened version of the Youth Digital Skill Indicator (Helsper et al., 2020) was used to capture the level of digital skills. The responses to these scales were used to test the hypotheses.

The subsequent sections will present the hypotheses derived from these research questions, detail the methodological approach, and provide a comprehensive analysis of the results. This analysis will not only test the proposed relationships but also explore the nuanced ways in which different aspects of BCL interact with intentions and digital skills to influence parental mediation practices.

6.2 BCL and parental mediation

6.2.1 Introduction

This section examines the relationship between Behavior Change Literacy (BCL) levels, three types of parental mediation behaviors (combined, restrictive only, and active only), and digital skills (Livingstone & Helsper, 2008). The analysis is structured first to present the results for the three hypotheses, followed by a discussion in the context of existing theory and literature. This foundational analysis sets the stage for a more nuanced examination of the different types of BCL in subsequent sections.

Parental Mediation Behaviors (PMB) guide children's digital interactions and ensure safe and balanced media consumption (Livingstone et al., 2017). The enactment of these mediation behaviors is influenced by Parental Mediation Intentions (PMI) and their BCL, which describes the literacy that enables individuals to effectively initiate and sustain desired behavioral changes in themselves and others (see Conceptual Model Chapter 3). By examining how composite BCL interacts with PMI to affect PMB, this section provides insights into the complex dynamics of digital parenting.

Digital skills (DS) are a relevant component of modern parenting, contributing to parents moderating their children's digital activities (Palts & Kalmus, 2015). This analysis explores how these skills, in conjunction with BCL and PMI, influence PMB.

This section presents the findings related to three hypotheses:

H1: Parental mediation intentions will have a small to moderate positive association with parental mediation behaviors.

H2: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL compared to those with low BCL.

H3: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL and high digital skills compared to those with high BCL and low digital skills.

By analyzing these relationships, this section establishes a comprehensive understanding of how BCL and digital skills contribute to effective parental mediation, providing a basis for further investigation into specific components and dimensions of BCL in digital parenting.

6.2.2 Results

Descriptive insights

The descriptive statistics presented in Table 26 offer valuable insights into the patterns of parental mediation intentions and behaviors, as well as BCL and digital skills among the study participants. Several noteworthy observations emerge from this data.

A clear intention-behavior gap is evident in parental mediation practices. The mean score for parental mediation intentions (PMI = 3.49) is notably higher than the mean score for parental mediation behaviors (PMB = 2.93). This discrepancy suggests that parents generally intend to

engage in more mediation activities than they actually implement in practice. This pattern holds true for both restrictive and active mediation strategies, indicating a consistent challenge in translating intentions into actions across different approaches to parental mediation. Restrictive PMI (mean = 3.54) is slightly higher than active PMI (mean = 3.46), but in practice, active and restrictive PMB are nearly identical (2.93 and 2.92). The variability is greater in restrictive mediation than in active mediation, reflected in larger standard deviations.

BCL demonstrates the highest mean score (3.70) among all variables, with a relatively low standard deviation (0.52). This suggests that participants generally perceive themselves as having high and consistent levels of BCL. DS also show a moderately high mean (2.38 on a 1-3 scale) with low variation (SD = 0.39), suggesting that participants generally assess their digital competencies positively and consistently. This finding implies a relatively homogeneous level of digital skills among the study sample, which could be an important insight for interpreting the explanatory relationship between digital skills and parental mediation.

The skewness values add nuance to the response distribution across variables. PMI show moderate negative skewness (-0.58 for both restrictive and active), indicating higher intention scores compared to behaviors, reflecting the intention-behavior gap. PMB exhibit near-zero skewness (-0.02), suggesting a more symmetrical behavior distribution. BCL also shows moderate negative skewness (-0.41), consistent with its high mean score, indicating a concentration of responses at the higher end. DS display the most pronounced negative skewness (-0.89), reflecting strong self-reported digital competencies. These skewness patterns highlight positive self-perceptions and the balanced distribution of actual mediation behaviors.

Table 26

Descriptive statics of the dependent and independent variables

	Range	Mean	SD	Skewness
PMI	1-5	3.49	.94	-.58
Restrictive PMI	1-5	3.54	1.16	-.58
Active PMI	1-5	3.46	.95	-.53
PMB	1-5	2.93	.95	-.02
Active PMB	1-5	2.93	.93	-.02
Restrictive PMB	1-5	2.92	1.23	-.01
BCL	1-5	3.70	.52	-.41
DS	1-3	2.38	.39	-.89

N = 513

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

DS = Digital skills

H1: Parental mediation intentions will have a positive association with parental mediation behaviors

The data from the simple correlation model and across more complex regression models supported the hypothesis. The simple correlation model showed a strong and significant positive relationship between parental mediation intention and parental mediation behavior (r

= .78, $p < 0.01$). Similar values were observed for restrictive ($r = .76$, $p < .001$) and active parental mediation ($r = .79$, $p < .001$).

The relationship also held for more complex regression models (see Table 27). PMI had the strongest consistently significant positive relationship with PMB ($\beta_{PMI \text{ only}} = .79$ to $.75$, $p < .001$). Parents who expressed a stronger intention to engage in parental mediation over the next four weeks reported higher PMB in the past four weeks. PMI explained most of the variance in PMB ($\Delta R^2 = .61$, $R^2 = .62$) compared to the control variable-only model ($R^2 = .01$). This was also true for the BCL and DS models.

This finding partially challenges the only study that has examined the promise of parental mediation intentions (Hong, 2021), which found intentions to have a weaker yet non-trivial explanatory value ($r_{\text{Hong}} = .20$ compared to $r_{\text{Rohde}} = .79$ for active parental mediation; $r_{\text{Hong}} = .18$ compared to $r_{\text{Rohde}} = .76$ for restrictive parental mediation; $R^2_{\text{Hong}} = .09$ compared to $R^2_{\text{Rohde}} = .62$).

H2: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL compared to those with low BCL

To test the moderation hypothesis, an interaction term was created by multiplying the variables PMI and BCL. Hierarchical multiple regression analysis was conducted to test and understand the moderation hypothesis more comprehensively. The analysis began by entering the control variables (Gender and Education) into the regression model to account for their effects on the dependent variable. Next, the main effect of PMI was included in the model. Then, the main effect of BCL was then added to the model to examine their additional contribution over and above the socio-demographic and intention indicators. Finally, the interaction term between PMI and BCL was added to test the moderation hypothesis.

The regressions show that BCL significantly explained parental mediation for composite ($\beta = .19$, $p < .001$) and active mediation ($\beta = .24$, $p < .001$) but not for restrictive mediation in models with PMI (see Table 27). The interactions with PMI were not significant for any of these parental mediation types. Moreover, the regressions in M3 confirm that PMI significantly explained parental mediation for composite ($\beta = .77$, $p < .001$), restrictive ($\beta = .79$, $p < .001$), and active mediation ($\beta = .72$, $p < .001$). Interestingly, education significantly explained restrictive ($\beta = .14$, $p < .05$) but not composite or active parental mediation behaviors.

PMI significantly added to the explained variance in parental mediation for composite ($\Delta R^2 = .01$, $R^2 = .62$), restrictive ($\Delta R^2 = .57$, $R^2 = .58$), and active mediation ($\Delta R^2 = .58$, $R^2 = .58$). BCL added a small amount to the explained variance for composite ($\Delta R^2 = .01$, $R^2 = .63$) and active mediation ($\Delta R^2 = .02$, $R^2 = .60$) but not for restrictive mediation.

The strong positive relationship between intentions and behaviors for all parental mediation types underscores the foundational explanatory role of intentions. However, the relationship between composite BCL and parental mediation behaviors proved more nuanced than initially hypothesized. While composite BCL was significantly associated with active mediation, it showed no significant relationship with restrictive mediation. This initial finding suggested a potential differential role for BCL depending on the type of mediation. However, subsequent analyses disaggregating BCL into its components (type, referent, behavior class) and dimensions (e.g., operational, child-related, habit-related) revealed a more complex picture.

These disaggregated analyses showed strong positive associations between operational, child-related, and habit-related BCL and both active and restrictive mediation.

The absence of a significant relationship between composite BCL and restrictive mediation appears to be due to opposing effects within the BCL construct. Specifically, while habit-related BCL was positively associated with restrictive mediation, action-related BCL showed a negative association. When these opposing effects are combined in the composite BCL measure, they effectively cancel each other out, resulting in a non-significant overall relationship.

Higher levels of education were associated with greater engagement with restrictive but not active parental mediation. Active mediation demands a significant and consistent investment of parental time and effort. Highly educated parents, who may also be in demanding professional roles, might perceive themselves as having limited time resources. Restrictive measures, such as setting time limits or using filtering software, can be implemented relatively quickly and, once established, require less ongoing active engagement. However, the existing research on the connection between parental education and mediation patterns remains inconclusive, with most findings indicating that education might not play a decisive role (Lauricella & Cingel, 2020; Lee et al., 2022; Nikken & Schols, 2015).

Table 27*Hierarchical Regression Analysis of BCL and PMI on PMB*

Independent variable	Composite PMB				Restrictive PMB				Active PMB			
	M1	M2	M3	M4	M1	M2	M3	M4	M1	M2	M3	M4
Gender ^a	-.03	.02	.01	.01	-.01	-.01	-.01	-.01	-.04	.03	.02	.02
Education ^b	.13	.07	.07	.06	.21*	.14*	.14*	.14*	.09	.04	.04	.03
PMI ^c		.79***	.77***	.64***		.80***	.79***	.85***		.75***	.72***	.56*
BCL			.19***	.07			.10	.15			.24***	.10
PMI x BCL				.03				-.02				.04
R ²	.01	.62	.63	.63	.01	.58	.58	.58	.00	.58	.60	.60
R ² change		.61***	.01***			.57***				.58***	.02***	
Adjusted R ²	.00	.62	.63	.62	.00	.58	.58	.58	.00	.58	.60	.60

N = 513

† = p < .1; * p < .05; ** = p < .01; *** = p < .001

^a = Reference category woman^b = Reference category university education^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

H3: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL and high digital skills compared to those with high BCL and low digital skills

To test the moderation hypothesis, an interaction term was created by multiplying the variables PMI, BCL, and digital skills (DS). The regressions show that BCL significantly explained parental mediation for composite ($\beta = .15, p < .01$) and active mediation ($\beta = .21, p < .001$) but not for restrictive mediation in models with PMI and DS (see Table 28). Digital skills significantly explained parental mediation for composite ($\beta = .17, p < .05$), restrictive ($\beta = .20, p < .05$), and active mediation ($\beta = .18, p < .05$). The three-way interaction terms between PMI, BCL, and DS were not significant for any of these parental mediation types. Moreover, the regressions in M3 confirm that PMI significantly explained parental mediation for composite ($\beta = .75, p < .001$), restrictive ($\beta = .78, p < .001$), and active mediation ($\beta = .71, p < .001$). Education marginally significantly explained restrictive ($\beta = .14, p < .10$) but not composite or active parental mediation behaviors. PMI significantly added to the explained variance in parental mediation for composite ($\Delta R^2 = .01, R^2 = .62$), restrictive ($\Delta R^2 = .57, R^2 = .58$), and active mediation ($\Delta R^2 = .58, R^2 = .58$).

These findings support the previous ones and provide novel insights. The combined influence of PMI, BCL, and DS does not uniquely explain PMB beyond their individual contributions. However, the new analysis found consistent support for the importance of digital skills in relation to the different types of PMB. Parents with higher digital skills are more likely to be engaged in all types of parental mediation behaviors compared to parents with high BCL, who are only more likely to be involved in active parental mediation behaviors. To explain parental mediation behaviors, knowing the level of digital skills might improve the ability to predict whether a parent will undertake mediation practices. These findings highlight the nuanced sensitivity of parental mediation behaviors to digital skills.

A recommendation for future research is to work with larger samples that have enough variation within PMI, BCL, and DS to detect interactions. This might explain why digital skills and BCL lost significance when the interactions were entered into the model.

Table 28*Hierarchical Regression Analysis of BCL and PMI on PMB*

Independent variable	Composite PMB			Restrictive PMB			Active PMB		
	M1	M2	M3	M1	M2	M3	M1	M2	M3
Gender ^a	.13	.06	.04	-.01	.02	.02	-.04	.04	.04
Education ^b	-.03	.04	.06	.21*	.13 [†]	.14 [†]	.09	.03	.03
PMI ^c		.75***	.78***		.78***	.82***		.71***	.74***
BCL		.15**	.17 [†]		.06	.09		.21***	.24*
DS		.17*	.20		.20*	.25		.18*	.22
PMI x BCL x DS			.00			.00			.00
R ²	.00	.63	.63	.00	.58	.58	.00	.60	.60
R ² change		.63***			.58***			.60	
Adjusted R ²	.00	.63	.63	.00	.58	.58	.00	.60	.60

N = 513

[†] = p < .1; * p < .05; ** = p < .01; *** = p < .001^a = Reference category woman^b = Reference category university education^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

DS = Digital Skills

6.2.3 Discussion and recommendations

These findings concerning BCL, intentions, and digital skills provide theoretical and practical insights for several disciplines, particularly for parental mediation, BCL, and literacy researchers. Each of these scholarly communities can utilize the insights from this study to advance their respective fields.

Contribution to parental mediation research

For parental mediation researchers, these findings provide a novel perspective on the factors influencing parental mediation behaviors. Traditionally, parental mediation scholarship has focused on demographics, digital skills, and parental attitudes as key determinants of mediation practices (e.g., Lin et al., 2019; Vijayalakshmi et al., 2018). The introduction of BCL and further exploration of parental mediation intentions offer insights for researchers interested in improved explanations of parental mediation behaviors and building accurate theoretical models for the design of effective parental mediation interventions to support children in capturing the opportunities/benefits and minimizing the risks/harms of media and technology (Fishbein & Ajzen, 2010; Hong, 2021; Kalmus et al., 2013).

Intentions

The empirical findings align with the TPB (Ajzen, 2011) and suggest that parental mediation intentions are the strongest explanation of parental mediation behaviors. This finding expands upon the findings of Hong (2021), the only prior study examining the promise of parental mediation intentions, which identified a weaker, though still non-trivial, explanatory relationship. While broad societal shifts, such as rapidly changing attitudes towards the importance of parental mediation or significant alterations in digital technology access, could theoretically contribute to these differing results, methodological differences appear to be a more plausible primary explanation.

Several key methodological distinctions between this thesis and Hong's (2021) study warrant consideration.

First, this study measured intentions and behaviors simultaneously to minimize recall bias and maximize the accuracy of the intention-behavior relationship assessment, whereas Hong (2021) measured intentions and behaviors in two separate surveys administered six months apart. In the present thesis, participants were asked about their intentions to engage in parental mediation in the next four weeks. Next, they reported on their actual engagement in parental mediation behaviors in the previous four weeks. A single survey is deemed an acceptable research practice in the literature on the intention-behavior relationship (e.g., Finke et al., 2015; Phau et al., 2014; Wang et al., 2023; Zarei et al., 2019). Meta-analysis has shown a smaller effect size with an increasing time lag between measurements (McEachan et al., 2011). Compared to Hong's (2021) research, there was no time lag between the measurements in the present study, which the extant literature indicates should increase the effect size. The shorter 4-week time frame might make intentions more concrete and thus more correlated with behaviors, as opposed to studies considering more extended periods where various factors could influence the actual behavior and recall of these. Generally, the extent to which this pattern is based on consistency bias or more accurate recall remains an open question. Specifically, when respondents report both their intentions and recent behaviors in the same survey, they may be more inclined to report them as consistent with each other, even if subconscious, to present a coherent self-image. While it is preferable to measure future intentions and then measure past behavior once

the timeframe specified in the intentions has elapsed, measuring them simultaneously is common because past behaviors are among the strongest predictors of future behaviors (Sheeran & Webb, 2016).

Second, the scales used to measure parental mediation in the studies were different. While this dissertation integrated two of the three intention items from Hong's (2021) intention scale, it also included eight additional items from the validated Parental Mediation Interactive Media Scale (Nimrod et al., 2019), to ensure a more comprehensive measure of parental mediation behaviour and test the role of intentions according to the principle of compatibility. The resulting 10-item intention and 10-item behavior scales were designed to adhere to the principle of compatibility, which emphasizes that intentions and behaviors should be measured using identically phrased items to maximize the accuracy of the assessment (Ajzen, 2006, p. 2). Hong (2021) did not follow the strong recommendation to use behavior items phrased exactly as the intention items and vice versa to most accurately capture the relationship (Ajzen, 2002; Francis et al., 2004). More specifically, Hong (2021) used three intention items and 25 behavior items from the EU Kids Online Survey (Livingstone et al., 2011). Using different intention and behavior scales may have led to less accurate findings regarding the relationship between PMI and PMB.

Third, Hong (2021) used a 7-point agreement scale for intentions and a 5-point frequency scale for behaviors. The mismatch in scale types (7-point vs. 5-point) could have diluted the observed relationship. In contrast, the dissertation's survey employed here used two compatible 5-point scales. This might have resulted in stronger and more accurate correlations, thereby explaining a higher proportion of variance in the intention-behavior relationship. Compared to Hong's (2021) dissertation, the core strength of the present work comes from the coherent usage of measures, while a relevant limitation might be the simultaneous measurement of intention and behavior.

While these methodological differences offer very plausible explanations for the stronger intention-behavior relationship observed in this thesis, contextual factors warrant brief acknowledgment. Hong's (2021) study was conducted with a Canadian sample, while this research focused on parents in the US and UK. Although both represent broadly similar Western cultural contexts, subtle differences in parenting norms, or very rapid shifts in ideal digital parenting practices, could have a minor influence. The samples also differed somewhat in size (998_{Hong} vs. 513), education levels (33%_{Hong} vs. 51% with university education), and the proportion of parents with one child (53%_{Hong} vs. 22%). The age range of children also differed slightly (8-17_{Hong} years vs. 12-18 years here). Hong's data collection date is not entirely clear (potentially pre-COVID), but the dissertation was published in 2021, while data for this thesis was collected in 2023. It is plausible that the much greater dependency and engagement with digital technology and parenting due to the lockdown during the pandemic could have caused significant shifts. Unfortunately, Hong's sampling method was unspecified, whereas this study used a quota sampling approach. The lack of detail on sampling method makes direct comparison difficult.

The broader intention-behavior literature can help to contextualize the two divergent findings. Several meta-analyses of the intention-behavior relationship across behaviors have revealed intentions to explain 30% to 50% of the variance among behaviors (Armitage & Conner, 2001; Sheeran, 2002; Sheeran & Webb, 2018; Steinmetz et al., 2016). Overall, Hong's results seem more likely to be an underestimate of the association due to the methodological design, whereas the current results might overestimate it. The contrasting findings are more likely based on methodological design rather than larger sociological changes, such as more positive societal

norms around parental mediation. Overall, intentions are a promising explanation for parental mediation behaviors, aligned with research on the intention-behavior relationship for various other digital behaviors (Baker & White, 2010; Jiang et al., 2017; Procter et al., 2019). Intentions should be included in future explanatory research on parental mediation.

Parental mediation researchers can utilize the insights on intentions to advance their field further in several ways. First, future research should examine the relationship between measurement lag (Guadagno & Cialdini, 2010; Podsakoff et al., 2003) and the explanatory power of parental mediation intentions across different types of parental mediation behaviors (e.g., active and restrictive). Second, longitudinal research could help to construct theories explaining the changes in the size of the parental mediation intention-behavior relationship over time (e.g., based on the age of the children) (Kalmus et al., 2022). Third, future researchers should focus on understanding the factors influencing parental mediation intentions and how those intentions might be strengthened. A promising avenue is to examine the three TBP-proposed antecedents of intentions, namely attitudes, social norms, and perceived behavior control (Fishbein & Ajzen, 2010). Fourth, future studies should examine how parental mediation intentions and TBP-proposed antecedents interact with established explanations of parental mediation beyond digital skills, such as parental social media use or locus of control, which is the degree to which people believe that they, as opposed to external forces, have control over the outcome of events in their lives (Lin et al., 2019; Vijayalakshmi et al., 2018). Finally, experimental-minded researchers should leverage the research on intention interventions in behavioral science (e.g., Hagger & Luszczynska, 2014) to build accurate models for designing effective parental mediation intention interventions. For instance, educational programs that change parents' attitudes towards digital mediation, highlight positive social norms, and boost their confidence in managing their children's digital might be particularly effective. The promise of intentions for understanding parental mediation behaviors opens numerous practical avenues to advance the field further.

Behavior Change Literacy

BCL has emerged as a promising independent explanation for parental mediation behaviors, aligning partially with the conceptual model proposed in this research. The findings suggest that BCL does not moderate the parental mediation intention-behavior relationship, indicating a lack of indirect effects.

This phenomenon can be elucidated through the lens of expected value theory and the influence of societal norms on behavior (Wigfield & Eccles, 2000). The concept of expected value in decision-making posits that individuals are more likely to engage in behaviors they perceive as having high value and importance (Fischhoff et al., 1982; Quiggin, 2012). In the context of parental mediation, managing children's digital behaviors is likely perceived as having high expected value due to its potential impact on family well-being. This perception aligns with the strong cultural narratives surrounding the importance of parental mediation and digital behaviors (e.g., Livingstone & Blum-Ross, 2020). The high expected value of parental mediation behaviors can be theoretically linked to two key components of the Theory of Planned Behavior (TPB): attitudes and social norms (Fishbein & Ajzen, 2010). The social imperative to be a "good digital parent" (Smyth & Craig, 2017) may lead to strong intentions to engage in parental mediation across varying levels of BCL. This societal expectation could potentially overshadow individual differences in BCL, resulting in a stronger relationship between intentions and behaviors regardless of BCL levels. Consequently, BCL may not moderate the intention-behavior relationship as initially hypothesized. Despite not moderating the intention-behavior relationship, BCL demonstrated considerable promise as an independent

explanation of parental mediation behaviors, even when accounting for digital skills, a well-established explanatory factor. However, it is important to note that the study's methodology, particularly the simultaneous measurement of intentions and behaviors, may have influenced these results. Research has shown that a smaller time lag between measurements is associated with larger effect sizes (McEachan et al., 2011), potentially leading to an artificially strong correlation between intention and behavior and leaving little room for moderation effects.

Parental mediation researchers can utilize the research on BCL to advance their field further in several ways that address limitations and unexplored areas of this thesis. First, researchers should examine how the timing of intention and behavior measurements affects the explanatory power of BCL for parental mediation (Guadagno & Cialdini, 2010; Podsakoff et al., 2003). For example, exploring models for parental mediation behaviors with measures taken four weeks apart is worthwhile. Second, studies should examine how BCL interacts with other explanations of parental mediation beyond digital skills, such as parental and child age (Lin et al., 2019; Nikken & Schols, 2015). Third, experimental and intervention research on parental mediation (e.g., Ko et al., 2015; Moreno et al., 2021) should leverage these theoretical insights to build accurate models to design effective BCL modules as part of more comprehensive general parental mediation interventions. Finally, parental mediation outcome research (e.g., Livingstone et al., 2017) should examine the relationship between BCL, parental mediation behaviors, and relevant positive and negative outcomes. These findings highlight the role of BCL in digital parenting and can guide future research and practical applications aimed at supporting parents in navigating their children's increasingly digitalized upbringing.

Digital skills

The presented research affirms digital skills as an independent explanation of parental mediation behaviors, aligning with previous findings in the literature (Daneels & Vanwynsberghe, 2017; Livingstone et al., 2017; Livingstone & Helsper, 2008; Rodríguez-de-Dios et al., 2018). The finding that digital skills and BCL independently explain parental mediation behaviors rather than interacting with intentions presents an intriguing departure from the hypothesized explanation. The independent relationship between digital skills and parental mediation behaviors suggests that parents' technical competence directly contributes to their ability to implement mediation strategies, regardless of their intentions or BCL level. This aligns with the technology acceptance model, which posits that perceived ease of use and usefulness of technology influence its adoption and use (Davis et al., 1989). The direct association between digital skills and parental mediation behaviors could be attributed to several factors. First, parents with higher digital skills possess the technical know-how to protect devices with PINs, screen patterns, or biometric measures (Helsper et al., 2020). This technical proficiency may instill confidence in enacting restrictive parental mediation behaviors, such as implementing technical controls to mediate their children's digital access. Moreover, parents skilled in verifying online information and assessing website trustworthiness (Livingstone et al., 2017) are likely better equipped to engage in active parental mediation, such as discussing the intentions of content creators with their children. Secondly, digital skills might provide parents with a sense of self-efficacy specifically related to technology use (Livingstone & Helsper, 2010). This domain-specific confidence could directly translate into more frequent and effective mediation behaviors, independent of broader BCL or general parenting intentions, consistent with research on self-efficacy and its domain-specificity (Bandura, 1997). Parents who feel competent in the digital realm may be more likely to engage in mediation behaviors spontaneously, without necessarily going through the process of forming explicit intentions or drawing on general behavior change skills. These findings also indicate that the ability to initiate and sustain behavioral changes is valuable in digital parenting, even when controlling

for technical skills and specific intentions. Parents with high BCL might be more adaptable and resilient in the constantly changing digital environment, enabling them to adjust their mediation strategies more effectively. This adaptability is important in the rapidly evolving digital landscape, as highlighted by Livingstone and Blum-Ross (2020).

The lack of interaction between digital skills, BCL, and intentions could be explained by the complexity of parental mediation as a behavior. Unlike simpler, more individualistic behaviors, parental mediation involves dynamic interactions within the family system, as noted by Clark (2011). This complexity might mean that skills, literacy, and intentions operate through distinct pathways rather than synergistically enhancing each other's effects. However, future research should explore larger samples that have enough variation within PMI, BCL, and DS to detect interactions. The independent effects of digital skills and BCL have theoretical and practical implications for parental mediation researchers. These findings suggest that effective digital parenting relies on a multifaceted approach addressing digital skills, BCL, and intentions separately rather than assuming these elements interact. This perspective aligns with Bronfenbrenner's (1979) ecological systems theory, which emphasizes the importance of considering multiple factors and their interactions in understanding human development and behavior.

Future research in this area could benefit from several paths. First, longitudinal digital skills research (e.g., Correa et al., 2024) should examine how the development of parental digital skills and BCL interact over time and influence parental mediation behaviors. Second, experimental and educational digital skills research (e.g., Clarkson & Zierl, 2018) should manipulate digital skills and BCL independently to understand their effects on parental mediation behaviors better. Third, qualitative digital skills research (e.g., Eynon & Geniets, 2016) could explore parents' perceptions of how their digital skills and BCL influence their mediation behaviors. Lastly, cross-cultural digital skills research (e.g., Helsper & Van Deursen, 2015; Hietajärvi et al., 2024) should explore the relationship between digital skills, BCL, and parental mediation across different societal contexts and parenting norms.

Practically, these findings have implications for the design of interventions and support programs aimed at enhancing digital parenting. Rather than focusing solely on increasing parental intentions or providing general BCL, effective interventions might need to address multiple components simultaneously, an approach supported by comprehensive models of behavior change such as the COM-B model (Michie et al., 2011). These components include enhancing parents' digital skills through practical, hands-on training in current technologies and platforms popular among children and adolescents, developing parents' BCL focusing on strategies specific to the challenges of digital parenting, and influencing attitudes, social norms, and perceived behavior control related to parental mediation behaviors to strengthen intentions.

By pursuing these research directions, parental mediation scholars can develop a more comprehensive understanding of the factors contributing to effective digital parenting. This knowledge can then inform the development of more targeted and impactful interventions to support parents in navigating the complex digital landscape with their children, ultimately promoting positive digital experiences and mitigating potential risks associated with children's technology use (Kalmus et al., 2024; Mascheroni et al., 2018).

Alternative explanations

The empirical data does not support gender as an explanation for parental mediation behaviors in this sample. This finding may be influenced by the study sample's specific characteristics

rather than broader societal trends. Parents with children aged 12 to 18 from the US and UK involved in online surveys may represent a subset of parents more likely to share child-rearing responsibilities, including digital mediation, regardless of gender. Fathers involved in such services might be unusually tech-savvy and socially progressive. It would be premature to conclude that this result indicates a widespread shift towards egalitarian parenting practices in these countries. The literature on parental gender explaining parental mediation behaviors is inconclusive (Liau et al., 2008; Nikken & Schols, 2015; Sonck et al., 2013; Wallace, 2021; Wang et al., 2005). Future research should explore gender dynamics for parental mediation behaviors and BCL using mixed-methods approaches and detailed analysis (Talves & Kalmus, 2015).

Education was relevant for restrictive but not active parental mediation behaviors. In this sample, parents who were more educated showed more restrictive parental mediation behaviors. Educated parents might likely have greater access to and understanding of the potential risks associated with children's digital media use. Higher-educated parents could more likely display restrictive mediation because it might not require high continuous effort. The literature on parental education explaining parental mediation behaviors is mixed and mostly points towards education not being particularly relevant (e.g., Lauricella & Cingel, 2020; Lee et al., 2022; Nikken & Schols, 2015).

Future studies should explore how parental mediation behaviors vary across different cultural contexts, socioeconomic strata, and family structures (Kalmus, 2013). Additionally, qualitative research could provide deeper insights into how parents of different genders and educational backgrounds perceive and approach their role in mediating their children's digital experiences.

Contribution to behavior change research

This study's findings offer insights and avenues for further exploration for researchers focused on behavior change and the newly developed concept of BCL. BCL's potential as an explanatory framework for high-impact behaviors across different domains, such as health and education, presents exciting opportunities for advancing the field of behavioral science (Michie et al., 2011; Sheeran et al., 2017). The study's results suggest that BCL serves as a promising independent explanation for behaviors rather than primarily functioning as a moderator of the intention-behavior relationship. It indicates that an individual's capacity to initiate and sustain behavioral changes may directly influence their behaviors, regardless of their specific intentions, aligning with research on the importance of self-regulatory skills to motivate change (Baumeister & Vohs, 2007). BCL could broadly support the enactment of beneficial behaviors and avoidance of harmful behaviors, contributing to the growing body of work on health behavior change (Conner & Norman, 2015).

Several key areas warrant further investigation by behavior change researchers. First, experimental research should be conducted to test the efficacy of BCL-focused interventions across various behavioral domains. Comparing these comprehensive BCL interventions with more traditional approaches, such as interventions based on the TBP (e.g., Steinmetz et al., 2016) or COM-B model (e.g., Barker et al., 2016), could provide valuable insights into the most effective strategies for promoting lasting behavior change. While interventions aimed at increasing specific behavioral intentions or their antecedents can be effective for particular behaviors (e.g., Steinmetz et al., 2016), enhancing BCL may have broader benefits across a wide range of behaviors, making it a more impactful target for interventions. This knowledge can then inform the development of more targeted and effective interventions to support individuals in achieving positive outcomes and minimizing negative ones across various life

domains (Michie et al., 2014). Second, understanding the factors that promote or hinder the development of BCL is important. This could involve identifying factors found to be relevant to other literacies (e.g., Choudhary & Bansal, 2022; Maršíková & Mazurchenko, 2022; Singleton & Krause, 2010), such as access to educational resources. This thesis focused primarily on establishing BCL as a construct and its relationship to parental mediation behaviors. Still, it did not examine the antecedents of BCL itself due to time and resource constraints. However, this represents a logical next step in BCL research. These factors could inform the design of educational programs and interventions aimed at enhancing BCL from an early age and throughout the lifespan. Third, BCL should be integrated into broader theoretical advancements in behavioral science, such as being a key aspect of the capability component of the COM-B model (Michie et al., 2011). Moreover, examining empirically how BCL interacts with established behavior change theories, such as social cognitive theory (Bandura, 1999) and their prominent constructs (e.g., self-efficacy), could lead to more comprehensive models of behavior change. This integration could provide a more nuanced understanding of why some individuals are more successful at changing their behaviors than others, even when faced with similar circumstances or interventions (Sheeran & Webb, 2016). Fourth, while this study focused on parental mediation, it is promising to explore the extent to which BCL could explain high-impact behaviors in different disciplines, such as daily noting of gratitude for well-being (Komase et al., 2021). Longitudinal studies that track BCL levels and behavioral outcomes over extended periods would be particularly informative, helping to establish the stability and predictive validity of BCL across different life stages and situations (Rindfleisch et al., 2008). Finally, researchers should explore the direct relationship between BCL and important positive and negative outcomes of behaviors in different life domains (Michie et al., 2014). This could include investigating how BCL levels correlate with physical health indicators, mental health outcomes, job performance metrics, or measures of life satisfaction. Understanding these relationships could help prioritize the development of BCL in populations where it might have the most beneficial impact.

The findings related to BCL open up promising avenues for behavior change research. By further developing and validating the BCL construct, researchers can contribute to a more comprehensive understanding of behavior change processes and ultimately develop more effective strategies for promoting positive behavioral outcomes across diverse populations and contexts (Hagger et al., 2020). This line of research has the potential to impact public health, personal development, and societal well-being by empowering individuals with the literacy needed to successfully navigate and implement behavior changes in an increasingly complex world.

Contribution to field-specific literacy researchers

The concept of BCL offers significant potential for advancing research in domain-specific literacies. This integration could enhance our understanding of how individuals translate knowledge into sustained behavioral change across various fields.

