

Parent and Child Perspectives of Engagement in an Online Intervention to Promote Self-Regulation Skills for Healthy Eating: A Qualitative Study

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e da **Professora Doutora Paula Magalhães**

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"Un vainqueur est un rêveur qui n'abandonne jamais » Nelson Mandela.

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Perspetivas dos pais e dos filhos sobre o envolvimento numa intervenção online para promover competências de autorregulação para uma alimentação saudável: Um estudo qualitativo

Resumo

Uma alimentação saudável é fundamental para a nossa saúde. Nas últimas décadas, vários estudos têm sido realizados para promover uma alimentação saudável, como as intervenções online. Poucos estudos analisaram os facilitadores e barreiras ao envolvimento de crianças e pais em intervenções dirigidas a crianças. Este estudo tem como objetivo explorar as perspetivas de envolvimento das crianças e dos pais numa intervenção online para promover a alimentação saudável das crianças através da autorregulação. Nesta intervenção, os pais foram convidados a participar e a colaborar na intervenção online dos seus filhos. Foram realizadas entrevistas semiestruturadas com as crianças (N=26) e respetivos pais (N=23) no final da intervenção. As entrevistas incluíram tópicos como as expectativas em relação ao programa, o envolvimento das crianças, o envolvimento dos pais na intervenção on-line e as barreiras e facilitadores do seu envolvimento na intervenção. Os dados foram analisados através dos seis passos da análise de conteúdo e destacaram três temas principais (envolvimento cognitivo, emocional e comportamental). Os resultados revelaram 13 facilitadores e seis barreiras ao envolvimento das crianças e dos pais. Em conclusão, é importante considerar os diferentes facilitadores e barreiras para contribuir para uma melhor adesão e envolvimento dos participantes.

Palavra-chave: Crianças; Pais; Envolvimento; Facilitador; Barreiras; Alimentação Saudável; Autorregulação

Parent and child perspectives of engagement in an online intervention to promote self-regulation skills for healthy eating: A qualitative study

Abstract

Following a healthy diet is fundamental to our health. Over the last decades, several studies have been conducted to promote healthy eating, such as online interventions. Still, only a few studies have analyzed the facilitators and barriers to the engagement of children and parents in interventions targeting children. This study aims to explore the perspectives of engagement of children and parents in an online intervention to promote children's healthy eating through self-regulation. In this intervention, parents were invited to participate and collaborate in their children's online intervention. Semi-structured interviews were conducted with children (N=26) and respective parents (N=23) at the end of the intervention. Interviews included topics such as expectations regarding the program, children's engagement, parent's engagement in the on-line intervention, and barriers and facilitators of their engagement in the intervention. Data were analyzed through the six steps of content analysis and highlighted three main themes (cognitive, emotional, and behavioral engagement). Results showed 13 facilitators and 6 barriers to child and parent engagement. In conclusion, it is important to consider the different facilitators and barriers to contribute to a better adherence and engagement of the participants.

Key-word: Children; Parent; Engagement; Facilitator; Barriers; Healthy Eating; Self-Regulation

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Parent and child perspectives of engagement in an online intervention to promote self-regulation skills for healthy eating: A qualitative study

A healthy diet plays a fundamental role in the proper functioning of the individual. In fact, adopting healthy eating behaviors helps prevent certain diseases and increases the quality of life (Cecchini et al., 2010). Due to its importance, many interventions to promote healthy eating habits have been developed and implemented (Jansen & Schyns, 2022), including those with children (García-Muñoz et al., 2022). The most common pattern is to deliver face-to-face interventions, but delivering these programs is costly, due to various difficulties; for example, difficulties related to the retention of participants or report recruitment (Mâsse et al., 2020). Recent advances in technology have shown mHealth as a promising approach likely to overcome the difficulties found (De Sousa & al., 2022). mHealth has been found a viable alternative (Masse & Trials, 2020) and more economical, appealing, and accessible (Brigden et al., 2020) than face-to-face interventions for behavior change, particularly those conducted with children. However, despite their benefits, online interventions pose challenges that can compromise their effectiveness, namely the ability to enroll individuals and maintain their engagement in interventions (Melville et al., 2010). We believe that exploring the enablers and barriers to engagement in online interventions for children is crucial to inform the development of future interventions.

Facilitators and barriers to engaging in online interventions to promote healthy eating

Over the years, some online interventions have been developed to promote healthy eating among children (Bell et al., 2019; García-Muñoz et al., 2022). The online format has shown to be able to help overcome barriers present in face-to-face interventions, such as availability, cost, and transportation (Jones et al., 2011), and family time constraints (Drapeau et al., 2022). Moreover, data show that participation in an online prevention program developed in the school context produces greater adherence than participation in other contexts (Neil et al., 2009). However, conducting interventions online poses challenges to their effectiveness, namely those related to efforts to keep participants engaged in the intervention (Ryan et al., 2017). For example, Mâsse et al., (2020) found that children with engagement in an intervention show an improvement in their eating habits when compared to children with less engagement. In short, a few investigations were carried out on the aspects likely to facilitate engagement in online interventions to promote healthy eating (e.g., visual design, navigation, content, or the integration of interactive and gamification elements that seem to be fundamental tools for the engagement of participants in an online intervention (Huang et al., 2019;

Kuosmanen et al., 2018; Nitsch et al., 2019). For example, Goodyear et al. (2021) found that the use of smartphones or other electronic devices tend to improve children's engagement in the intervention, while long texts tend to reduce their engagement in the intervention (Schaarup et al., 2015). Other important aspects that contribute to engagement in an intervention are fun intervention and inquisitiveness (Nitsch et al., 2016). In addition, has been demonstrated that goal setting influences participants by directing attention to goal-relevant activities, increasing persistence, and promoting goal-relevant strategies (Locke & Latham, 2002).

