

Co-development of a digital screening and intervention tool to improve lifestyle habits: focus group with parents and clinicians

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Abstract

Background: Chronic preventable diseases represent a major burden in Canada, often rooted in unhealthy behaviors established during childhood. Despite recommendations for routine screening, most children are not assessed due to clinical barriers. This study presents the early development of Project DISCO, a self-administered, digital pre-appointment tool to screen and support healthy lifestyle behaviors, including physical activity, sleep, nutrition, and screen time, in children aged 2 to 12 years.

Objective: This study aimed to explore clinicians' and parents' needs and past experiences with health technology, integrate their insights into the development of a digital tool for promoting health behaviors, and evaluate the usability, relevance, and acceptability of this tool.

Methods: Three semi-structured focus group and interview sessions were conducted with primary care clinicians and parents. Participants were recruited at the Groupe de Médecine de Famille Universitaire (GMF-U) Saint-Hubert using purposive and convenience sampling; clinicians were recruited internally, while parents of children aged 2-12 were invited via email sent by clinic staff. Data were analyzed using a combination of inductive and deductive approaches. Findings informed iterative refinements throughout the co-development of the digital tool for promoting healthy lifestyle behaviors in children.

Results: A total of 8 participants took part in six discussions, including 5 parents of children aged 3-12 and 3 primary care clinicians. Hybrid thematic analysis identified six themes: (1) the potential of a digital tool to promote healthy habits in pediatrics; (2) implementation challenges and opportunities, including integration of the tool into clinical workflow; (3) adherence and engagement with the tool, with suggestions for reminders and involvement of nurses; (4) perceived limitations and improvement of screening tool, particularly the nutrition and sleep questionnaires; (5) feedback on the screening report and intervention, emphasizing clarity and actionable guidance; and (6) perceived clinical value and opportunity costs. Insights from these discussions guided refinements of the digital tool.

Conclusions: Findings support the tool's relevance and inform its ongoing development. A feasibility study is planned prior to a randomized controlled trial.

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Original Manuscript

Title: Co-development of a digital screening and intervention tool to improve lifestyle habits: focus group with parents and clinicians

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Abstract:

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Keywords: pediatrics, screening, intervention, lifestyle behavior, qualitative study, digital tool.

INTRODUCTION

In Canada, chronic preventable diseases cause 65% of all deaths [1], affect 44% of Canadians and account for 58% of the annual healthcare budget [2]. Unhealthy lifestyle behaviors such as physical inactivity, excessive screen time, unhealthy diet, and poor sleep hygiene are key contributors to chronic

preventable conditions including obesity, diabetes, cardiovascular disease, several types of cancer, and psychological illnesses [3-9]. These behaviors often originate in childhood, tend to track into adulthood [9-11], and cluster [5,12-14].

Despite recommendations for systematic screening by several organizations including the Canadian Task Force on Preventive Health Care [15-17], most children are not screened for lifestyle behaviours. Barriers include limited clinician time, competing priorities, fear of upsetting families, and low perceived self-efficacy of clinicians [18-22].

Digital pre-appointment screening can help overcome those barriers [23-26]. Compared to traditional methods, it is more time-efficient, scalable, and generally well-accepted by clinicians and families [23,24,26-32]. In pediatrics, digital Screening, Brief Intervention, and Referral to Treatment (SBIRT) has helped address adolescent substance abuse [31,33-35] by identifying risky behaviors, initiating behavior change, and connecting patients to support resources [36,37]. Similar tools have been developed for parents to support childhood obesity in primary care [38].

Active stakeholder involvement is essential in developing screening and intervention tools [39-41]. Parents can help ensure the tool's relevance and fit within real-life family contexts [42], while clinicians inform its feasibility and acceptability in practice [31,43,44]. For example, an intervention to support young adults with type 1 diabetes was co-developed with patients, researchers, and healthcare professionals, helping identifying priorities and concrete

strategies [45].

The aim of this research was to develop and refine a self-administered, digital pre-appointment screening and intervention tool targeting physical activity, sleep, nutrition, and screen time in children aged 2 to 12 in general pediatric primary care. This article describes its co-development with parent and clinician stakeholders.

METHODS

- Preliminary data and tool development

This study is part of a larger research program that was initiated from October 2021 to November 2022, with a need assessment conducted with 114 families at the Groupe de Médecine de Famille Universitaire (GMF-U) Saint-Hubert, a suburban family medicine group [46]. This need assessment confirmed clinicians' interest in obtaining more information about children's lifestyle behaviors, highlighted the prevalence of unhealthy behaviors in this population, and revealed parents' interest in the development of a pre-appointment screening tool for lifestyle behaviors.

Subsequently, a first iteration of our SBIRT was developed through an iterative process combining evidence from scientific literature, input from clinicians and family-partners [25,35,47-49], and existing programs such as the RIPPLE program (Resource Information Program for Parents on Lifestyle and Education), an e-Health SBIRT tool developed by collaborators Ball and van Mierlo

[25,38,48,50], to prevent pediatric obesity. To strengthen impact, behavioral sciences principles were integrated to better reflect real-world decision-making [51]. These approaches have shown promise in improving behaviors [52] like physical activity [53,54] and nutrition [55–57]. Evidence from adult and promising data in pediatrics [58], guided their integration into the tool.