BCL served as a promising complementary explanation to digital skills, which are often considered a component of digital literacy (Spante et al., 2018). By incorporating BCL into existing frameworks, researchers could develop more comprehensive theories around field-specific literacies, such as well-being literacy (e.g., Oades et al., 2021) and health literacy (e.g., Nutbeam, 2008). While domain-specific literacies typically focus on knowledge and skills within their respective areas, BCL addresses the fundamental ability to translate that knowledge into sustained behavioral change. This integration could help explain why some individuals with high domain knowledge still struggle to enact desired behaviors, while others with

seemingly less knowledge are more successful in implementing behavioral changes. Domain-specific literacy theories and interventions might be more effective if they incorporate elements of BCL. For instance, a well-being literacy program might not only teach habits enhancing well-being but also foster BCL to ensure their enactment (Oades et al., 2021). This is important because BCL has been shown to have independent effects, and individuals who struggle with general behavior enactment are likely to face challenges adhering to domain-specific behaviors as well (Sheeran & Webb, 2016). Moreover, researchers could explore how different combinations of domain-specific literacy and BCL create unique "literacy profiles" that predict behavioral outcomes, aligning with trends in precision health and education (Smith & Lee, 2022). This could lead to more personalized intervention approaches. Researchers could investigate how different levels of BCL interact with domain-specific literacies to influence high-impact behaviors and outcomes. For example, scholars interested in health literacy could examine the relationship between health literacy, BCL, and exercise behaviors linked to health outcomes (Fleary et al., 2018). This approach could provide a more nuanced understanding of the factors that contribute to successful health behavior change. Furthermore, researchers interested in domain-specific behaviors, such as health (Austin et al., 2020), could explore whether enhancing BCL in one domain (e.g., health behaviors) transfers to improved behavior change capabilities in other domains (e.g., digital behaviors). This line of inquiry aligns with research on skill transfer and could have significant implications for designing more efficient and effective behavior change programs. By considering how general BCL interacts with domain-specific knowledge and skills, researchers can develop more comprehensive and effective approaches to literacy. This integrated approach has the potential to bridge the gap between knowledge acquisition and behavior change (Sheeran & Webb, 2016), potentially leading to more impactful interventions across various domains of literacy.

As the field of literacy research continues to evolve, incorporating insights from BCL could lead to a more nuanced and practical understanding of what it means to be truly literate in any given domain. This approach aligns with calls for more integrative and interdisciplinary approaches to literacy research and intervention design (Batterham et al., 2016).

6.3 BCL-types and parental mediation

6.3.1 Introduction

Most literacy models have three basic theoretical components: emotion, cognition, and performance/operation/behavior (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). Consequently, this tripartite model was adopted here to conceptualize and measure the type component of BCL. This nuanced approach is critical to understand how individuals achieve effective behavior change, as it recognizes that successful change requires not just knowledge, but also emotional readiness and practical skills (Willmott et al., 2021). In the context of parental mediation, these types of BCL are particularly significant, as they collectively contribute to parents' ability to guide their children's digital behaviors. Parental mediation in the digital age requires a complex set of competencies that align well with the tripartite model of literacy (Livingstone & Helsper, 2008; Clark, 2011).

Emotional BCL encompasses a strong sense of self-efficacy related to the ability to change behaviors and a positive attitude toward behavior change (e.g., Ajzen & Fishbein, 2000; Albanese et al., 2019). This dimension reflects the motivational aspects that drive parents to engage in mediation practices. Parents who believe in their capability to influence their children's digital habits and who value behavior change are more likely to be proactive in their mediation efforts. Cognitive BCL involves declarative and procedural knowledge about behavior change theories and techniques, drawing on theories of knowledge acquisition and application (Seger, 1994; Ten Berge & Van Hezewijk, 1999). This dimension includes understanding the principles behind effective behavior change and knowing how to apply these principles in practical scenarios. Cognitive BCL equips parents with the necessary knowledge to implement strategies that can help regulate their children's digital consumption. Operational BCL, defined as the literacy that enables individuals to translate intentions into behavior change and consistently maintain these behaviours over time, is characterized by a track record of successful behavior change, emphasizing the importance of past successes in shaping future behavior (Sheeran & Webb, 2016). It represents the ability to translate emotional readiness and knowledge into tangible behavior change results. As it involves the practical execution of behavior change, operational BCL is necessary for the actual implementation of mediation strategies.

While emotional and cognitive BCL lay the groundwork for understanding and preparing for behavior change, the operational dimension actualizes these into successful behavior change. Parents with lower levels of operational BCL may find it challenging to effectively enact their desired parental mediation behaviors despite high emotional readiness and cognitive understanding, which is aligned with the intention-behavior gap observed in many domains of health behavior (Sheeran & Webb, 2018).

This section explores how these three types of BCL—emotional, cognitive, and operational— affect parental mediation behaviors. The hypothesis (H2a) posits that parental mediation intentions will have a stronger positive association with parental mediation behaviors for parents with high operational BCL compared to those with high emotional or cognitive BCL. By examining these dimensions, this research identified which aspects of BCL most effectively support parents' efforts to mediate their children's digital activities. This understanding can inform the development of targeted interventions to enhance parental mediation practices, ultimately promoting healthier digital habits in children.

6.3.2 Results

Descriptive insights

Table 29 presents the descriptive statistics for BCL's three constituent types: operational, emotional, and cognitive.

There is a noticeable gap between emotional BCL and operational BCL, with emotional BCL (mean = 4.03) scoring higher than operational BCL (mean = 3.34). This pattern suggests that while participants feel emotionally prepared for behavior change, their confidence in practical implementation is lower. Cognitive BCL (mean = 3.74) falls between the two, indicating a moderate level of knowledge about behavior change, though with greater variability (SD = 0.67) compared to emotional BCL (SD = 0.50). Emotional BCL shows the highest mean with the lowest variation, indicating a generally high and consistent emotional readiness among participants. In contrast, the higher standard deviation in operational BCL (SD = 0.65) highlights greater variability in participants' confidence in executing behavior change.

Overall, despite these differences, all BCL components have mean scores above the midpoint, indicating a generally positive self-assessment of BCL types among participants. The skewness values for emotional and cognitive BCL highlight that these assessments are unevenly distributed, skewing towards higher readiness and understanding.

Table 29

Descriptive statistics of BCL-Types

	Range	Mean	SD	Skewness
BCL	1-5	3.70	.52	-.41
OBCL	1-5	3.34	.65	.00
EBCL	1-5	4.03	.50	-.56
CBCL	1-5	3.74	.67	-.92

N = 513

BCL = Behavior Change Literacy

OBCL = Operational Behavior Change Literacy

EBCL = Emotional Behavior Change Literacy

CBCL = Cognitive Behavior Change Literacy

H2a: Parental mediation intentions will have a positive association with parental mediation behaviors, but this relationship will be strongest for individuals with high operational BCL compared to those with high emotional and cognitive scores

An interaction term was created to test the moderation hypothesis by multiplying the variables PMI and the three BCL types. The regressions show that operational BCL significantly explained parental mediation for composite ($\beta = .32, p < .001$), restrictive ($\beta = .26, p < .001$), and active mediation ($\beta = .36, p < .001$) (see Table 30). However, emotional BCL and cognitive BCL were not significantly involved in explaining any of the three parental mediation types. The interactions with PMI and operational BCL were significant for composite ($\beta = .11, p < .05$) and active ($\beta = .11, p < .05$) but not for restrictive mediation. However, the explanatory power did not relevantly improve upon adding them.

PMI continued to significantly explain parental mediation for composite ($\beta = .76, p < .001$), restrictive ($\beta = .79, p < .001$), and active mediation ($\beta = .71, p < .001$). Similarly, education maintained a significant relationship with restrictive parental mediation behaviors ($\beta = .15, p < .05$).

The analysis of the three BCL types provided new insights, affirming the fundamental role of operational BCL in facilitating parental mediation. Surprisingly, neither emotional BCL nor cognitive BCL were significantly involved in explaining parental mediation behaviors. The previously discussed composite BCL model showed the explanatory power of BCL for PMB. However, the decomposed analysis (considering operational, emotional, and cognitive separately) revealed that the effectiveness of BCL in influencing PMB is predominantly driven by operational BCL rather than by a balanced contribution of all BCL types. Although not significant, negative coefficients for emotional and cognitive BCL in the non-interactive models suggest potential conflicts or cancellations among BCL dimensions.

Table 30

Hierarchical Regression Analysis of BCL type on PMB

Independent variable	Composite PMB			Restrictive PMB		Active PMB	
	M1	M2	M3	M2	M3	M2	M3
Gender ^a	-.03	.02	.02	.00	-.01	.03	.02
Education ^b	.13	.07	.06	.15*	.14*	.04	.04
PMI ^c		.76***	.71***	.79***	.92***	.71***	.67**
Operational BCL		.32***	-.06	.26***	.06	.36***	-.02
Emotional BCL		-.10	.05	-.06	.00	-.11	.12
Cognitive BCL		-.07	.07	-.12	.11	-.06	.02
PMI x OBCL			.11*		.06		.11*
PMI x EBCL			-.05		-.02		-.07
PMI x CBCL			-.04		-.07		-.02
R2	.01	.65	.65	.59	.59	.62	.63
R2 change		.64***		.58***		.61***	.01***
Adjusted R2	.00	.64	.64	.58	.58	.62	.62

N = 513

† = $p < .10$; * $p < .05$; ** = $p < .01$; *** = $p < .001$

^a = Reference category woman

^b = Reference category university education

^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

OBCL = Operational Behavior Change Literacy

EBCL = Emotional Behavior Change Literacy

CBCL = Cognitive Behavior Change Literacy

H3a: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high operational BCL and high digital skills

To test the moderation hypothesis, an interaction term was created by multiplying the variables PMI, the three BCL types, and digital skills (DS). Similar to the previous analysis, PMI and operational BCL remained important explanations (see Table 31). Interestingly, the regressions show that cognitive BCL in the non-interaction models significantly explained parental mediation for composite ($\beta = -.10, p < .05$), restrictive ($\beta = -.09, p < .10$), and active mediation ($\beta = -.16, p < .05$). Moreover, parental education as an explanation for restrictive PMB turned non-significant. Digital skill significantly explained composite ($\beta = .21, p < .01$), restrictive ($\beta = .21, p < .01$), and active mediation ($\beta = .28, p < .05$) in non-interaction models and in the composite ($\beta = .28, p < .10$) and restrictive ($\beta = .31, p < .05$) interaction models. However, the interactions did not relevantly improve in the explanation of parental mediation behaviors.

These findings support the previous results for the BCL types and digital skills. They underscore the importance of focusing on enhancing operational BCL and digital skills independently to improve parental mediation behaviors.

Table 31

Hierarchical regression analysis of interaction between BCL-types and DS on PMB

Independent variable	Composite PMB		Restrictive PMB		Active PMB	
	M1	M2	M1	M2	M1	M2
Gender ^a	.05	.05	.06	.05	.03	.03
Education ^b	.06	.06	.03	.03	.13	.14
PMI ^c	.74***	.81***	.69***	.77***	.77***	.83**
Operational BCL	.32***	.15	.34***	.20	.26***	.17
Emotional BCL	-.11	-.02	-.11	.00	-.07	-.01
Cognitive BCL	-.10*	.02	-.09 [†]	.01	-.16*	.00
DS	.21**	.28 [†]	.21**	.31*	.28*	.28
PMI x OBCL x DS		.02		.02		.01
PMI x EBCL x DS		-.01		-.01		.00
PMI x CBCL x DS		-.01		-.01		-.02
R2	.65	.65	.63	.63	.59	.59
R2 change		.00		.00		.00
Adjusted R2	.65	.65	.62	.62	.59	.59

N = 513

[†] = $p < .1$; * $p < .05$; ** = $p < .01$; *** = $p < .001$

^a = Reference category woman

^b = Reference category university education

^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

OBCL = Operational Behavior Change Literacy

Table 31*Hierarchical regression analysis of interaction between BCL-types and DS on PMB*

	Composite PMB		Restrictive PMB		Active PMB	
Independent variable	M1	M2	M1	M2	M1	M2
EBCL = Emotional Behavior Change Literacy						
CBCL = Cognitive Behavior Change Literacy						
DS = Digital Skills						

6.3.3 Discussion and recommendations

The results support the previous findings while providing a more nuanced understanding of BCL. The empirical data supported the theoretical type-based component of BCL, underscoring their importance for both theory and practice in parental mediation behaviors. Consistent with prior research on the intention-behavior relationship (Steinmetz et al., 2016), parental mediation intentions emerged as the primary explanation for parental mediation behaviors. Operational BCL was found to be the second most influential factor, aligning with research highlighting the importance of past behavioral success (Sheeran & Webb, 2016).

Operational BCL may reflect a parent's actual history of successfully translating intentions into behaviors (Sheeran & Webb, 2016). When parents have demonstrated that they can successfully change their own behaviors or help others change, it is easier to apply these techniques in the context of digital parenting. This is consistent with the concept of "behavioral spillover" concept, where success in one behavioral domain can positively influence behaviors in another (Truelove et al., 2014). The practical competence may stem from effective self-regulation strategies and an ability to establish routines and habits that reduce the cognitive load required to initiate and maintain mediation strategies (Wood & R nger, 2016). In other words, if a parent has repeatedly succeeded in adopting and maintaining behavior changes, they are more likely to do so with parental mediation, whether that mediation takes the form of active engagement with their child's digital activities or implementing restrictive measures to manage screen time.

There are several potential antecedents to different operational BCL levels. Parents may develop higher operational BCL through accumulated life experiences that provide opportunities to practice and refine behavior change techniques. For instance, having a history of successfully managing one's own health or work-related behaviors can serve as a foundation for operational BCL in parenting contexts, consistent with research on skill transfer (Singley & Anderson, 1989). Exposure to education in psychology or behavioral science may also bolster operational BCL, reflecting the importance of education in literacy development (Nutbeam, 2008). Yet, it is plausible that learning can also work informally and be derived from experience (Helsper et al., 2020). Social and familial support can play a role, as parents who have guidance from peers, mentors, or professionals may develop more effective routines and strategies, consistent with social cognitive theory and the role of social modeling (Bandura, 2001; Sanders & Woolley, 2005). Additionally, individual characteristics such as resilience, adaptability, conscientiousness, and problem-solving ability can influence how well parents are able to implement behavioral changes consistently, aligning with research on the role of personality traits in behavior change (Hennecke et al., 2014). Established parenting styles, particularly those characterized by authoritativeness (combining warmth with clear expectations and consistent enforcement), may also contribute significantly to higher operational BCL. Authoritative parents, by their nature, are more likely to have established effective strategies

for managing child behavior in general, and these strategies can be adapted to the digital realm (Baumrind, 1991; Darling & Steinberg, 1993). Conversely, parents with more permissive or uninvolved parenting styles may struggle with the consistent implementation required for high operational BCL. These factors together could create an environment in which operational literacy is more likely to flourish.

Contrary to expectations, cognitive and emotional BCL demonstrated less explanatory power, challenging the initial theoretical framework of BCL proposed in this thesis. This finding suggests that the ability to implement behavior changes successfully may be more valuable than knowledge or attitudes related to behavior change, echoing research on past performance predicting future performance (Ouellette & Wood, 1998). Parents with higher operational BCL were better equipped to execute parental mediation behaviors effectively, learn from their experiences, and continuously improve their approaches.

An unexpected finding was the weak and occasionally negative associations between parental mediation behaviors and emotional as well as cognitive BCL. This observation raises intriguing questions about the potential drawbacks of certain BCL aspects in specific contexts, reminiscent of research on decision-making biases (Kahneman, 2011). For instance, excessive knowledge or heightened emotional awareness might lead to overthinking or hesitancy in digital parenting decisions, potentially hindering the frequency of mediation behaviors.

These insights offer rich opportunities for researchers across various disciplines. For those focused on improving explanations of parental mediation behaviors, several research directions emerge. First, it is important to identify factors that lead to high and low operational BCL since it is the most promising BCL type in terms of explanatory power. Second, examining how operational BCL interacts with established explanations of parental mediation, such as parental attitudes toward technology media (e.g., Pila et al., 2021) or perceived risks of digital media (Helsper et al., 2024), is important to develop a stronger theory of parental mediation. Third, researchers need to explore the interaction between operational BCL and other influential digital parental behaviors, such as “phubbing” or “technoference”, which are linked to negative child outcomes (McDaniel & Radesky, 2018; Wong et al., 2020; Xie & Xie, 2020). Phubbing is when someone, such as a parent, is focused on their phone instead of engaging others, such as their children, while technoference refers to letting daily activities and relationships be disrupted by the interference of technology (e.g., notifications). Fourth, exploring whether emotional and cognitive BCL serve as antecedents to operational BCL might be valuable in resolving their unexpected lack of influence on parental mediation behaviors and potentially beyond. For example, qualitative research could offer deeper insights into parents' experiences and perceptions of cognitive and emotional BCL and their influence on mediation strategies. Finally, experimental research should utilize these insights to create effective operational BCL interventions as part of more comprehensive parental mediation interventions.

For researchers interested in enhancing BCL's explanatory power for high-impact behaviors, developing a theory that predicts the most important BCL type for given behaviors by specifying key conditions would be valuable. Additionally, investigating factors leading to high and low levels of operational, cognitive, and emotional BCL could inform more effective interventions. Assessing the transferability of operational BCL across domains could significantly advance BCL theory.

Researchers focused on domain-specific literacies could benefit from conceptualizing and measuring their literacy across operational, cognitive, and emotional components, following the BCL framework (Domanska et al., 2020; Gilster, 1997; Nutbeam, 2008; Oades et al., 2021;

Rozendaal et al., 2016; Spante et al., 2018). Developing a model that predicts how BCL types interact with domain-specific literacy to promote desired behaviors or outcomes would be an important theoretical contribution.

These research directions offer a comprehensive approach to further understanding and applying BCL types in various contexts, potentially leading to more effective interventions and improved outcomes in digital parenting and beyond. By focusing on the operational aspects of BCL while also exploring the nuanced roles of cognitive and emotional components, researchers can contribute to a more holistic and practical understanding of behavior change processes.

6.4 BCL-referent and parental mediation

6.4.1 Introduction

Behavior Change Literacy (BCL) encompasses both individual and social processes, acknowledging its operation on multiple levels similar to other literacies such as health literacy and digital literacy (Domanska et al., 2020; Rozendaal et al., 2016; Schreurs & Vandenbosch, 2020). Understanding these levels is valuable in the context of parental mediation, as it informs how parents can effectively guide their children's digital behaviors.

Individual-level BCL involves acquiring and applying knowledge and skills to modify one's own behavior. For instance, parents can improve their digital habits through self-regulation techniques. This self-related BCL should help parents establish beneficial digital behavior, which can positively influence their children's digital habits. Social-level BCL encompasses how individuals interact with and influence others (Bronfenbrenner, 1979). This includes understanding and navigating behavior change dynamics in more complex settings, such as family interactions. For example, a parent using BCL to negotiate screen time rules with their children or partner illustrates the social aspect of BCL. It involves not only managing one's own behavior but also positively influencing the digital habits of others, making it a critical component of effective parental mediation. The integration of individual and social processes in BCL is especially important in parental mediation. Effective BCL requires a parent's self-related BCL (individual process) and their ability to influence the behaviors of their partner and child (social process). This integrated approach acknowledges that behavior change involves both individual and social dynamics, which are essential for successful parental mediation.

Among the three dimensions within the referent component of BCL, child-related BCL is most directly related to parental mediation. It enables parents to tailor their strategies precisely to their children's unique digital realities, thereby influencing children's digital behaviors and habits more effectively compared to self-related and other-related BCL. Understanding and addressing children's specific needs and contexts in digital environments is paramount for parental mediation.

This section explored how different facets of BCL—self-related, child-related, and other-related—impact parental mediation behaviors. By examining these associations, the research provides insights into developing more effective parental mediation strategies that leverage the strengths of each referent dimension of BCL.

6.4.2 Results

Descriptive insights

Table 32 presents the descriptive statistics for BCL's three referent-based components: self, children, and significant other people.

Examining the components of BCL reveals interesting patterns. Self-related BCL has the highest mean score (4.01, $SD = 0.53$), indicating that participants feel most confident in managing their own behavior changes. Child-related BCL is close behind (mean = 3.97, $SD = 0.54$), suggesting parents are nearly as confident in influencing their children's behavior as they are their own. In contrast, other-related BCL has a lower mean (3.37, $SD = 0.70$), indicating less confidence in influencing behavior changes in significant other people. The similarity

between self-related and child-related BCL scores suggests parents see their influence over their children as nearly equivalent to their self-efficacy.

Overall, all BCL components have mean scores above the midpoint, indicating a generally positive self-assessment of self-related, child-related, and other-related BCL among participants. All skewness values for BCL are unevenly distributed, skewing towards higher values.

Table 32

Descriptive statistics of BCL-referent

	Range	Mean	SD	Skewness
BCL	1-5	3.70	.52	-.41
SBCL	1-5	4.01	.53	-.71
CHBCL	1-5	3.97	.54	-.46
OTBCL	1-5	3.37	.70	-.47

N = 513

BCL = Behavior Change Literacy

SBCL = Self-related Behavior Change Literacy

CHBCL = Child-related Behavior Change Literacy

OTBCL = Other-related Behavior Change Literacy

H2b: Parental mediation intentions will have a positive association with parental mediation behaviors, but this relationship will be strongest for individuals with high child-related BCL compared to those with high self-, and other-related scores

The regressions show that child-related BCL significantly explained parental mediation for composite ($\beta = .22, p < .001$), restrictive ($\beta = .17, p < .10$), and active mediation ($\beta = .25, p < .001$) (see Table 33). However, self-related BCL and other-related BCL were not involved in significantly explaining any of the three parental mediation types in direct-effect models. The interactions with PMI and any of the referent dimensions were not relevant for any of the three mediation types. Similar to the previous analysis, PMI remained an important explanation for all types, and education maintained a significant relationship with restrictive parental mediation behaviors ($\beta = .14, p < .05$).

The analysis of the three BCL referent dimensions provided new insights, confirming the fundamental role of child-related BCL in facilitating parental mediation. Surprisingly, neither self-related BCL nor other-related BCL were significantly involved in explaining parental mediation behaviors. The dominance of one dimension is similar to the finding in the previous section on BCL types, suggesting that understanding children's digital interactions is what matters for effective parental mediation. The disaggregated analysis revealed that the effectiveness of BCL in influencing PMB is predominantly driven by child-related BCL rather than by a balanced contribution of all referent dimensions.

Table 33*Hierarchical Regression Analysis of BCL referent on PMB*

Independent variable	Composite PMB			Restrictive PMB		Active PMB	
	M1	M2	M3	M2	M3	M2	M3
Gender ^a	-.03	.01	.00	-.02	-.02	.01	.01
Education ^b	.13	.07	.07	.14*	.15*	.04	.03
PMI ^c		.76***	.60**	.79***	.77**	.71***	.61*
Self-related BCL		-.03	.25	-.04	.13	-.04	.28
Child-related BCL		.22***	-.15	.17 [†]	-.11	.25***	-.06
Other-related BCL		.04	-.02	.00	.11	.06	-.05
PMI x SBCL			-.09		-.05		-.10
PMI x CHBCL			.11 [†]		.08		.10
PMI x OTBCL			.02		-.03		.04
R2	.01	.63	.64	.58	.58	.61	.61
R2 change		.62***	.01***	.57***		.60***	
Adjusted R2	.00	.63	.63	.58	.58	.60	.60

N = 513

[†] = $p < .10$; * $p < .05$; ** = $p < .01$; *** = $p < .001$ ^a = Reference category woman^b = Reference category university education^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

SBCL = Self-related Behavior Change Literacy

CHBCL = Child-related Behavior Change Literacy

OTBCL = Other-related Behavior Change Literacy

H3b: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL and high digital skills compared to those with high BCL and low digital skills

Similar to the previous analysis, PMI and child-related BCL remained important explanations (see Table 34). Interestingly, the regressions show that self-related BCL in the interaction models was a marginally significant explanation of parental mediation for composite ($\beta = .27$, $p < .10$) and active ($\beta = .27$, $p < .10$) but not restrictive mediation. Digital skill significantly explained composite ($\beta = .17$, $p < .05$), restrictive ($\beta = .19$, $p < .10$), and active mediation ($\beta = .18$, $p < .05$) in non-interaction models. Child-related BCL showed a significant positive relationship in initial models but became non-significant in interaction models, suggesting that while children's specific digital contexts are important, other factors may dilute this relationship when considering broader interactions. Self-related BCL demonstrated a marginally significant positive association in some interaction models, indicating its potential relevance in nuanced scenarios. However, these effects did not robustly contribute to the overall explained variance in PMB, indicating that the hypothesized moderating role of BCL types was not strongly supported.

These findings support the previous results from the BCL types. They underscore the importance of focusing on enhancing child-related BCL and digital skills independently to explain parental mediation behaviors better.

Table 34

Hierarchical regression analysis of interaction between BCL-types and DS on PMB

Independent variable	Composite PMB		Restrictive PMB		Active PMB	
	M1	M2	M1	M2	M1	M2
Gender ^a	.03	.02	.01	.00	.04	.03
Education ^b	.06	.06	.14 [†]	.14*	.03	.03
PMI ^c	.75***	.77***	.78***	.79***	.70***	.75***
Self-related BCL	-.07	.27 [†]	-.08	.17	-.07	.27 [†]
Child-related BCL	.20**	-.12	.15 [†]	-.16	.23***	-.06
Other-related BCL	.04	.05	.00	.10	.07	.05
DS	.17*	.18	.19 [†]	.19	.18*	.22
PMI x SBCL x DS		-.04*		-.03		.05*
PMI x CHBCL x DS		.04*		.04 [†]		-.04 [†]
PMI x OTBCL x DS		.00		-.01		.00
R2	.64	.64	.59	.59	.61	.62
R2 change		.00		.00		.01
Adjusted R2	.63	.63	.58	.58	.61	.61

N = 513

[†] = $p < .1$; * $p < .05$; ** = $p < .01$; *** = $p < .001$

^a = Reference category woman

^b = Reference category university education

^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

SBCL = Self-related Behavior Change Literacy

CHBCL = Child-related Behavior Change Literacy

OTBCL = Other-related Behavior Change Literacy

DS = Digital Skills

6.4.3 Discussion and recommendations

The theoretical argument to distinguish between the different referent dimensions has proven empirically relevant and, thereby, important for theory and practice. This finding underscores the importance of considering social context in behavior change processes, consistent with ecological systems theory (Bronfenbrenner, 1979).

The primacy of parental mediation intentions as an explanation for parental mediation behaviors corroborates the Theory of Planned Behavior (Ajzen, 1991), supporting earlier findings in digital parenting research (Hong, 2021). The emergence of child-related BCL as the second most promising explanation, followed by digital skills, extends our understanding of

factors influencing parental mediation beyond traditional explanations such as digital literacy (Livingstone & Helsper, 2008).

The significance of child-related BCL over self- and other-related BCL in explaining parental mediation behaviors suggests a specific mechanism through which parents develop and apply behavior change strategies in the context of digital parenting. This finding resonates with research on domain-specific self-efficacy (Bandura, 1997) and parental competence (Sanders & Woolley, 2005), indicating that parents' confidence and skills in changing their children's behaviors may be particularly salient in the digital realm.

The insights from this study offer several avenues for future research across multiple disciplines. In parental mediation research, exploring the relative importance of different subtypes of child-related BCL (e.g., operational vs. habit-related) across various parental mediation strategies (Livingstone et al., 2017) could provide a more nuanced understanding of effective digital parenting practices. Additionally, investigating the antecedents of child-related BCL could inform the development of targeted interventions to enhance parents' capabilities in managing their children's digital behaviors. For BCL researchers, developing predictive models that specify when different referent components of BCL are most relevant could significantly advance the field. This approach aligns with calls for more context-specific theories in behavior change research (Hayes et al., 2012). Examining the transferability of BCL across domains could also illuminate the generalizability of behavior change skills, contributing to broader theories of human development and learning. In the field of domain-specific literacies, the findings encourage a more nuanced conceptualization that distinguishes between individual and social components (Domanska et al., 2020; Schreurs & Vandenbosch, 2020). The social dimension should further differentiate between different social relationships relevant to a literacy (e.g., significant others, children, employees, or clients). This refined approach could enhance the explanatory power of literacy models across various domains, from digital literacy to health literacy, by accounting for the social dynamics inherent in many behavioral contexts.

By integrating insights from social cognitive theory, ecological systems theory, and domain-specific literacy research, this study's findings on BCL's referent component offer a significant multi-disciplinary contribution, advancing our understanding of behavior change processes in the context of digital parenting and beyond.

6.5 BCL-behavior class and parental mediation

6.5.1 Introduction

The behavior change literature distinguishes between two types of behaviors: (1) habitual and (2) non-habitual behaviors (Gardner & Rebar, 2019). The behavior class component of BCL involves applying tailored behavior change strategies depending on whether the behavior is habitual or non-habitual. Understanding these distinctions is important in the context of parental mediation of digital behaviors, as they are the two pathways for parents to effectively guide their children's interactions with digital technologies effectively.

Habitual behaviors are actions performed automatically and regularly (e.g., daily or weekly), often triggered by contextual cues (Gardner & Rebar, 2019). For example, a parent might first attempt to consciously enforce a “no phones at the dinner table” rule, but the practice eventually becomes a routine, requiring little thought. This habitual aspect is important in parental mediation of digital behaviors, ensuring consistency and persistence in family practices. Once established, habits require minimal effort to maintain, making them a powerful tool in consistently and sustainably shaping children's digital behaviors. Non-habitual behaviors, on the other hand, are deliberate and occur less frequently. These actions, such as setting up a screen time monitoring app or discussing cyberbullying, represent the initial steps in behavior change and require conscious effort (Gardner, 2015). They lay the groundwork for future habits and address immediate concerns in digital parenting. Repeated performance of these non-habitual behaviors can eventually transform them into habits, embedding beneficial digital parenting practices into daily life. Parents with high habit-related Behavior Change Literacy (BCL) are adept at establishing and maintaining habits essential for effective parental mediation. In contrast, those with high action-related BCL excel at executing deliberate, well-considered actions related to parental mediation. Habit-related BCL is expected to have a larger impact because habits, once established, become automatic and require less effort, ensuring consistent influence on children's digital behaviors. Action-related BCL is important for initiating change but may not sustain long-term consistency as effectively.

Understanding the transition from non-habitual to habitual behaviors is essential for parents to embed beneficial digital parenting practices into daily life. This distinction between habit-related and action-related BCL highlights different strengths in parental mediation strategies. For instance, a parent might start with a deliberate action, such as setting screen time limits, which, through consistent application, becomes a habitual part of family life.

This section explored the role of the behavior-class component of BCL in parental mediation by examining the associations between parental mediation intentions (PMI), habit-related BCL, action-related BCL, and parental mediation behaviors (PMB). It examined how different facets of BCL influence the effectiveness of parental mediation strategies, thereby contributing to a more comprehensive understanding of how parents can better manage their children's digital behaviors. By analyzing these dynamics, this research seeks to provide insights into the development of effective parental mediation interventions, emphasizing the importance of fostering both habitual and action-oriented behaviors in digital parenting.

6.5.2 Results

Descriptive insights

Table 26 shows the descriptive statistics for BCL’s two behavior class components: actions and habits.

Habit-related BCL shows a slightly higher mean score (3.74) compared to Action-related BCL (mean = 3.67), with both exhibiting similar variability (SD = 0.55 and 0.56, respectively). The minimal difference in means (0.07) suggests that participants perceive their competence in influencing habitual behaviors and one-time actions as nearly equivalent.

Overall, both BCL components have mean scores above the midpoint, indicating a generally positive self-assessment among participants of habit-related and action-related BCL. The skewness values for both highlight that these assessments are unevenly distributed, skewing towards higher values.

Table 35

Descriptive statics of BCL-behavior class

	Range	Mean	SD	Skewness
BCL	1-5	3.70	.52	-.41
ABCL	1-5	3.67	.56	-.51
HBCL	1-5	3.74	.55	-.28

N = 513

BCL = Behavior Change Literacy

ABCL = Action-related Behavior Change Literacy

HBCL = Habit-related Behavior Change Literacy

H2c: Parental mediation intentions will have a positive association with parental mediation behaviors, but this relationship will be strongest for individuals with high habit-related BCL compared to those with high action-related scores

The regressions show that habit-related BCL significantly explained parental mediation for composite ($\beta = .28, p < .001$), restrictive ($\beta = .42, p < .001$), and active mediation ($\beta = .23, p < .001$) (see Table 36). Surprisingly, action-related BCL was only involved in significantly explaining restrictive parental mediation behaviors from an inverse perspective ($\beta = -.32, p < .001$). The interactions with PMI and any of the behavior class dimensions were not relevant for any of the three mediation types. Similar to the previous analysis, PMI remained an important explanation for all types, and education maintained a marginally significant relationship with restrictive parental mediation behaviors ($\beta = .14, p < .10$).