Extant literature has notably showed the importance of external support to improve engagement in the intervention (Aardoom et al., 2013). For example, the use of "daily reminders, motivational pop-ups, and tips and advice", tend to increase participants' engagement in the program. Moreover, previous research highlighted features of online dietary interventions likely to improve their effectiveness such as personalized feedback (Alexander et al., 2010; Elbert et al., 2016), interaction between participants and researchers, and the duration of the intervention (Cullen et al., 2017; Murimi et al., 2019). In addition, research highlighting that students' social presence is a crucial component (Garrison et al., 2001), and that communication is an important factor to facilitate community building (Aldemir et al., 2018). Moreover, the direct or indirect participation of parents in an online intervention aimed at their children also seems to be a crucial aspect of their engagement in the intervention. For example, previous research (e.g., Mâsse et al., 2020; Rose et al., 2018) examined differences in intervention effectiveness related to parents' participation. Data show an increase in the consumption of healthier food by children (Masse & Trials, 2020) and that children tended to improve their health behaviors when parents participate in the intervention. In contrast when parents are not engaged in the intervention, children are likely to show a low improvement in behaviors. In addition, previous research shows that interventions seem to be more successful when parents are engaged (Hammersley et al., 2021; Niemeier et al., 2012b) and that high parental engagement is expected to increase children's engagement in the intervention (Masse et al., 2020). Moreover, Khan et al. (2021) showed that many parents highlighted that they were the main motivational force behind their children's engagement. Finally, extant research has also highlighted aspects acting as potential barriers to parental engagement in the intervention, such as its duration, the time between sessions (Cranney et al., 2023), and also the lack of time to attend the sessions or the schedules not adjusted to parents' professional lives (Jones et al., 2023; Zahry & Ling, 2020).

Theoretical framework

The literature on engagement is vast and the concept has been addressed in many different ways (Appleton et al., 2008). The present study follows the theoretical framework of Fredricks, Blumenfeld & Paris (2004) on school engagement. School engagement encompasses students' active participation and engagement in various educational activities, such as classes and extracurricular activities. It is a comprehensive concept that seeks to understand students' feelings, behaviors, and thoughts (Azevedo, Rosario, Núñez, et al., 2023). School engagement appears to be a key aspect in students' life, being an important predictor of success (Azevedo, Rosário, Núñez, et al., 2023). For example, literature has shown that less engaged students have more academic difficulties than more engaged students (e.g., Rosario et al., 2017a). In addition, student engagement predicts student performance and dropout rates (e.g., Fredricks et al., 2004; Pino-James et al., 2019). The flexible aspects of students' motivation and behavior are key to promoting learning and well-being in the school environment (Christenson & Reschly, 2012). Fredricks et al. (2004) framework presents school engagement as holding a multidimensional nature with three dimensions: cognitive, emotional, and behavioral engagement. Cognitive engagement concerns students' investment and efforts in tasks, the capacity for self-regulation and the value attributed to the learning process (Fredricks et al., 2004). On the other hand, emotional engagement refers to the students' sense of belonging. Involves emotional satisfaction and affective connection with academic activities, colleagues, and teachers (Fredricks et al., 2004). Finally, behavioral engagement refers to the active and committed participation of students in school activities and tasks, such as doing homework, attending classes. It implies effort, attention, persistence, discipline, and compliance with the expectations and rules established (Fredricks et al., 2004).

Purpose of the study

The literature particularly aimed at adults' behaviors has indicated some of the facilitators and barriers to engaging in online interventions. Literature on facilitators and barriers to engagement in online interventions for healthy eating among children is limited. However, previous research shows that parental engagement seems to be an important facilitating factor for children's engagement. These data ground the need to conduct interventions promoting and instigating the engagement of parents in the intervention, even when they are not the target of the intervention. To this aim, along with the children's perspective, we need to further explore the parents' perspective on facilitators and barriers to their engagement in their children's programs and activities healthy eating related. All considered, the

present study aimed to identify the facilitators and barriers to the engagement of children and parents in an online intervention aimed at children, but in which parents were regularly invited to participate. The following research question guided this study: “What are the facilitators and barriers to the engagement of children and parents in an online intervention?”

Methodology

Context of the study

This study is part of a project on Healthy Eating Promotion through Self-Regulation (HEP-S) (Magalhães et al., 2020) conducted on the CANVAS® platform. HEP-S is a preventive educational program that aims to promote the individual's agent role to self-regulate their eating behaviors. The intervention used the story tools "Yellows Trials and Tribulations" (Rosário, Nuñez, et al., 2007) and "The Hill of Bald Trees and Other Stories" (Rosário et al., 2016) to promote self-regulation skills for healthy eating in children (Rosário et al., 2016, 2017). The program was delivered online through CANVAS® on a 1h weekly session for 18 weeks. In every session, the narrative telling the adventures of the rainbow colors in search of Yellow who gets lost in the forest was read aloud to the whole group and set the discussion of using self-regulation strategies applied healthier eating behaviors. To promote participation, children took turns to read the text aloud. In addition, the research assistant encouraged participants to discuss the self-regulation strategies embedded in the narrative and transfer the learning messages to their diet. Furthermore, participants completed in-session and out-of-session activities to consolidate the learning acquired during the reading and discussion of the chapter. Gamification strategies were embedded throughout the program. The gamification elements present in this program were the narrative context, feedback, reputations/ranks/levels, competition under rules (explicit and enforced), teams, and time pressure (Magalhães et al., 2020). It is important to emphasize that the parents of the participants enrolled were invited to participate in the intervention. In addition, video summaries of the narrative were sent to the parents every week and there were out-of-session activities in which children were encouraged to complete them together with the parents/family.

This intervention started before the Covid-19 pandemic and during its course Portugal declared a state of emergency and ordered, among other many measures, school closure, home confinement, and, for many professionals, remote work.

Design and procedure

The present study is part of a research project approved by the Department of Ethics of the University of Minho Research Committee in Social and Human Sciences (CEICSH) (CEICSH 032/2019). The project was found to meet the requirements of good practice in human research according to national standards and international standards for research in the social sciences and humanities, including the Declaration of Helsinki. A school in the North of Portugal was invited to participate in this project. The intervention was presented at the fifth-grade parent's meetings at the beginning of the school year and parents were invited to enroll their child in the intervention. Prior to data collection, written informed assent and consent were obtained from children and parents/legal guardian, respectively. To protect data confidentiality and anonymity, identification codes (e.g., BFMO3) were assigned to participants. Data collection took place online at the end of the program. The research assistant conducted the interviews, individually.

