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EDITED BY

Irene Sotirios Chaidi,
National Centre of Scientific Research
Demokritos, Greece

REVIEWED BY

Victoria Bamicha,
National Centre of Scientific Research
Demokritos, Greece
Chrysovalantis Kefalis,
National Centre of Scientific Research
Demokritos, Greece

*CORRESPONDENCE

Franceli L. Cibrian
✉ cibrian@chapman.edu
Kimberley D. Lakes
✉ Kimberley.Lakes@amedsch.ucr.edu

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ParentCoach: designing an mHealth parenting app to enhance parental involvement in ADHD support

Franceli L. Cibrian^{1*}, Nancy Herrera², Jesus A. Beltran³,
Lucas M. Silva⁴, Mikaela Pulse², Kayla Anderson¹, Cassie Zeiler⁵,
Vitica X. Arnold⁶, Luc Rieffel^{6,7}, Daniel I. Lee²,
Sabrina E. B. Schuck⁵ and Kimberley D. Lakes^{2*}

¹Fowler School of Engineering, Chapman University, Orange, CA, United States, ²Department of Psychiatry and Neuroscience, School of Medicine, University of California, Riverside, Riverside, CA, United States, ³Department of Computer Science, California State University, Los Angeles, Los Angeles, CA, United States, ⁴Department of Computer Science, University of Iowa, Iowa City, IA, United States, ⁵Department of Pediatrics, School of Medicine, University of California, Irvine, Irvine, CA, United States, ⁶Department of Informatics, School of Information and Computer Sciences, University of California, Irvine, Irvine, CA, United States, ⁷School of Information, University of California, Berkeley, Berkeley, CA, United States

Introduction: Parents play a vital role in supporting self-regulation and managing behaviors in children with Attention-Deficit/Hyperactivity Disorder (ADHD). However, many face barriers to accessing consistent, evidence-based support. Mobile health (mHealth) technologies offer a promising way to deliver flexible, low-burden guidance for parents on best practices and strategies to support their children's self-regulation. However, designing them is non-trivial.

Objective: This paper introduces *ParentCoach*, a mobile application designed to support parents of children with ADHD through brief daily lessons, reflection prompts, and skill-building activities.

Methods: *ParentCoach* was developed in two phases: (1) secondary analysis of qualitative data from over 30 families using mHealth tools to support self-regulation, and (2) co-design with ADHD experts to refine and validate the curriculum.

Results: Our findings identify key design needs for digital parenting tools: micro-interactions, flexible content formats, scaffolding for executive function, and emotional reflection. The resulting app delivers an 80-lesson curriculum across 16 weekly themes covering relational self-reflection, emotional regulation, communication, and behavior management.

Discussion: *ParentCoach* design and development show how evidence-based parenting strategies can be translated into accessible, scalable mHealth interventions. Our study offers key design implications for digital tools that support parent learning, emotional resilience, and behavioral consistency in the home. Currently, we are running a randomized controlled trial to provide evidence of ParentCoach's impact. This work contributes to ongoing efforts to develop technology-enhanced behavioral interventions for families of children with ADHD.

KEYWORDS

mHealth, ADHD, parenting, self-regulation, design, digital health intervention (DHI)

1 Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is the most widespread psychiatric condition among children, affecting approximately 11.4% of children aged 3–17 years old in the United States (Danielson et al., 2024). Children with ADHD¹ often exhibit differences in attention, impulsivity, hyperactivity, and self-regulation, which can impact academic performance, social interactions, and daily routines (American Psychiatric Association, 2023). These difficulties place considerable strain on caregivers, who must continuously navigate behavioral outbursts, emotional reactivity, and executive functioning challenges such as forgetfulness, disorganization, and poor time management (Song et al., 2021; Theule et al., 2013).

Children with ADHD demonstrate executive functioning (EF) deficits (Barkley, 1997), and a growing body of research demonstrates the importance of targeting EFs in order to increase positive behaviors (e.g., Chaimaha et al., 2017; Welsch et al., 2021; Zhang et al., 2023). EFs refer to a set of cognitive processes, including working memory, attention, inhibitory control, and cognitive flexibility, that are necessary for strategizing, prioritizing, concentrating, and shifting focus in the service of goal-directed behavior (Diamond, 2013; Diamond and Ling, 2016; Wade et al., 2018). EFs play a vital role in the development of self-regulation, which encompasses emotional control, goal setting, behavioral consistency, and flexible thinking (Cibrian et al., 2022; Dawson and Guare, 2018; Reid et al., 2005; McClelland et al., 2017). Furthermore, evidence suggests that there is a relationship between EF and Theory of Mind (ToM) during the developmental period, though underlying mechanisms explaining the functional overlap are not fully understood (Austin et al., 2014; Wade et al., 2018). ToM, which refers to the cognitive ability to acknowledge and reason about the internal experiences of others (i.e., thoughts, feelings, beliefs) in order to predict and understand their behaviors (Byom and Mutlu, 2013), is one facet of social cognition that plays a central role in the social development of children (Mukerji et al., 2019). Social cognition is another area that children with ADHD often demonstrate deficits in (Uekermann et al., 2010). Generally speaking, these skills (i.e., EFs, self-regulation, social cognition) do not develop “automatically” in children; instead, they must be taught, scaffolded, increased, and reinforced through consistent interactions with supportive adults. Furthermore, children with ADHD often benefit from more explicit instruction and targeted intervention in order to master these skills, and research suggests that different approaches, including metacognitive strategies, can be used to target EF deficits and produce positive behavior change (Kajka and Kulik, 2021).

Parents play a central role in supporting their children’s self-regulation, emotional development, and EF, as well as in cultivating ToM and Metacognition (Victoria and Athanasios, 2023; Sodian and Frith, 2008). Parents themselves also need opportunities to practice these higher-order skills (i.e., interpreting a child’s mental state, reflecting on their own responses, and adapting strategies in

context), which are tightly linked to EF and self-control (e.g., A metacognitive approach to ToM and Self-Control). However, they may feel unequipped, overwhelmed, or unsupported in the face of daily challenges (O’Malley, 2005; Blair and Raver, 2015).