The analysis provided new insights, confirming the fundamental role of habit-related BCL in facilitating parental mediation. Surprisingly, action-related BCL was significantly linked to less restrictive behaviors. The dominance of one dimension is similar to the previous findings, suggesting that habit-related BCL is what matters for effective parental mediation. The disaggregated analysis revealed that the effectiveness of BCL in influencing PMB is predominantly driven by habit-related BCL rather than by a balanced contribution of the two dimensions.

Table 36*Hierarchical Regression Analysis of BCL behavior class on PMB*

Independent variable	Composite PMB			Restrictive PMB		Active PMB	
	M1	M2	M3	M2	M3	M2	M3
Gender ^a	-.03	.00	.00	-.04	-.04	.01	.01
Education ^b	.13	.06	.06	.14 [†]	.15*	.03	.03
PMI ^c		.77***	.62**	.79***	.86***	.72***	.56**
Action-related BCL		-.09	.18	-.32**	.09	.02	-.22
Habit-related BCL		.28***	-.12	.42***	.08	.23**	.32
PMI x ABCL			.01		-.12		.07
PMI x HBCL			.03		.10		-.03
R2	.01	.63	.63	.59	.59	.60	.60
R2 change		.62***		.58***		.59***	
Adjusted R2	.00	.63	.63	.59	.59	.60	.60

N = 513

† = p < .10; * p < .05; ** = p < .01; *** = p < .001

^a = Reference category woman^b = Reference category university education^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

ABCL = Action-related Behavior Change Literacy

HBCL = Habit-related Behavior Change Literacy

H3c: Parental mediation intentions will have a positive association with parental mediation behaviors, but this association will be stronger for individuals with high BCL and high digital skills compared to those with high BCL and low digital skills

Similar to the previous analysis, PMI and habit-related BCL remained important explanations (see Table 37). Action-related BCL maintained the surprisingly significant negative relationship with restrictive ($\beta = -.36$, $p < .001$) and newly composite parental mediation behavior ($\beta = -.13$, $p < .10$). Digital skill significantly explained composite ($\beta = .19$, $p < .01$), restrictive ($\beta = .23$, $p < .05$), and active mediation ($\beta = .19$, $p < .01$) in non-interaction models. The interactions were not relevant as explanations.

These findings support the previous results from the other BCL aspects. They underscore the importance of focusing on enhancing habit-related BCL and digital skills independently to better explain parental mediation behaviors.

Table 37*Hierarchical Regression Analysis of BCL behavior class on PMB*

Independent variable	Composite PMB		Restrictive PMB		Active PMB	
	M1	M2	M1	M2	M1	M2
Gender ^a	.03	.03	-.01	-.01	.04	.04
Education ^b	.05	.05	.12 [†]	.13 [†]	.02	.02
PMI ^c	.75***	.77***	.78***	.81***	.70***	.74***
Habit-related BCL	.29***	.24	.42***	.09	.23**	.36
Action-related BCL	-.13 [†]	-.07	-.36***	.00	-.02	-.12
Digital skills	.19**	.22	.23*	.27	.19**	.24
PMI x HBCL x DS		.01		.04		-.02
PMI x ABCL x DS		-.01		-.04		.01
R ²	.64	.64	.60	.60	.61	.61
R ² change		.00		.00		.00
Adjusted R ²	.63	.63	.59	.59	.60	.60

N = 513

† = p < .1; * p < .05; ** = p < .01; *** = p < .001

^a = Reference category woman^b = Reference category university education^c = Parental mediation intention was adjusted according to parental mediation behavior type (i.e., composite, restrictive, or active)

BCL = Behavior Change Literacy

PMI = Parental Mediation Intention

PMB = Parental Mediation Behavior

ABCL = Action-related Behavior Change Literacy

HBCL = Habit-related Behavior Change Literacy

6.5.3 Discussion and recommendations

The empirical relevance of distinguishing between habitual and non-habitual behaviors in the context of BCL aligns with contemporary theories of behavior change (Gardner & Rebar, 2019). As hypothesized, parental mediation intentions emerged as the strongest explanation for parental mediation behaviors, consistent with the Theory of Planned Behavior (Ajzen, 2011). However, the significant association of habit-related BCL with parental mediation behaviors, surpassing digital skills and action-related BCL, offers novel insights into the mechanisms of effective digital parenting.

The prominence of habit-related BCL in explaining parental mediation behaviors suggests that parents' ability to establish and maintain consistent mediation practices is important. This finding aligns with research emphasizing the importance of habitual behaviors in parenting practices (Rothman et al., 2011). The high expected value of parental mediation, potentially rooted in social norms and cultural narratives about responsible digital parenting (e.g., Livingstone & Blum-Ross, 2020), may explain the strong intentions observed across parents, potentially diminishing the moderating effect of habit-related BCL on the intention-behavior relationship.

These results offer several implications for parental mediation research. Future studies should investigate the relative importance of specific subtypes of habit-related BCL (e.g., operational, child-related) across different conceptualizations of parental mediation behaviors (Kuldass et al., 2021). Additionally, exploring factors contributing to high and low habit-related BCL in parents could inform more targeted interventions. Experimental testing of interventions incorporating various elements of BCL is necessary to validate their effectiveness in real-world settings.

These findings open avenues for developing more comprehensive theories of behavior change. Future work should aim to predict which behavior class dimension (habit-related or action-related) is most critical for different behaviors, considering contextual factors. Examining the relationship between behavior class BCL and established high-impact behaviors across domains could provide insights into the broader applicability of these findings.

Researchers focused on domain-specific literacies can draw valuable insights from this study (Domanska et al., 2020; Gilster, 1997; Nutbeam, 2008; Oades et al., 2021; Rozendaal et al., 2016; Spante et al., 2018). Incorporating distinctions between habitual and non-habitual components in literacy conceptualizations could enhance their explanatory power. Developing theories that predict which behavior class BCL component complements domain-specific literacies most effectively could lead to more integrated models of literacy and behavior change.

These findings contribute to a more nuanced understanding of BCL's role in parental mediation of digital behaviors, emphasizing the importance of habit formation in effective digital parenting. This research lays the groundwork for future studies to advance our understanding of parenting practices in the digital age and inform the development of targeted interventions to support parents in navigating the complex digital landscape with their children.

6.6 Conclusion

Chapter 6 offers insights into the complex dynamics of parental mediation in the digital age, highlighting the intricate relationships between Behavior Change Literacy (BCL), digital skills, parental mediation intentions, and actual parental mediation behaviors. Moreover, this comprehensive analysis provides a nuanced understanding of how different dimensions within each component of BCL interact with parental intentions to influence digital parenting practices.

The first major finding is that all three direct-association models explain a considerable amount of variance in parental mediation behaviors (i.e., from .62 to .65). Moreover, the difference in explained variance was negligible for the interaction models (mostly between +.01, 0, and -.01). Given the lower complexity, the direct relationship models are superior explanatory models. Amongst the BCL-type, direct-association models, the model with DS was slightly better than the baseline model in terms of explained variance ($\Delta R^2_{\text{TYPE+DS}} = .65$ compared to $\Delta R^2_{\text{TYPE}} = .64$). The referent model ($\Delta R^2_{\text{REF+DS}} = .63$ and $\Delta R^2_{\text{REF}} = .62$) and behavior class model ($\Delta R^2_{\text{BC+DS}} = .63$ and $\Delta R^2_{\text{BC}} = .62$) explained slightly less. BCL demonstrated considerable promise as an independent explanation for parental mediation behaviors, even when accounting for established factors, such as digital skills. The second major finding is the dominance of one literacy type in each model. The three dominating components were operational BCL ($\beta_{\text{CPMB}} = .32$, $p < .001$, $\beta_{\text{RPMB}} = .26$, $p < .001$, $\beta_{\text{APMB}} = .36$, $p < .001$), child-related BCL ($\beta_{\text{CPMB}} = .22$, $p < .001$, $\beta_{\text{RPMB}} = .17$, $p < .10$, $\beta_{\text{APMB}} = .25$, $p < .001$), and habit-related BCL ($\beta_{\text{CPMB}} = .28$, $p < .001$, $\beta_{\text{RPMB}} = .42$, $p < .001$, $\beta_{\text{APMB}} = .23$, $p < .01$), which had the most reliably significant and moderate effect-size explanations. Aligned with expectations, the different subtypes of literacy have different association strengths. The multi-component nature of BCL, encompassing operational, emotional, and cognitive types, as well as the self-, child-, and other-related referent dimensions, and habit- versus action-related behavior class dimensions, proved empirically relevant and theoretically insightful. The third finding is the strong association between parental mediation intentions and behaviors across all models (e.g., type: $\beta_{\text{CPMI}} = .76$, $p < .001$, $\beta_{\text{RPMI}} = .79$, $p < .001$, $\beta_{\text{APMI}} = .71$, $p < .001$). Parental mediation intentions emerged as the strongest explanation of actual mediation behaviors, aligning with the Theory of Planned Behavior (Ajzen, 2011a) and underscoring the importance of motivational factors in digital parenting practices. These findings challenge previous research that found weaker associations (Hong, 2021), highlighting the need for further investigation into methodological approaches and measurement techniques in this field. Last, digital skills emerged as an independent explanation of parental mediation behaviors. This finding reinforces the importance of digital competence in effective digital parenting while also highlighting that such skills alone are insufficient for ensuring consistent mediation practices (de Ayala López et al., 2020; Jeong et al., 2012).

These findings have implications for both theory and practice in the fields of parental mediation, behavioral science, and literacy studies. Future research in parental mediation behaviors should adopt a multifaceted approach, focusing on several key areas. First, researchers interested in the changes in parental mediation over time (Beyens et al., 2019) should examine how BCL, intentions, and digital skills interact with parental mediation behaviors. Second, these research findings suggest that interventions aimed at enhancing parental mediation behaviors should adopt a holistic approach, simultaneously targeting multiple components, including strengthening intentions, enhancing BCL (focusing on operational, child-related, and habit-related aspects), and developing digital skills. Third, studies should examine the factors that shape parental mediation intentions, especially the TBP-proposed antecedents of intentions, namely attitudes, social norms, and perceived behavior control (Fishbein & Ajzen, 2010).

Finally, researchers should investigate how the timing of measurements affects the explanatory power of both intentions and BCL, supporting a theory of temporal measurement dynamics related to parental mediation behaviors. Additionally, examining how BCL interacts with established explanations of parental mediation, such as parental and child age (Lin et al., 2019; Nikken & Schols, 2015), could help develop a more comprehensive theory of parental mediation.

For behavior change scholars, these findings open new avenues for investigating BCL's influence on high-impact behaviors across various domains. First, research should explore the conditions in which utilizing BCL as a composite explanation is more promising than the usage of BCL subtypes. Second, experimental research should be conducted to test the efficacy of BCL-focused interventions across various behavioral domains. Comparing these comprehensive BCL interventions with more traditional approaches, such as interventions based on the TBP (e.g., Steinmetz et al., 2016) or COM-B model (e.g., Barker et al., 2016), could provide valuable insights into the most effective strategies for promoting lasting behavior change. While interventions aimed at increasing specific behavioral intentions or their antecedents can be effective for particular behaviors (e.g., Steinmetz et al., 2016), enhancing BCL may have broader benefits across a wide range of behaviors, making it a more impactful target for interventions. Third, understanding the factors that promote or hinder the development of BCL is important to build a more comprehensive theory of BCL. This could involve identifying factors relevant to other literacies (e.g., Choudhary & Bansal, 2022; Maršíková & Mazurchenko, 2022; Singleton & Krause, 2010), such as access to educational resources. These factors could inform the design of educational programs and interventions aimed at enhancing BCL from an early age and throughout the lifespan. Last, BCL should be integrated into broader theoretical advancements in behavioral science, such as being a key aspect of the capability component of the COM-B model (Michie et al., 2011). Moreover, examining empirically how BCL interacts with established behavior change theories, such as social cognitive theory (Bandura, 1999) and their prominent constructs (e.g., self-efficacy), could lead to more comprehensive models of behavior change. This integration could provide a more nuanced understanding of why some individuals are more successful at changing their behaviors than others, even when faced with similar circumstances or interventions.

Researchers interested in conceptualizing and measuring domain-specific literacies (e.g., Hou et al., 2021) should consider adopting insights from the BCL framework to enhance their literacy. BCL's emphasis on the type, referent, and behavior class components could help domain-specific literacy researchers develop more powerful theories and accurate measurements. For example, a revised model of financial literacy might include not only knowledge of financial concepts but also emotional resilience in the face of financial stressors and practical skills for implementing financial plans. Moreover, health literacy researchers might expand their focus beyond cognitive and emotional health literacy to include an operational dimension (Fleary et al., 2018). Similarly, well-being literacy researchers (e.g., Oades et al., 2021) might incorporate elements that distinguish between self-related and other-related well-being literacy. Moreover, the BCL concept might inspire researchers to develop new outcome measures for literacy interventions. Rather than focusing solely on knowledge gains, interventions could be evaluated based on their ability to foster lasting behavioral changes and enhance individuals' overall capacity for self-directed learning and adaptation within the domain. Regarding intervention design, the BCL framework encourages researchers to move beyond purely informational approaches. Instead, literacy interventions could incorporate elements that enhance emotional literacy (e.g., building self-efficacy and positive attitudes towards change), cognitive literacy (e.g., teaching behavior change principles), and

operational literacy (e.g., providing opportunities for successful behavior change experiences within the domain).

This chapter has advanced our understanding of the factors influencing parental mediation behaviors in the digital age. By empirically examining the explanatory promise of Behavior Change Literacy, the thesis has contributed new perspectives on how parents navigate the challenges of digital parenting. The findings provide a solid foundation for future research and the development of more effective interventions to support parents in managing their children's digital media use. As digital technologies continue to evolve and permeate family life, this research offers valuable insights that can inform policies, educational programs, and support systems aimed at promoting positive digital experiences for children and families.

Chapter 7 — General conclusion

7.1 Introduction

This doctoral dissertation has advanced the understanding of parental mediation behaviors by exploring the roles of behavior-specific intentions, skills, and Behavior Change Literacy (BCL). The research addressed a critical gap in the literature by testing intentions further and developing and validating a novel theoretical construct, namely BCL, which is defined as the literacy that enables individuals to initiate and sustain desired behavioral changes in themselves and others effectively, leveraging operational, emotional, and cognitive literacies across habitual and non-habitual behaviors. This work was guided by the central research question:

What roles do behavior-specific intentions and BCL play in explaining parental mediation behaviors?

The dissertation's contributions span three broad areas: parental mediation, behavioral science, and domain-specific literacy research. More specifically, they provide theoretical, methodological, and practical insights for researchers interested in

- improving explanations of parental mediation behaviors across their different types and relationships with important outcomes as well as building accurate theoretical models for the design of effective parental mediation interventions to support children and families in capturing the opportunities/benefits and minimizing the risks/harms of media and technology (Clark, 2011; Helsper & Smahel, 2020; Kalmus et al., 2024; Livingstone et al., 2017)
- advancing explanations of (non-paternalistic) behavior change and BCL's explanatory power for high-impact behaviors across behavioral domains (e.g., health or work) and important outcomes as well as building accurate theoretical models for the design of effective BCL and behavior change interventions to support the population in capturing positive outcomes (e.g., physical health) and minimizing negative outcomes (e.g., depression) (Fishbein & Ajzen, 2010; Gutman & Schoon, 2015; Krpan & Urbaník, 2024; Michie et al., 2011; Thaler & Sunstein, 2009)
- strengthening the explanatory power of domain-specific literacies (e.g., digital literacy or health literacy) for behaviors and important outcomes as well as building accurate theoretical models to design effective domain-specific literacy interventions to support the population in capturing the domain-specific positive outcomes and minimizing negative outcomes (Domanska et al., 2020; Gilster, 1997; Nutbeam, 2008; Oades et al., 2021; Rozendaal et al., 2016; Spante et al., 2018)

The theoretical contributions are centered around developing a comprehensive conceptualization of BCL, encompassing three distinct theoretical components: BCL type, referent, and behavior class. This multi-component and -dimension literacy framework provides a nuanced understanding of behavior change processes, particularly in the context of parental mediation behaviors. The three theoretical components of BCL (i.e., BCL type, referent, and behavior class) were empirically relevant. The findings demonstrate that BCL significantly explains parental mediation behaviors, especially the operational, child-related, and habit-related components. This substantial relationship underscores BCL's potential as a valuable addition to intention-behavior models, opening new avenues for research in

communication and media studies, behavioral science, and field-specific literacy studies (Helsper & Smahel, 2020; Hong, 2021; Sheeran & Webb, 2016; Thaler & Sunstein, 2009).

While acknowledging the thesis's limitations, such as the reliance on self-reported data, cross-sectional design, and sample representativeness, this dissertation lays a solid foundation for future exploration of BCL. It not only contributes to the theoretical understanding of parental mediation but also provides practical tools and methodological innovations that can inform future research and applications in communication and media studies, behavioral science, and field-specific literacy studies.

The subsequent sections in Chapter 7 discuss the theoretical, methodological, and practical implications of this research for three key areas of contribution in greater detail. This comprehensive discussion begins with broader implications for behavioral science before delving into the specific implications for parental mediation research and practice and finishing with insights for field-specific literacy studies.

7.2 Behavioral science

7.2.1 Theoretical implications

Behavioral science focuses on identifying theories that provide robust explanations for behaviors (Hallsworth, 2023; Sanders et al., 2018). In theory, researchers are interested in explaining how to increase the frequency of behaviors like exercise that are closely associated with important positive outcomes, such as well-being, and decrease behaviors linked to negative outcomes across behavioral domains (Abraham & Michie, 2008; Gutman & Schoon, 2015; Sheeran et al., 2017). In practice, most behavior change research focuses on health-related behaviors (Steinmetz et al., 2016).

Consequently, the thesis contribution is fourfold: providing a new avenue for better explanations of behavior change with BCL, exploring the particularities of a specific subset of behaviors in the field of media and communication, drawing on field-specific explanations for these behaviors while leveraging the Theory of Planned Behavior (TPB) as a theoretical backdrop (Ajzen, 2011a), and enriching the field-specific explanations with a well-established explanation within the behavior change field, namely intentions (Morwitz & Munz, 2021). This thesis developed BCL predominantly with the narrow goal of developing better explanations for parental mediation behaviors (Clark, 2011). However, it also contributes to a broader theoretical goal of enhancing the explanations of behaviors (Hagger et al., 2020).

Intentions

Amongst the different candidates to explain behavior, intentions emerged as one of the strongest explanations over decades of research compared to alternative explanations, such as perceptions of risk and severity (e.g., Sheeran & Webb, 2016) or personality factors (Chiaburu et al., 2011). The presented results support the explanatory strength of intentions for behaviors in the domain of the digital, particularly parental mediation behaviors. Behavior-specific intentions were the strongest explanation among the contenders, namely BCL, behavior-specific skills (i.e., digital skills), education, and gender. The primacy of intentions for parental mediation behaviors is aligned with existing literature on the relative explanatory strength of explanations for behavior (Fishbein & Ajzen, 2010).

Behavior Change Literacy

The development and exploration of BCL as a new explanation was motivated by the research that shows how people differ in their ability to enact behaviors (e.g., Sheeran & Webb, 2016) and the explanatory utility of the literacy concept across disciplines, such as health science and psychology (e.g., Nutbeam, 2008; Oades et al., 2021). BCL is a newly developed and empirically validated concept developed in this thesis. BCL is theoretically conceptualized here as the literacy that enables individuals to effectively initiate and sustain desired behavioral changes in themselves and others. Like other literacies, BCL is especially promising because it can be actively taught, which empowers people to autonomously increase the frequency of a wide range of behaviors that are closely associated with important outcomes, such as well-being or physical and mental health (Gutman & Schoon, 2015; Kalmus et al., 2013; Xie et al., 2019).

The presented results demonstrate that composite BCL is a promising independent explanation of behavior. The most promising theory for this finding is based on BCL influence being guided by the relative expected value of a behavior within a larger landscape of behavioral change targets (Wigfield & Eccles, 2000). This perspective is consistent with expected utility theories applied to behavior, which posit that individuals are more likely to engage in behaviors they perceive as having high value and importance (Fischhoff et al., 1982; Quiggin, 2012). High BCL individuals might be more likely to apply their literacy to behaviors perceived as having high expected value. There are strong cultural narratives around the importance of parental mediation behaviors and the impact of digital behaviors more broadly (e.g., Livingstone & Blum-Ross, 2020). Managing children's digital behaviors is plausibly a high-expected value behavior due to its socially promoted impact on the well-being of children, parents, and the family unit. The high expected value could be linked theoretically to two of the key components of the TPB, namely attitudes and social norms towards a behavior (Fishbein & Ajzen, 2010). High BCL should only increase the frequency of personally prioritized behaviors, while not automatically increasing the frequency across all behaviors. This theory could be tested by, for example, examining the extent to which high BCL has a strong independent effect on exercise behaviors for single individuals but less so for parents since one would expect singles to acquire additional expected benefits related to the significant other/romantic partner search from those behaviors. However, it is also possible that staying fit for one's children could cancel out this difference. It is worthwhile to examine this expected value hypothesis further as an explanation for the independent effect of BCL.

An interactive relationship between BCL and parental mediation intentions might exist but could be too small to be detected with the current sample size and measurement method. A larger sample size would increase the statistical power to detect smaller interaction effects and increase variance across interaction categories (Cohen, 1992; Jaccard & Turrisi, 2003). Furthermore, assessing parental mediation intentions and behaviors at different points in time can help mitigate consistency bias, where measuring variables closely in time can artificially strengthen correlations because people tend to prefer to see themselves as consistent across cognitions, emotions, and behaviors (Guadagno & Cialdini, 2010; Podsakoff et al., 2003). Temporal separation helps reduce the consistency effect and, thereby, the strength of the direct intention-behavior relationship. By addressing these issues, even partially, a smaller interactive relationship could become detectable. Additionally, the temporal separation could either lead to a stronger direct relationship between BCL and an investigated behavior or a weaker relationship since more things can interfere when timescales are longer. Overall, the predominant pathway of BCL appears to be likely through the direct influence on enacting perceived high-value behavior.

Moreover, this doctoral dissertation has theorized and empirically demonstrated the significance of an even more granular conceptualization of BCL based on the literacy literature (see Table B1 and Table B2, Appendix B), covering three distinct components of BCL: the type of literacy employed (i.e., operational, emotional, and cognitive), the referent of the behavior change (i.e., self, child, and other), and the class of behavior targeted (i.e., action and habit). These three theoretical components matter when explaining behaviors.

Most literacy models show three basic theoretical components: emotion, cognition, and performance/operation/behavior (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018). Consequently, BCL is conceptualized using the same three dimensions. Emotional BCL is decomposed into two facets: behavior change self-efficacy (e.g., having confidence in one's ability to establish good habits) and behavior change attitude (e.g., perceiving it to be important to become better at avoiding bad actions) (e.g., Ajzen & Fishbein, 2000; Albanese et al., 2019). Informed by the different conceptualizations of the cognitive dimension, the cognitive BCL is also conceptualized in a two-fold manner: declarative knowledge (e.g., knowing about the COM-B model or different behavior change techniques) and procedural knowledge or skill (e.g., implicitly knowing how to make oneself do difficult actions) related to behavior change. This is a well-established distinction beyond the context of literacy (Ten Berge & Van Hezewijk, 1999). The operational dimension refers to the extent to which behavior change attempts have been successful. It involves applying the knowledge (cognitive dimension) and emotional drivers (emotional dimension) in practical, observable ways to achieve successful behavior change. The empirical work done here revealed that while BCL's emotional and cognitive dimensions may provide the foundational knowledge and motivation for behavior change in relation to parental mediation they might not be particularly important in explaining this subset of behaviors. Operational BCL appears to be a necessary condition, as it captures the extent to which individuals can translate their intentions into actual behavior change. For example, an individual might be aware of a BCL technique (reminders), know how to use it, and want to perform the behavior. However, they might still not perform the behavior due to a lack of resources or an inability to navigate their current environment.

Extending the concept of BCL to encompass both individual and social processes, it is acknowledged that BCL operates on multiple levels, as do other literacies (Domanska et al., 2020; Rozendaal et al., 2016; Schreurs & Vandenbosch, 2020). At the individual level, BCL involves acquiring and applying knowledge and skills to alter one's own behavior. For instance, an individual might improve their digital habits through self-regulation techniques (Rothman et al., 2011; Schwarzer, 2008; Sedikides & Hepper, 2009). Socially, BCL extends to how individuals interact with and influence others. This involves understanding and navigating the dynamics of behavior change in a more complex setting (Bronfenbrenner, 1979). For example, a parent employing BCL to negotiate screen time rules with their children or partner exemplifies BCL's social dimension. BCL is concerned not only with managing one's behavior but also with positively influencing others' digital habits. The integration of individual and social processes in BCL was expected to be important, especially in contexts like parental mediation of children's technology and media use. In fact, compared to self- and other-related BCL, child-related BCL was a much more important explanation of parental mediation behaviors. This could be explained in a bi-directional interaction: if someone has high operational, emotional, and cognitive literacy related to children, it is easier for them to use it effectively and reap positive benefits from it. Similarly, if an individual prescribes a high expected value to influencing child-related behaviors, they might further develop this literacy over time. However, how highly the person values parental mediation's expected outcomes was not measured, which would be a promising future research avenue.

As the literature suggested, individuals differ in their literacies related to behavior initiation and maintenance, making such distinctions practically important (e.g., Gardner & Rebar, 2019). Habitual behaviors (behavioral habits) are performed with a high degree of automaticity and regularity (i.e., daily or weekly), often triggered by contextual cues rather than through deliberate decision-making. For example, a parent consistently enforcing a “no phones at the dinner table” rule might initially start as a conscious action. Over time, it might become a habitual part of the family routine, requiring little thought or effort to maintain (Rothman et al., 2011). Non-habitual behaviors (actions), in contrast to habits, are characterized by their deliberative and bound nature. Such behaviors are performed once, rarely, infrequently, or occasionally, but not habitually (Gardner et al., 2022). They often represent the initial steps in the process of behavior change, requiring conscious effort and intention (Gardner, 2015). In the realm of digital parenting, actions include setting up a new app for monitoring screen time or having a first-time discussion about cyberbullying with a child (Nikken & Jansz, 2014). In practice, habit-related BCL was significantly associated with the specific behavior, while action-related BCL was not. Individuals with high habit-related literacy might be more likely to focus on behavior categories (e.g., parental mediation) that require many habitual behaviors to produce positive outcomes. Parental mediation likely requires the parents to establish several parental mediation habits for a noticeable positive difference in the well-being of the child(ren), parents, and family across restrictive and active dimensions (Livingstone & Blum-Ross, 2020). It is unlikely that a singular habit would make significant differences. If individuals have high habit-related literacy, they will be more motivated and able to leverage it to perform high-expected value behavior categories that require consistent execution to obtain the benefits. Moreover, supposing that individuals perceive high expected value from these habitual behaviors, they are more likely to develop and refine their habit-related literacy over time, creating a virtuous cycle of behavior change and reinforcement.

The thesis expands behavioral theory by demonstrating the importance of the nuanced relationship between a set of specific behaviors, such as parental mediation, the type of BCL relevant (i.e., operational, emotional, and cognitive), the target of behavior change (i.e., self, children, and others), and the class of behavior (i.e., actions and habits). Exploring direct and indirect effect models is still worthwhile since the insignificant moderation could be explained by the unusually small observed intention-behavior gap for the investigated behavior. The small gap itself could point toward either a methodological issue or an alternative explanation related to the specific type of behavior, such as strong social norms for parents, which might have contributed to an unusually small gap. The methodological issue appears most plausible based on the results of Hong’s (2021) results. Consequently, it is premature to conclude that BCL does not offer a meaningful influence on the strength of the relationship between intentions and behaviors, at least in the context of alternative behaviors, such as behaviors with a larger documented intention-behavior gap, like exercising (Steinmetz et al., 2016).

Behavior-specific skills and literacy

BCL was an important explanation even if digital skills, which have been conceptualized as a component of digital literacy (e.g., Helsper et al., 2020; Spante et al., 2018), were included as an explanation. The results presented in the thesis indicate that explanations of behaviors should consider behavior-specific skills and literacies because they could be related to a higher enactment of targeted behaviors. Behavior-specific skills are relatively similar to the perceived behavioral control construct, one of the TBP-based promising explanations of intentions and behaviors (Fishbein & Ajzen, 2010). A bi-directional interaction is plausible. For example, more behavior-related skills and literacy could make it easier for an individual to perform a set

of specific behaviors (e.g., parental mediation). Similarly, frequent performance of a behavior might lead to higher behavior-related skill and literacy levels over time. Understanding the extent to which behavior-specific skill is or is not captured by behavior-specific behavioral control in the TPB model could be worthwhile to explore in longitudinal research.

Gender and education

The present thesis's empirical work does not support gender as an explanation of examined behavior. However, education was relevant for restrictive parental mediation behaviors. Parents who were more educated showed more restrictive behaviors. Parents with higher levels of education might be more informed about potential behavioral risks and have more enhanced critical thinking skills. The literature on parental education explaining parental mediation behaviors is mixed and mostly points towards education not being particularly relevant (e.g., Lauricella & Cingel, 2020; Lee et al., 2022; Nikken & Schols, 2015). It is promising for researchers to understand how other socio-demographic and socio-cultural indicators, such as parental and child age, explain BCL (Lin et al., 2019; Nikken & Schols, 2015).

Broader theoretical contribution

From a birds-eye view, BCL provides a new direction for behavioral science research. Currently, a prominent approach that informs behavioral research and theories is the libertarian paternalist approach (Hansen, 2016; Krpan & Urbaník, 2024; Thaler & Sunstein, 2009). More specifically, it means that theories tend to focus on explaining the factors an external party must consider when attempting to change people's behaviors (e.g., TPB via intentions, attitudes, social norms, and perceived behavioral control). In contrast, theories that explain how individuals (struggle to) bridge their own intention-behavior relationship are rare. BCL is a new concept that explains the differences in people's success with behavior change that can be taught, and individuals can self-directly utilize it to achieve their desired life outcomes through effective behavior change.

7.2.2 Methodological implications

The methodology employed to develop the BCLS provides a good example of combining literature-informed new theory with rigorous scale development and empirical validation. This research employed a mixed-methods approach, combining qualitative cognitive interviews with quantitative survey data (DeVellis, 2016; Boateng et al., 2018), yielding valuable methodological insights for future studies on BCL and specific behaviors.

First, when developing a new concept, a systematic process for synthesizing diverse theoretical, methodological, and empirical work is valuable to ensure it is grounded and previous efforts are utilized. In this context, the research captured various conceptualizations of literacies across multiple fields (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018) and examined common theoretical nuances relevant to developing a behavior-focused adaptation (i.e., Behavior Change Literacy). This well-grounded conceptualization of BCL and comprehensive review of literacy scales facilitated the informed generation of BCL items across different theoretical dimensions.

Second, cognitive interviews proved invaluable in identifying necessary changes to improve the scale's validity and accurately capture the intended construct (García, 2011). The cognitive interviews conducted in this research yielded significant methodological insights that enhance

the measurement of BCL. This iterative process of refining item wording, response options, and explanatory texts based on participant feedback resulted in a more precise and accessible measurement tool, demonstrating the value of cognitive interviews in improving the validity and reliability of complex psychological constructs (García, 2011; Willis, 2004). This technique should be taken up more extensively in behavioral science research. Key methodological refinements included optimizing the ordering of items and sections, which enhances data quality by reducing respondent fatigue and confusion. The introduction of explanatory texts encouraging consideration of diverse behavior categories addressed the risk of over-reliance on specific domains, thereby improving the scale's generalizability (Sudman et al., 1996; Tourangeau et al., 2000). Refinement of response options for each BCL type (cognitive, emotional, and operational) contributes to a more nuanced and accurate measurement of the construct. The inclusion of specific timeframes for operational items addresses the challenge of inconsistent recall periods, enhancing the comparability and reliability of BCL assessments across individuals and over time (Conway & Pleydell-Pearce, 2000; Schwarz & Oyserman, 2001). Additionally, insights gained regarding the impact of major events (e.g., the COVID-19 pandemic) on behavior change processes highlight the importance of considering contextual factors in BCL measurement (Sallis et al., 2015).

Third, the research shows how to deal with a construct and scale with three components. The pilot survey results provide robust empirical support for the theoretical conceptualization of BCL as a multi-component construct. The use of both confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) in validating the BCLS revealed strong correlations among these components and dimensions within different fixed-factor 72-item models (Thabane et al., 2010). The conceptualization of BCL consisted of referents embedded within types and those, in turn, have different behavior classes embedded within them. This hierarchical structure means that these are not separate independent components of BCL but branches of one another. Based on this conceptualization, shifting the analytical approach from examining one overarching factor analysis to focusing on three separate factor analyses across the three theoretical components (i.e., types, referent, and behavior class) was logical. Such an approach is consistent with recommendations for dealing with complex, multidimensional constructs (Brown, 2015; Kline, 2015). Developing specialized scales (T-BCL, R-BCL, and BC-BCL) alongside the comprehensive CBCLS-41 offers researchers flexibility in studying specific aspects of BCL while maintaining the option for a holistic assessment. This approach aligns with the theoretical framework's emphasis on the interconnected yet distinct nature of BCL dimensions. This approach of developing multiple scales to capture different aspects of a complex construct is supported by research on multidimensional constructs in psychological measurement (Edwards, 2001; Law et al., 1998). The CBCLS-41's strong psychometric properties, including high reliability for all subscales and acceptable discriminant validity within subscales in the same domain, provide a solid foundation for its use in future research (MacKenzie et al., 2011). These properties suggest that the scale accurately captures the nuanced theoretical conceptualization of BCL.