Participants

At the beginning of the intervention, 32 children from the three fifth-grade classes enrolled were ascribed to 11 small groups of about 3 children each. The groups were composed of children from the same class for two reasons, the literature: 1) highlights the role of social influence in incrementing engagement (Poirier & Cobb, 2012) and 2) also that children are more willing to participate in a program with their classmates (Magalhães, Pereira, et al., submitted). Of the 32 children, 6 (18.75%) dropped out of the intervention; specifically, 4 spontaneously stopped attending the sessions and did not communicate their motive, and 2 claimed having too much workload related to the extracurricular activities in which they were enrolled. After these dropouts, the groups were not restructured, as it would have been disruptive for the children and the groups' dynamic. Therefore, one "group" finished the intervention with only one child. Interviews were conducted with the remaining 26 children (81.25%), of whom 17 were girls (65.4%). Ages ranged from 9 to 11 years (M_{years} = 9.92, SD = 0.392).

The data from 23 parents of the 26 children who participated in the intervention were collected. Two parents did not want to be interviewed at the end of the intervention (EE_LRC16 and EE_IMSM12, 7.69%) and, due to having twin children, a mother was interviewed once for both children (EE_MGS17-MGS18). Interviews were conducted with the remaining 23 parents/legal guardians of whom 17 were mothers (73.91%) and four were fathers (17.39%), one sister (4.35%) and one godmother (4.35%) acting as children's legal guardians. The ages ranged from 24 to 50 years; the average age was 40 years. To facilitate the reading, from now onwards we will refer to parents instead of legal guardians.

Instruments

Personal information

Participants were asked to provide information about their gender and their age.

Semi-structured interviews

The script for the semi-structured interview was developed with the aim of exploring children's and parent's perceptions of the factors that contributed to their engagement in the online intervention to promote self-regulation skills for healthy eating. The interviews started with questions regarding participants' initial expectations about the intervention. The remaining questions were focused on children and parents' engagement in the intervention (i.e., what reasons led them to get engaged, if their child shared something about the intervention, what would need to be different for them to get more engaged). Each interview lasted approximately 45 minutes and was video recorded with the Zoom® built-in functionality.

Data analysis

The interviews were transcribed verbatim, and a content analysis was performed to identify and interpret standard themes. We used the phases of content analysis to guide this process (Braun & Clarke, 2006). An a priori coding framework (codebook) was created based on the three dimensions of engagement, i.e., cognitive, emotional and behavioral (Fredricks et al., 2004), and some codes were retrieved from the literature: trainer structure and support, gamification elements, content and intervention characteristics, participating family, inquisitiveness, strategic approach, fun intervention, lack of in-person contact, group effect, online format advantages, family encouragement, busy family and technology-related struggles. In addition to the codebook, following an inductive approach during the familiarization phase, new codes were found, and added to the codebook, namely knowledge transfer, dysfunctional group, non-participating family, pandemic worries, responsibility vis-à-vis the program, and lockdown spare time. To ensure the reliability of the analysis, two researchers worked on the coding according to Braun & Clarke's (2006) six-phase thematic analysis scheme 1) familiarization with the data, 2) generation of initial codes, 3) search for themes, 4) reviewing themes, 5) defining and naming themes, and 6) producing the report. The two researchers reached an inter-observer agreement of 0,998, which is considered excellent. Qualitative data were analyzed with a content analysis approach aided by QSR international's NVivo10. NVivo software provided the number of participants in each code, and the researchers calculated the respective frequencies and percentages.

When reporting the frequency of the responses for each code, the scoring scheme for qualitative thematic analysis by Rodgers & Cooper (2006) was considered. Particularly, when referring to participants, i.e., both children and parents' interviews, the categorization was as follows: all = 49 cases, nearly all = 44-48 cases, most = 28-43 cases, around half = 24-27 cases, some = 3-26 cases, a couple = 2 cases, and one = 1 case. When referring to children or parents separately, the categorization for parents was the following: all = 23 cases, nearly all = 21-22 cases, most = 13-20 cases, around half = 11-12 cases, some = 3-10 cases, a couple =2 cases, and one=1 case. For children, the categorization was the following: all = 26 cases, nearly all = 23-25 cases, most = 15-22 cases, around half = 13-14 cases, some = 3-12 cases, a couple = 2 cases, and one =1 case.

Findings

Based on the framework of engagement, three themes were considered: cognitive, emotional, and behavioral engagement (Fredricks et al., 2004). Each of these themes has several codes associated providing explicit information on the facilitators and barriers regarding children and parents' engagement in the intervention.

Table 1.

Themes, codes, respective response frequency, and representative quotes from a qualitative study on parent and child perspectives of engagement.

Theme	Code	N (%)		Example
		Children	Parents	
Cognitive Engagement	Strategic approach[1]	23 (88.6)	16 (69.56)	"... the ranking also involves the activities and the diary, the work I did during the week. That is, if I hadn't done the diary (...) I would lose points and that would push me next time to do the diary and the other things." (AFAA3,10-year-old girl) "[what I would change in the intervention in order to get more engage] I would suggest one session a week with the two of us (...) Parents, the parents and the child. (...) that would, I don't want to say oblige us, but that's almost it, to interact." (EE_BFMO3, 37-year-old mother)
	Knowledge transfer	15 (57.69)	16 (69.56)	"I always thought it was positive... insofar as, beyond the food issue, there was always a moral lesson that overcame all of that and involved other issues, more related to values... It was directly linked to habits, let's say (..) Food [habits], although then there could be a common thread there that would lead to that, while developing other skills, which, in my opinion, end up being so important." (EE_DGF6, 42-year-old mother) "Because I liked planning using PLEA [Plan, Execute, Evaluate] (...) I was playing a board game with my cousin and I used PLEA to defeat him." (TMCM23, 10-year-old boy)
	Inquisitiveness [2]	8 (30.77)	7 (30.43)	"Because they were looking for Yellow and then it was cool what the teacher bird said, the riddles that the pirate tree made (...) And I also wanted to know what was going to happen in the end." (DGF6,10-year-old girl) "...I was also curious to hear the end of the story. (...) And the fact that my youngest daughter also wanted to participate led me to be here a little more... by their side." (EE_AGCC2, 41-year-old father)
Emocional Engagement	Trainer structure and support [3]	25 (96.15)	18 (78.26)	Yes, [the presence of the psychologist/research assistant] is also good because it gives advice on what we did wrong and what we didn't do, so that we don't make mistakes later on (...) Or [she helps us] improve our work and also say it is all well done and we're all happy and proud because we put on effort to achieve it. (...) Or then saying that we had to get more involved (...) we know that we have to work more on that so I think the advice is good." (LOS16, 10-year- old girl). "[The messages of the psychologist/research assistant] forced me, they forced me is a way of saying it. (...) But we forced ourselves to be more attentive and to learn the contents they were talking about and what they were doing. (...) [as a parent we didn't felt like] we're wasting time there, look, an hour wasted there.I even wanted to go do some errands (...) No, the topics became relevant and were important, even to make them grow." (EE_LSPC17, 46-year-old mother)