Evidence-based Behavioral Parent Training programs, such as Parent Management Training (Patterson et al., 1968; Patterson, 1974), Helping the Non-compliant Child (Forehand et al., 1980), and The Incredible Years (Webster-Stratton, 2014), have shown the importance of parental training in reducing disruptive behaviors in children and improving parenting skills (Catalá-López et al., 2017; Evans et al., 2018; Aghebati et al., 2014; Bor et al., 2002; De Graaf et al., 2008; Daley et al., 2014; Fabiano et al., 2021). Some of these programs also include explicit strategies for supporting emotional regulation, such as Parent-Child Interaction Therapy with Emotion Coaching (Chronis-Tuscano et al., 2016) and Regulating Emotions Like An eXpert (RELAX) (Breux and Langberg, 2020). However, these programs often rely on in-person sessions and require significant time, investment, and resources that many families struggle to access or sustain. Digital tools (e.g., websites, mobile applications) offer a promising alternative. Mobile apps such as STEPS (Kostyrka-Allchorne et al., 2022), d-PMT (Döpfner et al., 2019, 2021; Döpfner and Schürmann, 2023; Döpfner et al., 2025), UseIt! (Lindhiem et al., 2025), and the ADHD Coping Card App (Păsărelu et al., 2023) translate BPT principles into mobile contexts. However, to our knowledge, these have not specifically targeted the development of self-regulation skills, nor have they been designed with input from families experienced using mobile apps to improve self-regulation.

In this paper, we introduce the design and development of ParentCoach, a mobile application designed to support parents of children with ADHD through lightweight, daily interactions that scaffold both behavioral skills and emotional growth. Content for the app was drawn from a standardized, evidence-based program developed over several decades and most recently updated, implemented, and evaluated in the Positive Assertive Cooperative Kids study (Schuck et al., 2018a,b). The app includes an 80-lesson curriculum organized into 16 weekly themes, co-developed with ADHD experts and grounded in qualitative data from more than 30 families. We discuss design implications that we learned through the analysis of the qualitative data, as well as the ParentCoach design.

Our contributions are:

- A qualitative analysis that surfaces parents’ needs and aspirations for digital tools that support self-regulation skills in children with ADHD.
- Design implications for creating mobile interventions that integrate into the daily realities of parenting, which lead to the design of ParentCoach’s app

2 Related work

2.1 The role of parents in ADHD intervention

Parents play a foundational role in the care and support of children with ADHD, particularly in fostering self-regulation, behavioral management, and EF within the home environment.

¹ Communities differ on person-first (‘children with ADHD’) vs. identity-first (‘ADHD children’) language (e.g., Spiel et al., 2022). To show respect for the different views and preferences in this paper we will adopt person-first language to align with our community partner.

Beyond providing structure and consistency, parents also serve as models of reflection, empathy, and emotional regulation for their children. These capacities draw on ToM (understanding the child's perspective) and Metacognition (monitoring and adjusting one's own responses). By engaging in these processes, parents strengthen their ability to co-regulate with children, anticipate emotional triggers, and adapt strategies across different contexts. Research highlights that fostering ToM and metacognition is closely tied to improvements in social skills, EF, and self-control, underscoring their importance as mechanisms in ADHD interventions (e.g., Victoria and Athanasios, 2023; Sodan and Frith, 2008).

Since the 1960s, several evidence-based Behavioral Parent Training programs have been developed to address disruptive behaviors and strengthen family functioning. Notable examples include Parent Management Training (Patterson et al., 1968; Patterson, 1974), Helping the Noncompliant Child (Forehand et al., 1980), and The Incredible Years (Webster-Stratton, 2014). Behavioral Parent Training remains one of the most well-established interventions for families of school-aged children with ADHD (e.g., Catalá-López et al., 2017; Evans et al., 2018) and has demonstrated significant effectiveness in reducing both ADHD symptoms and externalizing behaviors (e.g., Aghebati et al., 2014; Bor et al., 2002; De Graaf et al., 2008; Daley et al., 2014; Fabiano et al., 2021).

Despite this evidence base, several studies have identified important limitations in traditional Behavioral Parent Training approaches (Marquet-Doleac et al., 2024). These include limited generalization of behavioral improvements beyond the home context and a reliance on parent-reported outcomes rather than independent or blinded assessments (Sonuga-Barke et al., 2018; Zwi et al., 2011). Moreover, emerging research has emphasized the critical role of emotion regulation for both parents and children with ADHD (Laugesen and Grønkjær, 2014). In many cases, emotional dysregulation in parents, driven by stress and frustration, can lead to hostility and coercive interactions, which may further exacerbate emotional and behavioral challenges in children with ADHD (Breux and Langberg, 2020).

In response to these limitations, more holistic parent training models have been proposed that target both behavioral and emotional processes. For instance, the Emotions Program (Shortt et al., 2014; Zargarinejad et al., 2025) has demonstrated improvements in parents' emotion regulation and effortful control when implemented following traditional BPT. Likewise, interventions such as Parent-Child Interaction Therapy with Emotion Coaching (PCIT-EC) for families with preschoolers with ADHD (Chronis-Tuscano et al., 2016) and RELAX for families with adolescents with ADHD (Breux and Langberg, 2020) have shown promise in enhancing emotional awareness, improving conflict resolution skills, and promoting overall family cohesion.

While these emotion-focused programs offer important advances, they are typically time- and resource-intensive, often requiring in-person delivery by professionals trained specifically in these program strategies. Consequently, there remains a significant need for accessible, low-burden, and scalable digital interventions that can support parents in developing both behavioral strategies and emotional skills to effectively navigate the challenges of raising a child with ADHD.