Finally, the survey research revealed the importance of theoretically and methodologically distinguishing different aspects of the behavior under examination (i.e., restrictive and active mediation). It pointed towards the theoretical value in analyzing the decomposed models of key concepts, such as BCL and parental mediation. This approach is consistent with the recommendations for developing complex psychological constructs (MacKenzie et al., 2011). The results also highlighted the methodological importance of temporal separation in intention and behavior measurement.

Overall, this thesis' methodological approach can provide a blueprint for incorporating BCL in research on other high-impact behaviors. Contextual exploration and adaptation are important to understanding the validity of the BCLS across different behavioral domains.

7.2.3 Practical implications

The research on BCL offers practical implications for various stakeholders, including individuals, societal institutions, and researchers. This framework provides valuable insights for enhancing personal development, improving public health interventions, and enriching educational curricula, aligning with calls for more integrative approaches to behavior change and literacy research (Batterham et al., 2016).

Individuals seeking to improve their ability to perform more of their desired behaviors can leverage the BCL framework to enhance their operational, emotional, and cognitive literacies. Creating an extensive record of successful behavior change (operational literacy) aligns with research on the importance of self-efficacy in behavior change (Bandura, 1997). Cultivating self-efficacy and positive attitudes toward one's ability to change behaviors (emotional literacy) is supported by studies highlighting the role of emotions in behavior change processes (Baumeister & Vohs, 2007). Gaining knowledge about effective behavior change techniques and theory, including understanding how to apply them in various contexts (cognitive literacy), reflects the importance of theoretical knowledge in behavior change interventions (Carey et al., 2019). Individuals should develop literacy across important and difficult actions and habits, consistent with research on habit formation and behavior change techniques (Gardner et al., 2022; Michie et al., 2013). Furthermore, considering the extent to which they need to become more skilled in their relationship with themselves or others aligns with social cognitive theories emphasizing the role of social context in behavior change (Bandura, 2001).

While this thesis did not design or test training materials, it offers a framework for conceptualizing BCL and measuring people's current levels, providing a foundation for future intervention development. Public institutions can use this nuanced understanding of BCL to help achieve their goals and develop interventions and training programs using the measurement tools provided. Public health institutions aiming to improve population health and well-being through various strategies should consider incorporating BCL components into interventions to support change in high-impact behaviors, aligning with comprehensive models of behavior change such as the COM-B model (Michie et al., 2011).

Educational institutions can play a role in fostering BCL among students, teachers, and the broader community. Integrating BCL into educational curricula can help students develop the skills they need to manage their behaviors effectively, reflecting calls for more comprehensive approaches to education that include life skills (Gutman & Schoon, 2016). Courses covering topics such as self-regulation, goal setting, and the science of habit formation align with research on the importance of these skills in academic and life success (Duckworth & Carlson, 2013). Providing teachers with training on BCL can equip them to better support students in developing these skills, consistent with research on the importance of teacher training in implementing new educational approaches (Darling-Hammond et al., 2017). Teachers can learn how to incorporate BCL principles into their teaching methods and classroom management strategies, potentially enhancing the overall learning environment. Schools and universities can offer extracurricular programs that focus on enhancing BCL, including workshops on stress management, time management, and healthy lifestyle choices, all framed within the context of BCL. This approach aligns with research on the benefits of comprehensive school health programs (Langford et al., 2014).

Future research should support and refine these practical applications of BCL. Educational scholars should conduct long-term studies that analyze the effects of integrating BCL into the curriculum, offering data-driven insights into the benefits of BCL and potential areas for improvement. These studies can help identify best practices and potential areas for enhancement, ensuring that BCL education remains relevant and impactful. This approach aligns with calls for evidence-based educational practices (Slavin, 2002). Researchers can also explore the interplay between BCL and various educational outcomes, such as academic performance, social-emotional development, and digital citizenship, providing a comprehensive understanding of how BCL influences student success. This holistic approach reflects trends in educational research that consider multiple aspects of student development (Durlak et al., 2011).

The practical implications of BCL research extend far beyond theoretical understanding, offering tangible strategies for personal development, public health improvement, and educational enhancement. By applying these insights, individuals can better achieve their behavioral goals, public health institutions can design more effective interventions, and educational systems can foster essential life skills. The ongoing collaboration between practitioners and researchers in refining and expanding BCL applications promises to yield societal benefits, potentially transforming how we approach behavior change across various domains. This collaborative approach aligns with calls for more interdisciplinary and applied research in behavior change and literacy studies.

7.3 Parental mediation

This section discusses the research's theoretical, methodological, and practical implications for scholars and practitioners interested in explaining and developing interventions related to parental mediation, digital skills, and family well-being (Kalmus et al., 2013). Parental mediation research focuses on explaining parental mediation behaviors and the relationship between them and positive and negative outcomes for children (Warren, 2020). While more work is needed to understand all the nuances, the general conclusion is that parental mediation behaviors are worth promoting.

However, studies suggest that parents have difficulties changing or enacting parental mediation behaviors. In interview studies, parents reported difficulties living up to their ideal parental mediation (Aierbe et al., 2019; de Ayala López et al., 2020). Similarly, one experimental study examined parental intentions formulated in the Family Media Plan and found “no statistically significant changes in media rule engagement” (Moreno et al., 2021, p. E1). Different explanations have been examined for parental mediation behaviors, especially parental media and digital literacy, which explain only a limited amount (e.g., Jeong et al., 2012). A better theory is still needed to support parents in enacting their behaviors to help their children navigate the digital world.

The ensuing sections discuss the implications of the broader literature and individual studies closely related to the presented work.

7.3.1 Theoretical implications

Broad discussion

Intentions

By highlighting the importance of parental intentions in explaining mediation behaviors, this study addresses a critical gap in the existing literature. Previous research has predominantly focused on factors such as digital skills, social media use, and locus of control (Lin et al., 2019; Vijayalakshmi et al., 2018), potentially overestimating their direct effects due to the omission of intentions as a key explanatory variable. Research on various digital behaviors, such as the use of consumer protection tools, engaging with mobile phones while walking, and adolescents' interaction with social networking platforms, has shown that intentions significantly influence these behaviors (Baker & White, 2010; Jiang et al., 2017; Procter et al., 2019). Despite this evidence, only Hong (2021) has examined intentions specifically in the context of parental mediation. This thesis supports Hong's findings, demonstrating that parental mediation intentions are a promising explanation of parental mediation behaviors, and the intention-behavior relationship might not be significantly different between the distinct types of parental mediation (i.e., enabling mediation and restrictive mediation). The TPB outlines three key components that shape intentions: attitude toward the behavior, perceived social norms, and perceived behavioral control (Fishbein & Ajzen, 2010). These components collectively influence the strength of the intention to perform a behavior. The TBP base components showed promise in explaining parental mediation intentions (Hong, 2021).

Future research in parental mediation should explore several key areas to advance the field. Studies should qualitatively and quantitatively investigate how measurement lag affects the explanatory power of parental mediation intentions across different mediation types since timing between intention measurement and behavior observation can significantly influence evaluations (Guadagno & Cialdini, 2010; Podsakoff et al., 2003). Longitudinal research is needed to understand how the intention-behavior relationship changes over time, particularly as children age (Kalmus et al., 2022). Researchers should focus on identifying factors that influence and strengthen parental mediation intentions, using the TPB to examine attitudes, social norms, and perceived behavioral control (Fishbein & Ajzen, 2010). Studies should also explore how these intentions interact with other established explanations of parental mediation, such as social media use and locus of control (Lin et al., 2019; Vijayalakshmi et al., 2018). Finally, experimental research should leverage existing knowledge on intention interventions in behavioral science (Hagger & Luszczynska, 2014) to develop effective models for enhancing parental mediation intentions, potentially through educational programs that address parents' attitudes, social norms, and confidence in managing children's digital media use.

Behavior Change Literacy

The presented research results suggest that BCL is a promising independent explanation for parental mediation behaviors in addition to parental mediation intentions. The concept of expected value in decision-making posits that individuals are more likely to engage in behaviors they perceive as having high value and importance (Fischhoff et al., 1982; Quiggin, 2012). Managing children's digital behaviors is plausibly a high-expected value behavior due to its significant impact on the well-being of children, parents, and the family unit. The high expected value might be rooted in one of the key components of the TPB (Fishbein & Ajzen, 2010), namely strong social norms and narratives around the value of parental mediation and potentially the discourse on the impact of digital behaviors more broadly (Livingstone & Blum-Ross, 2020).

Moreover, this doctoral dissertation presented a nuanced conceptualization of BCL in the context of parental mediation, building upon the theoretical framework established earlier in

the thesis. The granular approach to BCL, encompassing three types of literacy (operational, emotional, and cognitive), three referent groups (self, children, and significant others), and two behavior classes (actions and habits), aligns with multidimensional models of literacy proposed by scholars such as Bröder et al. (2017) and Domanska et al. (2020). This comprehensive conceptualization allows for a more detailed examination of how different aspects of BCL influence parental mediation behaviors, reflecting the complexity of behavior change processes in real-world contexts (Michie et al., 2011; Michie et al., 2014).

The empirical findings suggest that emotional and cognitive BCL are not significant explanations compared to operational BCL for parental mediation behaviors. This aligns with research highlighting the importance of practical skills and experiences in behavior change (Gardner et al., 2022). Parents may possess substantial knowledge about behavior change and emotional readiness. However, knowing what to do and how to do it does not guarantee that they will take the necessary steps, echoing findings from health behavior research (Sheeran & Webb, 2016). Without a history of applying this knowledge successfully, cognitive and emotional BCL alone do not seem to ensure that parents will consistently engage in mediation behaviors. This finding supports the notion that knowledge and motivation alone are insufficient for behavior change, as proposed by models like the COM-B (Michie et al., 2011). Confidence and positive attitudes provide motivation, but without practical experience and evidence of successful behavior change, parents may struggle to enact effective parental mediation behaviors consistently. Operational BCL prepares parents to deal with the real-world challenges and setbacks that come with changing behavior, reflecting the importance of implementation skills emphasized in behavior change theories (Gollwitzer & Sheeran, 2006).

The findings reveal that child-related BCL was a much more important explanation for parental mediation behaviors compared to self- and other-related BCL. This supports the theoretical proposition that BCL may vary depending on the target of change (Nutbeam, 2008) and aligns with research on the importance of context-specific skills in parenting (Livingstone & Blum-Ross, 2020). The results suggest that if the behavior is other-related (i.e., parental mediation), then general BCL needs to be object-related as well, highlighting the importance of considering the social context in behavior change processes (Bronfenbrenner, 1979).

The research also found that habit-related BCL shows more promise than action-related BCL for explaining parental mediation behaviors. This could be explained by parental mediation behaviors requiring repeated performance rather than a one-off execution to produce benefits, aligning with research on habit formation and its role in sustained behavior change (Gardner & Rebar, 2019; Wood & Rüniger, 2016). Parental mediation might require the establishment of several habits, which are by their nature repeatedly performed without requiring much cognitive effort, to notice positive lasting differences in the well-being of the child(ren), parents, and family across the restrictive and active dimensions over time (Livingstone & Blum-Ross, 2020). The explanation for the importance of habit-related BCL could be twofold. First, a parent with high habit-related literacy might have been more motivated and able to leverage it consistently to establish high-expected value parental mediation habits, reflecting theories of expected utility applied to behavior (Fischhoff et al., 1982; Quiggin, 2012). Second, parents who perceive high expected value from parental mediation habits will be more likely to increase their habit-related literacy over time, suggesting a potential reciprocal relationship between perceived value and literacy development.

The thesis suggests that direct and indirect effect models for parental mediation behaviors are worth exploring because the insignificant moderation could be explained by the unusually small observed intention-behavior gap. This small gap could point towards either a methodological

issue or an alternative explanation related to the specific type of behavior, such as strong social norms for parents, which might have contributed to a minimal gap. This observation aligns with research on the intention-behavior relationship and the factors that influence it (Sheeran & Webb, 2016).

These theoretical insights have important implications for future research on digital behaviors and the development of interventions targeted at parental mediation behaviors. Future theory development for parental mediation behaviors should focus on explaining and increasing levels of BCL, particularly related to operational BCL, child-related BCL, and habit-related BCL, which dominated the parental mediation context. This approach aligns with calls for a more nuanced and context-specific nature of digital parenting (Clark, 2011). BCL is particularly promising because it can be actively taught to parents, which would empower them to self-directedly engage in parental mediation and shape important outcomes, such as family well-being. This aligns with the broader goals of literacy interventions to enhance individuals' capacities for self-directed learning and adaptation (Oades et al., 2021).

Digital skills

The presented research affirms digital skills as an independent explanation of parental mediation behaviors, aligning with a growing body of literature in this field (Daneels & Vanwynsberghe, 2017; Livingstone et al., 2017; Livingstone & Helsper, 2008; Rodríguez-de-Dios et al., 2018). This finding contributes to the ongoing discourse on the role of digital literacy in shaping parenting practices in the digital age.

The independent relationship between digital skills and parental mediation behaviors suggests that parents' technical competence directly contributes to their ability to implement mediation strategies, regardless of their intentions or BCL level. This aligns with the technology acceptance model, which posits that perceived ease of use and usefulness of technology influence its adoption and use (Davis et al., 1989). In the context of parental mediation, digital skills may enhance both perceived ease of use and usefulness of mediation strategies.

The direct association between digital skills and parental mediation behaviors could be attributed to several factors, which warrant further exploration in future research. First, parents with higher digital skills are more adept at implementing technical safeguards, such as PINs, screen patterns, or biometric measures (Helsper et al., 2020). This technical proficiency may instill greater confidence in enacting restrictive parental mediation behaviors (Clark, 2011). Moreover, parents skilled in verifying online information and assessing website trustworthiness are likely better equipped to engage in active parental mediation, such as discussing content creators' intentions with their children (Livingstone et al., 2017). This reflects the importance of critical digital literacy skills in fostering meaningful parent-child conversations about digital media (Spante et al., 2018).

Second, digital skills might provide parents with a sense of self-efficacy specifically related to technology use (Livingstone & Helsper, 2010). This domain-specific confidence could directly translate into more frequent and effective mediation behaviors, independent of broader BCL or general parenting intentions. This aligns with the principle of domain-specificity in self-efficacy research (Bandura, 2006), suggesting that confidence in one's digital abilities may be particularly relevant in the context of digital parenting.

Parents who feel competent in the digital realm may be more likely to engage in mediation behaviors spontaneously, without necessarily going through the process of forming explicit

intentions or drawing on general behavior change skills. These findings also indicate that the ability to initiate and sustain behavioral changes is valuable in digital parenting, even when controlling for technical skills and specific intentions. This supports the broader literature on behavior change and habit formation (Wood & R nger, 2016), suggesting that BCL may play a complementary role to digital skills in effective parental mediation. Parents with high BCL might be more adaptable and resilient in the face of the constantly changing digital environment, enabling them to adjust their mediation strategies more effectively. It might be worthwhile to examine the extent to which modeling digital skills as antecedents of intentions instead of behaviors improves the explanatory power.

The strong relationship between parental mediation intentions and behaviors, potentially caused by the methodological design, might have led to a less pronounced direct association with digital skills and a moderation relationship with BCL and digital skills. This limitation aligns with concerns raised in the literature about common method variance in self-report measures (Podsakoff et al., 2003) and highlights the need for diverse methodological approaches in future research.

Gender

The empirical data does not support gender as an explanation for parental mediation behaviors in this sample. This finding may be influenced by the study sample's specific characteristics rather than broader societal trends. Parents with children aged 12 to 18 from the US and UK involved in online surveys may represent a subset of parents more likely to share child-rearing responsibilities, including digital mediation, regardless of gender. Fathers involved in such services might be unusually tech-savvy and socially progressive. It would be premature to conclude that this result indicates a widespread shift towards egalitarian parenting practices in these countries. The literature on parental gender explaining parental mediation behaviors is inconclusive (Liau et al., 2008; Nikken & Schols, 2015; Sonck et al., 2013; Wallace, 2021; Wang et al., 2005). Future research should explore gender dynamics for parental mediation behaviors and BCL using mixed-methods approaches and detailed analysis (Talves & Kalmus, 2015).

Education

Education was relevant for restrictive but not active parental mediation behaviors. In this sample, parents who were more educated showed more restrictive parental mediation behaviors. Educated parents might likely have greater access to and understanding of the potential risks associated with children's digital media use. Higher-educated parents could more likely display restrictive mediation because it might not require high continuous effort. The literature on parental education explaining parental mediation behaviors is mixed and mostly points towards education not being particularly relevant (e.g., Lauricella & Cingel, 2020; Lee et al., 2022; Nikken & Schols, 2015).

Conclusion

Future research improving the explanations of parental mediation behaviors should include intentions, BCL, and digital skills. This approach aligns with the growing recognition in behavior change research of the need for multifaceted models that capture the complexity of human behavior (Michie et al., 2011, 2014). Moreover, it could be promising for better explanations of intentions to include the TPB proposed components (attitudes, social norms, and perceived behavioral control related to parental mediation) explaining intentions (Fishbein

& Ajzen, 2010). This suggestion is supported by meta-analyses demonstrating the predictive utility of these components across various behavioral domains (Armitage & Conner, 2001; McEachan et al., 2011).

Overall, this might indicate the need to reprioritize research efforts in the field from digital literacy to BCL and digital behavior-specific intention. This shift is in line with recent calls for more nuanced approaches to understanding digital behaviors (Helsper & Van Deursen, 2015). At the same time, the impact of digital skills found in this thesis might imply that general BCL is not enough; it needs to be complemented with digital literacy. This finding resonates with research emphasizing the importance of domain-specific knowledge and skills in effectively navigating digital environments (Livingstone et al., 2017; Mascheroni et al., 2018).

Studies focused on outcomes of digital behaviors should explore the role of behavior-specific intentions, BCL, and digital skills to expand our understanding of the relationship between behaviors and important outcomes (Kalmus et al., 2024; Livingstone et al., 2023). This approach is supported by research highlighting the complex interplay between digital practices and various life outcomes. Specifically, studies could explore whether parents with high levels of BCL, and thus find it easier to undertake parental mediation behaviors, are more likely to have children with better mental health or educational performance. While this thesis was not able to address this directly, such investigations would build on existing research linking parental mediation practices to child outcomes (Kalmus et al., 2013; Livingstone et al., 2017).

Furthermore, more longitudinal research would be valuable (Kalmus et al., 2022). It would be beneficial to examine the long-term impacts of consistently enacted parental mediation behaviors on children's development (Correa et al., 2024). This could include tracking changes in children's digital literacy, emotional and social well-being, and academic performance alongside increasing or decreasing gaps between mediation intentions and behaviors. By understanding these long-term effects of BCL and mediation intentions, researchers and policymakers can develop more targeted and effective strategies to support parents in their mediation efforts, aligning with calls for more evidence-based policy in the digital realm (Livingstone et al., 2013).

These findings suggest that effective digital parenting relies on a multifaceted approach addressing digital skills, BCL, and intentions separately rather than assuming these elements interact. This aligns with comprehensive models of behavior change, such as the COM-B model (Michie et al., 2011), which emphasizes the interplay of capability, opportunity, and motivation in shaping behavior. Researchers should consider developing more nuanced frameworks that account for the distinct pathways through which intentions, digital skills, and BCL influence parental mediation behaviors.

Narrow discussion

Hong's (2021) study is only one examining the relationship between parental mediation intentions and parental mediation behaviors. The present work found intentions to have a substantially stronger explanatory promise. Hong's results seem more likely to be an underestimate of the association due to the methodological design, whereas the current results might overestimate it. The contrasting findings are more likely based on methodological design rather than larger sociological changes, such as more positive societal norms around parental mediation. Overall, intentions are a promising explanation for parental mediation behaviors, aligned with research on the intention-behavior relationship for various other digital behaviors

(Baker & White, 2010; Jiang et al., 2017; Procter et al., 2019). Intentions should be included in future explanatory research on parental mediation.

Future research could examine what caused the contradictory findings among the possible explanations (e.g., sample, methods, or other intervening variables). Longitudinal research could help to construct theories that explain the changes in the size of the relationship over time (e.g., based on the age of the children) and solve the question of whether past behaviors are more important than intentions for the future in predicting behavior (McEachan et al., 2011).

7.3.2 Methodological implications

This thesis's methodological approach offers valuable insights for future research in the field of parental mediation. The mixed-methods approach, combining qualitative cognitive interviews with quantitative surveys, provides a comprehensive understanding of BCL in the context of parental mediation.

The survey development process began with a clear theoretical framework of BCL and parental mediation behaviors, which was informed by a thorough synthesis of theoretical, methodological, and empirical work on various literacies (Bröder et al., 2017; Domanska et al., 2020; Potter, 2004; Rozendaal et al., 2011; Saarni, 1999; Schreurs & Vandenbosch, 2020; Zarouali et al., 2018) and parental mediation (Daneels & Vanwynsberghe, 2017; Dedkova & Smahel, 2019; Jiow et al., 2017; Lou & Kim, 2019; Robertson, 1979).

More specifically, this thesis has developed two scales for parental mediation intentions and behaviors based on synthesizing and modifying previous research. Parental mediation scales do not follow the best practices to measure intentions and behaviors (Ajzen, 2006, p. 2). They rarely specify the recall time, do not distinguish enough between intentions and behaviors, use scales with different numbers of points, and may not use frequency response scales (e.g., Kuldass et al., 2021; Livingstone et al., 2017; Nikken & Jansz, 2014; Nimrod et al., 2019). Similarly, Hong (2021) used different behaviors and intention items and, thereby, did not follow the principle of compatibility to define behavior and intention items “in terms of exactly the same elements” to achieve the most accurate representation of the relationship (Ajzen, 2006, p. 2).

The dissertation combined and modified an existing validated and compact 8-item interactive media parental mediation scale (Nimrod et al., 2019) and a validated 3-item intention scale for parental mediation (Hong, 2021) based on best practices. The 10-item intention and 10-item behavior parental mediation scales have a clear recall time of 4 weeks, strictly follow the principle of compatibility, employ the same number of scale points for intention and behavior response scales, and use frequency response scales.

As suggested by Hong (2021), this thesis used a shorter timeframe of four weeks instead of six months to examine to what extent a shorter window of time affects the relationship between parental mediation intention and parental mediation behavior. More importantly, research indicates that individuals are more accurate in recalling whether they have performed a specific action within the past month than over the past six months, likely due to the natural decline in memory accuracy as time elapses and the tendency for recent memories to be more vivid and accessible (Clarke et al., 2008; Rubin & Wenzel, 1996).

The cognitive interviews were instrumental in refining the BCL scale, ensuring that the items were clear, understandable, and relevant to the specific context of parental mediation of children's digital behaviors (García, 2011). This process highlights the importance of qualitative

methods in scale development, particularly for new constructs like BCL, ensuring that the scale accurately captures the nuances of BCL as it applies to parents (DeVellis, 2016). A survey allowed for the rigorous statistical validation of the BCL scale, establishing its reliability and validity specifically for parents (Thabane et al., 2010). This quantitative approach is essential for ensuring that the scale can be used reliably in future research within this domain.

Furthermore, the thesis's focus on the intention-behavior relationship and the use of hierarchical regression analysis to examine the moderating role of BCL offers a methodological template for future research in parental mediation (Fowler, 2014). This approach allowed for an examination of how BCL influences the relationship between parents' intentions to mediate and their actual mediation behaviors, providing a more nuanced understanding of the factors contributing to behavior change in parental mediation.

The thesis's mixed-methods approach provides a valuable framework for future research in parental mediation of children's digital behaviors (Creswell & Clark, 2018). The combination of qualitative and quantitative methods, the sequential research design, and the focus on the intention-behavior relationship offer a robust and comprehensive approach to studying BCL and its implications for parental mediation in the digital age.

7.3.3 Practical implications

Professionals working directly with parents, such as therapists, parenting coaches, pediatricians, social workers, or counselors, play a role in enhancing BCL to support effective parental mediation of digital behaviors. Adopting a structured approach from assessment, design, and delivery to refinement might be beneficial (e.g., Craig et al., 2008; Eldredge et al., 2016; Michie et al., 2014), but this may need to be adapted to the specific context and resources available.

Assessment

Where feasible, professionals might consider assessing aspects of parents' BCL, potentially focusing on operational, habit-related, and child-related dimensions. Existing tools, such as the BCL scale developed in this research, could be adapted for this purpose. Depending on the context, professionals might also explore parents' attitudes, perceived social norms, and perceived behavioral control (Ajzen, 2006; Hong, 2021), as well as their digital skills (Helsper et al., 2020) and initial intentions regarding digital mediation. This information could then inform the development of tailored support.

Design

Following an initial assessment, professionals might consider working collaboratively with parents to develop strategies tailored to address specific aspects of BCL identified as needing support. While designing and prioritizing interventions, it can be helpful to consider breaking down broader objectives into smaller, manageable steps, as suggested by research on intervention design (Wight et al., 2016). For instance, if a parent seeks to improve their operational BCL, an initial focus might be setting consistent screen time limits, before moving on to more complex strategies like engaging in co-use of digital media. Ideally, approaches should be customized and adapted to focus on the areas where parents feel they need the most support and to align with the family's unique circumstances (Moreno et al., 2021). For example, if parents express concerns about their own emotional responses to their children's digital media use, exploring strategies to enhance emotional self-regulation could be beneficial.

Delivery

In supporting parents to enhance their mediation behaviors, professionals can benefit from considering the different delivery options discussed in intervention and implementation science literature (Marques et al., 2024; Marques et al., 2021; Michie & Johnston, 2017; Norris et al., 2020, 2021; Schenk et al., 2024). A key aspect of this support may involve addressing barriers related to parental mediation intentions, BCL, and digital skills. However, the specific approach should be tailored to the individual family and the resources available to the professional.

Refinement

To support parents effectively, it can be beneficial to regularly monitor parents' progress through appropriate means, which could include follow-up discussions or, where feasible, more formal assessments. Tracking changes in BCL levels, intentions, and actual mediation behaviors, as well as broader outcomes like family well-being (Lipsey & Cordray, 2000), can provide valuable insights. This information can then be used to refine existing strategies and develop new ones as needed. While the instruments developed in this thesis offer one approach to measuring BCL, professionals may also find other methods useful, depending on their context.

While BCL and structured interventions offer valuable frameworks for supporting parents, realistic expectations and adaptability are crucial. Professionals should prioritize collaborative, individualized approaches, recognizing the diverse needs, resources, and contexts of families. The goal is to empower parents to navigate the digital family landscape in a manageable way, aligned with their values. Where professional support is not available to families, the acquisition of BCL, like digital and other literacies, is likely to be inequitably distributed. Therefore, there might be an important role for schools and educators to play in promoting BCL. Further research should identify accessible ways to support parents with varying BCL, skills, and resources.

7.4 Field-specific literacies

The concept of literacy has become central to much theoretical and empirical work in various disciplines, leading to conceptualizations of health literacy (e.g., Nutbeam, 2008), media literacy (e.g., Livingstone, 2004), psychological literacy (e.g., Newell et al., 2020), advertising literacy (e.g., Livingstone & Helsper, 2006), financial literacy (e.g., Zait & Berteau, 2015), well-being literacy (e.g., Oades et al., 2021), and science literacy (e.g., Laugksch, 2000). Literacy is a popular concept across disciplines because it can be taught and aids people in navigating specific parts of their experience.

The concept of BCL offers insights for researchers focused on domain-specific literacies, such as digital literacy, well-being literacy, financial literacy, or health literacy. As demonstrated in this thesis, BCL was an important explanation for parental mediation behaviors even when digital skills, which have been conceptualized as a component of digital literacy (e.g., Helsper et al., 2020; Spante et al., 2018), were included as an explanation. This finding suggests that BCL likely holds great explanatory promise for other literacies and could contribute to the development of more powerful theories and effective literacy interventions.

A two-level literacy theory emerges as a promising avenue for exploration, in which BCL is situated at the higher level and domain-specific literacies at the lower level. This

conceptualization positions BCL as an explanation for the extent to which individuals effectively leverage their domain-specific literacy. While well-being literacy (e.g., Oades et al., 2021) and health literacy (e.g., Nutbeam, 2008) focus on knowledge and emotional readiness within their respective domains, BCL addresses the fundamental ability to translate that literacy into sustained behavioral change. This integration could help explain why some individuals with high domain-specific literacy may still struggle to enact desired behaviors while others with seemingly less literacy are more successful in implementing behavioral changes (Sheeran & Webb, 2016).

Researchers in domain-specific literacies could benefit from exploring several key areas of interaction. First, studies need to build a theory that predicts how different levels of BCL and types of BCL interact with domain-specific literacies to influence domain-specific high-impact behaviors and outcomes. For example, does high health literacy combined with high BCL lead to better health outcomes than high health literacy alone? (Nutbeam, 2008). Second, longitudinal research needs to examine how the development of domain-specific literacy relates to the development of BCL (Lazonder et al., 2020). This could provide insights into whether certain domain-specific literacies facilitate the growth of BCL or vice versa. Third, researchers could explore whether enhancing BCL in one domain (e.g., digital behaviors) transfers to improved BCL in other domains (e.g., health behaviors) (Austin et al., 2020). This could inform the design of more holistic literacy interventions. Fourth, investigations into how environmental, social, and cultural factors (Kalmus, 2013) influence the relationship between domain-specific literacy, BCL, and behavioral outcomes could lead to more nuanced theoretical models and interventions. Lastly, researchers could explore how different combinations of domain-specific literacy and BCL create unique "literacy profiles" that predict behavioral outcomes, aligning with trends in precision health and education (Smith & Lee, 2022). This could lead to more personalized intervention approaches.

Moreover, researchers focused on domain-specific literacies should consider adopting insights from the BCL framework to enhance their conceptualizations. First, conceptualizing their domain-specific literacy (Nutbeam, 2008; Oades et al., 2021; Spante et al., 2018) along the three empirical relevant theoretical components of BCL, namely type (i.e., operational, emotional, and cognitive domain-specific literacy), referent (i.e., social and individual domain-specific literacy), and behavior class (i.e., action-related and habit related domain-specific literacy). Second, the social dimension should further differentiate between different social relationships relevant to the domain-specific literacy (e.g., significant others, children, employees, or clients) (Bronfenbrenner, 1979). Third, a theory needs to be developed that predicts which domain-specific literacy components are most linked to high-impact behaviors or outcomes by specifying key conditionals (e.g., if the health behaviors do not involve other people, then operational self-related, habit-related health literacy is likely the most important explanation), ideally across subtypes of the domain-specific literacy if applicable in the specific literacy context (Boschetti et al., 2011). Comparable domain-specific literacy conceptualization would enable a more consolidated and cross-fertilizing field of literacy research. Finally, the concept of BCL also challenges researchers to think more broadly about what constitutes literacy in their specific domains. For instance, health literacy researchers might expand their focus beyond understanding health information to include the ability to implement and sustain health-promoting behaviors (Nutbeam, 2008). Similarly, well-being literacy researchers might incorporate elements of self-regulation and habit formation into their conceptualizations of what it means to be well-being literate (Oades et al., 2021). Moreover, a revised model of financial literacy might include not only knowledge of financial concepts but also emotional resilience in the face of financial stressors and practical skills for implementing financial plans (Zait & Berteau, 2015).

The two-level literacy theory and an expanded conceptualization of domain-specific literacies should encourage researchers to move beyond purely informational approaches. Instead, literacy interventions could incorporate elements that enhance emotional literacy (e.g., building self-efficacy and positive attitudes towards change), cognitive literacy (e.g., teaching behavior change principles), and operational literacy (e.g., providing opportunities for successful behavior change experiences within the domain). Domain-specific literacy interventions might be more effective if they incorporate elements of BCL. For instance, a well-being literacy program might not only teach habits that enhance well-being but also foster the emotional, cognitive, and operational BCL to ensure the enactment. The BCL concept might inspire researchers to develop new outcome measures for literacy interventions. Rather than focusing solely on knowledge gains, interventions could be evaluated based on their ability to foster lasting behavioral changes and enhance individuals' overall capacity for self-directed learning and adaptation within the domain.

As the field of literacy research continues to evolve, incorporating insights from BCL could lead to a more nuanced and practical understanding of what it means to be truly literate in any given domain.

7.5 Limitations

While the current research offers significant contributions, it is subject to limitations that require consideration. Inherent in the selected methodologies and scope, these limitations offer context for interpreting the findings and indicate future investigations.

7.5.1 Cross-sectional design and causality

This study employed a cross-sectional design, examining relationships between variables at a single point in time. This design was selected because it allows efficient data collection from a sufficiently large and diverse sample, enabling rigorous psychometric analyses (scale validation) and testing the core hypotheses regarding the relationships between BCL, intentions, and self-reported behaviors (DeVellis, 2016). Without the added complexity and cost of longitudinal data collection, a focused analysis of these relationships was possible.