Theme	Code	N (%)		Example
		Children	Parents	
	Group Effect [4]	23 (88.46)	10 (43.48)	"I think it makes the experience more interesting because then we get together with more people, not only the student with the psychologist (...) But then we have teams with colleagues and expose our opinions and I think that's good. (...) We help each other (...) In any difficulty the other person is not making fun of us because we are having difficulties but helping us and giving tips on how we can improve and so on." (IPG10, 10-year-old girl) "It was also one of the factors that required greater involvement, and also always wanting to (...)participate, do the work on time, and (...) was to get points afterward so that we would have more and more points (...) To be a winner and work there as a team and so on. I think that's what's important." (EE_MMFC18, 38-year-old mother)
	Fun intervention [5]	18 (69.23)	7 (30.43)	"It was fun because in the story ... we learned a lot of new things and we had fun reading the story (...) Because it was fun and the colors taught us a lot of things and the other characters and that was something I liked about this program." (MSV20, 10-year-old girl) "Aspects that contributed... I think it was the way you presented things, the way you reached out to the kids and ended up reaching to us too, (...) it wasn't a monotonous program.(...) Oh the tasks you asked them to do turned out to be fun tasks." (EE_BFMO3, 37-year-old mother)
	Dysfunctional group	19 (73.09)	4 (17.39)	"Ah, I think it was on the first one in the diary because there were those things [activities/tasks] that some didn't do, others did and it ends up getting a little bit confusing." (JSP11,10-year-old girl) "that's how it was, I think it went well, but I saw F., sometimes unmotivated because she was alone, because it was just her, because she was alone (...) yes, AG., then there was a colleague, then the colleague left, then it's just me. Hmm, I think it should involve three, four students. Seeing if there was more interaction between them as well, and a little more interest, like "I'm doing it and the others aren't doing it" or "why am I doing it and the others aren't". I found her a little discouraged, and I said to her: daughter, you don't have to think about what others don't do or what others don't want to do. If you are interested in continuing, you will continue. (...) And when you start something, you have to finish it." (EE_AFLP1, 46-year-old mother)
	Family encouragement [6]	7 (26.92)	8 (34.78)	"It's part of school, it's part of your health, (...) . Pretend it's a... another step you have to go through while continuing with school, that's it and he managed to get there.I got him to join, all that stuff." (EE_EFMT6, 46-year-old mother) "This program was a different program, they had never heard of it, so, when I was more attentive, they gave me more enthusiasm, the willpower to be more attentive." (IMSM12, 10-year-old girl)
	Lack of in-person contact [7]	7 (26.92)	6 (26.08)	"I liked it, but if it had been at school as it was supposed to be, I think it could have been more fun (...) Because you lived more with people instead of being in front of a screen" (AFLP1,10-year-old girl)

Theme	Code	N (%)		Example
		Children	Parents	
				"Personal contact is always much better than at distance contact. (...) It's the same as the... these online classes. They are inside the classroom, they don't live with each other, the look... face to face (...) It's totally different to be looking in front of a computer." (EE_BMM1, 33-year-old mother)
Behavioral Engagement	Participating family [8]	25 (96.15)	22 (95.65)	"I mean, it influenced me because if I didn't talk to my family I couldn't do things right, I couldn't send/upload things, that means I didn't have participation." (BFMO3,10-year-old boy) "Usually it was the things that called the most attention to him or that he had the most difficulties with, it's just that he spoke to me the most. (...) Oh, there was one time he had me ask what certain words meant. That they were a little (pause) difficult.(...) From the texts, I had him explain what it was." (EE_ROP18, 39-year-old mother)
	Gamification elements[9]	25 (96.15)	21 (91.30)	"She accepted, though, and she, and she said this, this many times: "you were right after all". When I told her things in a certain way, "L" listened but did not assimilate. And with this, with this program, with what she had now, with this activity, "L" started to understand in a different way. (...) the way it was explained, through the puppets, through, the search for the yellow of, the stories that were told, the readings that they were made,"L" was perceiving it in a different way, maybe the way I had explained it was not the most correct. (...) Yes, yes, because she was committed to discovering colors or where he was, where he wasn't, what she had to do, what she didn't have to do, the game. The game itself, the story, and the being, being attentive and staying, make the person's ambition always want more and do, and always want to do better. And this, I think this is very healthy for the kids." (EE_LSPC17, 46-year-old mother) "Well, because that way we received points for the activities we did... (...) I knew that I had points and I wanted to earn more every week and then I would do things [I needed to do to earn the points].." (AFAA3, 10-year-old girl)
	Content and intervention characteristics [10]	26 (100)	13 (56.52)	"Hmm. Those tasks, because they were also done, that's it, with photographs to send and all that, that's it, I think that's it, because then the fact that there were these tasks and they developed these activities, therefore, aroused more curiosity and more commitment." (EE_MMFC18, 38-year-old mother) "...the PLEA because it helped me to better understand how I have to plan things to execute them and so on, there was the CRAva goals for me to achieve goals and another [strategy] help, helps colleagues because in reality, it is really asking other people for help because they will always be there to support us." (JSP11, 10-year-old girl)
	Online format advantages [11]	15 (57.69)	22 (95.65)	"I think it was good because if we had to go to school at seven p.m. it would also have been complicated." (DGF6, 10-year-old girl)