2.2 Digital and mobile tools for parent support

Traditional parent training programs often face barriers to adherence due to parents' competing responsibilities, including work schedules, long commutes, and caregiving demands (Sourander et al., 2016). In response, digital technologies, including web-based platforms and mobile applications, offer promising alternatives for or supplements to delivering parent-focused behavioral interventions. These tools can increase access to evidence-based support by providing regularly updated psychoeducational content, interactive guidance, and greater scheduling flexibility (Florea et al., 2020; Heckendorf et al., 2022). For parents of children with ADHD, digital interventions can serve as effective channels for behavioral support, combining the convenience of mobile delivery with principles from Behavioral Parent Training. These tools typically offer modules that include psychoeducation, behavioral prompts, self-monitoring tools, and skill-building exercises that integrate evidence-based strategies into everyday life. Reviews confirm the broad potential of smartphone apps to transform parenting education (Davis et al., 2017), and more recent evaluations emphasize the importance of understanding parent experience with these tools (Hodson et al., 2024).

E-Parenting Support app, based on the New Forest Parenting Program (Sonuga-Barke et al., 2001). STEPS provides parents with flexible, on-demand access to educational resources aimed at helping them understand the roots of their children's challenging behaviors, build confidence, improve communication, and strengthen the parent-child relationship (Kostyrka-Allchorne et al., 2022). The app emphasizes the importance of praise, self-care, and practical guidance for managing behavior. While evaluation is still ongoing, its design illustrates how digital platforms can deliver structured and theory-driven parenting support. Another intervention, d-PMT (hiToco®), is a mobile app derived from the German THOP (Therapy program for children with hyperkinetic and oppositional problem behavior, their acronym in German *Therapieprogramm für Kinder mit hyperkinetischem und oppositionellem Problemverhalten*) program for children with hyperkinetic and oppositional problem behavior (Döpfner et al., 2019). It integrates content from self-help workbooks (Döpfner et al., 2021; Döpfner and Schürmann, 2023) into five modules that cover psychoeducation, coping with parental challenges (e.g., stress reduction and organizational skills), strengthening family resources, and addressing specific behavior problems. In a recent randomized controlled trial, d-PMT demonstrated significant improvements in parent-rated ADHD and ODD symptoms compared to treatment-as-usual, highlighting its effectiveness and efficiency as a time-saving intervention (Döpfner et al., 2025).

The UseIt! mobile app is another promising intervention for iOS and Android devices (Lindhiem et al., 2025). It includes six integrated features: (1) a troubleshooting guide offering behavior management strategies, (2) a behavior diary, (3) a digital library of parenting skills, (4) a point counter for reward systems, (5) a skills alarm to prompt practice, and (6) a timer for structured routines like time-outs. A forthcoming randomized protocol will examine standalone and coach-guided app versions to evaluate

their feasibility and effectiveness. The ADHD Coping Card App offers yet another example of mobile-based BPT delivery. This app includes structured content across five sections: psychoeducation, activities, journaling, mood monitoring, and a customizable user profile. Preliminary findings suggest strong usability, and parents report high satisfaction with the app's gamified and accessible format (Păsărelu et al., 2023). Evidence from controlled trials is beginning to emerge in the area of digital parent training. Döpfner et al. (2025) demonstrated the efficacy of a mobile-based, self-directed parent management training program, while Lindström et al. (2025) showed that parent training tailored for parents with ADHD can be effectively delivered digitally. These findings reinforce the potential for scalable, evidence-based interventions delivered through mobile devices.

Taken together, these emerging technologies indicate that mobile tools for parent support are both feasible and potentially effective in extending the reach of traditional Behavioral Parent Training. However, many of these interventions are still in early testing phases, and robust evidence for their impact remains limited. Continued research is needed to determine how best to integrate digital platforms into ADHD care in clinically meaningful, scalable, and sustainable ways.

2.3 Digital and mobile tools for ADHD support

Literature reviews on ADHD highlight the potential of digital health interventions (DHIs) to address a wide range of needs. Serious games (Doulou et al., 2025; Chaidi and Drigas, 2022; Chaidi et al., 2024), mobile applications (Doulou et al., 2022), web-based interventions (Khan et al., 2019), and, more recently, AI chatbots (Pergantis et al., 2025) have been explored as tools to support self-regulation (Cibrian et al., 2022), cognition, social-emotional skills, behavior management, academic and organizational skills, medication adherence, vocational development, motor behaviors, and even clinical care (Lakes et al., 2022; Cibrian et al., 2021a). This body of work emphasizes the potential of mobile and wearable platforms to provide support in children's daily lives, with studies also reporting benefits of wearable devices for EF and academic performance (Ayearst et al., 2023).

mHealth applications have been investigated as tools for supporting ADHD, being one of the earliest WHAAM (Web Health Application for ADHD Monitoring; Spachos et al., 2014; Liu et al., 2011), a mobile/web application that enables behavior data collection and visualization to inform clinical intervention. Another example is the MOBERO system (Sonne et al., 2016), and a mHealth app that supports families in establishing structured morning and bedtime routines through tokens and rewards. Beyond traditional mobile tools, more recently, MoodGems, a home-based interactive display that allowed children with ADHD and their families to externalize and reflect on emotions through tangible objects, fostering awareness and communication, and the REMEMO (Stefanidi et al., 2025) revealed how in-the-wild systems can promote emotional expression, regulation, and family dialogue and show the combination of multiple technologies to support different family members.

Concerning commercially available apps, reviews show that most ADHD apps available on the Apple Store and Google Play have not been evaluated in controlled studies (Powell et al., 2017). Similarly, Păsărelu et al. (2020) concluded that systematic evidence is scarce, with limited clinical validation (Lakes et al., 2022).

Overall, digital tools for ADHD span a wide spectrum of technologies and show strong potential to enhance self-regulation, EF, and family routines. However, supporting children requires supporting parents with structured, evidence-informed guidance that builds skills, practice, and strengthens confidence.

3 Methods

We designed the ParentCoach app through two complementary and interrelated phases: (1) qualitative analysis of prior studies with families of children with ADHD, and (2) collaborative design and refinement of the app curriculum with clinical experts.

3.1 Data set

We conducted an in-depth secondary analysis of qualitative data sets from six prior studies [S1–S6] (Cibrian et al., 2020 [S1]; Cibrian et al., 2021b [S2]; Ankrah et al., 2023 [S3]; Silva et al., 2023 [S4]; Silva et al., 2024 [S5]; Silva et al., Under Review² [S6]), which involved over 30 families of children with ADHD who had used mobile health (mHealth) tools to support self-regulation. All studies were part of a protocol (IRB # HS20184664) approved by the University of California, Irvine Institutional Review Board, with a Reliance established with the University of California, Riverside, and Chapman University. All adult participants provided informed consent, and children provided assent. These studies comprised semi-structured interviews and focus groups centered on everyday routines, parenting practices, and technology use.