The cross-sectional nature precludes conclusive causal inferences (Levin, 2006). Due to the absence of temporal sequencing, the direction of influence between variables (e.g., whether BCL causes changes in parental mediation or vice versa) cannot be definitively determined. While the simultaneous measurement of intentions and reports of past behavior is common practice, as past behaviors are often strong predictors of future behaviors (Sheeran & Webb, 2016), it does not conclusively establish the direction of influence in the present context. To this end, a longitudinal design would be necessary, examining the extent to which changes in BCL precede changes in parental mediation behavior or vice versa.

While no definitive mitigation is possible within a cross-sectional design, the research was conducted in a way that strengthens the theoretical basis for potential causal interpretation. The examined relationship between intentions and behavior is supported by longitudinal and experimental research (Fishbein & Ajzen, 2010; Steinmetz et al., 2016). Compared to intentions, the causal research on digital skills and behaviors is in the early stages, but there is tentative evidence (Jeong et al., 2012; Xie et al., 2019). To allow for a more robust assessment of temporal precedence and causal relationships, future research should prioritize longitudinal

designs, tracking changes in BCL, digital skills, parental mediation intentions, and behaviors over time.

7.5.2 Self-assessment and potential biases

The present research used self-reported measures for assessing BCL, digital skills, parental mediation intentions, and behaviors. Self-assessment was appropriate for the current research stage, which prioritized the initial development and validation of the novel BCL construct, and the exploration of the promise of BCL, behavior-specific intentions, and digital skills for parental mediation (DeVellis, 2016). Self-report surveys provide an efficient and cost-effective means of gathering data from a relatively large and diverse sample, which was important for the robust psychometric analyses required for scale validation (Furr, 2011). Typically, more objective measures of behaviors, literacy, and skills require considerably more resources and time while potentially being more intrusive, possibly impacting participant behavior and responses (Riley-Tillman et al., 2005). Mixing self-report data and objective measures can also introduce significant complexities in data analysis and interpretation, possibly obscuring the core relationships under investigation (Locher & Philipp, 2023).

However, self-report measures introduce the potential for several well-documented biases. Social desirability bias, where respondents may overreport socially approved behaviors or underreport undesirable ones, is a significant concern (Grimm, 2010; Krumpal, 2013). Recall bias, the imperfect recollection of past events, can also affect responses, particularly for behaviors assessed over longer periods (Schwarz, 1999). The Dunning-Kruger effect might have influenced responses to the BCL scale, where individuals with lower competence tend to overestimate their abilities (Dunning, 2011; Kruger & Dunning, 1999). Finally, common method bias, the potential for inflated correlations between variables measured using the same method (self-report), is a consideration (Podsakoff et al., 2003). While self-assessment has its weaknesses, all assessment methods have their own limitations. For example, observational studies can be influenced by the Hawthorne effect, where participants alter their behavior simply because they are being observed (McCambridge et al., 2014).

Several steps were taken to mitigate potential biases during the scale development and data collection phases. During the cognitive interview phase, a non-judgmental environment was fostered to encourage honest self-reflection and probing questions focused on concrete examples rather than general self-assessments (Collins, 2003; Willis, 2004). Within the survey itself, items were worded neutrally to avoid leading questions and social desirability cues, often using indirect questioning (Fisher, 1993); specific timeframes were used for operational BCL items to improve recall accuracy (Tourangeau & Yan, 2008); and an “I don't want to answer” option was included to reduce pressure to provide inaccurate responses (Tourangeau & Yan, 2008). The scale also incorporated positively and negatively worded items to counter acquiescence bias (Weijters et al., 2013). While representing best practices in minimizing bias, these measures cannot conclusively eliminate it. To assess and statistically control for social desirability bias, future studies might consider using techniques like the Marlowe-Crowne Social Desirability Scale (Reynolds, 1982). Moreover, future research should consider incorporating complementary methodologies, such as observational data or informant reports, to triangulate findings.

7.5.3 Simultaneous measurement of intentions and behavior

Based on a higher-level decision to employ a single survey to measure all constructs, parental mediation intentions and behaviors were simultaneously assessed. This is a widely accepted practice in behavioral research because past behavior strongly predicts future intentions and behavior (Sheeran & Webb, 2016). This approach provides robust evidence to evaluate the promise of BCL, intentions, and digital skills for behaviors.

However, this methodological decision introduces the potential for consistency bias, where respondents may strive to present a coherent picture of their intentions and behaviors, potentially inflating the observed relationship (Guadagno & Cialdini, 2010; Podsakoff et al., 2003). This means that the strong correlations observed between intentions and behaviors might be partially due to this methodological artifact rather than reflecting the strength of the relationship with high accuracy.

To mitigate this potential bias, the study design incorporated a clear temporal distinction within the simultaneous measurement. Participants were asked about their intentions for the next four weeks and their behaviors in the past four weeks. While this separation did not eliminate consistency bias entirely, it encouraged participants to reflect on distinct time periods. The four-week timeframe was also selected to balance recall accuracy (Clarke et al., 2008; Rubin & Wenzel, 1996) with the need to capture a meaningful period for parental mediation behaviors. Future research should explore the use of experience sampling methods (ESM) or daily diary studies to capture intentions and behaviors closer in time, while still minimizing the impact of consistency bias (Bolger et al., 2003).

7.5.4 Sample representativeness and generalizability

Participants were recruited through online crowdsourcing platforms (specifically, Prolific). This method was selected for its efficiency in reaching a relatively diverse sample of parents, which was important for the initial validation of the BCL scale and the exploration of its relationships with other variables (Buhrmester et al., 2011; Peer et al., 2017). Crowdsourced samples offer a broader range of participants than traditional convenience samples, and previous research has demonstrated the reliability of data obtained when appropriate quality control measures are used (Chandler & Shapiro, 2016; Paolacci & Chandler, 2014). Prioritizing diversity rather than national representativeness was theoretically justified for this study since the primary aim was to test theoretical relationships and validate a novel construct across varied parental contexts, rather than to make precise population-level estimates. This approach aligns with the principles of theoretical sampling, which emphasizes variance in constructs of interest over representativeness (Eisenhardt & Graebner, 2007). To achieve this theoretical diversity, quota sampling was employed with targets set for gender, education level, and ethnicity, ensuring sufficient variation in key demographic characteristics to examine how BCL functions across different parental backgrounds.

However, concerns about sample representativeness, common to online recruitment methods, persist. Participants recruited online may be more digitally literate, more motivated to participate in research, or hold different parenting beliefs and practices compared to the general population of parents (Chandler et al., 2014). The limitations of representativeness should be considered when interpreting the present findings. Future studies could aim for more representative samples, potentially through collaborations with schools or community organizations, or by employing probability sampling methods within online panels.

7.5.5 Parental mediation limited to adolescents

The goal was not to provide a universal account of parental mediation across all ages, but rather to deeply explore the role of BCL in a context where it was hypothesized to be particularly relevant. Therefore, the research focused on parents of adolescents (children aged 12-18) since adolescence represents a period of increasing independence in digital media use, making parental mediation particularly important and challenging (Clark, 2011; Padilla-Walker et al., 2012). This age range allowed for a focused investigation of BCL and parental mediation within a specific developmental context where these issues are highly salient (Livingstone & Blum-Ross, 2020).

The decision limits the generalizability of the findings to families with younger children. The importance of intentions, digital skills, and BCL may differ for parents of younger children, potentially because of different developmental needs and technology engagement patterns (Barkin et al., 2006; Kalmus et al., 2013; Nikken & Schols, 2015). Future research should explore the promise of these constructs across different developmental stages of children.

7.5.6 Limited scope of explanatory variables

This dissertation intentionally focused on a limited set of key variables: BCL, parental mediation intentions, parental mediation behaviors, and digital skills. This decision was guided by the objective of introducing and validating the novel BCL construct in the context of parental mediation while, at the same time, exploring how intentions as a well-established predictor of behavior (Ajzen, 1991; Fishbein & Ajzen, 2010) and digital skills as a relevant domain-specific skill (Livingstone & Helsper, 2008; Livingstone et al., 2017) relate to parental mediation behaviors. Prioritizing parsimony and depth over breadth allowed for a more thorough investigation of these core relationships within the constraints of a doctoral project. This approach aligns with the principle of parsimony in scientific research, which favors simpler explanations, provided they adequately account for the phenomenon under investigation (Baker, 2016). Focusing on a core set of variables also allowed for a more in-depth statistical analysis of their interrelationships, including exploring moderation effects. Furthermore, practical considerations related to survey length and participant burden also played a role (Fowler, 2014). Including additional explanatory variables would have necessitated a longer and more demanding survey, potentially leading to lower response rates and reduced data quality (Rolstad et al., 2011).

However, a focused and manageable scope involved excluding potentially relevant other factors. A wider array of variables likely influences parental mediation. These may include parental stress (Abidin, 1992; Deater-Deckard, 1998), specific aspects of the digital environment and access (Livingstone, 2016), socioeconomic status, cultural background, family structure, and individual differences in parenting styles (Clark, 2011; Kalmus, 2007). The cognitive interviews during the scale development phase highlighted the importance of factors such as children's developmental stages, generational differences in technology use, and macro-environmental events (e.g., the COVID-19 pandemic). While the development of the BCL scale and the subsequent quantitative analyses prioritized a focused and feasible scope over capturing and examining many context-specific nuances, this decision limits the advancement of our understanding with regards to the role different contexts play for BCL, behavior-specific intentions, behavior-specific skills, and behavioral enactment.

7.5.7 Unidirectional exploration

The research focused on parents to maintain a manageable research scope. While the bidirectional relationship between children and parents was not empirically investigated

(Livingstone & Blum-Ross, 2020), it was kept in mind in the theoretical background of the research. For example, the literacy of the parents is closely associated with the literacy of the children (Ha, 2023) and more beneficial child behaviors (Csima et al., 2024). Future research should investigate the bidirectional influences between parents and children in the context of BCL. For example, observational methods could be leveraged to examine how children's digital skills and BCL influence parental mediation and vice versa.

7.5.8 Feasibility of BCL development

This dissertation focused on the theoretical promise of BCL as an explanatory construct and its relationship to parental mediation rather than the practical demonstration of how to increase BCL levels in real-world settings, a common and preferred sequence in construct development (DeVellis, 2016). Without this evidence of a relationship, intervention research would be premature. The construct's validity and relevance have to be established before developing and testing interventions to modify it. More specifically, demonstrating a correlation between BCL and desired behaviors is a necessary precursor to designing and testing interventions to increase BCL. The research in this thesis has established the potential value of BCL and laid the foundation for future intervention studies.

However, it did not demonstrate the feasibility of developing higher BCL levels in parents in practice. The replication crisis in (social) psychology has raised legitimate concerns about the effectiveness and generalizability of psychological interventions (e.g., Open Science Collaboration, 2015), prompting a critical examination of the assumptions underlying behavior change research. While research on literacy interventions in various domains offers encouraging evidence for the potential to enhance specific skills and knowledge (Fleary et al., 2018; Jeong et al., 2012; Vahedi et al., 2018; Xie et al., 2019), more research is needed to understand the extent to which attaining meaningful and lasting improvements in BCL is truly achievable for parents.

The cognitive interviews offered preliminary qualitative support for the potential to develop BCL, revealing instances of parents educating themselves on behavior change techniques over time. However, the empirical assessment of the direct and quantifiable effect of such self-directed learning on parents' BCL levels was within the scope of this dissertation. Nevertheless, this observation indicates some degree of malleability in BCL. It does not provide conclusive evidence of the effectiveness of any specific intervention approach. Future research should prioritize developing and evaluating interventions designed to enhance BCL. These interventions could take various forms, such as educational programs, workshops, or online resources, and should be rigorously tested using randomized controlled trials (RCTs) whenever possible.

7.5.9 Impact on outcomes

This dissertation investigated the relationships between BCL, parental mediation intentions, and parental mediation behaviors. It did not directly examine the downstream effects of these factors on children's outcomes (e.g., digital well-being, academic performance) or broader aspects of family dynamics. This is another progression after establishing the construct's validity and its relationship to relevant behaviors. The previously outlined rationales drove this methodological decision. Before exploring the complex pathways linking BCL to beneficial outcomes, it was necessary to demonstrate that BCL is a meaningful and measurable concept related to proximal behaviors (i.e., parental mediation). Investigating a new explanatory model for behavior while also examining its relationship to a wide range of outcomes would

significantly increase the complexity of the study design and data analysis, potentially diluting the core findings. While existing literature suggests plausible links between effective parental mediation and positive child outcomes (e.g., Kalmus et al., 2013; Livingstone et al., 2017), directly testing these connections would have required a significantly more complex research design, likely involving longitudinal data collection from both parents and children. Such a comprehensive investigation was beyond the scope and resources available for this doctoral project. The current work establishes the necessary preconditions for future investigations by demonstrating that BCL is a measurable construct that is significantly associated with relevant parenting behaviors.

Future research should investigate the downstream effects of BCL and parental mediation on child outcomes (e.g., digital well-being, academic performance) and broader family dynamics. This could involve longitudinal studies that track changes in parent and child outcome variables over time.

In sum, all the limitations described above do not negate the value or significance of the findings presented in this dissertation. The present work provides a robust foundation upon which to build, offering a validated BCL scale, a refined explanation of parental mediation behaviors, and a clear articulation of the research gaps that remain. By addressing these limitations in subsequent studies, the field can move toward a more complete and actionable understanding of how to support parents in navigating the complexities of the digital age and fostering positive outcomes for their children.

7.6 Future research

The empirical investigation of the theoretical framework has created opportunities for future research to enhance our understanding of BCL and parental mediation. The research agenda focuses on improving construct measurement and expanding our understanding of BCL and parental mediation.

7.6.1 Methodological advancements

Although the current study established a strong foundation, it relied on a cross-sectional design and self-reported data. Future research should prioritize methodological advancements to enhance validity, reliability, and generalizability, such as moving beyond self-reports and exploring longitudinal designs.

Understanding the measurement accuracy of BCL

While this study employed established psychometric techniques to validate the BCL scale, future research should adopt a multi-method approach to triangulate findings and address the inherent limitations of self-assessments (Podsakoff et al., 2003), enabling a more accurate assessment of BCL and related constructs.

A compelling study could involve a combination of self-reported BCL measures, observational coding of parent-child interactions, and digital trace data (e.g., screen time logs and app usage) (Bolger et al., 2003). Trained observers, blinded to parents' self-reported BCL scores, could code the frequency and quality of parental mediation behaviors (e.g., co-viewing, setting limits, discussing online content) during structured family activities involving digital media. This observational data could then be compared to parents' self-reported BCL and mediation practices, as well as to objective measures of children's digital media use obtained through

device monitoring, as suggested by Ellis (2019). Discrepancies between self-reported and observed measures could be used to identify specific areas where self-reports are less accurate, and potentially inform the development of more objective BCL indicators, such as behavioral tasks or skill assessments (Baumeister et al., 2007). This multi-method approach would provide a more comprehensive and objective assessment of BCL's manifestation in real-world parenting practices, addressing concerns about social desirability and recall bias in self-reports (Ciesielska et al., 2018; Grimm, 2010).

This multi-method study would provide stronger evidence for the construct validity of the BCL scale by demonstrating its convergence with objective behavioral measures (Cronbach & Meehl, 1955). It would also allow researchers to identify potential discrepancies between perceived and actual BCL, informing refinements to the scale (Podsakoff et al., 2003). Furthermore, examining the divergence between self-reported and objective measures could be theoretically informative in itself, revealing insights into parents' self-awareness and potential biases in their perception of their own behavior change skills.

Exploring measurement timing of parental mediation

To address the limitations of simultaneously timed measurement, future investigations should explore the impact of measurement timing on BCL and the intention-behavior relationship. Specifically, research should examine how the interval between measuring intentions and observing behaviors affects the observed relationships (Guadagno & Cialdini, 2010; Podsakoff et al., 2003). This could be examined using the survey method and the experience sampling method (ESM) (Shiffman et al., 2008). As for the next promising survey study, it could be a replicate of the current study, measuring the same constructs but four weeks apart. This would enable to isolate the effect of the measurement timing and assess the stability of the intention-behavior relationship and the role of BCL within it.

As for the ESM study, parents could be prompted multiple times a day via a smartphone app to report their current intentions regarding digital mediation, any recent mediation behaviors they have engaged in, and their perceived BCL related to those specific situations. This could include asking questions like: “In the next hour, do you intend to limit your child's screen time?” (intention), “In the past hour, did you discuss online safety with your child?” (behavior), and “How confident do you feel in your ability to manage your child's digital use right now?” (emotional BCL). This ESM study would provide several key advantages (Stone & Shiffman, 2002). First, it would capture the dynamic interplay between intentions, behaviors, and BCL in real time, minimizing recall bias and providing a more fine-grained analysis of the intention-behavior relationship. Second, it would allow for the examination of how situational factors (e.g., time of day, child's mood, parent's stress level) influence the relationship between intentions, BCL, and behaviors. Finally, it would provide a rich dataset for exploring individual differences in the stability and variability of BCL and parental mediation practices. Furthermore, ESM could be combined with ecological momentary intervention (EMI) techniques (Heron & Smyth, 2010), where parents receive real-time support or prompts based on their reported intentions, BCL, or situational context.

7.6.2 Antecedents and development of BCL

Building upon the validation of the BCL construct, a critical next step is to investigate the factors that contribute to its development and the mechanisms through which it operates. This involves exploring both the antecedents of BCL and its potential as a mediator or moderator of other established relationships in the field of behavior change.

Examining temporal dynamics

Future studies should emphasize longitudinal designs to strengthen the understanding of temporal dynamics. They could track changes in BCL, intentions, parental mediation practices, and relevant outcomes over time (Rindfleisch et al., 2008), enabling more robust temporal and causal reasoning. This approach could build on existing longitudinal research on parental mediation strategies, demonstrating significant changes in mediation practices over time (Kalmus et al., 2022). A particularly insightful study would be a longitudinal investigation spanning several years, tracking a cohort of parents and their children from early childhood through adolescence. Assessments of BCL, parental mediation intentions, actual mediation behaviors, and relevant child outcomes (e.g., digital literacy, well-being, academic performance) would be conducted at multiple, strategically spaced time points. Employing advanced statistical techniques such as cross-lagged panel modeling (Selig & Preacher, 2009) or latent growth curve analysis (Bollen & Curran, 2006), researchers could disentangle the temporal relationships between these variables. This would allow for a rigorous examination of whether changes in BCL precede (and potentially influence) changes in parental mediation practices and, subsequently, child outcomes. Such a design would also enable researchers to identify critical periods or developmental transitions where BCL may be particularly influential.

Moreover, longitudinal BCL research could explore connections to recent work on risk and resilience in child development (Gutman & Flouri, 2017), investigating the extent to which BCL interacts with various protective and risk factors. Similarly, BCL could contribute to recent research on child vulnerability in the digital world (Kalmus et al., 2024). Future studies could explore how BCL interacts with resilience and vulnerability.

Identifying promoting and hindering factors of BCL development

Longitudinal mixed-methods studies of BCL could support building a theory of BCL development, identifying promoting and hindering factors (Rindfleisch et al., 2008). This research should draw on existing work in the field of literacies, such as the social determinants of health literacy (Nutbeam, 2008). For example, qualitative interviews could be combined with quantitative surveys through childhood to adolescence, exploring the relationships between varying levels of BCL and life experiences, behaviors, outcomes, educational backgrounds, and social contexts in children, parents, and the family unit. The qualitative component could involve in-depth interviews with parents identified as having high, medium, and low BCL, exploring their personal histories, parenting approaches, and experiences with behavior change. The quantitative component could use a survey to assess potential predictors of BCL, such as exposure to behavior change information (L. Dong et al., 2024), social support for behavior change (Choi, 2020), and prior experiences with successful (or unsuccessful) behavior change attempts, and personality traits like conscientiousness and openness to experience (McCrae & Costa, 1987). This research enables experimental intervention research and public health initiatives to target the removal of BCL barriers and the promotion of BCL facilitators. Specific hypotheses could be tested, such as whether access to parenting resources, social support networks, or prior experiences with successful behavior change are positively associated with BCL development.

Understanding the promise of BCL interventions

The dissertation's theoretical framework posits that BCL is a malleable construct that can be developed through learning and experience. However, the practical feasibility of significantly enhancing BCL, particularly among parents who may have limited time or resources, remains an open question. A crucial next step would be to conduct a randomized controlled trial (RCT) to rigorously evaluate the effectiveness of a BCL intervention specifically designed for parents. This intervention would draw upon best practices in behavior change interventions (Michie et al., 2008) and incorporate elements from successful literacy programs in other domains (e.g., health literacy, financial literacy). It could include educational modules providing declarative knowledge of behavior change principles, practical exercises to build procedural skills in setting goals (Locke & Latham, 2002), using implementation intentions (Gollwitzer, 1999), and creating supportive environments), and strategies for fostering self-efficacy and a positive attitude towards behavior change (emotional BCL). The intervention could be delivered through a variety of formats, such as in-person workshops, online modules, or a combination of both. Participants would be randomly assigned to either the intervention group or a wait-list control group. BCL levels, parental mediation intentions, and parental mediation behaviors would be assessed at baseline, immediately post-intervention, and at follow-up intervals (e.g., 3, 6, and 12 months). This rigorous experimental design would provide strong evidence for (or against) the feasibility of enhancing BCL through targeted interventions, addressing the critical question of whether BCL is a truly trainable skill (Fleary et al., 2018; Jeong et al., 2012; Vahedi et al., 2018; Xie et al., 2019). This, in turn, can inform larger-scale implementation and dissemination efforts.

7.6.3 Expanded contextual understanding

To address the limitation of variations in BCL across different developmental stages, family technology environments, or macro-level contexts, future research should consider developing age-specific BCL measures, exploring the interaction between BCL and digital skills in intergenerational contexts, and investigating the long-term impact of significant societal events on BCL and parental mediation practices.

Investigating BCL's generalizability to other populations and behaviors

The current study focused on parents of adolescents in the UK and US. Future research should examine the generalizability of the BCL construct and its relationships to behaviors across diverse populations and cultural contexts. For example, studies could investigate BCL among young adults managing their own digital behaviors, among individuals attempting to adopt healthier lifestyles, or among professionals seeking to improve workplace productivity. A particularly informative study would involve adapting and validating the BCL scale for different populations (e.g., young adults, older adults, individuals with chronic health conditions) and behavioral domains (e.g., health behaviors, financial behaviors, work-related behaviors). This would involve not only translating the scale but also conducting cognitive interviews and pilot testing to ensure that the items and concepts are relevant and understandable in the new context (Harkness et al., 2003; Hofstede, 2011). Cross-cultural studies could examine how BCL manifests and operates in different cultural settings (e.g., individualistic vs. collectivist cultures), where social norms and expectations around behavior change may vary. This broader investigation would establish the extent to which BCL is a universal construct or one that requires adaptation for different populations and behavioral domains. Such cross-cultural and cross-domain validation is essential for establishing the broad applicability of the BCL framework (Helsper & Van Deursen, 2015; Hietajarvi et al., 2024).

To address the children's age limitation, future research may explore the role of BCL and digital skills in parental mediation for younger age groups, as the dynamics of parent-child interactions around technology use can vary greatly across different developmental stages (Zaman et al., 2016). This could involve developing and validating age-appropriate measures of BCL and parental mediation for parents of toddlers, preschoolers, and elementary school children. Qualitative studies, such as in-home observations and interviews, could provide valuable insights into the unique challenges and strategies employed by parents of younger children in managing technology use (Plowman et al., 2010).

Examining more comprehensive models

To address the limitation of not accounting for other established influences, future research may consider incorporating additional variables that could influence this relationship, such as parental stress (Abidin, 1992; Deater-Deckard, 1998) or specific aspects of the digital environment (Livingstone, 2016). The complex nature of parenting in the digital age suggests that a multifaceted approach, considering a wider range of psychological, social, and environmental factors, may provide a more comprehensive understanding of parental mediation behaviors (Clark, 2011; Kalmus, 2007). Future investigations should examine the relationship between BCL and children's digital vulnerability, as conceptualized by Kalmus et al. (2024). Investigating how parents' BCL levels correlate with their children's exposure to online risks and subjective vulnerability could provide insights into the role of parental mediation in mitigating digital risks. Additionally, broadening the scope of research to consider diverse family circumstances and socioeconomic factors offers a chance to develop more inclusive and comprehensive theories (Helsper, 2021). This holistic approach can reveal how BCL manifests in various contexts, from single-parent households to families juggling multiple jobs. By addressing these aspects, future research has the potential to not only enhance theoretical frameworks but also to inform practical, adaptable strategies that empower a wide range of families to navigate the digital landscape successfully. As the field progresses, it would be valuable to examine the relationship between BCL dimensions and other well-established behavior change concepts, such as attitudes, social norms, and perceived behavioral control (Steinmetz et al., 2016). This line of inquiry could potentially integrate BCL into existing theoretical frameworks, enriching our overall understanding of behavior change processes. It might reveal how BCL complements or perhaps challenges current theories, leading to more comprehensive explanations of human behavior.

Exploring multidirectional relationships

To address the limitation of practically exploring the multidirectional nature, future research should explore these relationships, drawing on the research on the rich, bidirectional nature of parental mediation (Livingstone & Blum-Ross, 2020). This perspective recognizes children as active participants in shaping family digital practices, especially in cases where they possess advanced digital skills.

A study could employ qualitative methods, such as family interviews or ethnographic observations, to examine how BCL is negotiated and enacted within the family system. This would provide a more nuanced understanding of the interplay between parent and child BCL, and how these dynamics shape digital practices within the home. It could also explore how children's digital skills and BCL influence parental mediation strategies, challenging the traditional top-down view of parenting. This approach would contribute to a more reciprocal and dynamic understanding of digital parenting, recognizing the agency of both parents and children (Livingstone & Helsper, 2008). Furthermore, studies could investigate how children's

own BCL influences their digital behaviors and, in turn, shapes their parents' mediation practices. This recognizes the increasing digital competence of children and their potential role in shaping family technology norms.

Understanding the relationship between BCL, behaviors, and outcomes

The potential contribution of BCL to important life outcomes, such as well-being, represents a critical area for future study (Gutman & Schoon, 2015; Kalmus et al., 2013). Exploring the relationship between digital skills, BCL, non-cognitive skills, and child outcomes would be promising. A longitudinal study could investigate how parental BCL and parental mediation practices influence children's long-term well-being, academic achievement, and social-emotional development. This could extend existing work on non-cognitive skills and their relationship to later outcomes for children and adolescents (Gutman & Schoon, 2016), providing a more targeted approach to understanding how parents can develop the literacies most relevant to influence their children's outcomes. This approach could build on previous research examining the impact of internet use on child well-being (Kalmus, 2013), offering a framework for understanding how BCL might mediate the relationship between digital practices and broader developmental outcomes. By linking BCL to concrete outcomes, researchers can demonstrate its practical significance and inform the development of interventions aimed at promoting positive development in children and families.

Future research using this framework would be based on a logical progression from understanding the fundamental aspects of BCL development to its practical applications and theoretical integrations. By pursuing the proposed new lines of inquiry, researchers can advance our understanding of behavior change processes, with implications for fields such as behavioral science, psychology, and media and communication studies. The insights gained from this future research have the potential to impact how we approach important behaviors like parental mediation, ultimately contributing to improved individual and societal outcomes.

7.7 Final remarks on original contribution

This doctoral dissertation has made a substantial and original contribution to the fields of media, communication, behavioral science, and literacy research. The development and validation of the BCL construct represent an advancement in our understanding of what enables individuals to effectively implement and sustain desired behavioral changes.

The study's innovative approach, combining rigorous theoretical development with robust empirical validation, has yielded a comprehensive framework for understanding and measuring BCL. It has provided insights into how parents can effectively manage their children's digital behaviors. The research has demonstrated that BCL, particularly its operational, child-related, and habit-related components, is important in enacting the desired parental mediation behaviors. The identification of these key components offers valuable insights for researchers and practitioners alike, paving the way for more targeted and effective interventions. Methodologically, this dissertation exemplifies the benefits of a mixed-methods approach, integrating qualitative cognitive interviews with quantitative survey data. This robust methodology has ensured the development of a valid and reliable BCL scale that can be used in future research to explore new components and dimensions of BCL. The iterative process of scale refinement, combined with rigorous statistical validation, sets a high standard for similar studies aiming to develop new constructs and scales. The practical implications of this research are far-reaching. By providing both a theoretical framework and a validated measurement tool for BCL, this thesis equips professionals, educators, and policymakers alike with the means to assess and enhance parents' capacity for effective digital mediation. Integrating BCL into educational curricula and public awareness campaigns has the potential to transform how we approach digital literacy and parenting in an increasingly technology-driven world. While acknowledging the limitations inherent in self-reported data and cross-sectional design, this dissertation lays a robust foundation for future research. The thoughtful consideration of these limitations and the proposed directions for future study demonstrate a deep understanding of the field and a commitment to advancing scientific knowledge. Perhaps most importantly, this research bridges the gap between theoretical understanding and practical application. By integrating BCL into established intention-behavior models, the thesis offers a novel approach to developing more effective interventions for digital parenting and beyond. This integration not only advances our theoretical understanding but also provides tangible strategies for supporting parents in navigating the complex digital landscape.

This doctoral dissertation represents a leap forward in our understanding of behavior change processes in the context of digital parenting and beyond. Its contributions to theory, methodology, and practice are substantial and have the potential to influence research and interventions for years to come. The work presented here not only advances the academic discourse but also offers practical solutions to real-world challenges faced by parents and children in the digital age. As such, it stands as a testament to the power of rigorous, interdisciplinary research to address complex societal issues and improve the well-being of families in our increasingly digital world.