Theme	Code	N (%)		Example
		Children	Parents	
				"...since I was away from home, I managed to keep up with T., because maybe if it was at school, (...) I would not have had the possibility of going to school to work with him, if it was really after school, maybe I would have to... leave him there and leave, then I would go get him and here [in the online format], it allows me to be in my space, right? (...) manage to keep up with T. and continue the activities I had to do, right? Because this is an hour he was there, (...) we managed to organize everything and it was just turning on the computer, if it was another [place]... having to take it somewhere was more trouble and so I was able to keep up with T." (EE_TMCM23, 24-year-old sister)
	Technology-related struggles [1] [2]	22 (84.61)	7 (30.43)	"Because at the beginning, I didn't know how, I didn't know how to use the cell phone very well. I still had classes and I had classes all day, and when I got home, I had little time to learn too (...) So, in a way, as I still didn't know how to move very well, I had to learn to move so I didn't participate as much in the first few days." (AFAA3, 10-year-old girl) "She gained a boost because, meanwhile, I had to invest in a new computer for professional reasons and then in that class [my daughter would emphasize the improvement, such as] "Ah, because A. said she already heard me, she already spoke and other stuff". And then [because of the new computer] it was already very different, I also think that the limitations of a technological nature that she encountered initially also put a little bit there, a barrier because she felt that she could not participate in the same way." (EE_DGF6, 42-year-old mother)
	Busy Family [1] [3]	9 (34.61)	19 (82.60)	"no, she didn't have it, but when it started, both the father and the mother, we work in shifts and it's a little difficult sometimes to always be with her." (EE_AFLP1, 46-year-old mother) "It was because of having to go to the swimming classes and that's why I had to go earlier and almost didn't attend the sessions." (AGCC2, 9-year-old girl)
	Responsability vis-à-vis the program	9 (34.61)	12 (52.17)	Because I have nothing to do with my colleagues having given up, [this doesn't mean] That I have to follow the same path as them. I wanted to continue, I continued." (AFAA3, 10-year-old girl) "Great! On Wednesday morning I was remembering that it was canvas day (...) At a quarter past seven I was already on the computer, worried that it wouldn't show up. Waiting, more than half an hour to go, but I was already there waiting for someone to come in."(EE_BMM1, 33-year-old mother))
	Lock down spare time	15 (57.69)	6 (26.08)	"Yes. Not everything went well like in the beginning, I didn't have internet, I had to go swimming and so I couldn't even [attend the whole session properly] so now when this pandemic started I had more time to be here [in the session], it was a little earlier and so I could be at ease and... still play." (AGCC2, 9-year-old girl)

Theme	Code	N (%)		Example
		Children	Parents	
				"No, I became even more available to accompany. (...) [yes I had more availability], because I stopped working, I had more time for him. (...) Yes, without a doubt, because when I was working, I was always running. (...) It was [hard to keep up with the ntervention], but my husband started working later on. (...) Yeah, but then I was always around." (EE_TRMM24, 35-year-old mother)
	Non-participating family	1 (3.84)	15 (65.21)	"I will be very honest, I participated very little [in the program] (...) Even only when he had something, so that's what I say, there's something they really asked us for help or they couldn't understand what was going on, he asked us, because otherwise. He pretty much did it himself." (EE_RSP19, 45-year-old mother) "My mother would sometimes pass by, my mother would sometimes stop by (...) but no,she didn't watch it (...) my father arrives at eight p.m. (...) we went to bed at half past nine (...)" (ROP18, 10-year-old boy)
	Pandemic worries	2 (7.69)	2 (8.69)	"Every reservation was canceled (...) and then there were days and nights of worries, and I couldn't devote myself to do anything else." (EE_IPG10, 46-year-old mother) "Ah, for my mother the impact was really clear, because at night she came to my sessions, but now she comes a few times because she keeps watching the news, the cases get worse and so she goes to Facebook, goes to Google and searches for coronavirus in Portugal and so on (...) So oh well, she hasn't been coming to my sessions that much because she's been very worried." (BMM1, 10-year-old girl)

[1] (Locke & Latham, 2002)
[2] (Nitsch & al., 2016)
[3] (Alexander et al., 2010 ; Cullen et al., 2017 ; Elbert et al.,2016; Murimi et al., 2019)
[4] (Aldemir et al.,2018)
[5] (Nitsch et al., 2016)
[6] (Khan et al., 2021)
[7] (Neil et al., 2009)
[8] (Hammersley et al.,2021 ; Masse et al., 2020 ; Niemier et al., 2012 ; Rose et al.,2018)
[9] [10] (Huang et al., 2019 ; Kuosmanen et al., 2018 ; Nitsch et al., 2019)
[11] (Jones et al., 2011)
[12] (Zahry & Ling, 2020)
[13] (Cranney et al., 2023; Drapeau et al., 2022 ; Jones et al., 2023 ; Zahry & Ling, 2020)

Cognitive engagement

This theme describes investment in the learning process through applied effort and strategies. It is particularly related to the establishment of goals and the use of self-regulated learning strategies (Boekaerts et al., 2000). This theme includes three codes: "Strategic approach", "Knowledge transfer" and "Inquisitiveness".

The "Strategic approach" code was the most prominent among the cognitive engagement theme, being mentioned by most participants. This code includes the notion of having the skill to plan what one needs to do to earn points and set goals. It also includes the issue of time organization, and the ability to ask for help (e.g., parents, colleagues, research assistants) to do something during the intervention. The following example illustrates this idea:

"Well about the points we know that if we did the activity we would get points and we could reach the end and we could win all of this and maybe the weekly ranking we knew who didn't do the activity like Mr. B the diary, the ferret and so on (...) Hum, well, the rankings I knew I could... if I saw the score I had at the end, I could improve what I did for example, by just doing the activity I would earn the five points [and I would think] "cool" I would earn five points, [then] I knew that if I completed the diary I would earn more (...) Points and then I completed the diary and the activity and so on, (...) I knew I was going to win and that I was going to earn two points." (LRC16,10-year-old girl)

The "Knowledge transfer" code was mentioned by most participants. Specifically, the fact that the participants were curious to learn something with the intervention to be able to transfer knowledge to other contexts (for example, applying the intervention's contents to the topic of food or learning), made them engaged more in the intervention. The following example illustrates this idea:

"Because I think it's important for us to know a little bit about food, even for me. I have a lot of difficulty in containing some... Mainly sugar and I really wanted to see if it helped in anything, (...) [the program] it is also [helpful] for me to learn." (EE_TRMM24, 35-year-old mother)

Finally, "Inquisitiveness" code was mentioned by some participants. Specifically, their curiosity and willingness to know the end of the story, as well as discovering Amarelo, was key to their engagement. The parents' speeches also illustrate this aspect:

"... I like to go find out (...) Find out more, I want to know what happened [in the story], in the chapters, you know, [I want to know] what's going to happen in the next chapter (...) I'm really looking forward to it (...)." (LOS16, 10-year-old girl)

Emotional engagement

This theme describes a sense of belonging, a feeling of support provided by teachers or others, as well as positive feelings about something (e.g., school, homework) (Fredricks et., 2004). This theme comprises six codes: “Trainer structure and support”, “Group effect”, “Fun intervention”, “Dysfunctional group”, “Family encouragement” and “Lack of in-person contact”.