Across the six studies, we engaged with 66 children with ADHD (ages 8–15), 66 parents, 9 school staff, and at least 10 siblings without ADHD (Table 1). All participants lived in the US and spoke English. S1–S3 were exclusively recruited from a non-public school specialized in ADHD, and S4–S6 were home deployments. Some of the families included single- and multiple-parents household; one or both caregivers participated depending on availability. Given that males are more likely to meet the diagnostic criteria of ADHD than females (e.g., Ramtekhar et al., 2010; Mowlem et al., 2019; Willcutt, 2012), most of the children with ADHD participants (83%) were self-identified as male.

In total, we analyzed 75 transcripts encompassing children, parents, and teachers. Because our research questions targeted parent perspectives, the findings mainly highlight parent quotations. To protect confidentiality, quotations from individual interviews are attributed using pseudonyms of the form P0##–S# (e.g., P012–S3), where “P” indicates the parent identifier and “S” the source study. For focus-group excerpts where individual speakers could not be uniquely identified, we use a group-level

² Silva, L. M., Min, A., Stefanidi, E., Cibrian, F. L., Beltran, J. A., Zeiler, C., et al. (Under Review). *FamilyBloom: Understanding Ecologies of Collaboration in Family-Centered Health Tracking* (Submitted to CHI 2026).

TABLE 1 Summary of demographics across studies.

Study	Setting	ADHD children (F/M)	Age (y)	Parents (F/M)	Others (participant; F/M; age)	Notes
S1 (Cibrian et al., 2020)	Non-public school specializing in ADHD	24 (3/21)	10–13	4 (2/2)	9 (Staff)	Five 1 h workshops; 1 FG with staff; 1 FG with 3 parents + 1 parent interviews.
S2* (Cibrian et al., 2021b) S3* (Ankrah et al., 2023)	Home deployment recruited from Nonpublic school specializing in ADHD	10 (0/10)	10–15	10 (–)		10 families (Independent interview with parents and children)
S4 (Silva et al., 2023)	Home deployment	10 (1/9)	8–15	17 (8/9)		10 families; 3 single-parent households
S5 (Silva et al., 2024)	Home deployment, Virtual co-design	8 (1/7)	8–11	15 (7/8)		8 families; 3 co-design sessions/family. Some siblings without ADHD participated
S6 (Silva et al., under review)	Home deployment	14 (6/8)	8–12	20 (9/11)	10 (Siblings 7/3-ages 6–13)	12 families; Siblings without ADHD participated
Total		66 (11/55)	8–15	66	10 Siblings; 9 Staff	

*S2 and S3 shared the same participant pool but has distinct qualitative datasets. Parents' gender was not collected. FG, focus group.

pseudonym of FG##–S# (e.g., FG01–S1), denoting the focus group and source study rather than a specific parent.

3.2 Qualitative data analysis

The qualitative data analysis was guided by the research question: *What design characteristics should a parent mobile app include to support self-regulation in children with ADHD?* To analyze the transcripts, the research team began by independently manually conducting open coding on a randomly selected interview from each of the source studies (S1–S6) to generate an initial draft of the codebook.

Then, we employed techniques that support human qualitative analysis with Large Language Models (LLMs), such as those presented in Collaborative Qualitative Analysis (e.g., Gao et al., 2023, 2024) and the Augmenting Thematic Analysis using LLMs (ATA-LLMs) software (Beltran Verdugo et al., 2025). Given the size of our data set (~75 transcripts across at least five cohorts), ATA-LLM was used to assist (not automate) data handling. It was configured exclusively for excerpts' labeling. The excerpts persisted unchanged and identical to the original interviews. The assigned labels corresponded to one or more codes retrieved from the predefined codebook, which was developed by the research team through analysis of a subsample of interviews and team agreement.

The research team then (1) reviewed and checked the ATA-LLM groups, (2) corrected mislabels and updated the codebook where needed, and (3) iteratively manually refined the codebook through collaborative discussions until we got a final codebook. After reaching consensus on a final codebook, we applied it across the whole dataset using ATA-LLM to identify and cluster significant quotes by code and theme. These clusters were then analyzed by the research team to synthesize key themes and select representative quotes. The representative quotes were then manually searched in their transcripts to double-check they were accurate. All representative quotes reported in the paper were manually verified against the original transcripts.

3.3 Co-Development of app curriculum

Building on insights from the qualitative analysis, we co-developed the app's curriculum through a participatory and iterative process with ADHD experts, including child psychologists and behavioral specialists. This collaboration ensured that the content was both clinically relevant and developmentally appropriate. Experts reviewed lesson topics, content framing, and interactive elements, contributing to multiple rounds of revision to align the app's structure and tone with the needs of both parents and children.

4 Results

Our analysis of interviews and focus groups with parents of children with ADHD uncovers three themes that inform the design of a parent application: (1) Supporting Parents in Contexts of Stress and Overload, (2) Providing Guidance on Effective Parent-Child Communication and (3) Scaffolding Children's Self-Regulation and Executive Functioning. These themes highlight both the challenges families face and their aspirations for how digital tools can meaningfully support daily routines, emotional connection, and skill-building.

4.1 Supporting parents in contexts of stress and overload

Parents consistently emphasized the importance of designing tools that respect their limited time, cognitive bandwidth, and emotional availability. Many described feeling overwhelmed by the demands of parenting, with one parent explaining, *"As a mom all the time, we don't ever have time to sit down."* P008–S6. Others referenced emotional fatigue and the need for support rather than added complexity.