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Appendix A—Figures

Figure A1

CFA for full-types model without residuals

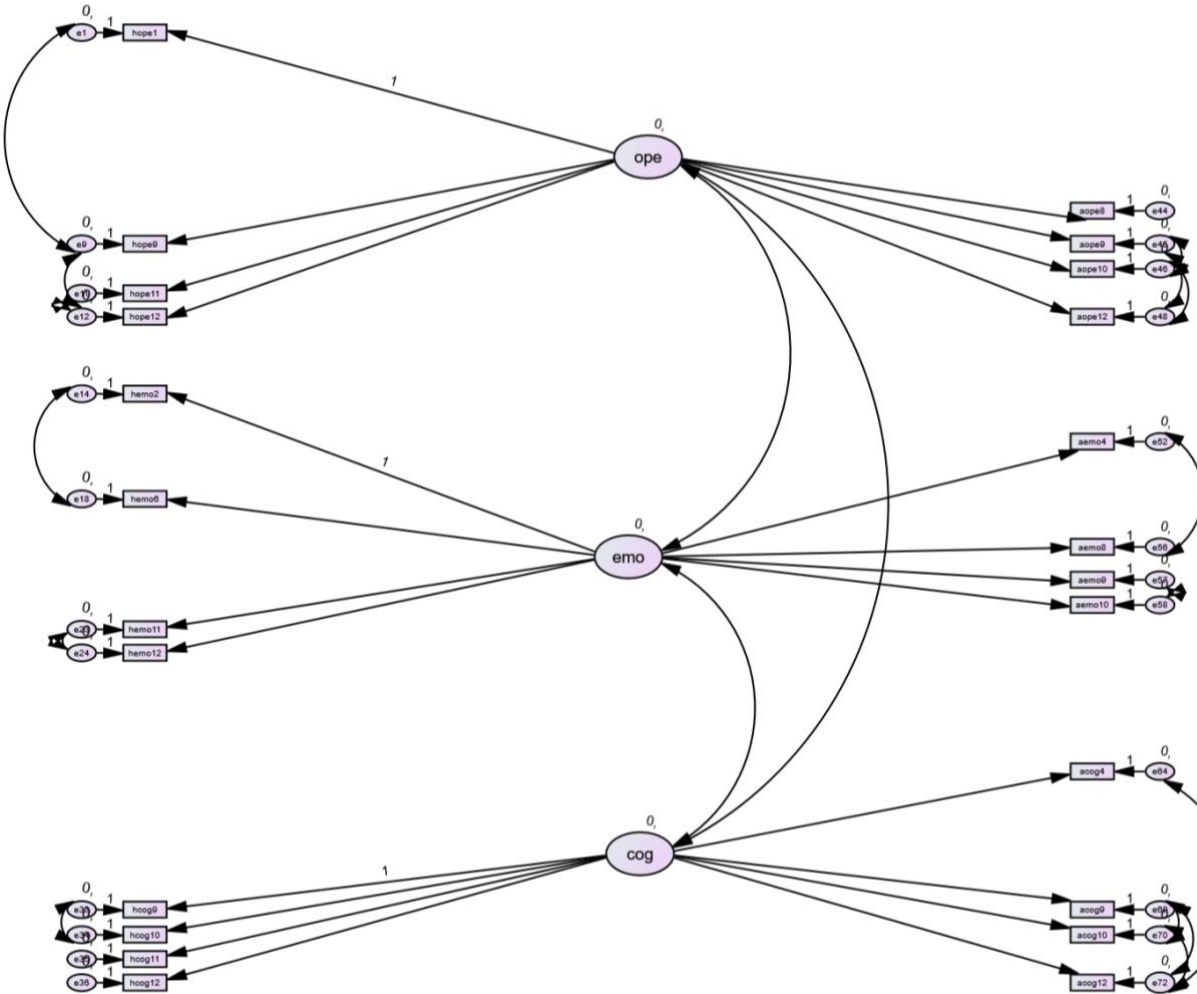


Figure A2

CFA for full-types model with residuals

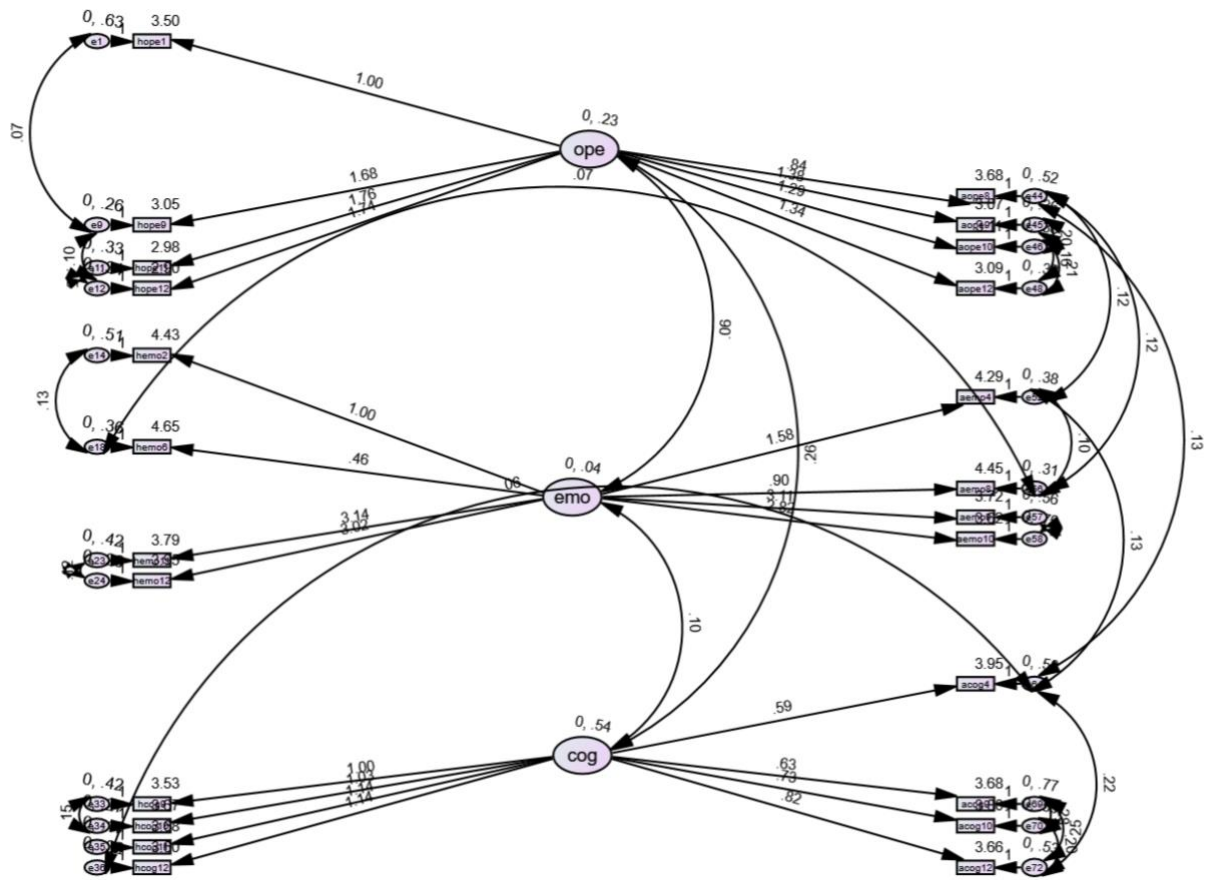


Figure A3

CFA for full-reference model with residual covariance

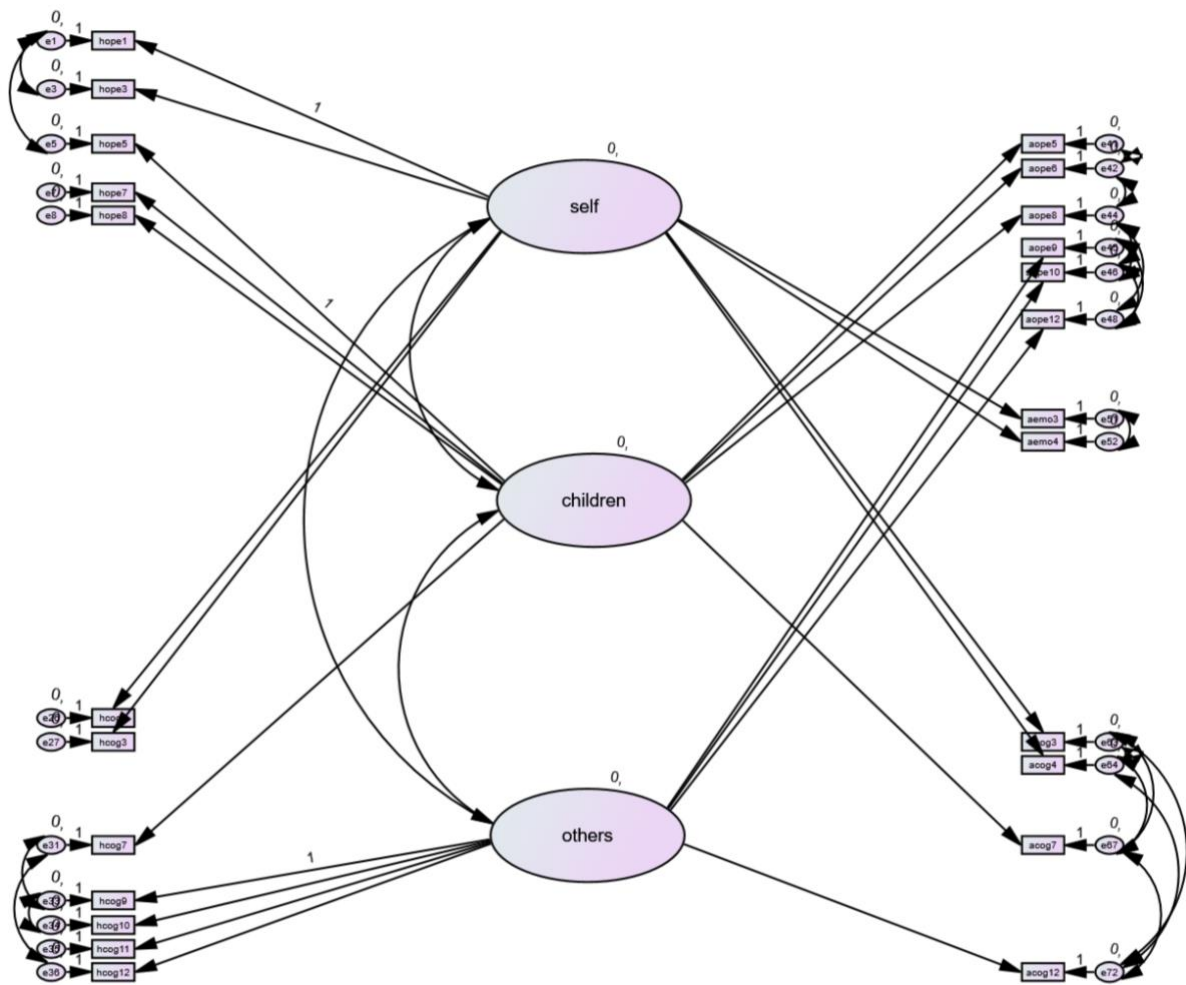
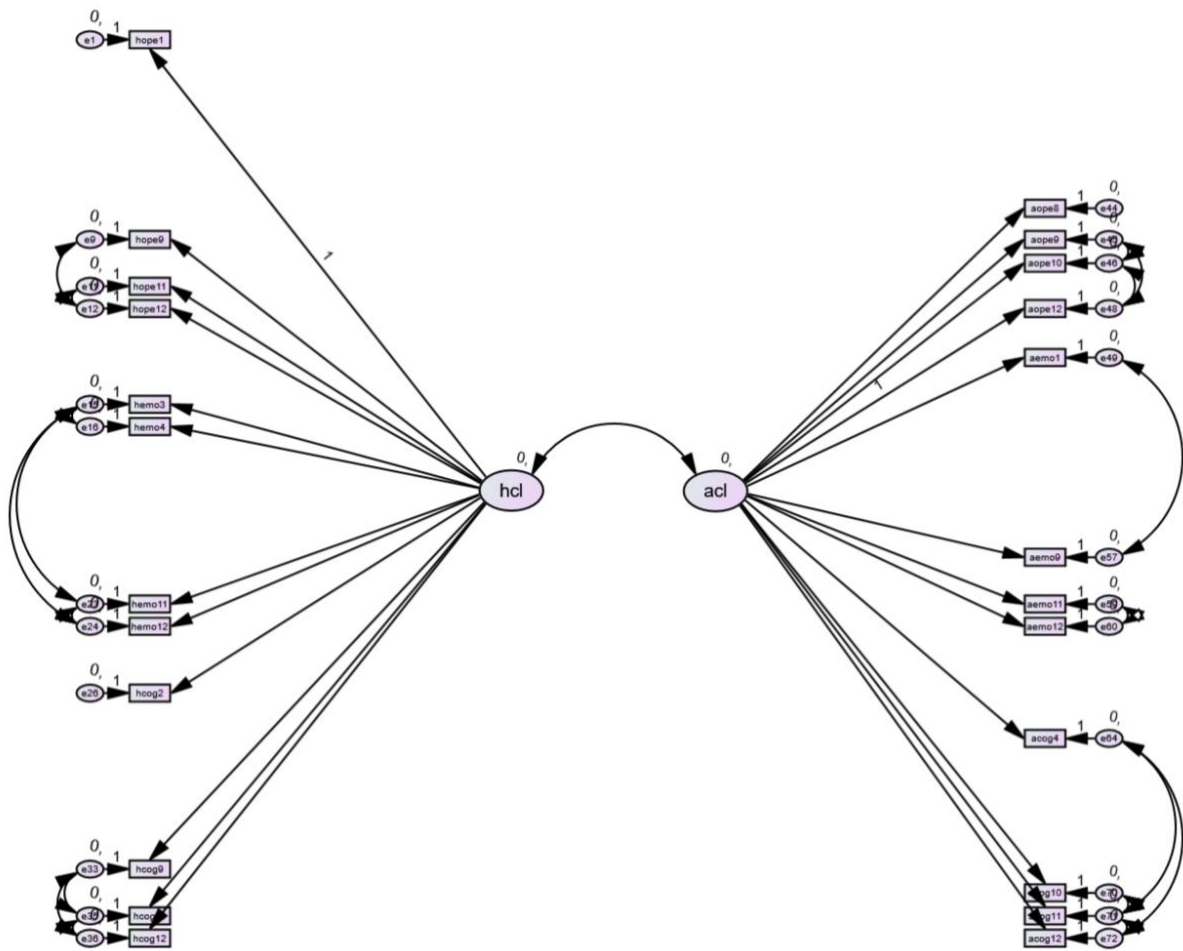


Figure A4

CFA for full-behavior class model with residual covariance



Appendix B—Tables

Table B1

Conceptualization of different literacies

Conceptualizations	Author
“The initial, classical meaning of the word at the time of Cicero did not describe a person who could read Latin, but one who was learned (Clanchy, 1979).”	(Laugksch, 2000, p. 82)
Digital literacy is “the ability to understand and use information in multiple formats from a wide range of sources when it is presented via computers”	(Gilster, 1997, p. 1)
Digital literacy is the “skills to an evocative new medium, [and] our experience of the Internet will be determined by how we master its core competencies”	(Joosten et al., 2013, p. 6)
Digital literacy is “[t]he functional access, skills and practices necessary to become a confident, agile adopter of a range of technologies for personal, academic and professional use”	(Beetham & Sharpe, 2011, p.1)
Digital literacy is “the ability to understand and use information in multiple formats with emphasis on critical thinking rather than information and communication technology skills”	(Chan et al., 2017, p. 2)
“Information literacy is broadly defined as the individual’s ability to handle information in general. Digital literacy refers to the ability to handle technological devices (hardware and software). New literacies are a series of new and innovative skills associated with ways of working with online content and social technologies, thus going beyond the concept of digital literacy”	(Machin-Mastromatteo, 2012, p. 574)
Digital literacy is “the awareness, attitude and ability of individuals to appropriately use digital tools and facilities to identify, access, manage, integrate, evaluate, analyse and synthesize digital resources, construct new knowledge, create media expressions, and communicate with others, in the context of specific life situations, in order to enable constructive social action; and to reflect upon this process.”	(Martin, 2006, p. 155)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
Critical digital literacies are “those skills and practices that lead to the creation of digital texts that interrogate the world; they also allow and foster the interrogation of digital, multimedia texts”	(Ávila & Pandya, 2013, p. 3)
Critical digital literacy is “the ability to access, critically assess, use and create information, through digital media in engagement with individuals and communities”	(Roche, 2017, p. 43)
Digital literacy is “to be able to engage the connections and communications possibilities of digital technologies, in their capacity to generate, remix, repurpose and share new knowledge as well as simply deliver existing information.”	(Stewart, 2013, p. 232)
Digital literacy is “[t]he abilities a person or social group draws upon when interacting with digital technologies to derive or produce meaning, and the social, learning and work-related practices that these abilities are applied to”	(Stordy, 2015, p. 472)
Digital literacy is defined here as the “capabilities which fit an individual for living, learning and working in a digital society” and as the “integration of computer literacy, information literacy, media literacy, the ability to communicate and collaborate using digital networks, to participate in research and scholarship dependent on digital systems, to study and learn using technology, and to use digital tools and media to make informed decisions and achieve goals”	(JISC, 2011, p. 2)
Digital literacy is “the capabilities required to thrive in and beyond education, in an age when digital forms of information and communication predominate”	(Littlejohn et al., 2012, p. 547)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
Digital literacy is “a fundamental learning objective including information-handling skills, and the capacity to judge the relevance and reliability of web-based information”	(Istance & Kools, 2013, p. 43)
Digital literacy is the “[a]bility to use ICT tools and internet access, manage, integrate, evaluate, create and communicate information to function in a knowledge society”	(Parvathamma & Pattar, 2013, p. 159)
Digital literacy is a “a continuum of skills, beginning with basic operational tasks progressing to more complex critical production and consumption of digital material”	(Bancroft, 2016, p. 49)
“Digital literacy is less about tools and more about thinking, skills and standards based on tools and platforms have proven to be somewhat ephemeral”	(Kühn, 2017, p. 24)
Digital literacy is the “skills and different levels of engagement with the Internet and other ICTs”	(Helsper & Smahel, 2020)
Digital competence is “the knowledge, skills, attitudes and digital literacy that are needed for developing and managing digital information systems.”	(Khan & Bhatti, 2017, p. 574)
Digital competence is “a means of achieving a degree of literacy suited to present-day society’s needs”	(Mengual-Andrés et al., 2016, p. 1)
Digital competency is “set of knowledge, skills, attitudes, strategies and awareness which are required when ICT and digital media are used to perform tasks, resolve problems, communicate, manage information, collaborate, create and share content, and build knowledge in an effective, efficient and adequate way, in a critical, creative, autonomous, flexible, ethical and a sensible form for work, entertainment, participation, learning, socialization, consumption and empowerment”	(Ferrari, 2013, p. 3)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
Digital competence is ““Digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet”	(European Commission, 2006, p. 16)
Media literacy “is the ability to access, analyze, evaluate, and create messages in a variety of forms (Aufderheide, 1993; Christ & Potter, 1998)”	(Livingstone, 2004, p. 5)
“Media literacy may be thought of as the ability to create personal meaning from the visual and verbal symbols we take in every day from television, advertising, film, and digital media. It is more than inviting students to simply decode information. They must be critical thinkers who can understand and produce in the media culture swirling around them”	(Adams & Hamm, 2001, p. 33)
Media literacy is “skillful collection, interpretation, testing and application of information regardless of medium or presentation for some purposeful action”	(Anderson & Ploghoft, 1981, p. 22)
Media literacy is ‘a political, social and cultural practice’	(Sholle & Denski, 1995, p. 17)
Media literacy is “a critical-thinking skill that enables audiences to decipher the information that they receive through the channels of mass communications and empowers them to develop independent judgments about media content”	(Silverblatt & Eliceiri, 1997, p. 48)
Social media literacy is “the technical and cognitive competencies users need to use social media in an effective and efficient way for social interaction and communication on the web. (Vanwynsberghe, Boudry, & Verdegem, 2015, p. 85)”	(Daneels & Vanwynsberghe, 2017, p. 4)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
Social media literacy is “the extent to which cognitive and affective structures are present among users to ensure the risks of interactions with social media content are mitigated and the opportunities are maximized.”	(Schreurs & Vandebosch, 2020, p. 2)
Media literacy is “most commonly described as a skill set that promotes critical engagement with messages produced by the media.”	(Bulger & Davison, 2018, p. 3)
“Advertising literacy, by extension [of media literacy], is understood as the skills of analyzing, evaluating and creating persuasive messages across a variety of contexts and media (Young, 2003)”	(Livingstone & Helsper, 2006, p. 562)
“Advertising literacy as a skill to decipher and understand persuasive strategies (Livingstone & Helsper, 2006; Rozendaal et al., 2011).”	(Naderer & Oprea, 2021, p. 2)
“Advertising literacy refers to an individual’s ability to recognize, assess, and cope with advertising messages (Nelson 2016).”	(Ahn, 2021, p. 2)
Persuasion knowledge enables consumers to “recognize, analyze, interpret, evaluate, and remember persuasion attempts and to select and execute coping tactics believed to be effective and appropriate”	(Friestad & Wright, 1994, p. 3)
“Advertising literacy is defined as an individual’s knowledge, abilities and skills to cope with advertising (Boush, Friestad, & Rose, 1994)”	(De Jans et al., 2019, p. 2)
“Advertising literacy is part of media literacy (i.e., the ability to access, analyze, evaluate, create, and act using all forms of communication; National Association for Media Literacy Education [NAMLE], 2010) and is defined as the knowledge and skills needed to recognize advertising and critically reflect on it.	(De Pauw et al., 2019, p. 1198)
Food literacy is “the scaffolding that empowers individuals, house-holds, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-	Thompson et al. (2021, p. 16)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake.” This is a synthesis of Vidgen & Gallegos work, including the 2014 paper, as they co-authored Thompson et al. (2021, p. 16)	
“Food literacy is the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within a complex food system. It’s the ability to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components.”	(Cullen et al., 2015, p. 143)
“This term encompasses nutritional knowledge, food skills, the ability to communicate about nutritional issues and to critically reflect on one’s eating behavior and the effects of consumption decisions.”	(Krause et al., 2016, p. 632)
“Food literacy is the ability to “read the world” in terms of food, thereby recreating it and remaking ourselves. It involves a full-cycle understanding of food—where it is grown, how it is produced, who benefits and who loses when it is purchased, who can access it (and who can’t), and where it goes when we are finished with it. It includes an appreciation of the cultural significance of food, the capacity to prepare healthy meals and make healthy decisions, and the recognition of the environmental, social, economic, cultural, and political implications of those decisions.”	(Sumner, 2013, p. 86)
“Food literacy entails both understanding nutrition information and acting on that knowledge in ways consistent with promoting nutrition goals and FWB [food well-being].”	(Block et al., 2011, p. 7)
“The enhancement of the individual psycho-physical well-being through appropriate food choices.”	(Palumbo et al., 2017, p. 173)

Table B1*Conceptualization of different literacies*

Conceptualizations	Author
Food literacy is “an understanding, appreciation, and stewardship of the social (culture, ethnicity, history, etc.), political (policy, economics, etc.), scientific (nutrition, environment, etc.), and personal (deliciousness, cooking, etc.) dimensions of food within one’s local and global communities.”	(Rowat et al., 2021, p. 460)
“Health literacy is the capacity of individuals to obtain, interpret, and understand basic health information and services and the competence to use such information and services in ways which enhance health.”	(National Health Education Standards, 1995, p. 11)
“The cognitive and social skills which determine the motivation and ability of individuals to gain access to understand and use information in ways which promote and maintain good health.”	(Nutbeam & Kickbusch, 1998, p. 357)
“To understand and act upon physical and psycho-social activities with appropriate standards, being able to interact with people and cope with necessary changes and; demands reasonable autonomy so as to achieve complete physical, mental and social well-being.”	(Fok & Wong, 2002, p. 257)
“The ability to make sound health decision(s) in the context of everyday life – at home, in the community, at the workplace, the healthcare system, the market place and the political arena. It is a critical empowerment strategy to increase people’s control over their health, their ability to seek out information and their ability to take responsibility.”	(Kickbusch et al., 2005, p. 8)
“A process that evolves over one’s lifetime and encompasses the attributes of capacity, comprehension, and communication. The attributes of health literacy are integrated within and preceded by the skills, strategies, and abilities embedded within the competencies needed to attain health literacy.”	(Mancuso, 2008, p. 250)
“Health literacy comprises a broad range of knowledge and competencies that people seek to encompass, evaluate, construct and use. Through health literacy competencies people become able to understand	(Paakkari & Paakkari, 2012, p. 316)

Table B1

Conceptualization of different literacies

Conceptualizations	Author
themselves, others and the world in a way that will enable them to make sound health decisions, and to work on and change the factors that constitute their own and others' health chances."	
"Health literate individuals are able to understand and apply health information in ways that allow them to take more control over their health through, for example, appraising the credibility, accuracy, and relevance of information and action on that information to change their health behaviors or living conditions."	(Wu et al., 2010, p. 445)
"Health literacy is linked to literacy and entails people's knowledge, motivation and competencies to access, understand, appraise and apply information to make judgements and take decisions in everyday life concerning healthcare, disease prevention and health promotion to maintain and improve quality of life during the life course."	(Sørensen et al., 2012, p. 3)
"The personal characteristics and social resources needed for individuals and communities to access, understand, appraise and use information and services to make decisions about health. Health literacy includes the capacity to communicate, assert and enact these decisions."	(World Health Organization, 2015, p. 12)

Table B2

Typologies of different literacies

Components of literacy	Explanation of component	Author
Social media literacy: structures	<p>“Cognitive structures include sets of organized knowledge in the user’s memory that provide the user with sufficient resources to process social media content adequately (Lang, 2017). (...). At an average level, knowledge on the effects exists but is not, or inconsistently, applied. At a high level, adolescents actively use their cognitive structures and interpret, reflect on and understand social media content within its specific context. (...) Cognitive structures of social media literacy include understandings of (a) traditional media literacy, (b) social media features and (c) interpersonal communication dynamics on social media.” (p. 3).</p> <p>“[A]ffective structures refers to sets of organized emotions in the users’ memory which guide (spontaneous) emotions in response to using social media.(...) [A] social media literate user is that he/she would rather apply adaptive than maladaptive strategies when experiencing negative or positive emotions resulting from one’s social media usage.” (p. 4)</p>	(Schreurs & Vandenbosch, 2020)
<p>Health literacy: individual attributes, skills, or competencies</p> <ul style="list-style-type: none"> • cognitive competency • behavioral/operational competency • behavioral/communicative competency • affective/conative/attitudinal competency • social context competency 	<p>Cognitive (health-related information processing & knowledge): “understanding, appraising, critical thinking, and functional literacy skills” and “knowledge about physical activity; the health risks of alcohol use, cannabis use and smoking ...”</p> <p>Behavioral: “information seeking, application of health information”</p> <p>Behavioral/communicative: “skills to communicate and interact about health information”</p> <p>Affective/conative/attitudinal: “self-awareness, self-control, self-efficacy, motivation, interest”</p>	(Domanska et al., 2020, p. 5)

Table B2

Typologies of different literacies

Components of literacy	Explanation of component	Author
<p>Advertising literacy: literacy or knowledge</p> <ul style="list-style-type: none">• conceptual advertising literacy• attitudinal advertising literacy• advertising literacy performance	<p>Contextual: “competencies of social agents, including doctors, parents, and friends, for communication and provision of support related to health topics”</p> <p>Conceptual advertising literacy: “the ability to recognize and understand advertising messages, entails seven components (...)</p> <ol style="list-style-type: none">1) recognition of advertising— differentiating advertising from other media content like television programs and editorial Web content;2) understanding selling intent—understanding that advertising tries to sell products;3) recognition of advertising’s source—understanding who pays for advertising messages;4) perception of intended audience—understanding the concept of audience targeting and segmentation;5) understanding persuasive intent—understanding that advertising attempts to influence consumers’ behavior by changing their mental states, for instance, their attitudes and cognitions about a product;6) understanding persuasive tactics—understanding that advertisers use specific tactics to change consumers’ attitudes, cognitions, and behaviors; and7) understanding of advertising’s bias—being aware of discrepancies between the advertised and the actual product.” <p>Attitudinal advertising literacy: “which includes low-effort, attitudinal mechanisms that can function as a defense under conditions of low elaboration” or “having a critical attitude toward advertising,” which is comprises two components (1) “skepticism toward</p>	<p>(Rozendaal et al., 2016, p. 3-4)</p>

Table B2

Typologies of different literacies

Components of literacy	Explanation of component	Author
<p>Advertising literacy</p> <ul style="list-style-type: none">• conceptual advertising literacy• moral advertising literacy• attitudinal advertising literacy• dispositional advertising literacy• situational advertising literacy	<p>advertising—the tendency toward disbelief of advertising” and (2) “disliking of advertising—a general negative attitude toward advertising”</p>	
	<p>Advertising literacy performance: “which takes into account the actual use of conceptual advertising knowledge when confronted with advertising” or “the ability to actually use the conceptual advertising knowledge when confronted with advertising” which is comprises two components (1) “retrieval of advertising literacy—the ability to retrieve relevant advertising related knowledge from memory while processing an advertising message” (2) and “application of advertising literacy—the ability to apply advertising-related knowledge to an advertising message while processing the message.”</p>	
	<p>Conceptual: “refers to the ability to recognize a commercial message and its intentions”</p>	<p>(Van Dam & Van Reijmersdal, 2019, p. 2)</p>
	<p>Moral: “refers to moral perceptions of appropriateness and acceptance of persuasion, or in our case, influencer marketing”</p>	
	<p>Attitudinal: “involves disliking of advertising and scepticism, which are attitudes that counterbalance the positive affective responses evoked automatically by the entertaining character of most new online advertising formats”</p>	
<p>Dispositional: “knowledge, beliefs and abilities someone has regarding advertising”</p>		
<p>Situational: “refers to the actual activation of the dispositional knowledge when exposed to a persuasive attempt”</p>		

Table B2

Typologies of different literacies

Components of literacy	Explanation of component	Author
Advertising literacy <ul style="list-style-type: none"> • Cognitive • Affective • Moral 	<p><i>Cognitive</i>: “corresponds largely with the concept of persuasion knowledge or people’s personal knowledge about persuasion agents’ goals and tactics.” and “advertising recognition” and “advertising understanding”</p> <p><i>Affective</i>: “refers to children’s conscious awareness of their initial emotional reactions toward advertising, and their skills or abilities to suppress or regulate these emotions.”</p> <p><i>Moral</i>: “entails the skills, abilities, and propensity to morally evaluate advertising, as expressed by the beliefs and judgments people develop about the appropriateness of its tactics.”</p>	(Zarouali et al., 2018, p. 197-198)
Wellbeing literacy: various <ul style="list-style-type: none"> ○ Vocabulary / language ○ Knowledge ○ Capacity to comprehend ○ Capacity to compose ○ Skills ○ Ability to pay attention to the (cultural) context ○ Intentionality 	<ol style="list-style-type: none"> 1. Vocabulary to articulate well-being ideas 2. Knowledge of well-being 3. Capacity to comprehend well-being related communications 4. Capacity to compose well-being relevant “texts” across speaking, writing, or creating 5. “Skills to improve well-being” 6. Ability to pay attention to the (cultural) context of well-being and adapt responses to it 7. Wellbeing intentionality: ”involving a desire to deliberately use language to improve the wellbeing of oneself, others or the world” and “right moral intentions as part of its conceptual definition, recognising that language does not use itself, rather it has a user with intentions.” 	(Hou et al., 2021, p. 3-4)
Food literacy <ul style="list-style-type: none"> • Access 	Access: Being able to access food through some source on a regular basis with very limited resources	(Vidgen & Gallegos, 2014)

Table B2*Typologies of different literacies*

Components of literacy	Explanation of component	Author
<ul style="list-style-type: none"> • Ability • Self-awareness • Knowledge • Confidence / self-efficacy 	<p>Ability to</p> <p>(1) “plan and manage” food investments, intake, and decision</p> <p>(2) access, select and evaluate food,</p> <p>(3) prepare food, and</p> <p>(4) eat, understand, be aware, and socialise with food</p>	
Food literacy	<ul style="list-style-type: none"> • Functional literacy • Interactive literacy • Critical literacy 	(Krause et al., 2018)
Food literacy	<ul style="list-style-type: none"> • Food and nutrition knowledge • Food skills • Self-efficacy and confidence • Ecologic (beyond self) • Food decisions 	(Thomas et al., 2019)
Digital literacy	<p>The Six Contemporary Learning Practices (6-CLPs) that comprise “Social Constructivist Digital Literacy”</p> <p>1: CREATE Invention, creation and completion of a digital project stemming from an original idea</p> <p>2: MANAGE Project planning, project management, teamwork (e.g., role-taking, task delegation), problem-solving</p>	(R. Reynolds, 2016)

Table B2*Typologies of different literacies*

Components of literacy	Explanation of component	Author
	<p>3: PUBLISH Publishing, distribution of self-created digital artifacts to an audience, community of peers</p> <p>4: SOCIALIZE Giving and getting feedback about project through social interaction, participation, exchange</p> <p>5: RESEARCH Inquiry, information seeking, agentive use of resources), to support the artifact's topic, message, design, execution</p> <p>6: SURF/PLAY Surfing, experimentation and play with existing networked Web applications and tools</p>	
Scientific literacy	<p>The scientifically literate individual was characterized as one with an understanding of the:</p> <ul style="list-style-type: none"> (a) interrelationships of science and society (b) ethics that control the scientist in his work (c) nature of science (e) difference between science and technology (d) basic concepts in science (f) interrelationships of science and the humanities 	(Pella et al., 1966)
Scientific literacy	<p>as “the ability to read, write, and understand systematized human knowledge” (p. 5) eight different categories of scientific literacy:</p> <ul style="list-style-type: none"> (a) methodological science literacy (b) professional science literacy 	(Branscomb, 1981)

Table B2*Typologies of different literacies*

Components of literacy	Explanation of component	Author
Scientific literacy	(c) universal science literacy (d) technological science literacy (e) amateur science literacy (f) journalistic science literacy (g) science policy literacy (h) public science policy literacy	(Miller, 1983)
Scientific literacy	consisting of three dimensions: (a) an understanding of the norms and methods of science (i.e., the nature of science); (b) an understanding of key scientific terms and concepts (i.e., science content knowledge); (c) an awareness and understanding of the impact of science and technology on society	(Arons, 1983, p. 92-93)
Scientific literacy	will possess the ability: (a) to recognize that “scientific concepts are invented or created by acts of human intelligence and imagination . . .” (b) to “comprehend the distinction between observation and inference . . .” (c) to comprehend “. . . the deliberate strategy of forming and testing hypotheses” (d) to “. . . recognize when questions such as ‘How do we know . . . ? Why do we believe . . . ? What is the evidence for . . . ?’ have been addressed, answered, and understood, and when something is taken on faith.”	(Arons, 1983, p. 92-93)

Table B3*Inspirational items for emotional BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
Attitude	It _	It matters to me to debate social or political issues online (e.g. in online forums, news sites, Facebook, Twitter).	Not at all Very little Yes Very much!	Digital literacy (DigCompSat)	Clifford et al. (2020)
	I _	I am keen to create new digital content by mixing and modifying existing digital resources (e.g. a presentation with photos and a soundtrack found on the Internet).	Not at all Not much Yes, I am Very much!		
		I am aware that I should manage the time I spend on my digital devices			
	To what extent do you agree with the following sentences?	It is important to me to know about health issues	Not at all Little Moderate Strong Very strong	Health literacy	
	It is important to me to _ How often do you think _?	How often do you think television commercials tell things that are not true?	Never Sometimes Often Very often	Advertising literacy	Rozendaal et al. (2016)
Self-Efficacy	To what extent do you agree with the	I can influence whether or not I feel well.	Not at all Little	Health literacy	Domanska et al. (2020)

Table B3*Inspirational items for emotional BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
	following sentences?		Moderate Strong Very strong		
	I can influence _ I can _	I can solve most problems if I invest the necessary effort If I am in trouble, I can usually think of a solution I can usually handle whatever comes my way.	Not at all true Hardly true Moderately true Exactly true	Health literacy	Schmidt et al. (2010)
	I will_ When facing difficult _	I will be able to achieve most of the goals that I have set for myself. When facing difficult tasks, I am certain that I will accomplish them. In general, I think that I can obtain outcomes that are important to me. I believe I can succeed at most any endeavor to which I set my mind. I will be able to successfully overcome many challenges.	Strongly disagree Somewhat disagree Neither agree nor disagree Somewhat agree Strongly agree	General Self-Efficacy Scale	Chen et al. (2001)

Table B3*Inspirational items for emotional BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
		I am confident that I can perform effectively on many different tasks.			
		Compared to other people, I can do most tasks very well.			
		Even when things are tough, I can perform quite well.			