The “Trainer structure and support” code was the most prevalent code for the emotional engagement theme. Indeed, most participants mentioned how the feedback received helped to improve engagement and instigate motivation to carry out activities, as well as participate in the sessions. Nearly all children revealed that the presence of the research assistant was essential for the smooth running of the intervention, as illustrated in the following example:

“[the presence of the research assistant was] Very good because we could learn more things, we could remember that we have session (...) We remembered that we had to do the tasks and the activities. (...) Well, it helped me, influenced me to be more present, to express myself better (...) I think the feedback that the psychologist gives and gave was very good, these are good things that will stay in our memories, things that we will be able to recall [in the future].” (LSPC17, 9-year-old girl)

Additionally, most participants mentioned that the “Group effect” was beneficial and facilitated their engagement, as it allowed support and help to each other and increased children’s sense of belonging to the group. Concurrently, “Group effect” also allowed the existence of competition, which was engaging according to the interview reports. The following example illustrates this idea:

“Increased (...) Because if I was here alone, I would be the only one talking and it would be boring. (...) [if the intervention was not in the group] I think I had already given up” (DGF6, 10-year- old girl)

In addition, around half of the participants were enthusiastic about the “Fun intervention”, as the activities being fun (example: narrative, diary, rankings, points) facilitated their engagement in the intervention. The following example illustrates this idea:

"They [the activities] are didactic, yeah, interesting and a bit of fun, they weren’t boring (...) Because if they were boring, they [the children] wouldn’t go [to the intervention] (...) They would just come up with excuses to miss the session." (EE_EFMT6, 48-year-old mother)

Moreover, around half of the participants mentioned that the “Dysfunctional group” aspect (existence of failures in the connection, not all participants had the same goal) was something demotivating and a barrier to engaging. Most children highlighted being in a group as a barrier to their good engagement. The following example illustrates this idea:

"I think if they hadn't given up [the peers of their group] I think it would be more interesting (....) Ah, they could have helped me (....) I could have helped them too (....) It would be more interesting also to read because everyone would be able to read I ... it would be more interesting to have a variation of characters." (AFAA3, 10-year-old girl)

"Family encouragement" was another code mentioned by some participants. Specifically, it refers to encouraging children to join the program or do the activities and demonstrates the benefit of encouragement on the part of the family, as it is demonstrated by some participants that this aspect helped to increase the children's motivation in the intervention, and their engagement. The following example illustrates this idea:

"I said that maybe it would be a little boring but she [my mother] said that it would be fun because she had already had this but it was in class, altogether when she was in sixth or seventh grade, she had and told me that it was fun and we talked about what happened and some of the things that she did and then I thought that it could also be the same but in other things and that's why I also wanted to participate." (LRSF15, 10-year-old boy)

Lastly, some participants mentioned "Lack of in-person contact". Participants explained that it would have been better if the intervention had been delivered in-person due to the need for interpersonal contact. The intervention delivered face-to-face would have been a facilitator for the engagement of families and children. Participants identified the online delivery as a barrier.

"Yes, I would have liked it better if it was in person. It would have been better, however, it was also a good option to be online, because she also participated (...) but, if it had been in-person, maybe I would have attended more because I was obliged to take her, do you understand? I would have been obliged to be with her. Now, [because it was online] besides the fact that I didn't have the patience, I had other things to do. Often, I wasn't at home, I had to pick up my daughter from work. I had to do the shopping, ... I had to cook dinner and had no time to be with her [in the online session]." (EE_MLFMS17, 43-year-old mother)

Behavioral Engagement

This theme describes engagement in the activities (e.g., attendance, respect for rules, active participation in activities, and carrying out activities). Ten codes were found: "Participating family", "Gamification elements", "Content and intervention characteristics ", "On-line format advantages", "Technology-related struggles", "Busy family", "Responsibility vis-à-vis the program", "Lock down spare time", "Non-participating family" and "Pandemic worries".

The most prominent code of this theme is "Participating family". This theme was stated by

nearly all participants. This code includes the active participation of the family in the activities, and their presence during the intervention, that is, reading the narrative, carrying out the sessions, activities, asking questions about the course of the intervention, watching the video-summaries together, explaining the meaning of words/clarifying doubts, or answering messages sent by the research assistant. Reports from nearly all the participants demonstrate that this participation was beneficial to their engagement.

"Yes, because at first, she was still not quite familiar with canvas, nor with the email itself (...) Nor with attaching photos, so in those first weeks (...) I got more involved, even for that part, right? (...) And then when she needed to do the tasks, as a family, we also did the tasks with her" (EE_LOS16, 36-year-old mother)

The "Gamification elements" code was another relevant aspect of the behavioral engagement theme. Nearly all participants highlighted that the game elements of the program (teams/groups, psychologist feedback, reputations/points, ranks, and levels, the rules) tended to improve engagement, thus being a facilitator aspect. The following example illustrates this idea:

"I think the rules are so good (...) Because without rules I couldn't know what I couldn't do or what I could do (...) I think so because we had to have time [to do the tasks] ... the task for example, the task is available today we can't do it in a month from now." (BFM03, 10-year-old boy)

All children and most parents referred that the "Content and intervention characteristics" (such as the diary, padlet, narrative, readings, activities, PLEA, CRAva) were aspects that promoted engagement in the intervention because they facilitated the achievement of the goals, as highlighted in this sentence from one of the participants:

"I thought it was very funny, very funny, very beautiful because it is a happy story, beautiful, colorful, with various characters (...) Because at the same time that it was the "Yellow Trouble" that gave us the activities, it told us about the PLEA, the CRAva objectives, various things, the food wheel, and a lot of things that the narrative told us I think I don't know the word. (...) It helped us to understand the questions [the narrative], helped us to understand the things that they proposed to us in the sessions, that they proposed to us in the activities (...) To participate more in the sessions (intervention characteristic), to participate more in the activities." (LRC16, 10-year-old girl)

In addition, the "Online format advantages" seems to have facilitated the participation of most participants, as they did not have to travel to enroll in the intervention. The following example illustrates this idea:

"I think it's good because at the time my group had the online session, is a time I would normally be at home whereas if [the program had been in person] we were at school or somewhere else [it would have been more difficult to participate] because there are several activities that we have to go to (...) So this thing of it being online was really good because we can be at home and we didn't have to leave (...) That influenced me because of the time, if we did need to go somewhere then I probably wouldn't go and participate, but when they said it was by computer by an online program I thought "great"." (IMSM12, 10-year-old girl)

In contrast, "Technology-related struggles" were mentioned by most participants, but mainly by children, as an important barrier to engagement. In these technical difficulties, we include difficulties in using the platform or the computer/mobile phone. This code also includes aspects related to internet connection or microphone delay during the intervention, which negatively affected engagement in the intervention, as we can see in the following report:

"But then, you had to search for it on the computer, you had to go to the site, you had to enter the identification (...) Yes, there were a lot of steps, to go there, our computer was also a little slower, it didn't help much, that's why sometimes there were those interferences, or it went down." (EE_MMFC18, 38-year-old father)

The code "Busy family" included aspects such as work, household, and children's occupations, time incompatibilities, as well as family mealtimes, which were seen as a barrier by most participants to engagement in the intervention. This aspect is illustrated in the following quotation:

"[attend the sessions] Sometimes I would just start at the beginning and then I couldn't [attend the whole session] (...) because it was like this, it was time for me to start making dinner. And I couldn't have her in the kitchen either because I would make noise, and then it's like this, I have my mother-in-law and she likes to be in the kitchen watching the TV (...) we have a TV in the kitchen. And it's complicated to (...) and me making noise because I was preparing dinner and my mother-in-law was watching the TV, isn't it? (laughs) (....) is, and it was complicated, so L. was usually always alone" (EE_LGC15, 50-year-old father)

Furthermore, the code "Responsibility vis-a-vis the program", which included the notion of commitment to the intervention, has proven to be a facilitating aspect for engagement. Some participants mentioned that responsibility tends to make them present at the intervention:

"Just yesterday she told me: Mom, I want to go swimming today, but I can't because I have [to attend the session of the] project today. And it is also good to know how to give up one thing for another." (AFLP1, 10-year-old girl)

Some participants highlighted the positive aspect of the "Lockdown spare time". The lockdown allowed for a more adapted schedule and participated in the intervention in a way that would not have been possible without the lockdown. That is, having more free time due to confinement allowed some parents to support their children, demonstrating that the pandemic context was a facilitator for engagement in the intervention. The following example illustrates this idea:

"[more availability] Yes (...) Because I no longer have school, so I don't need to leave school and come home and ... Losing some time while I come home so I already have more time available [lock down] influenced the part of me having more time to do the tasks." (*EFMT6, 10-year-old girl)*

Another barrier that was highlighted by some participants was the "Non-participating family", including the notion of little presence of family members or their non-participation in the intervention. Most of the parents reported having little participation and this had an impact on children's engagement.

" I didn't participate in anything like that... Honestly, I won't lie. (...) The father even participated, but I didn't, I didn't go there, I wasn't very consistent about it. "(EE_ROP18, 39-year-old mother)

Finally, some reports suggest that the "Pandemic worries" were a barrier to their participation because they implied personal changes. The following example illustrates this idea:

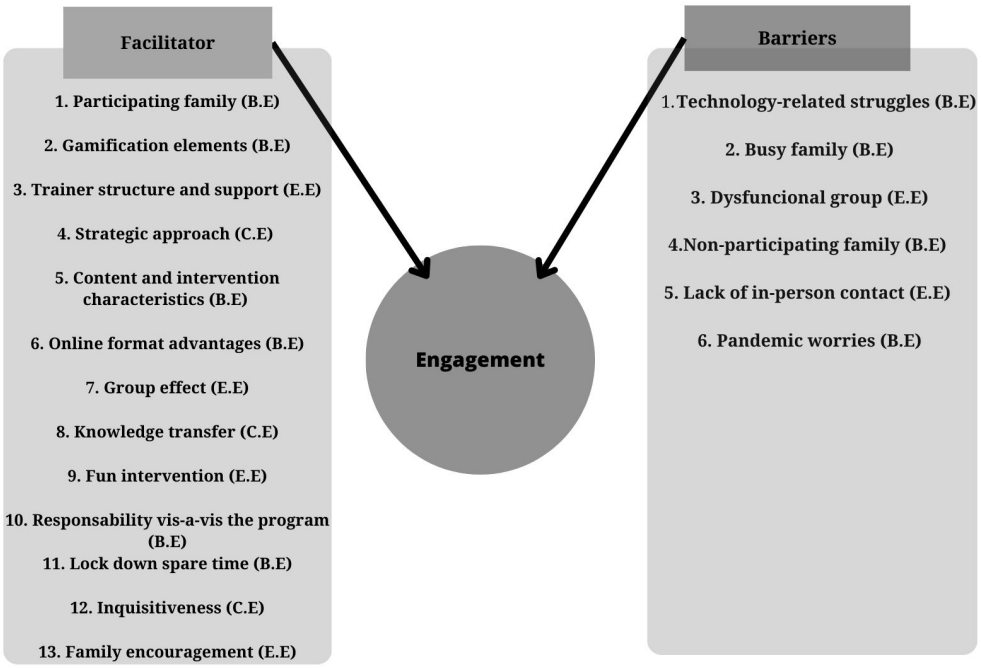
"Everything that was reservations was canceled (...) and then there were days and nights of worries, and I couldn't devote myself to do anything else." (EE_IPG10, 33-year-old mother)

Discussion

This study aimed to explore and understand the facilitators and barriers to children and parents' engagement in an online intervention to promote self-regulation skills for healthy eating in children. From the children's and parents' perspectives, thirteen facilitators and six barriers for engagement in the intervention were identified. Most of the facilitators and barriers identified were from the behavioral engagement theme, followed by the emotional and, lastly, the cognitive engagement themes. Some aspects can be highlighted in relation to engagement, as no barriers were found in what concerns cognitive engagement, we only found facilitators. On the other hand, the engagement where more barriers were found was the behavioral engagement. It was also the engagement with the most facilitators. The facilitators and barriers are systematized in the following scheme (Figure 1).

Figure 1.

Facilitators and barriers for children and parents' engagement in the intervention.



Note: The order presented reflects the frequency that each code was mentioned by the participants and between brackets there is information regarding the dimension of engagement to which each particular code belong to. *CE* cognitive engagement, *EE* emocional engagement, *BE* behavioral engagement.