Micro-interactions and Minimal Burden. Across interviews, brevity and clarity emerged as key values. Parents preferred “mini-lessons” that could be completed in 1–5 min: “*Not super long [text].*” P003–S4. They appreciated features that made support feel lightweight and integrated: “*Maybe you need [it] at the beginning, like these reminders, and then you learn.*” FG2–S1. Suggestions included short pop-up reminders, simple tracking tools, and flexible interfaces allowing engagement without requiring prolonged focus or decision-making.

Multiple content modalities. Parents emphasized that having multiple content formats could help them engage in the content (e.g., short videos, readable text, quick questions, visual summaries, and even audio or paper). They expressed: “*Oh yeah, the videos would be very helpful.*” P001–S2; “*you can give it multiple choice... [or we] can type response...*” P005–S5; and “*Yeah, just having that visual to, I’m a very visual person.*” P008–S6. These quotes point to a need for multimodal materials with concise copy, brief question prompts, and at-a-glance visuals, complemented by optional audio and printable resources.

Support for Reflection Without Pressure. Reflection features, such as journaling or end-of-day reviews, were seen as valuable for processing emotional experiences. Parents appreciated the idea of a private, nonjudgmental space to revisit the day: “*It’s like your own personal journal. No one but you has access.*” P001–S2. These practices helped parents contextualize moments and prepare for future interactions: “*See and reflect about...*” FG2–S1.

Overall, our results show that parents need apps that are easy to access, non-disruptive, and support emotional grounding through micro-interactions, flexible formats, and optional reflection moments.

4.2 Providing guidance on effective parent-child communication

Research participants described parenting as an evolving journey requiring continual learning, mindset shifts, and shared growth with their children. They pursued apps that could help them not just manage behavior, but also improve how they relate, communicate, and model emotional intelligence.

Shared Learning and Modeling. Many parents viewed themselves as co-learners with their children on how to do better with ADHD. One noted, “*I think it’s better if we both learn how to do it.*” P001–S2. Others shared how collaborative activities fostered connection: “*We were doing exercises in our garage... and we would do it together every day.*” P005–S2. These shared routines were seen as opportunities for connection, with children often expressing enthusiasm to participate.

Communication Strategies and Language Awareness. Parents were eager to improve their communication in how they speak with children and how they model emotions using supportive language. Praise was seen as a powerful but often underutilized strategy. Parents emphasized the value of simple affirmations like “*You did really great today.*” P020–S5. Others reflected on how small phrasing choices can be heard as criticism. As one parent noted: “*Saying [to my child]: ‘well, you’re not helping me,’ I didn’t know what that meant [to him...], like you know, I think anybody can*

say, ‘you’re not helping me’ [and] it’s not necessarily a really negative thing, but he took it as a negative thing.” P004–S5. These results show the need for concrete guidance, brief praise scripts, alternative phrasings, and language prompts to help parents practice effective, supportive communication.

Facilitating Emotion-Focused Conversations. Some parents expressed communication challenges, especially when children were hesitant to express emotions verbally. They described a need for conversation starters or mood-sharing features that could prompt gentle engagement: “*Let’s go, let’s go on your phone or whatever it is, and see how your day went... Oh, look at nine o’clock, it looks like you’re... looks like you’re frustrated, what do you think happened?*” P004–S5. These insights show that digital tools could provide an example of how to praise and provide more thoughtful responses in difficult moments, as well as help initiate discussions that might not otherwise happen.

Overall, parents want apps that not only offer instructional content, especially around communication, but also help initiate reflective dialogue with children.

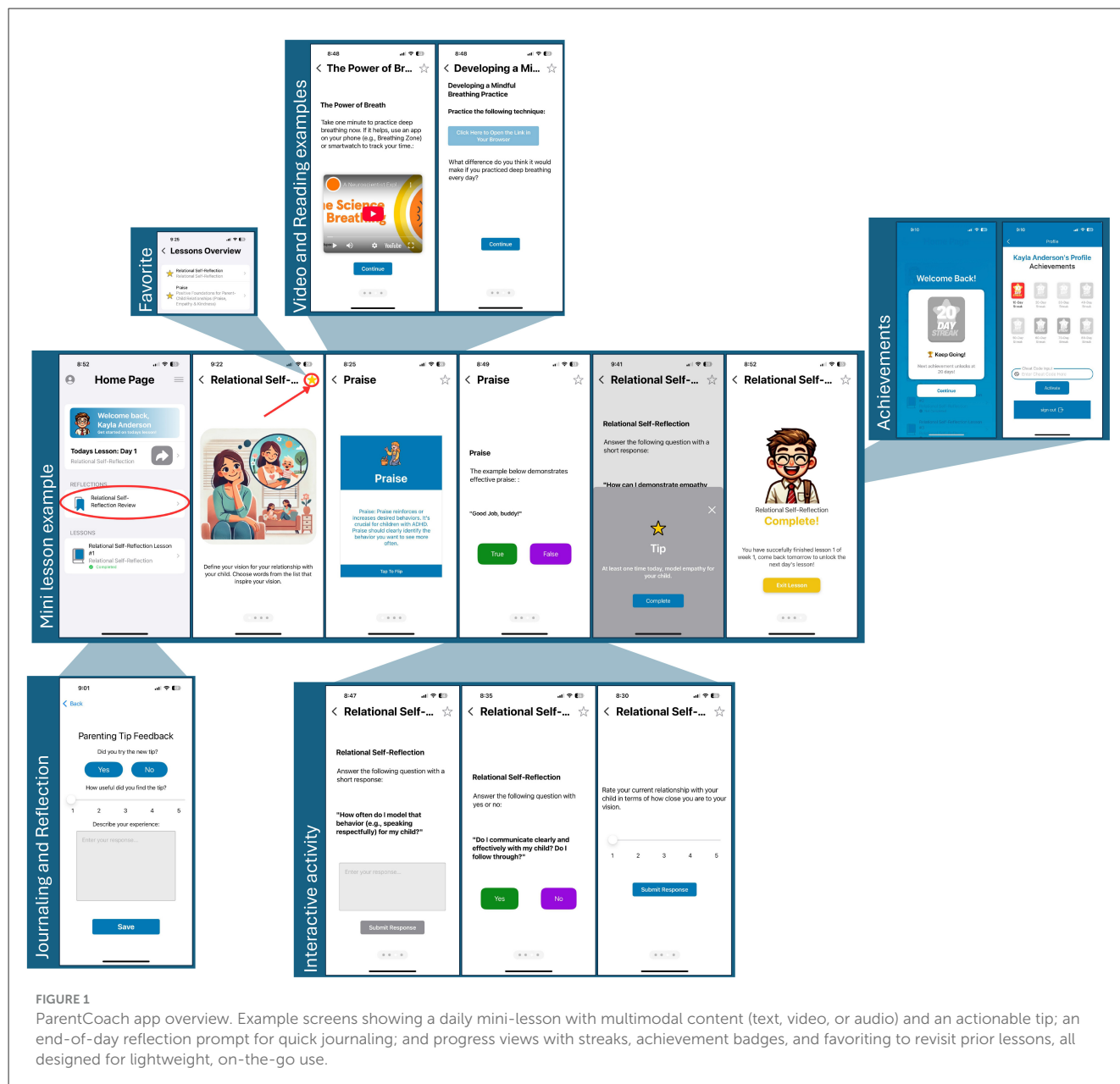
4.3 Scaffolding children’s self-regulation and executive functioning