Table B4*Inspirational items for cognitive BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
Knowledge	I know ...	I know that different search engines may give different search results, because they are influenced by commercial factors.	I have no knowledge of this / I never heard of this I have only a limited understanding of this and need more explanations I have a good understanding of this I fully master this topic/issue and I could explain it to others	Digital literacy (DigCompSat)	Clifford et al. (2020)
		I know a lot about wellbeing	Strongly disagree Moderately disagree Slightly disagree Neither agree nor disagree Slightly agree Moderately agree Strongly agree	Well-being literacy	Hou et al. (2021)
	One-point, single-choice	The first search result is always the best information source	Definitely not true Definitely true I'm not sure I do not want to answer	Digital literacy (ySKILLS)	Helsper et al. (2020)
		How often should a young person at your age to be physically active?	Up to two hours of sport per week is sufficient (0) Physical education lessons at school are sufficient (0)	Health literacy	Domanska et al. (2020)

Table B4*Inspirational items for cognitive BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
			About an hour every day while one's works up a sweat, is sufficient (1) Three times a week exercise is sufficient (0) Do not know (0)		
	Multiple-points, single-choice	Commercials often show a famous person or cartoon character. Why do you think that is?	To help children learn about the product To get children to recall the ad To get children to believe what the ad says To make children like the ad	Advertising literacy	Rozendaal et al. (2016)
Skill	I know how to ...	I know how to adjust privacy settings	Not at all true of me Not very true of me Neither true nor untrue of me Mostly true of me Very true of me I do not understand what you mean I do not want to answer	Digital literacy (ySKILLS)	Helsper et al. (2020)
		I know how to find a website I have visited before.	I don't know how to do it I can do it with help I can do it on my own I can do it with confidence and, if needed, I can support/guide others	Digital literacy (DigCompSat)	Clifford et al. (2020)

Table B4*Inspirational items for cognitive BCL*

Construct	Formulation	Example Item	Response options	Scale	Source
		I know how to improve my wellbeing	Strongly disagree Moderately disagree Slightly disagree Neither agree nor disagree Slightly agree Moderately agree Strongly agree	Well-being literacy	Hou et al. (2021)
	To what extent do you agree with the following sentences?	If my friends or siblings have questions about health, I can help them.	Strongly disagree Somewhat disagree Somewhat agree Strongly agree	Health literacy	Domanska et al. (2020)
	Are you able to ...	Are you able to prepare a meal using fresh ingredients? So without pre-packed and processed foods?	Not at all/never Rarely Seldom Often Yes/always	Food literacy	(Poelman et al., 2018)

Table B5

Screening survey for cognitive interviews

Introduction

Welcome to the research study!

The study should take you around 1 to 3 minutes. However, we may conduct a follow-up interview. You will be redirected at the end of the survey.

We are interested in understanding how different personal characteristics are related to each other.

Your participation in this research is voluntary. Please be assured that your responses will be kept completely confidential. Do not hesitate to ask any questions or mention concerns about the study either before, during, or after your participation by contacting the principal investigator at p.rohde@lse.ac.uk

By clicking the button below, you acknowledge that your participation in the study is voluntary, that you are 18 years of age or older, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Thank you for taking the time to participate in our study

Question(s)/Item(s)

Responses

What is the highest level of school you have completed or the highest degree you have received?

- No formal qualifications
 - Secondary education (e.g. GED/GCSE)
 - High school diploma/A-levels
 - Some college but no degree
 - Bachelor's degree
 - Master's degree
 - Doctoral degree
 - Professional degree (JD, MD)
 - Other (please specify)
-
- Prefer not to answer

Which statement best describes your current employment status?

- Student
 - Retraining
 - Homemaker
 - Working (paid employee)
 - Working (self-employed)
 - Not working (temporary layoff from a job)
 - Not working (looking for work)
 - Not working (retired)
 - Not working (disabled)
 - Not working (other)
-

Do you have children?

- Yes
- No
- Prefer not to answer

How many children do you have?
What age(s) is(are) your child(ren)?

- Child #1:

Choose one or more ethnic groups that you consider yourself to belong to

- Child #2:
 - Child #3:
 - Child #4:
 - Child #5:
 - Child #6:
 - Child #7:
 - Black or African American
 - Asian
 - Hispanic or Latino
 - White
 - Others (please specific)
-

What is your sex?

- Prefer not to answer
- Male
- Female
- Prefer not to answer

Are you now married, widowed, divorced, separated or never married?

- Married
- Widowed
- Divorced
- Separated
- Never married
- Prefer not to answer

What is your year of birth?

(Filler question)

Generally speaking, do you usually think of yourself as a Republican, a Democrat, an Independent, or something else?

- Conservative
 - Labour
 - Independent
 - No preference
 - Others (please specific)
-

What country are you currently residing in?

What was/is your main degree subject(s) at university or college?
(asked if participant has a university degree)

- Prefer not to answer

- Natural sciences (physics, chemistry, biology, and more)
- History
- Sociology
- Media & communication
- Religious studies
- Cultural studies
- Business & management
- Psychology
- Economics
- Finance & accounting
- Engineering
- Computer science
- Architecture
- Design
- Languages
- Education
- Leisure
- Law
- Midwifery
- Medicine
- Social work
- Creative arts
- Others (please specific)

(Filler question)
Please indicate honestly and openly to which extent you agree or disagree
with those statements.

-
- Prefer not to answer

 - Strongly disagree
 - Slightly disagree
 - Neutral; no opinion

Here are a number of characteristics that may or may not apply to you.

- Slightly agree
- Strongly agree

For example, do you agree that you are someone who likes to spend time with others?

Are you, someone who ____

- Tends to be quiet
- Is compassionate, has a soft heart
- Tends to be disorganized
- Worries a lot
- Is dominant, acts as a leader
- Is sometimes rude to others
- Has difficulty getting started on tasks
- Is fascinated by art, music, or literature
- Tends to feel depressed, blue
- Has little interest in abstract ideas
- Is full of energy
- Assumes the best about people
- Is reliable, can always be counted on
- Is emotionally stable, not easily upset
- Is original, comes up with new ideas

Interview invitation (if participant had children between 6-18)

Research on Behaviors and Habits

We would like to invite you to an online interview.

The research is about developing a questionnaire that helps better understand parents' habits and actions. The purpose of the interview is to improve the survey questionnaire based on your comments. We are currently in the midst of revising portions of the survey instrument and want to be sure that these particular items make sense to the potential respondents. A better questionnaire would enable more informed research on topics that should empower parents and promote well-being in families.

We are interested in all responses. There is no right or wrong. We are highly dedicated to creating a friendly, inclusive, jargon-free, and comfortable interview environment.

The interviews will be between **60 and 90** minutes and are compensated with **£15** via *Panelbase*.

If you decide to participate, then please enter your contact information (i.e., name and email) on the next page. We'll be contacting you via email to send you another information document, a consent form, and a link to a page where you can schedule the interview time. The interviews will be held via Zoom.

- I consent to partake in the interview
- I do not consent, and I do not wish to partake in the interview

Please enter your contact information below

Name

Email

Conclusion

This is the end of our survey.

Thank you for your participation. Please click on the next button to submit your responses and to be redirected.

We'll get in touch with you within the next few days.

If you have any questions or comments, please contact the principal investigator in the study at p.rohde@lse.ac.uk

Table B6

Invitation email

Dear X,

Thank you very much for your willingness to help with our research.

We are delighted to invite you to an online interview.

The research is about developing a questionnaire that helps better understand parents' habits and actions. The purpose of the interview is to improve the survey questionnaire based on your comments. We are currently in the midst of revising portions of the survey instrument and want to be sure that these particular items make sense to the potential respondents. A better questionnaire would enable more informed research on topics that should empower parents and promote well-being in families.

We are interested in all responses. There is no right or wrong. We are highly dedicated to creating a friendly, inclusive, jargon-free, and comfortable interview environment.

It should take approximately 60 to 90 minutes. You can a convenient schedule the time for the interview here: <https://calendly.com/paulrohde/research-interview>. If none of the times works for you, please let me know and we can arrange another time to accommodate your preference. After selecting a time, you will receive an email with a link to a meeting room on Zoom. You will receive £15 after the completion via Panelbase.

For the research to comply with the high ethical standards, please read the attached document about the study and please read the statements below. If you are happy with all of the statements, **please copy and paste them into an email and send it to me** at p.rohde@lse.ac.uk before our interview. This will be considered to constitute giving your consent to participate in the study.

If you have any questions about the research or the statements below, please do not hesitate to contact me.

Table B6

Invitation email

- I confirm that I have read and understood the information sheet dated 13/05/2022 for the study “Parenting in the Digital Age.”
- I understand that I have the opportunity to consider the information, ask questions and have these answered satisfactorily.
- I confirm that my participation is voluntary and that I understand that I am free to withdraw at any time without giving any reason and without any adverse consequences or penalty.
- I understand that the information I provide will be used for a doctoral dissertation and research publications and that my information will be anonymised.
- I understand that any personal information that can identify me – such as my name, and address, will be kept confidential and not shared with anyone beyond the researcher and his supervisors.
- I understand that the data from this project will be safely stored on London School of Economics Servers in a way that complies with General Data Protection Regulation (GDPR) guidelines.
- I give the researcher(s) permission to interview me and agree to the interview being audio recorded.
- I give permission for the researcher(s) to quote me directly using a pseudonym.
- I give permission for the researcher(s) to re-contact me to clarify information.
- I agree for the anonymised research data collected in this study to be used in other research studies.
- I am happy to take part in the research.

Please let me know in advance if you cannot make it to a scheduled appointment.

Once again, thank you, and looking forward to the conversation,
Paul

Table B7

Participant information document

Parenting in the Digital Age
Paul Rohde

London School of Economics and Political Science, Media and Communications

Information for participants, 2022/05/13

Thank you for considering participating in this study which will take place between May 2022 and July 2022. This information sheet outlines the purpose of the study and describes your involvement and rights as a participant if you agree to take part.

1. What is the research about?

The research is about developing a questionnaire that helps to understand the habits and actions of parents better. The purpose of the interview is to improve the survey questionnaire based on your comments. We are currently in the midst of revising portions of the survey instrument and want to be sure that these particular items make sense to the potential respondents. A better questionnaire would enable more informed research on topics that should empower parents and promote well-being in families.

2. What will my involvement be?

Table B7

Participant information document

You will be asked to take part in a cognitive interview about a newly developed scale. It should take approximately **60 to 90 minutes via a zoom** link provided to you in advance of the agreed-upon time. You will receive **£15** after the completion via Panelbase. You can schedule the time here: <https://calendly.com/paulrohde/research-interview>.

3. Do I have to take part?

It is up to you to decide whether or not to take part. Your participation in this research is completely **voluntary**. You do not have to take part if you do not want to. If you do decide to take part, you are asked to sign the consent form attached to the email. If you are happy to take part in this study, please read the statements in the email consent form.

Please copy and paste them into an email and send it to me at p.rohde@lse.ac.uk if you agree with all of the statements. This will be considered to constitute giving your consent to participate in the study.

4. How do I withdraw from the study?

You can withdraw from the study at any point until the publication of the data, without having to give a reason. If any questions during the interview make you feel uncomfortable, you do not have to answer them. Withdrawing from the study will have no effect on you. If you withdraw from the study, the information you have given thus far will not be retained, unless you are happy to do so.

5. What will my information be used for?

The collected information will be used for a doctoral dissertation and potentially academic papers.

6. Will my taking part and my data be kept confidential? Will it be anonymised?

The records from this study will be kept as confidential as possible. Only I and my two supervisors will have access to the files and any audiotapes. Your data will be anonymised – your name will not be used in any reports or publications resulting from the study. All digital files, transcripts and

Table B7

Participant information document

summaries will be given codes and stored separately from any names or other direct identification of participants. Any hard copies of research information will be kept in locked files at all times.

Limits to confidentiality: confidentiality will be maintained as far as it is possible, unless you tell us something which implies that you or someone you mention might be in significant danger of harm and unable to act for themselves; in this case, we may have to inform the relevant agencies of this, but we would discuss this with you first.

7. Who has reviewed this study? This study has undergone an ethics review in accordance with the LSE Research Ethics Policy and Procedure.

8. Data Protection Privacy Notice

The LSE Research Privacy Policy can be found at:

https://info.lse.ac.uk/staff/divisions/Secretarys-Division/Assets/Documents/Information-Records-Management/Privacy-Notice-for-Research-v1.2.pdf?from_serp=1

The legal basis used to process your personal data will be legitimate interests. The legal basis used to process special category personal data (e.g., data that reveals racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership, health, sex life or sexual orientation, genetic or biometric data) will be for scientific and historical research or statistical purposes.

To request a copy of the data held about you please contact: glpd.info.rights@lse.ac.uk

Table B7

Participant information document

9. What if I have a question or complaint?

If you have any questions regarding this study please contact the researcher, Paul Rohde, at p.rohde@lse.ac.uk.

If you have any concerns or complaints regarding the conduct of this research, please contact the LSE Research Governance Manager via research.ethics@lse.ac.uk.

Table B8

Semi-structured interview guide

Verbal introduction

Thank you for taking the time to help us develop our survey questionnaire. Your feedback will help us develop the behavior change scale that provides direction for research on how to help people close the gap between their intentions and actions. The purpose of this interview is to critically evaluate the survey. We are currently in the midst of revising portions of the survey instrument and want to be sure that these particular items make sense to the potential respondents.

Do you have any questions about this before we start?

The link for the questionnaire is <link>

Please share your screen.

You can leave your camera on or off depending on what you feel comfortable with.

would like to record this conversation so I don't have to take notes while we talk and to make sure that I will be able to remember what you have told me. Is that fine for you? This conversation will be confidential in the sense that I will never use your name or any other thing that might identify you in any future publications. I might use quotes from what you've said but they will always be incorporated in an anonymous way.

Is it fine for me to start the recording now?

Table B8

Semi-structured interview guide

Written introduction page

Research on Habits and Actions

Thank you for taking the time to help us develop our survey questionnaire. Your feedback will help us develop the behavior change scale that provides direction for research on how to help people close the gap between their intentions and actions. The purpose of this interview is to evaluate the survey critically. We are currently in the midst of revising portions of the survey instrument and want to be sure that these particular items make sense to the potential respondents. Your contributions are very valuable for the study. Hopefully, you will enjoy contributing and thinking about your behaviors. A better questionnaire would enable more informed research on topics that should empower parents to become better at changing family behaviors and promoting family well-being.

The survey has two blocks

- Habits
- One-time, occasional actions

Method. As you engage with the survey, the interviewer will interrupt you to request that you do the “think aloud” or ask about your response. To “think aloud” is to verbalize your thought processes as to how you figured out what the question is asking and how you decided upon your response. Thinking aloud may be new and unfamiliar to you, but please know there are no wrong answers. The interviewer is only interested in knowing what is going through your mind and will be taking a few notes during the session to remember what you said. Feel free to comment or ask questions as you engage with the survey. You will not hurt my feelings.

*Your participation in this research is **voluntary**.* The interview will be **video-recorded**. Please be assured that your responses will be kept completely **confidential**. Do not hesitate to ask any questions or mention concerns about the study during or after your participation.

By clicking the button below, you indicate that your participation in the study is voluntary, you are **18 years of age or older**, and that you are aware that you may choose to terminate your participation in the study at any time and for any reason.

Thank you for taking the time to participate in our study!

Table B8

Semi-structured interview guide

- I consent, begin the study
- I do not consent, and I do not wish to participate

Habits

Probes: Operational dimension

Habits

- All: What habits were you thinking about? What good habits? What bad habits?
- Self: What habits were you thinking about for yourself? What good habits? What bad habits?
- Significant others: What good or bad habits were you thinking about with regards to significant others?
- Children: Do you have any examples of recent habits with your children that you tried to influence?
- Children: And for the younger ones? Do any examples come to mind?
- **Digital habits:** And for the digital area of habits have you discussed that? Do you think the children are using their devices well? Has it been a big topic recently?

Response

- How do you see the difference between one response to the left (-) and one response to the right (+)?

Other

Table B8

Semi-structured interview guide

- Children: Would it make a difference if you think about a certain child? Or do you think it's more or less the same for all of them
- Significant others: Would it make a difference if you think about a certain significant other?
- Successful: How did you make sense of "successful" in this context? What were you thinking about when assessing the successfulness?
- Difficulty: How do you understand "difficult"?
- Importance: How do you understand "important"?
- Item difficulty: What are statements that you find hard to understand?
- Category selection: Can you explain why you selected [ANSWER]?
- Recall frame: Do the time frames make sense?
 - Is 5 years too much?
 - Is 12 months good?
 - Is 6 months good?
- Is the distinction between succeeding vs. trying clear?

Probes: Emotional dimension

- *Change*: Would you say that over time your ability to influence habits has changed for you? (e.g., as children grow up, for the second child) did you get better at it?
- *Skilled*: how do you make sense of 'skilled'?
- Negative consequences
 - Self: what negative consequences were you thinking about for yourself?
 - Significant others: what negative consequences were you thinking about for significant others?
 - Children: what negative consequences were you thinking about for your children?

Probes: Cognitive dimension

- Are descriptions for the techniques as well as principles and ideas clear?
- *Techniques*: What do 'practical techniques' mean to you? Can you give an example?
- *Theory*: What do 'principles and ideas' mean to you? Can you give an example?
- Do you go online and look for resources that help a little bit?
- What technique did you use in the past to help you get rid of bad habits? Did you do anything that helped you get rid of a bad habit?

Table B8

Semi-structured interview guide

- What technique did you use in the past to help you establish good habits? Did you do anything that helped you establish a good habit?

Actions

Probes: Operational dimension

- To what extent is the meaning of important actions clear?
- To what extent is the meaning of difficult actions clear?
- To what extent is the meaning of bad actions clear?
- *Self*: what actions were you thinking about for yourself? Good actions? Bad actions?
- *Significant others*: what actions were you thinking about for significant others? Good actions? Bad actions?
- *Children*: what actions were you thinking about for your children? Good actions? Bad actions?
- In your own words, do you see a difference between actions and habits?
- *Digital actions*: And for the digital area of actions do they play a part in your relationships? Has it been a big topic recently?

Probes: Emotional dimension

- *Change*: Would you say that over time your ability to influence actions has changed for you? (e.g., as children grow up, for the second child) did you get better at it?
- And were there any sources that helped you get better at this?
- Negative consequences
 - Self: what negative consequences were you thinking about for yourself?
 - Significant others: what negative consequences were you thinking about for significant others?
 - Children: what negative consequences were you thinking about for your children?

Probes: Cognitive dimension

- *Explanations*: Are descriptions for the techniques as well as principles and ideas clear?
- *Techniques*: When you were thinking about practical techniques, what are examples, what are things you use for yourself or for others?
- *Theory*: And with let's say the principles and ideas? Do you have any particular things – like how you think about that question?
- *Intentions*: Do you have any recent examples of intentions you had and associated action or inaction?

Table B8

Semi-structured interview guide

Conclusion

Probes

- What other thoughts did you have about the statement that you haven't shared?
- Was there anything that you expected us to ask you about that's not on the survey?
- What should we add? Or change to the survey?
- When you were thinking about 'domains', what were you concretely thinking about?

Table B9*Demographical characteristics of the pilot survey*

Variables	Values	Sample (n = 221)	
		n	%
Sex	Male	95	43%
	Female	12	57%
	Prefer not to answer		
Educational Background	No formal qualifications	1	1%
	Secondary education (e.g., GED/GCSE)	35	16%
	High school diploma/A-levels	38	17%
	Some college but no degree	33	15%
	Bachelor's degree	83	37%
	Master's degree	23	10%
	Doctoral degree	3	1%
	Professional degree (JD, MD)	4	2%
	Other (please specific):	1	1%
Prefer not to answer			
Educational Background (dichotomous)	Non-university education	109	49%
	University education	113	51%
Ethnical Background	Black	35	16%
	Middle eastern		
	Asian	25	11%
	Hispanic or Latino	3	1%
	White	142	64%
	Mixed	14	6%
Other (please specific):	2	1%	

Table B9*Demographical characteristics of the pilot survey*

Variables		Values	Sample (n = 221)	
			n	%
		Prefer not to answer	1	1%
Ethnical (dichotomous)	Background	Other	80	36%
		White	142	64%
Employment Status		Student	1	
		Retraining		
		Homemaker		
		Carer	2	1%
		Working (paid employee)	190	86%
		Working (self-employed)	27	12%
		Not working (temporary layoff from a job)		
		Not working (looking for work)	2	1%
		Not working (retired)		
		Not working (disabled)		
	Not working (unable to work)			
	Not working (other)			
	Prefer not to answer			
Marital Status		Married	139	63%
		Widowed	1	1%
		Divorced	16	7%
		Separated	3	1%
		Never Married	62	28%
		Prefer not to answer	1	1%

Table B9*Demographical characteristics of the pilot survey*

		Sample (n = 221)	
Variables	Values	n	%
Number of children	One	104	47%
	Two	81	37%
	Three	26	12%
	Four	7	3%
	Five	3	1%
	Six	1	1%
Number of children (dichotomous)	One child	104	47%
	More than one child	118	53%
Children with special needs	Yes	30	14%
	No	187	84%
	Prefer not to say	5	2%
Age range	35 and below	102	46%
	36 and above	120	54%
Variables	Values	Mean	
Age of Parent		40	
Number of Children		1.77	

Table B10*Demographic characteristics of theory-testing survey*

Variables	Values	Sample (n = 513)	
		n	%
Nationality	UK	411	80%
	US	102	20%
Sex	Male	262	52%
	Female	251	48%
	Prefer not to answer		
Educational Background	I have no formal qualifications (and I am not still studying)	4	1%
	High school / secondary school / GCSEs/ A levels	136	27%
	Vocational qualification	58	11%
	Diploma in higher education	47	9%
	University first degree (BA/ BSc/ BEd/ PGCE or equivalent)	187	37%
	Master's degree	55	11%
	Doctoral degree	8	2%
	Professional degree (JD, MD)	12	2%
	Other (please specify)	6	1%
	Prefer not to answer		
Educational Background (dichotomous)	Non-university education	251	49%
	University education	262	51%
Ethnical Background (US)	Black or African American	44	9%
	Asian	17	3%
	Hispanic or Latino	23	5%

Table B10*Demographic characteristics of theory-testing survey*

Variables		Values	Sample (n = 513)	
			n	%
		White	11	2%
		Other (please specify)	6	1%
		Prefer not to answer	1	0.5%
Ethnical Background (UK)		Black / African / Caribbean / Black British	17	3%
		Asian / Asian British	14	3%
		White	356	69%
		Arab	1	0%
		Chinese	5	1%
		Mixed/ Multiple ethnic groups	15	2.9%
		Other ethnic group (please specify)	2	0.4%
		Prefer not to answer	1	0.2%
		Other	144	28.1%
Ethnical Background (dichotomous)		White	367	71.5%
		Prefer not to answer	2	0.4%
Employment Status		Working full time (at least 30 hours a week)	340	66%
		Working part time (8-29 hours a week)	96	19%
		Retired	1	0%
		Unemployed	17	3%
		Permanently sick or disabled	11	2%
		Undergraduate student	3	0.6%

Table B10*Demographic characteristics of theory-testing survey*

Variables	Values	Sample (n = 513)	
		n	%
Marital Status	In part time education (not higher degree)	1	0.2%
	Doing housework, looking after children or other persons	44	8.6%
	Single	77	15%
	Married	328	64%
	In a legally recognized Civil Partnership	14	3%
	Divorced/Separated	52	10%
	Never married	36	7%
	Prefer not to answer	6	1.2%
Family configuration	Married couple family	328	64%
	Civil partner couple family	17	3%
	Opposite sex cohabiting couple family	65	13%
	Same sex cohabiting couple family	5	1%
	Lone parent family	85	17%
	Other (please specify)	12	2.3%
	I don't want to answer	1	0.2%
Family employment	Both are working full time (at least 30 hours a week)	190	37%
	Both are working part time (8-29 hours a week)	15	3%

Table B10*Demographic characteristics of theory-testing survey*

Variables	Values	Sample (n = 513)	
		n	%
	One person is working full time and another person is working part time	125	24%
	Both are unemployed	1	0%
	One person is unemployed	18	4%
	Both are doing housework, looking after children or other persons	2	0.4%
	One person is doing housework, looking after children or other persons	49	9.6%
	Other (please specify)	10	1.9%
	Both are permanently sick or disabled	2	0.4%
	One is permanently sick or disabled	8	1.6%
	One is retired	5	1%
	I don't want to answer	3	0.6%
Number of children	One	114	22.2%
	Two	253	49.3%
	Three	105	20.5%
	Four	33	6.4%
	Five	7	1.4%
	Six	1	0.2%
	One child	113	22%

Table B10*Demographic characteristics of theory-testing survey*

Variables	Values	Sample (n = 513)	
		n	%
Number of children (dichotomous)	More than one child	400	78%
Children with special needs	Yes	105	20.5%
	No	402	78.4%
	Prefer not to say	6	1.2%
Age range	below 35	64	12.5%
	35 and above	449	87.5%
Native language	English	489	95.3%
	Not English	24	4.7%
Variables	Values	Mean	
Age of Parent		44	
Number of Children		2.2	

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
<u>Habit-related cognitive dimension</u>		

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
In the past, I have been successful in establishing healthy habits	In the last 5 years, I've been successful in establishing better habits	<p>“In the past” was not necessary</p> <p>Exchange healthy for better to avoid strong bias toward nutrition and exercise habits</p>
If I intend to establish or stop a habit, I find this process difficult	In the last 5 years, if I intended to stop a bad habit, I found this process difficult	Double-barred item, decide to for the bad habit variation to keep, mixed spread between establishing good habits and stopping bad habits
In the last year, I have formed at least one new habit intentionally	In the last 12 months, I intentionally formed good new habits	<p>“In the last year” was a vague time and difficult to comprehend</p> <p>“At least one new habit” was too specific</p>
In the past, I have been successful in stopping unhealthy habits when I wanted to	In the last 12 months, I've been successful in stopping bad habits	<p>Same as item 1</p> <p>“When I want to” was not adding anything</p>
I've successfully helped my child(ren) stop habits because they were not serving them	In the last 5 years, I've successfully helped my child(ren) establish good habits	<p>“Because not serving them” was seen as not adding anything</p> <p>Changed from stopping to establishing to keep the ratio of good to bad similar for the block</p>

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
It has been difficult for me to help my child(ren) to get rid of habits that were not serving them	In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	Same reasoning as 5
After I've supported my child(ren), they successfully stopped undesirable habits or started desirable habits	In the last 12 months, my support was instrumental for my child(ren) to form better habits	Removed double-barred item Item was difficult to understand, simplified it
I've successfully helped my child(ren) align their habits with their intentions and goals	In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	
I've successfully helped significant others stop habits because they were not serving them	In the last 5 years, I've successfully helped significant people establish good habits	Same as 5
It has been difficult for me to help significant people to get rid of habits that were not serving them	In the last 5 years, it has been difficult for me to help significant people get rid of bad habits	Same as 5
After I've supported a significant other, they successfully stopped undesirable habits or started desirable habits	In the last 12 months, my support was instrumental for significant people to form better habits	Same as 7
I've successfully helped significant people align their habits with their intentions and goals	In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
<u>Habit-related emotional dimension</u>		
It can have negative consequences if I'm not skilled at changing my habits	It can have negative consequences if I'm not good at establishing good habits	Changed "skilled" to "better" because it confused people Specified "establishing good habits" instead of generic "changing habits"
It is important to me to become more skilled at establishing good habits	It is important to me to become better at getting rid of bad habits	Reframed as bad habits to keep a mix of good and bad
If I want to establish desirable habits in the future, I have confidence in my abilities to achieve that	If I want to establish good habits, I have confidence in my abilities to achieve that	Unified language from "desirable" to good "In the future" was not relevant
If I keep trying, I'll figure out a way to successfully stop any bad habit	If I keep trying, I'll figure out a way to successfully stop any bad habit	
It can have negative consequences if I'm not skilled at helping my child(ren) to establish good habits	It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	
It is important to me to become more skilled at helping my child(ren) to get rid of bad habits	It is important to me to become better at helping my child(ren) to get rid of bad habits	Changed skilled to better

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
I can help my child(ren) form habits if they want to	If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve that	Made similar to the items 3
If they keep trying, I can help my child(ren) figure out how to establish a habit that they have not been successful with	If my child(ren) keeps trying , I can help them figure out a way to get rid of a bad habit	Changed difficult to bad to ensure a mix of good and bad Stating the first they as significant others and then using they to reduce confusion
It can have negative consequences if I'm not skilled at helping significant others to establish good habits	It can have negative consequences if I'm not good at helping significant people establish good habits	Same as item 1
It is important to me to become more skilled at helping significant others to get rid of bad habits	It is important to me to become better at helping significant people get rid of bad habits	Changed skilled to better
I can help significant others form habits if they want to	If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve that	Made similar to the items 3
If they keep trying, I can help significant people that have not been successful figure out how to form a difficult habit	If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	Made similar to the items 8

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
<u>Habit-related cognitive dimension</u>		
I know how to stop bad habits	I know how to prevent bad habits from developing	Removed double-barred phrasing
I know how to form and maintain good new habits	I know how to establish good new habits	Simplified by using a more inclusive category of principles and ideas Refer explicitly to habits
I know practical techniques that help me establish good habits and stop bad habits	I know practical techniques that help me establish good habits	Adding the prevention dimension to the scale
I know theories, frameworks or models that explain how to be more successful at changing human behaviors	I know different principles and ideas that explain how practical techniques lead to more success in the formation of habits	Removing the double-barred phrasing and sticking to the good habit /bad habit framing
I know how to help my child(ren) stop bad habits	I know how to help my child(ren) prevent bad habits from developing	Same as 1
I know how to help my child(ren) form and maintain good new habits	I know how to help my child(ren) establish good new habits	Same as 2
I know practical techniques that enable me to help my child(ren) establish good habits and stop bad habits	I know practical techniques that enable me to help my child(ren) establish good habits	Same as previous equivalent

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
I know theories, frameworks or models that explain how to be more successful at changing human behaviors in my child(ren)	I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	Same as previous equivalent
I know how to help significant others stop bad habits	I know how to help significant people prevent bad habits from developing	Same as previous equivalent
I know how to help significant others form and maintain good new habits	I know how to help significant people establish good new habits	Same as previous equivalent
I know practical techniques that enable me to help significant others establish good habits and stop bad habits	I know practical techniques that enable me to help significant people establish good habits	Same as previous equivalent
I know theories, frameworks or models that explain how to be more successful at changing human behaviors in significant others	I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people	Same as previous equivalent
<u>Action-related operational dimension</u>		
I do the behaviors I intended to do	In the last 5 years, I managed to do the difficult actions I intended to do	Speaking of actions, behaviors, occasional actions and one-off confused participants so an explanation was added in the intro and “actions was only used”

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
		Made the item more difficult by focusing on “difficult actions”
I do avoid bad actions	In the last 5 years, I successfully avoided bad actions	Making it more conversational
I do important one-off actions	In the last 12 months, I manage to do important actions	Same as 1
I rarely forget important one-off actions	In the last 12 months, I've forgotten important actions	Moving to a frequency scale Removing biased frequency in items
I've successfully helped my child(ren) not do actions that were not serving them	In the last 5 years, I've successfully helped my child(ren) not do bad actions	Removed not “that not serving them” and simplified by referring to “bad actions” Removed “in the past”
I can help my child(ren) shape their actions if they want to	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	Same as 5
I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	“Many” is problematic for frequency scale

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
If they keep trying, I can help my child(ren) figure out how to do or not do actions that they have not been successful with	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	Negative framing was difficult to understand
In the past, I've helped others stopped behaviors because they were not serving them anymore	In the last 5 years, I've successfully helped significant people to not do bad actions	Same as 5
In the past, it has been difficult for me to help others to get rid of behaviors that were not serving them anymore	In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	Adjusted to mirror item 6
I've helped people align many of their behaviors with their intentions and goals in life	In the last 12 months, it has been difficult for me to help significant people do fewer bad actions	
Despite my support, others I care about often having difficulty translating their good intentions into actions	In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	Adjust to mirror items 8
<u>Action-related emotional dimension</u>		
It is important to me to become more skilled at shaping my behaviors	It is important to me to become better at shaping my actions	Changed "skilled" to "better" because it caused confusion

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
I believe it has negative consequences if one is not good at changing behaviors	It can have negative consequences if I'm not good at directing my actions	Make it a factual statement by removing "I believe" Make it personal with "I'm" instead of "one" Change behaviors to actions
If I want to do a difficult one-time action in the future, I have confidence in my ability to achieve that	If I want to do a difficult action, I have confidence in my ability to achieve that	Remove "one-time" and "in the future"
Even when I have not been successful to influence a behavior in the past, I know that I will figure out how to change it successfully at some point if I keep experimenting.	If I keep trying, I'll figure out a way to successfully do a difficult action.	Make it shorter and simpler
It is important to me to become more skilled at helping my child(ren) to be better at shaping their actions	It is important to me to become better at shaping the actions of my child(ren)	Facilitate is uncommon language Change behaviors to actions Add "significant" to "others"
It can have negative consequences if I'm not skilled at helping my child(ren) to shape their actions	It can have negative consequences if I'm not good at helping my child(ren) with their actions	Same as 2

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
I can help my child(ren) shape their actions if they want to	If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve that	Align with 3
If they keep trying, I can help my child(ren) figure out how to do or not do actions that they have not been successful with	If my child(ren) keeps trying, I can help them figure out how not to do bad actions	Same as 4
It is important to me to get better at facilitating the behaviors of others	It is important to me to become better at shaping the actions of my significant people	Simplified Better instead of skilled
I believe it has negative consequences if one is not good at facilitating the behaviors of others	It can have negative consequences if I'm not good at helping my significant people with their actions	Same as 9
I can help significant others shape their behavior if they want to	If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve that	Make it a more demand by focusing on "difficult actions"
Even when someone has not been successful to influence a behavior in the past, I know that I can help them figure out how to change it successfully at some point if they keep experimenting.	If they keep trying, I can help significant people figure out how not to do bad actions	Simplify with bad actions

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
<u>Action-related cognitive dimension</u>		
I know how to change my behaviors	I know how to ensure that I do difficult actions	Shift to the focus on the gap between actions and intentions
I know how to ensure that I do important one-off actions	I know how to ensure that I do important actions	Simplified by using a more inclusive category of principles and ideas Focus on actions
I know practical techniques that help me to change my behaviors	I know practical techniques that help me to close the gap between my intentions and actions	Make it more demanding with difficult actions
I know theories, frameworks or models that explain how to be more successful at changing human behaviors	I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions	Remove “one-off”
I know how to facilitate change in the behaviors of my child(ren)	I know how to help my child(ren) do difficult actions	Same as 1 Use more common “help” instead of “facilitate“
I know how to facilitate that my child(ren) do important one-off actions	I know how to help my child(ren) do important actions	Same as 2

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
I know practical techniques that help me facilitate behavior change in my child(ren)	I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions	Use more common “help” instead of “facilitate“ Focus on difficult actions
I know theories, frameworks or models that explain how to be more successful at changing the behaviors of my child(ren)	I know different principles and ideas that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	Use more common “help” instead of “facilitate“ Remove one-off
I know how to facilitate change in the behaviors of significant others	I know how to help significant people do difficult actions	Same as 1
I know how to facilitate that significant others do important one-off actions	I know how to help significant people do important actions	Same as 2
I know practical techniques that help me facilitate behavior change in significant others	I know practical techniques that enable me to help significant people to close the gap between their intentions and actions	Make it more demanding by focusing on difficult actions
I know theories, frameworks or models that explain how to be more successful at changing the behaviors of significant others	I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	Remove one-off

Explorative items

Table B11*From BCLSV1 to v2: Item changes and reasons based on cognitive interviews*

Previous item	Final item (after CI phase)	Reason for change
There are at least a handful of behaviors and habits I would like to get rid of	There are at least a handful of important habits I would like to get rid of	Removed double-barred phrasing Focus on habits
There are at least a handful of behaviors and habits I would like to establish	I'm satisfied with my current habits and actions	Same as 3 Actions instead of behavior
I am satisfied with my current behaviors and habits	There are at least a handful of important habits I would like to establish	Removed double-barred phrasing Focus on habits
There are still important behaviors and habits I would like to get rid of	My current habits and actions are not ideal	Same as 3 Actions instead of behavior
There are still important behaviors and habits I would like to establish	There are at least a handful of important habits that my child(ren) would benefit from getting rid of	Changed structure to have the same three-fold structure of self, children, others
My current behaviors and habits are not ideal	I'm satisfied with the current habits and actions of my child(ren) There are at least a handful of important habits that my child(ren) would benefit from establishing	

Table B11

From BCLSV1 to v2: Item changes and reasons based on cognitive interviews

Previous item	Final item (after CI phase)	Reason for change
	The current habits and actions of my child(ren) are not ideal	
	There are at least a handful of important habits that my significant people would benefit from getting rid of	
	I'm satisfied with the current habits and actions of my significant people	
	There are at least a handful of important habits that my significant people would benefit from establishing	

Note.