"Participating family" was the facilitator most mentioned by the participants. Despite the intervention having been devised for children, the family could, and was invited to, participate as well. In fact, children and parents highlighted that when one of the parents was present and available to help their children, this was likely to facilitate children's engagement with the, improve children's understanding of the, and increase children's engagement in the intervention. Therefore, the active presence of the parents in the intervention seems to be a good way to improve children engagement in the intervention. Similarly, to the current findings, Hoerr et al. (2019) concluded that the presence and engagement of the parents play a crucial and key role for children's engagement in the interventions. Interestingly, one of the main barriers to the engagement reported in this intervention was the theme "Busy family". In fact, participants' speeches suggest that children engagement was compromised by the families' occupations, especially the fathers. Some had professional commitments as well as other responsibilities to attend to, such as preparing dinner, which led to difficulties in engaging in the intervention. This result is in line with previous research highlighting that, due to the pandemic context, this aspect was particularly important as most participants had less available time than usual due to additional duties (e.g., home education, cook dinner) and increased screening time (for work and social

purposes) (Cranney et al., 2023; Zahry & Ling, 2020). Authors thus highlighted that parental engagement may have decreased during the intervention period because of these aspects of personal occupations. Therefore, future interventions may consider alternative ways to engage parents in the intervention while allowing their participation at their own pace.

The second most mentioned facilitator was “Gamification elements”. Participants reported that the gamification elements were important for their engagement, for example, the rules led to better organization in the intervention, the time limit prevented children from postponing tasks, or the points stimulated their motivation to do the tasks. This result is in line with the findings of Huang et al. (2019) showing the effectiveness of gamification elements to improve engagement. Likewise, the “Content and intervention characteristics” were important facilitators for engagement in the intervention, this aspect is consistent with the literature as the importance of content or the integration of interactive elements for the success and good engagement of participants was highlighted (Kuosmanen et al., 2018). Thus, future interventions can consider the inclusion of gamification elements as well as taking into account the content and integration of interactive elements to promote the engagement of participants in the intervention.

The third facilitator most mentioned was "Trainer structure and support". Participants reported that the presence of a research assistant during the intervention through reminders, messages, feedback, or clarification of doubts, facilitated and promoted the engagement of participants in the intervention. Children mentioned that it allowed a better understanding of the intervention due to the feedback delivered, whereas parents mentioned that the catch-up messages allowed them to remember that on that day there was the intervention and so they could help and be present for their child if needed. This result is in line with previous research by Aardoom et al. (2013) showing that an external element, i.e., the inclusion of support, can play an important role in promoting engagement and improving adherence to the online intervention. The importance of support for participants’ engagement was also highlighted in "Group effect", where participants commented that the group was a facilitator of their engagement because while in group they could interact, have fun, share opinions, as well as clarify doubts and ask for help. Interestingly, participants also expressed that being in a group can also be a barrier to their engagement - “Dysfunctional group”. The disorganization of the group, the fact of the different elements not having the same goal, and the absence of some elements during the intervention, were examples of behaviors that decreased children motivation to participate. This finding is similar to previous research highlighting that students’ social presence is a crucial component (Garrison et al., 2001), and also that communication is an important factor to facilitate community

building (Aldemir et al., 2018).

Another relevant facilitator mentioned by participants was the “Strategic approach”. Participants mentioned that the self-regulation strategies used by them with goals within the intervention, as well as the fact that they set goals, organize themselves, but also the ability to ask for help (e.g., parents, colleagues, research assistant), constituted an important facilitator for their engagement in the intervention. This is consistent with the literature stressing that goal setting influences participants by directing attention to goal-relevant activities, increasing persistence, and promoting goal-relevant strategies (Locke & Latham, 2002).

"Online format advantages" was also a relevant facilitator of engagement in the intervention. Participants reported that the program being online allowed them to stay at home and not have to commute to attend, it helped with scheduling because they could just turn on their computers to participate in the intervention. In addition, participants also mentioned that because the intervention was online, it was possible to maintain engagement throughout the lockdown within the pandemic context. This result is similar to the findings of Goodyear et al. (2021) showing that the fact that the intervention was online, using digital devices, improve children’s engagement in the intervention. In the current study, the online format also contributed to parents’ engagement. However, being online was also the main barrier to engagement in the intervention, as highlighted in the “Technology-related struggles” barrier. In fact, most of the participants, especially the children, highlighted that technical problems (e.g., delayed microphone, poor internet connection, not knowing how to use the computer) made them less engaged in the intervention (Zahry & Ling, 2020). Therefore, future studies must take this dichotomy and discrepancy of the online format into account when devising online interventions.

Limitations and future studies

The present study aimed to explore and understand the facilitators and barriers to children’s and parents' engagement in an online intervention aiming to promote self-regulation skills for healthy eating in children. Findings are promising, but some limitations should be acknowledged. First, one aspect that would allow a better understanding of facilitators and barriers to the engagement of parents would be to interview other members of the family. Interviewing other members of the family (e.g., sibling, grandmother/father) could be helpful as it was mentioned several times by the participants that we could learn more about the children engagement in the program through interviews with the “father” or the “sibling”. Another aspect would be to carry out the interventions using platforms familiar to children. Some participants reported that the intervention would have been easier and more accessible

if the intervention had been conducted in a platform used by them on a regular basis. Therefore, before setting an intervention, future studies could investigate which platform would be more accessible for participants. In addition, future research could consider using other measure of engagement, something more concrete and objective to be able to contrast with what was said in the interviews. For example, measure engagement every week and not just at the end of the intervention. For example, a high percentage of engagement was highlighted in self-reports in the interviews at the end of the intervention but, few parents demonstrated that they knew exactly what had occurred during the intervention.

Conclusion

The findings of the present study highlighted the facilitators and barriers in the engagement of children as well as parents in a self-regulated eating online intervention. Overall, participants highlighted that they had become engaged in the intervention due to the delivery format. Concretely, facilitators were as follows: easiness of access related to the online format; the presence of elements of gamification; and also the family support and the presence of the research assistant, as well as the group, as positive aspects for their engagement. However, some of the facilitators identified were also mentioned as barriers, for example, deliver the intervention via an online format. Participants mentioned technology related difficulties, as well as the availability of parents to participate indirectly in the intervention with the children as barriers to the participants 'engagement. All considered, we are confident that these aspects can help mitigate some of the barriers to user engagement and promote participant adherence.

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