Parents saw value in an app that could help them support their children build key self-regulation skills, particularly around emotion management, organization, and goal tracking.

Executive Functions. Parents frequently described difficulties their children experience with executive-function skills, such as organization, task initiation, time management, working memory, and self-monitoring. Many described everyday difficulties, especially sustaining attention and remembering multistep routines: “*‘Hey, you have a class coming up.’ He has a very difficult time staying on, remembering what to do... I thought it would be very helpful for him to remind him*” P001–S2. However, few articulated concrete strategies, highlighting the need for having content and strategies to help them teach and practice EF supports in context.

Management of Emotions. Emotion regulation was another prominent focus. Parents wanted practical, supportive techniques, such as calming prompts, breathing exercises, or guided visuals, that could help de-escalate challenging moments: “*Do [breathing] about one more time and if he doesn’t feel calm, he does it until he feels calm.*” P004–S3. These strategies were often described as being developmentally appropriate and respectful of children’s individual needs, especially when verbal processing was not accessible: “*Maybe on his own it could be a guide.*” P20–S5.

Proper Reward System. Many parents were experimenting with a token-reward system but asked for a clearer, fairer structure: As one parent noted, “*[Other families] offer electronics as a reward... but I don’t want that to be the motivation at home... it’s hard to think of daily rewards that aren’t electronic... You guys [researchers] giving ideas would be... helpful*” P020–S5. Approaches ranged from simple “gem jars” to point system, yet families described calibration problems, “*So we have two ways we’re tracking, from an adult point of view, and also from [the child] point of view too... Right now, the points are also subjective...*” FG005–S1, in both cases, the “reward” or values are given depending on



the context (e.g., same behavior might earn different points on different days). Together, these insights provide guidance on how this strategy could support their children at home.

Establishing Consistency and Structure. Parents expressed a strong interest in receiving guidance on how to set appropriate consequences and stay consistent with expectations, areas where they felt they needed more support, as one parent expressed: “I want to look to make sure that he’s like... is he consistently not doing a task we’re giving him?” P020–S5. Others emphasized that both reminders and routines needed to happen more reliably, saying, “The reminders definitely need to be more consistent,” P008–S6, and “every day it’s been more even for them.” P006–S6. Some parents voiced uncertainty about how to track or support attaining goals throughout the day, with one sharing, “We don’t... they don’t talk about the goals throughout the day... I don’t know how much they’re really trying.” P006–S6. These insights highlight the importance of

designing tools that not only provide reminders but also embed structures for accountability, encourage daily goal reflection, and offer clear strategies for follow-through.

Overall, parents expressed a desire to learn more about supporting EF, goal setting, and consistent, clear expectations for behaviors.

5 ParentCoach app

5.1 Description of the app structure

We developed ParentCoach (Figure 1), a mobile application that supports daily parenting practices through brief lessons, reflections, and progress tracking. The app was designed to accommodate parents’ constraints while fostering long-term

TABLE 2 Matching qualitative themes to ParentCoach features.

Qualitative theme	Corresponding app feature	Design goal
Supporting parents in contexts of stress and overload	• Micro-lessons (≤5 min) • Multimodal formats (text/audio/video) • Daily reflection	Reduce cognitive load, promote lightweight interaction
Designing for parent communication learning	• Language prompts • Praise modeling	Strengthen empathy and effective parenting communication
Scaffolding children's self-regulation	• Teaching token system tracker • Teaching emotional regulation	Promote executive function and emotion regulation skills

growth in both caregivers and their children. ParentCoach provides micro-learning lessons and emotional reflection time. The app supports parent growth, relational reflection, and scaffolding of children’s self-regulation (Table 2; Figure 1).

The core of the app experience is a daily, “mini-lesson” designed to introduce and increase effective parenting strategies. Each lesson consists of a short instructional sequence (delivered through text, video, or audio) followed by an interactive activity, such as: True/False or Yes/No questions, Rating scales, Short open-ended responses, Embedded videos, or reading content, followed by an actionable tip. At the end of the day, users are prompted to engage in a reflection so that parents can record their observations.

To support motivation, ParentCoach incorporates progressive feedback (e.g., streaks, achievement badges, and favoriting) and lets parents revisit previous lessons. ParentCoach is designed for asynchronous engagement. On any day the app is opened, a new lesson unlocks; there are no restrictions if there is a missing day. This non-prescriptive model supports fluctuating routines, stress levels, and availability, reflecting the real-world caregiving conditions. The app supports multiple content formats (reading, listening, watching), offering inclusive access across different use scenarios.

5.2 App content

The ParentCoach app delivers an 80-lesson curriculum organized into 16 weekly themes, each focused on a specific domain relevant to parenting children with ADHD (Figure 2). While the structure encourages users to complete five short lessons per week, the app is designed to be flexible. Parents can engage with the content at their own pace, whether daily, weekly, or sporadically, so if a week’s lessons are not completed, users can simply continue when ready. Those who engage daily can finish in approximately 16 weeks, while others may take longer based on their availability and needs.