Answer scales

Cognitive dimension

Not at all, rarely, sometimes, often, almost always, I don't want to answer

Emotional dimension

Disagree, slightly disagree, Neutral; no opinion, slightly agree, agree, I don't want to answer

Operational dimension

Not at all, rarely, sometimes, often, almost always, I don't want to answer

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
Operational	Habits	Self		In the last 5 years, I've been successful in establishing better habits	hope1self1
				In the last 5 years, if I intended to stop a bad habit, I found this process difficult	hope2self2
				In the last 12 months, I intentionally formed good new habits	hope3self3
				In the last 12 months, I've been successful in stopping bad habits	hope4self4
		Children		In the last 5 years, I've successfully helped my child(ren) establish good habits	hope5chi1
				In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	hope6chi2
				In the last 12 months, my support was instrumental for my child(ren) to form better habits	hope7chi3

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
		Significant people		In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	hope8chi4
				In the last 5 years, I've successfully helped significant people establish good habits	hope9oth1
				In the last 5 years, it has been difficult for me to help significant people get rid of bad habits	hope10oth2r
				In the last 12 months, my support was instrumental for significant people to form better habits	hope11oth3
				In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	hope12oth4
Emotional		Self	Attitude	It can have negative consequences if I'm not good at establishing good habits	hemo1self1att1
				It is important to me to become better at getting rid of bad habits	hemo2self2att2

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
			Self-efficacy	If I want to establish good habits, I have confidence in my abilities to achieve that	hemo3self3seef1
				If I keep trying, I'll figure out a way to successfully stop any bad habit	hemo4self4seef2
		Children	Attitude	It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	hemo5chi1att1
				It is important to me to become better at helping my child(ren) to get rid of bad habits	hemo6chi2att2
			Self-efficacy	If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve that	hemo7chi3seef1
				If my child(ren) keeps trying, I can help them figure out a way to get rid of a bad habit	hemo8chi4seef2
		Significant people	Attitude	It can have negative consequences if I'm not good at helping significant people establish good habits	hemo9oth1att1

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
				It is important to me to become better at helping significant people get rid of bad habits	hemo10oth2att2
			Self-efficacy	If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve that	hemo11oth3seef1
				If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	hemo12oth4seef2
Cognitive		Self	Skill	I know how to prevent bad habits from developing	hcog1self1ski1
				I know how to establish good new habits	hcog2self2ski2
			Knowledge	I know practical techniques that help me establish good habits	hcog3self3kno1
				I know different principles and ideas that explain how practical techniques lead to more success in the formation of habits	hcog4self4kno2
		Children	Skill	I know how to help my child(ren) prevent bad habits from developing	hcog5chi1ski1

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
				I know how to help my child(ren) establish good new habits	hcog6chi2ski2
			Knowledge	I know practical techniques that enable me to help my child(ren) establish good habits	hcog7chi3kno1
				I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	hcog8chi4kno2
		Significant people	Skill	I know how to help significant people prevent bad habits from developing	hcog9oth1ski1
				I know how to help significant people establish good new habits	hcog10oth2ski2
			Knowledge	I know practical techniques that enable me to help significant people establish good habits	hcog11oth3kno1
				I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people	hcog12oth4kno2

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
Operational	Actions	Self		In the last 5 years, I managed to do the difficult actions I intended to do	aope1self1
				In the last 5 years, I successfully avoided bad actions	aope2self2
				In the last 12 months, I manage to do important actions	aope3self3
				In the last 12 months, I've forgotten important actions	aope4self4
		Children		In the last 5 years, I've successfully helped my child(ren) not do bad actions	aope5chi1
				In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	aope6chi2
				In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	aope7chi3r
				In the last 12 months, my child(ren) was more often able to translate their good	aope8chi4

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
				intentions into actions because of my support	
		Significant people		In the last 5 years, I've successfully helped significant people to not do bad actions	aope9oth1
				In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	aope10oth2
				In the last 12 months, it has been difficult for me to help significant people do fewer bad actions	aope11oth3
				In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	aope12oth4
Emotional		Self	Attitude	It is important to me to become better at shaping my actions	aemo1self1att1
				It can have negative consequences if I'm not good at directing my actions	aemo2self2att2

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
			Self-efficacy	If I want to do a difficult action, I have confidence in my ability to achieve that	aemo3self3seef1
				If I keep trying, I'll figure out a way to successfully do a difficult action.	aemo4self4seef2
		Children	Attitude	It is important to me to become better at shaping the actions of my child(ren)	aemo5chi1att1
				It can have negative consequences if I'm not good at helping my child(ren) with their actions	aemo6chi2att2
			Self-efficacy	If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve that	aemo7chi3seef1
				If my child(ren) keeps trying, I can help them figure out how not to do bad actions	aemo8chi4seef2
		Significant people	Attitude	It is important to me to become better at shaping the actions of my significant people	aemo9oth1att1
				It can have negative consequences if I'm not good at helping my significant people with their actions	aemo10oth2att2

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
			Self-efficacy	If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve that	aemo11oth3seef1
				If they keep trying, I can help significant people figure out how not to do bad actions	aemo12oth4seef2
Cognitive	Actions	Self	Skill	I know how to ensure that I do difficult actions	acog1self1ski1
				I know how to ensure that I do important actions	acog2self2ski2
			Knowledge	I know practical techniques that help me to close the gap between my intentions and actions	acog3self3kno1
				I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions	acog4self4kno2
		Children	Skill	I know how to help my child(ren) do difficult actions	acog5chi1ski1
				I know how to help my child(ren) do important actions	acog6chi2ski2

Table B12*BCLS-72 v2*

Type	Behavior class	Referent	Sub-dimensions	Question(s)/Item(s)	Item short handle
			Knowledge	I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions	acog7chi3kno1
				I know different principles and ideas that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	acog8chi4kno2
		Significant people	Skill	I know how to help significant people do difficult actions	acog9oth1ski1
				I know how to help significant people do important actions	acog10oth2ski2
			Knowledge	I know practical techniques that enable me to help significant people to close the gap between their intentions and actions	acog11oth3kno1
				I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	acog12oth4kno2

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
Operational		Significant people	Habits	In the last 5 years, I've successfully helped significant people establish good habits	hope9oth1	2
Operational		Children	Habits	In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	hope8chi4	1
Operational		Children	Habits	In the last 12 months, my support was instrumental for my child(ren) to form better habits	hope7chi3	1
Operational		Children	Habits	In the last 5 years, I've successfully helped my child(ren) establish good habits	hope5chi1	1
Operational		Self	Habits	In the last 12 months, I intentionally formed good new habits	hope3self3	1
Operational		Self	Habits	In the last 5 years, I've been successful in establishing better habits	hope1self1	3
		Significant people	Habits	In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	hope12oth4	2
		Significant people	Habits	In the last 12 months, my support was instrumental for significant people to form better habits	hope11oth3	2

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
		Significant people	Actions	In the last 5 years, I've successfully helped significant people to not do bad actions	aope9oth1	2
		Children	Actions	In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	aope8chi4	4
		Children	Actions	In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	aope6chi2	1
		Children	Actions	In the last 5 years, I've successfully helped my child(ren) not do bad actions	aope5chi1	1
		Significant people	Actions	In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	aope12oth4	1
		Significant people	Actions	In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	aope10oth2	2
Emotional	Attitude	Children	Habits	It is important to me to become better at helping my child(ren) to get rid of bad habits	hemo6chi2att2	1

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
		Self	Habits	It is important to me to become better at getting rid of bad habits	hemo2self2att2	1
		Significant people	Actions	It is important to me to become better at shaping the actions of my significant people	aemo9oth1att1	2
		Significant people	Actions	It can have negative consequences if I'm not good at helping my significant people with their actions	aemo10oth2att2	1
	Self-efficacy	Self	Habits	If I keep trying, I'll figure out a way to successfully stop any bad habit	hemo4self4seef2	1
		Self	Habits	If I want to establish good habits, I have confidence in my abilities to achieve that	hemo3self3seef1	1
		Significant people	Habits	If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	hemo12oth4seef2	2
		Significant people	Habits	If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve that	hemo11oth3seef1	2
		Children	Actions	If my child(ren) keeps trying, I can help them figure out how not to do bad actions	aemo8chi4seef2	2

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
		Self	Actions	If I keep trying, I'll figure out a way to successfully do a difficult action.	aemo4self4seef2	2
		Self	Actions	If I want to do a difficult action, I have confidence in my ability to achieve that	aemo3self3seef1	2
		Significant people	Actions	If they keep trying, I can help significant people figure out how not to do bad actions	aemo12oth4seef2	1
		Significant people	Actions	If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve that	aemo11oth3seef1	1
Cognitive	Knowledge	Children	Habits	I know practical techniques that enable me to help my child(ren) establish good habits	hcog7chi3kno1	1
		Self	Habits	I know practical techniques that help me establish good habits	hcog3self3kno1	1
		Significant people	Habits	I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people	hcog12oth4kno2	3
		Significant people	Habits	I know practical techniques that enable me to help significant people establish good habits	hcog11oth3kno1	3

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
		Children	Actions	I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions	acog7chi3kno1	1
		Self	Actions	I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions	acog4self4kno2	3
		Self	Actions	I know practical techniques that help me to close the gap between my intentions and actions	acog3self3kno1	1
		Significant people	Actions	I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	acog12oth4kno2	3
		Significant people	Actions	I know practical techniques that enable me to help significant people to close the gap between their intentions and actions	acog11oth3kno1	1
	Skill	Significant people	Habits	I know how to help significant people prevent bad habits from developing	hcog9oth1ski1	3
		Self	Habits	I know how to establish good new habits	hcog2self2ski2	2

Table B13*All items from the three 24-item specialized scales*

Type	Sub-dimensions	Referent	Behavior class	Question(s)/Item(s)	Item short handle	Repetition
		Significant people	Habits	I know how to help significant people establish good new habits	hcog10oth2ski2	2
		Significant people	Actions	I know how to help significant people do difficult actions	acog9oth1ski1	2
		Significant people	Actions	I know how to help significant people do important actions	acog10oth2ski2	3

Table B14*CBCLS-41 items*

Aspect	Type	Short description	Item name
Behavior class			
Habit	Operational	In the last 5 years, I've been successful in establishing better habits	hope1self1
		In the last 12 months, I intentionally formed good new habits	hope3self3
		In the last 5 years, I've successfully helped my child(ren) establish good habits	hope5chi1
		In the last 12 months, my support was instrumental for my child(ren) to form better habits	hope7chi3

Table B14*CBCLS-41 items*

Aspect Behavior class	Type	Short description	Item name
		In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	hope8chi4
		In the last 5 years, I've successfully helped significant people establish good habits	hope9oth1
		In the last 12 months, my support was instrumental for significant people to form better habits	hope11oth3
		In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	hope12oth4
Emotional		It is important to me to become better at getting rid of bad habits	hemo2self2att2
		If I want to establish good habits, I have confidence in my abilities to achieve that	hemo3self3seef 1
		If I keep trying, I'll figure out a way to successfully stop any bad habit	hemo4self4seef 2
		It is important to me to become better at helping my child(ren) to get rid of bad habits	hemo6chi2att2
		If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve that	hemo11oth3seef 1
		If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	hemo12oth4seef 2

Table B14*CBCLS-41 items*

Aspect Behavior class	Type	Short description	Item name
	Cognitive	I know how to establish good new habits	hcog2self2ski2
		I know practical techniques that help me establish good habits	hcog3self3kno1
		I know practical techniques that enable me to help my child(ren) establish good habits	hcog7chi3kno1
		I know how to help significant people prevent bad habits from developing	hcog9oth1ski1
		I know how to help significant people establish good new habits	hcog10oth2ski2
		I know practical techniques that enable me to help significant people establish good habits	hcog11oth3kno1
		I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people	hcog12oth4kno2
Action	Operational	In the last 5 years, I've successfully helped my child(ren) not do bad actions	aope5chi1
		In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	aope6chi2
		In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	aope8chi4

Table B14*CBCLS-41 items*

Aspect Behavior class	Type	Short description	Item name
		In the last 5 years, I've successfully helped significant people to not do bad actions	aope9oth1
		In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	aope10oth2
		In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	aope12oth4
Emotional		If I want to do a difficult action, I have confidence in my ability to achieve that	aemo3self3seef 1
		If I keep trying, I'll figure out a way to successfully do a difficult action.	aemo4self4seef 2
		If my child(ren) keeps trying, I can help them figure out how not to do bad actions	aemo8chi4seef2
		It is important to me to become better at shaping the actions of my significant people	aemo9oth1att1
		It can have negative consequences if I'm not good at helping my significant people with their actions	aemo10oth2att2
		If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve that	aemo11oth3seef 1

Table B14*CBCLS-41 items*

Aspect Behavior class	Type	Short description	Item name
		If they keep trying, I can help significant people figure out how not to do bad actions	aemo12oth4seef 2
	Cognitive	I know practical techniques that help me to close the gap between my intentions and actions	acog3self3kno1
		I know different principles and ideas that explain how practical techniques lead to more success in shaping my actions	acog4self4kno2
		I know practical techniques that enable me to help my child(ren) to close the gap between their intentions and actions	acog7chi3kno1
		I know how to help significant people do difficult actions	acog9oth1ski1
		I know how to help significant people do important actions	acog10oth2ski2
		I know practical techniques that enable me to help significant people to close the gap between their intentions and actions	acog11oth3kno 1
		I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	acog12oth4kno 2

Appendix C—Exploratory factor analysis

Types-BCL scale

Operational BCL

Table C1

All items, short descriptions, and unstandardized factor loadings for the operational dimension

Short description	Factor loadings
<u>Habits</u>	
In the last 5 years, I've successfully helped significant people establish good habits	0.81
In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	0.81
In the last 12 months, my support was instrumental for significant people to form better habits	0.77
In the last 5 years, I've been successful in establishing better habits	0.60
In the last 5 years, I've successfully helped my child(ren) establish good habit	0.55
In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	0.54
In the last 12 months, I intentionally formed good new habits	0.53
In the last 12 months, I've been successful in stopping bad habits	0.53
In the last 12 months, my support was instrumental for my child(ren) to form better habits	0.48
In the last 5 years, it has been difficult for me to help significant people get rid of bad habits	-0.04
In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	-0.23
In the last 5 years, if I intended to stop a bad habit, I found this process difficult	-0.31
<u>Actions</u>	
In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	0.77
In the last 5 years, I've successfully helped significant people to not do bad actions	0.75

Table C1

All items, short descriptions, and unstandardized factor loadings for the operational dimension

Short description	Factor loadings
In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	0.73
In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	0.58
In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	0.52
In the last 5 years, I've successfully helped my child(ren) not do bad actions	0.49
In the last 12 months, I manage to do important actions	0.48
In the last 5 years, I managed to do the difficult actions I intended to do	0.46
In the last 5 years, I successfully avoided bad actions	0.41
In the last 12 months, it has been difficult for me to help significant people do fewer bad actions	0.12
In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	-0.03
In the last 12 months, I've forgotten important actions	-0.21

Note. In **bold** are the items with the highest loadings and selected for the final scale. See appendix for full item description. N = 221 pilot survey participants.

Emotional BCL

Table C2

All items, short descriptions, and factor loadings for the emotional dimension

Short description	Factor loadings
<u>Habits</u>	
If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	0.67
If I want to establish good habits, I have confidence in my abilities to achieve that	0.57
If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them	0.56
If I keep trying, I'll figure out a way to successfully stop any bad habit	0.52
If my child(ren) keeps trying, I can help them figure out a way to get rid of a bad habit	0.52
If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve them	0.44
It is important to me to become better at getting rid of bad habits	0.40
It is important to me to become better at helping my child(ren) to get rid of bad habits	0.40
It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	0.38
It is important to me to become better at helping significant people get rid of bad habits	0.38
It can have negative consequences if I'm not good at helping significant people establish good habits	0.37
It can have negative consequences if I'm not good at establishing good habits	0.22
<u>Actions</u>	
If I keep trying, I'll figure out a way to successfully do a difficult action	0.59
If my child(ren) keeps trying, I can help them figure out how not to do bad actions	0.56

Table C2*All items, short descriptions, and factor loadings for the emotional dimension*

Short description	Factor loadings
If I want to do a difficult action, I have confidence in my ability to achieve them	0.54
It can have negative consequences if I'm not good at helping my significant people with their actions	0.54
If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve them	0.53
It is important to me to become better at shaping the actions of my significant people	0.52
If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve them	0.52
It is important to me to become better at shaping my actions	0.49
It is important to me to become better at shaping the actions of my child(ren)	0.49
If they keep trying, I can help significant people figure out how not to do bad actions	0.49
It can have negative consequences if I'm not good at helping my child(ren) with their actions	0.44
It can have negative consequences if I'm not good at directing my actions	0.41

Table C3

All items, short descriptions, and unstandardized factor loadings for the cognitive dimension

Short description	Factor loadings
<u>Habits</u>	
I know <i>different principles and ideas</i> that explain how the practical techniques lead to more success in the formation of habits in significant people	0.75
I know <i>practical techniques</i> that enable me to help significant people establish good habits	0.70
I know <i>different principles and ideas</i> that explain how practical techniques lead to more success in the formation of habits	0.69
I know <i>different principles and ideas</i> that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	0.68
I know how to help significant people establish good new habits	0.66
I know how to help significant people prevent bad habits from developing	0.65
I know how to establish good new habits	0.63
I know <i>practical techniques</i> that help me establish good habits	0.61
I know <i>practical techniques</i> that enable me to help my child(ren) establish good habits	0.58
I know how to prevent bad habits from developing	0.49
I know how to help my child(ren) prevent bad habits from developing	0.46
I know how to help my child(ren) establish good new habits	0.43
<u>Actions</u>	
I know <i>different principles and ideas</i> that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	0.76
I know <i>different principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions	0.75
I know <i>practical techniques</i> that enable me to help significant people to close the gap between their intentions and actions	0.71

Table C3*All items, short descriptions, and unstandardized factor loadings for the cognitive dimension*

Short description	Factor loadings
I know <i>practical techniques</i> that help me to close the gap between my intentions and actions	0.69
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	0.66
I know how to help significant people do important actions	0.62
I know how to help significant people do difficult actions	0.53
I know how to help my child(ren) do important actions	0.42
I know how to ensure that I do difficult actions	0.41
I know how to ensure that I do important actions	0.41
I know how to help my child(ren) do difficult actions	0.31
I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions	

Reference-BCL scale

Self-related BCL

Table C4

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
<u>Habits</u>	
I know how to establish good new habits	0.72
In the last 12 months, I intentionally formed good new habits	0.66
I know <i>practical techniques</i> that help me establish good habits	0.66
In the last 5 years, I've been successful in establishing better habits	0.65
I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in the formation of habits	0.65
In the last 12 months, I've been successful in stopping bad habits	0.56
If I want to establish good habits, I have confidence in my abilities to achieve them	0.55
If I keep trying, I'll figure out a way to successfully stop any bad habit	0.54
I know how to prevent bad habits from developing	0.51
It is important to me to become better at getting rid of bad habits	0.22
It can have negative consequences if I'm not good at establishing good habits	0.11
In the last 5 years, if I intended to stop a bad habit, I found this process difficult	-0.42
<u>Actions</u>	
I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions	0.66
I know <i>practical techniques</i> that help me to close the gap between my intentions and actions	0.64
If I keep trying, I'll figure out a way to successfully do a difficult action	0.63

Table C4

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
If I want to do a difficult action, I have confidence in my ability to achieve that	0.61
In the last 5 years, I managed to do the difficult actions I intended to do	0.49
In the last 12 months, I manage to do important actions	0.47
I know how to ensure that I do important actions	0.45
I know how to ensure that I do difficult actions	0.39
In the last 5 years, I successfully avoided bad actions	0.37
It is important to me to become better at shaping my actions	0.26
It can have negative consequences if I'm not good at directing my actions	0.13
In the last 12 months, I've forgotten important actions	-0.29

Child-related BCL

Table C5

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
<u>Habit</u>	
In the last 12 months, my support was instrumental for my child(ren) to form better habits	0.70
In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	0.68
In the last 5 years, I've successfully helped my child(ren) establish good habits	0.61
I know <i>practical techniques</i> that enable me to help my child(ren) establish good habits	0.60
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	0.57

Table C5

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
If my child(ren) keeps trying, I can help them figure out a way to get rid of a bad habit	0.56
If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve them	0.50
I know how to help my child(ren) establish good new habits	0.49
I know how to help my child(ren) prevent bad habits from developing	0.43
It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	0.34
It is important to me to become better at helping my child(ren) to get rid of bad habits	0.28
In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	-0.23
<u>Actions</u>	
In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	0.67
In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	0.67
I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions	0.67
In the last 5 years, I've successfully helped my child(ren) not do bad actions	0.65
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	0.61
I know how to help my child(ren) do important actions	0.56
If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve them	0.55
If my child(ren) keeps trying, I can help them figure out how not to do bad actions	0.55
I know how to help my child(ren) do difficult actions	0.41
It can have negative consequences if I'm not good at helping my child(ren) with their actions	0.40

Table C5

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
It is important to me to become better at shaping the actions of my child(ren)	0.39
In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	-0.15

Other-related BCL

Table C6

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
<u>Habits</u>	
In the last 12 months, my support was instrumental for my child(ren) to form better habits	0.70
In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	0.68
In the last 5 years, I've successfully helped my child(ren) establish good habits	0.61
I know <i>practical techniques</i> that enable me to help my child(ren) establish good habits	0.60
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	0.57
If my child(ren) keeps trying, I can help them figure out a way to get rid of a bad habit	0.56
If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve them	0.50
I know how to help my child(ren) establish good new habits	0.49
I know how to help my child(ren) prevent bad habits from developing	0.43

Table C6

All items, short descriptions, and unstandardized factor loadings for the self-related dimension

Short description	Factor loadings
It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	0.34
It is important to me to become better at helping my child(ren) to get rid of bad habits	0.28
In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	-0.23
<u>Actions</u>	
In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	0.67
In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	0.67
I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions	0.67
In the last 5 years, I've successfully helped my child(ren) not do bad actions	0.65
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	0.61
I know how to help my child(ren) do important actions	0.56
If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve them	0.55
If my child(ren) keeps trying, I can help them figure out how not to do bad actions	0.55
I know how to help my child(ren) do difficult actions	0.41
It can have negative consequences if I'm not good at helping my child(ren) with their actions	0.40
It is important to me to become better at shaping the actions of my child(ren)	0.39
In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	-0.15

Behavior class-BCL scale

Habit-related BCL

Table C7

Short descriptions, and unstandardized factor loadings for all habit-related items

Short description	Factor loadings
<u>Operational</u>	
In the last 5 years, I've successfully helped significant people establish good habits	0.69
In the last 12 months, my support was instrumental for significant people to form better habits	0.69
In the last 12 months, I've successfully helped significant people align their habits with their intentions and goals	0.69
In the last 5 years, I've been successful in establishing better habits	0.64
In the last 12 months, I've successfully helped my child(ren) align their habits with their intentions and goals	0.58
In the last 12 months, I intentionally formed good new habits	0.57
In the last 5 years, I've successfully helped my child(ren) establish good habits	0.57
In the last 12 months, I've been successful in stopping bad habits	0.53
In the last 12 months, my support was instrumental for my child(ren) to form better habits	0.53
In the last 5 years, it has been difficult for me to help significant people get rid of bad habits	-0.10
In the last 5 years, it has been difficult for me to help my child(ren) get rid of bad habits	-0.24
In the last 5 years, if I intended to stop a bad habit, I found this process difficult	-0.38
<u>Emotional</u>	
If my significant people keep trying, I can help them figure out a way to get rid of a bad habit	0.61
If my significant people want to establish good habits, I have the confidence in my abilities to help them achieve them	0.60

Table C7*Short descriptions, and unstandardized factor loadings for all habit-related items*

Short description	Factor loadings
If I want to establish good habits, I have confidence in my abilities to achieve that	0.54
If I keep trying, I'll figure out a way to successfully stop any bad habit	0.46
If my child(ren) wants to establish good habits, I have the confidence in my abilities to help them achieve them	0.42
If my child(ren) keeps trying, I can help them figure out a way to get rid of a bad habit	0.37
It is important to me to become better at helping significant people get rid of bad habits	0.36
It is important to me to become better at getting rid of bad habits	0.18
It can have negative consequences if I'm not good at helping significant people establish good habits	0.15
It is important to me to become better at helping my child(ren) to get rid of bad habits	0.10
It can have negative consequences if I'm not good at helping my child(ren) to establish good habits	0.09
It can have negative consequences if I'm not good at establishing good habits	0.03
<u>Cognitive</u>	
I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in significant people	0.75
I know practical techniques that enable me to help significant people establish good habits	0.72
I know how to help significant people prevent bad habits from developing	0.66
I know how to establish good new habits	0.64
I know how to help significant people establish good new habits	0.64
I know different principles and ideas that explain how practical techniques lead to more success in the formation of habits	0.61

Table C7*Short descriptions, and unstandardized factor loadings for all habit-related items*

Short description	Factor loadings
I know different principles and ideas that explain how the practical techniques lead to more success in the formation of habits in my child(ren)	0.61
I know practical techniques that help me establish good habits	0.59
I know practical techniques that enable me to help my child(ren) establish good habits	0.56
I know how to prevent bad habits from developing	0.50
I know how to help my child(ren) prevent bad habits from developing	0.47
I know how to help my child(ren) establish good new habits	0.44

Action-related BCL**Table C8***Short descriptions, and unstandardized factor loadings for all action-related items*

Short description	Factor loadings
<u>Operational</u>	
In the last 12 months, significant people were more often able to translate their good intentions into actions because of my support	0.68
In the last 5 years, I've successfully helped significant people do more of the actions that were aligned with their intentions and goals	0.66
In the last 5 years, I've successfully helped significant people to not do bad actions	0.62
In the last 5 years, I've successfully helped my child(ren) do more of the actions that were aligned with their intentions and goals	0.59
In the last 12 months, my child(ren) was more often able to translate their good intentions into actions because of my support	0.59
In the last 5 years, I've successfully helped my child(ren) not do bad actions	0.56
In the last 5 years, I managed to do the difficult actions I intended to do	0.47
In the last 12 months, I manage to do important actions	0.47
In the last 5 years, I successfully avoided bad actions	0.37

Table C8*Short descriptions, and unstandardized factor loadings for all action-related items*

Short description	Factor loadings
In the last 12 months, it has been difficult for me to help significant people do fewer bad actions	0.13
In the last 12 months, it has been difficult for me to help my child(ren) do fewer bad actions	-0.04
In the last 12 months, I've forgotten important actions	-0.25
<u>Emotional</u>	
If my significant people want to do difficult actions, I have confidence in my abilities to help them achieve them	0.65
If they keep trying, I can help significant people figure out how not to do bad actions	0.61
If I want to do a difficult action, I have confidence in my ability to achieve that	0.54
If I keep trying, I'll figure out a way to successfully do a difficult action.	0.50
It is important to me to become better at shaping the actions of my significant people	0.50
If my child(ren) wants to do difficult actions, I have confidence in my abilities to help them achieve them	0.48
It can have negative consequences if I'm not good at helping my significant people with their actions	0.46
If my child(ren) keeps trying, I can help them figure out how not to do bad actions	0.39
It is important to me to become better at shaping my actions	0.28
It can have negative consequences if I'm not good at helping my child(ren) with their actions	0.26
It is important to me to become better at shaping the actions of my child(ren)	0.25
It can have negative consequences if I'm not good at directing my actions	0.22
<u>Cognitive</u>	

Table C8*Short descriptions, and unstandardized factor loadings for all action-related items*

Short description	Factor loadings
I know different principles and ideas that explain how the practical techniques lead to more success in helping significant people with important and difficult actions	0.75
I know practical techniques that enable me to help significant people to close the gap between their intentions and actions	0.74
I know how to help significant people do important actions	0.68
I know different <i>principles and ideas</i> that explain how practical techniques lead to more success in shaping my actions	0.63
I know how to help significant people do difficult actions	0.63
I know <i>practical techniques</i> that help me to close the gap between my intentions and actions	0.59
I know <i>practical techniques</i> that enable me to help my child(ren) to close the gap between their intentions and actions	0.58
I know different <i>principles and ideas</i> that explain how the practical techniques lead to more success in helping my child(ren) with important and difficult actions	0.58
I know how to help my child(ren) do important actions	0.49
I know how to ensure that I do difficult actions	0.47
I know how to ensure that I do important actions	0.44
I know how to help my child(ren) do difficult actions	0.39