The curriculum begins with foundational modules such as *Relational Self-Reflection*, where parents are invited to define their parenting vision and take steps toward building stronger, more empathic relationships with their children. This is followed by modules such as *Positive Foundations for Parent-Child*



FIGURE 2 ParentCoach curriculum overview. The 80-lesson curriculum is organized into 16 weekly themes (e.g., Relational Self-Reflection; Positive Foundations for Parent-Child Relationships; Managing Stress; Modeling Emotional Regulation; Effective Parent-Child.

Relationships, which introduces labeled praise and the 5:1 praise-to-correction ratio to increase desired behaviors.

Subsequent weeks target emotional skill-building, such as *Managing Stress* and *Modeling Emotional Regulation*, offering breathing exercises, mindfulness strategies, and self-monitoring techniques. Communication-focused themes like *Responding Instead of Reacting*, *Effective Parent-Child Communication I–III*, and *Communicating Directions Effectively and Following Through* provide concrete tools to replace reactive parenting with intentional, supportive responses.

In later stages, parents explore behavioral systems, including *Token Systems* and *Reinforcement & Punishment*, using token economies and reward menus tailored to their child’s evolving preferences. These systems are framed as proactive rather than punitive, emphasizing skill-building over behavior suppression.

The curriculum culminates with *Relational Self-Reflection II & III*, where parents revisit their original goals, assess growth, and refine their approaches, fostering long-term sustainability. Across

all lessons, the curriculum prioritizes clarity, brevity, and practical relevance, making it especially suitable for parents navigating stress, overload, and limited time.

6 Discussion

Our findings suggested the following design considerations for mobile applications intended to support parents in co-regulation with their children. These considerations reflect the emotional, cognitive, and logistical realities parents face in daily life and offer guidance for designing tools that promote co-regulation, EF, and shared growth within families. These considerations are grounded in parents' lived experiences of emotional stress, time constraints, and ongoing learning, and align with prior work on behavior change design, co-regulation, and human-centered computing.

6.1 Design considerations

6.1.1 Design for simplicity and flexibility

Parents repeatedly highlighted the need for mobile tools that are fast, easy to access, and minimally disruptive. They described using apps during fragmented moments, often while multitasking, emotionally depleted, or under time pressure. Micro-interactions, brief content units under 5 min, enabled them to engage meaningfully without cognitive overload. This aligns with work in persuasive technology and mobile health that emphasizes the value of just-in-time, low-burden interactions (Choe et al., 2014; Nahum-Shani et al., 2016; Oinas-Kukkonen and Harjumaa, 2018). Supporting diverse content modalities (text, audio, video) can further accommodate different learning preferences and situational needs. Simplicity in interface and instructional design is critical to minimize abandonment (Klasnja and Pratt, 2012).

6.1.2 Support emotional awareness and reflection

Emotional self-awareness emerged as a critical parental need. Parents valued journaling, check-ins, and private reflection features that supported emotional regulation, capacities foundational to co-regulation with children, as well as strengthened children and parents' metacognitive processes (Eisenberg et al., 2002; Morris et al., 2007). Tools that normalize and scaffold emotional insight can help parents interrupt reactive cycles and respond with intentionality (Smit et al., 2022). Reflective features should be private and nonjudgmental, encouraging self-compassion and relational growth. Teaching is also emotionally intelligent in the design of mHealth applications, which has been shown to improve parental mindfulness and reduce conflict (Shin et al., 2021). This can foster a culture of reflection and self-awareness that supports long-term relational growth.

6.1.3 Scaffold executive function and habit formation

Parents expressed uncertainty in how to help children build executive function skills such as planning, time management, and follow-through, skills commonly requiring extra support in children with ADHD (Barkley, 2012). Supporting EF also

requires strengthening parents' own cognitive capacities. Apps that include planners, task checklists, and goal-tracking can increase adaptive habit formation (Gkora and Drigas, 2024; Cibrian et al., 2020). Token systems were also valued, but needed to be clear and consistent. This could also encourage perspective-taking, a facet of ToM (Macheta et al., 2023), which can help parents anticipate their child's needs. These findings align with evidence supporting structured, collaborative positive reinforcement systems for increasing desired behaviors (Fabiano et al., 2009). Therefore, mobile apps should support the teaching and learning of these strategies so that parents feel comfortable using the apps and putting the strategy into practice.

6.1.4 Foster co-engagement and modeling

Parents reported greater success when learning and practicing alongside their children. This reflects the importance of behavior modeling and shared routines (Rogoff, 2003). Technologies should emphasize how to provide modeling, co-engagement opportunities, and collaborative routines to foster mutual accountability and connection (Hiniker et al., 2016; Yarosh et al., 2009). This learning could encourage parent-child interaction and transform everyday moments into opportunities for connection, learning, and growth.

6.1.5 Center parent learning and growth

Parents saw themselves as learners, not just behavior managers. They sought growth in communication, regulation, and understanding. This highlights the value of centering parent learning with mini-courses, insights, and supportive reflection, consistent with reflective parenting and adult learning theory (Mezirow, 1991; Sanders et al., 2014). Digital tools should position parents as empowered and evolving individuals navigating complex situations. Short courses, reflective prompts, and trend-based insights can help parents deepen their understanding over time without feeling overwhelmed. Design should treat parents not just as facilitators of their child's progress, but as learners in their own right, individuals engaged in an evolving process of growth, reflection, and change.

6.2 Comparison of ParentCoach with ADHD and parental apps

In terms of structure, ParentCoach offers an evidence-based curriculum that builds skills gradually through daily micro-lessons, practice tasks, and reflection prompts. While it shares a modular approach with apps such as hiToco® (Döpfner et al., 2019), UseIt! (Lindhiem et al., 2025), The ADHD Coping Card App (Păsărelu et al., 2023) and STEPS (Kostyrka-Allchorne et al., 2022). ParentCoach differentiates itself by pacing delivery day-by-day rather than presenting all modules at once. This design aims to avoid overwhelming parents with too much content and too many demands on their time. ParentCoach also incorporates a journaling section, similar to the ADHD Coping Card App (Păsărelu et al., 2023), but embeds it into a reflective cycle tied to each lesson. Notably, many commercial ADHD-labeled apps in the Apple App Store/Google Play emphasize gamified features (timers, reward

charts, attention games) with scarce clinical validation (Powell et al., 2017; Păsărelu et al., 2020; Lakes et al., 2022).

In terms of content, ParentCoach expands on existing tools by including modules dedicated to self-regulation, particularly EF and token systems, which are not consistently addressed elsewhere. Like UseIt! (Lindhiem et al., 2025), it provides detailed strategies for problem situations, but ParentCoach embeds these strategies within communication and emotional regulation lessons. Unlike hiToco[®] (Döpfner et al., 2019), which delivers comprehensive psychoeducation about ADHD's causes and course, ParentCoach focuses less on etiology and more on relationship-building and practical, needs-based strategies, an approach aligned with STEPS (Kostyrka-Allchorne et al., 2022). In contrast, many commercial apps prioritize engagement over parent skill acquisition (Powell et al., 2017; Păsărelu et al., 2020).

Finally, in terms of intended users, ParentCoach is explicitly a parent-centered intervention, designed to benefit children indirectly through direct support for parents. This contrasts with child and family-oriented systems such as MOBERO (Sonne et al., 2016), MoodGems (Stefanidi et al., 2024), and REMEMO (Stefanidi et al., 2025), which directly involve both children and parents in support of children's needs. A notable exception is the work of Ibrahim et al. (2025) that explored digitally delivered reflective questions for parents to reflect on children's emotions. To complement this focus, ParentCoach is designed to be used in tandem with a family-facing self-regulation app (Herrera et al., 2024), thereby offering coordinated but distinct pathways for parents and children.

7 Limitations and future work

Our findings are grounded in qualitative data and co-design with experts. Although qualitative studies commonly reach acceptable saturation of information with relatively small samples (often ~4–50 interviews/focus groups; e.g., Hennink and Kaiser, 2022; Ahmed, 2025), our secondary analysis draws on >75 transcripts across at least five cohorts (see Table 1). While this may increase transferability, the data were collected for the original studies rather than for this topic. Therefore, the themes emerged opportunistically from everyday routines rather than trying to specifically answer the research questions of this paper. Currently, the qualitative themes presented in this paper reflect caregiver perspectives and design. We also acknowledge that our participant sample may not represent the full spectrum of families with children with ADHD, including non-English speakers, single-parent households, or those with limited digital access.

Another limitation is that our current paper does not cover the evaluation of the app's impact on families. Currently, we are running a randomized controlled trial (Herrera et al., 2024) where more than 60 families will use the ParentCoach app, we are collecting pre- and post-assessments related to ADHD behaviors, and we are conducting semi-structured interviews with the families to evaluate the acceptability and effectiveness of ParentCoach.

Moreover, in future work, we plan to translate and study ParentCoach into additional languages and we will broaden recruitment across languages (e.g., Spanish/English), regions, school types, and family dynamics. We also plan to refine

personalization features, explore integration with wearable or school-based systems, and examine how such tools can support broader caregiver ecosystems, including educators and clinicians.

8 Conclusion

In this paper, we introduced the design and development process for ParentCoach, a mobile application co-designed with experts and grounded in the lived experiences of families of children with ADHD. Our work responds to a need for designing accessible and evidence-based tools that help parents scaffold their children's self-regulation and support their own growth and caregiving confidence.

Through qualitative analysis of interviews and focus groups with over 30 families, we identified themes reflecting the challenges and aspirations of parenting a child with ADHD: the need for lightweight, flexible tools; support for emotional reflection and communication; and practical strategies for improving EF. These insights directly shaped the design of ParentCoach's 80-lesson curriculum and interactive features. The resulting app prioritizes micro-learning, emotional scaffolding, and co-engagement, delivering content that can flexibly integrate into parents' daily lives.

Our findings highlight the potential for digital tools to extend beyond behavior management and instead foster mutual learning, relational reflection, and long-term habit formation between parents and children. ParentCoach builds on addressing gaps in emotional regulation and self-reflection while responding to the time, cognitive, and emotional constraints of real-world parenting. We are currently conducting a randomized controlled trial (Herrera et al., 2024) where more than 60 families will use the ParentCoach app, which will provide empirical, qualitative, and quantitative data about the usefulness of the app.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: Interested researchers may contact the authors who may share data with researchers who meet the criteria for access to qualitative data. Requests to access these datasets should be directed to FC, cibrian@chapman.edu.

Ethics statement

This secondary analysis used only de-identified interview and focus-group transcripts from prior IRB-approved studies (UCI IRB #HS20184664, with reliance agreements with UCR and Chapman). The analysis team had no access to direct identifiers or any re-identification code/key, performed no linkage to other datasets, and did not re-contact participants. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements.

Author contributions

FC: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. NH: Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing. JB: Data curation, Formal analysis, Methodology, Software, Supervision, Validation, Writing – review & editing. LS: Data curation, Investigation, Resources, Software, Validation, Writing – review & editing. MP: Conceptualization, Investigation, Project administration, Supervision, Writing – review & editing. KA: Software, Visualization, Writing – review & editing. CZ: Conceptualization, Project administration, Supervision, Writing – review & editing. VA: Conceptualization, Methodology, Visualization, Writing – review & editing. LR: Software, Validation, Writing – review & editing. DL: Formal analysis, Methodology, Writing – review & editing. SS: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Writing – review & editing. KL: Conceptualization, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Generative AI statement

The author(s) declare that Gen AI was used in the creation of this manuscript. To analyze the transcripts, we began by independently conducting open coding on a randomly selected interview from each of the original studies to generate an initial draft of the codebook. Then, we employed techniques from Collaborative Qualitative Analysis supported by Large Language Models (LLMs) following recent approaches (e.g., Gao et al., 2024, 2023) and using the ATA-LLM software (Beltran Verdugo et al., 2025). With ATA-LLM, we code a subset of interviews with the initial codebook and iteratively refine the codes through collaborative discussion. We also use LLM to check grammar and typos.

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