- o SBIRT content and description

Following the standard approach in the literature [25,38,50], our tool consists of three main sections: Screening questionnaire, Brief Intervention and Referral to Resources (see Table 1).

Component	Description
1 - Screening	Parents complete a digital, self-administered questionnaire covering the family's demographic information and the child's health behaviors (physical activity, sleep, nutrition, screen time). The questions were informed by the results of a prior needs assessment.
2 - Brief Intervention	After screening, families receive a personalized report summarizing all behaviors and highlighting those not meeting national health guidelines. Feedback, co-developed with Evolution Health™ (van Mierlo CEO), and family partners, includes behavioral strategies (e.g., Specific, Measurable, Achievable, Relevant, Timebound (SMART) goals, nudges). Age-appropriate educational materials are emailed, and results are shared with clinicians to support counseling.
3 - Referral to Resources	For each behavior not meeting guidelines, parents receive a curated list of community resources tailored to their child's age and needs. These resources, selected with input from healthcare professionals and parent partners, are emailed upon selection.

Table 1: SBIRT core components

- Tool refinement: focus groups

Following best practice, the primary objective of this study was the development and refinement of

our screening and intervention tool using end-user feedback obtained through focus groups [59].

The objectives of the focus group discussions were to: 1) gain insight into the needs of clinicians and parents regarding a digital tool aimed at promoting healthy behaviors, 2) explore participants' past experiences with health technology, 3) integrate insights obtained from the first focus group into the tool development process, and 4) assess the perceived usability, relevance, acceptability, and accuracy of the developed tool.

- o Participants and recruitment process

Two groups of participants were recruited: 1) primary care clinicians, and 2) parents or legal guardians of children. A purposive and convenience sampling strategy was used to ensure rich, relevant data while promoting in-depth discussion.

Clinicians were recruited through an internal invitation sent by the management of the GMF-U Saint-Hubert. Parents were recruited via email invitations relayed by clinic staff to those with upcoming appointments for children aged 2-12. Eligibility criteria included being a parent or legal guardian of a child in that age range and being fluent in French or English.

- o Data collection

Three semi-structured focus groups (August 2024, November 2024, March 2025), each lasting 60 to 90 minutes, were conducted. Clinicians participated in

person in August and virtually thereafter, while parents joined virtually in all sessions (via Microsoft Teams). Due to availability constraints, eight sessions were held as individual interviews. One clinician and one parent participated in all three phases, while others joined a single session.

Discussions explored users' experience with the digital health tool, perceived usability and relevance of the prototype, satisfaction, and suggestions for content, format, and delivery (Multimedia Appendix 1). Iterative refinement of the tool was based on feedback collected throughout the sessions. For example, after the first session, visual mock-ups were developed based on user expectations; the second session focused on reactions to various features (e.g., feedback messages); and the third examined acceptability and emotional responses to the tool. All data were collected and analyzed in French and translated into English for reporting.

- o Data analysis

All focus group recordings were transcribed verbatim and reviewed for accuracy. An iterative, hybrid analysis-combining inductive and deductive approaches-was conducted. Initial coding involved open coding of meaning units (ideas, experiences, suggestions), followed by axial coding to identify conceptual relationships and central themes. Usability, acceptability, and satisfaction with the tool were assessed using a published framework covering seven constructs: affective attitude, burden, perceived effectiveness, ethicality, coherence, opportunity costs, and self-efficacy [60].

Data were analyzed at the group level using thematic analysis to describe and interpret patterns of meaning [61]. The process was managed using Microsoft Excel. Tool refinement was guided by participant feedback, following a sequential co-creation approach inspired by the development of the RIPPLE pediatric obesity prevention tool [25,38,48,50]. Data will collect until data saturation, defined as no further theme extraction.

- o Ethical considerations

The study received ethical approval from research ethics boards of the Centre Intégré de Santé et de Services Sociaux (CISSS) de la Montérégie-Centre and the Sainte Justine University Hospital Centre.

All participants provided informed consent prior to participation and consented to the use and publication of their data. Each participant received a \$25 compensation per session.

Data were stored securely on the servers of Research Centre of the Sainte-Justine University Hospital Centre.

RESULTS

Six discussions were conducted with a total of 8 participants, including 5 parents of children and 3 clinicians. Sessions were held either as individual interviews or dyadic discussions. All participants were female, except one clinician. Clinicians were family physicians with 5 to 6 years of professional experience. Participating parents had 1 to 3 children aged between 3 and 14 years.

Potential of Digital Tool Promoting Healthy Habits in Pediatrics

Parental Experiences with Digital Health Tools

Participating parents reported previous use of various digital tools to support their children's health, including platforms such as Dialogue™ (a telemedicine app) [62], smartwatches (for activity and sleep tracking), Naître et Grandir® (a government-sponsored parenting education website) [63], and Rendez-vous Santé Québec® (an online medical appointment booking) [64]. Tools with simple, concrete guidance were particularly valued. As one parent shared, "[the information is] *written in a way that is very understandable for the general public, so it's very simple, very concise, with concrete examples*".

Several participants expressed concerns over tools perceived as overly commercial, simplistic, or lacking credibility. Some worried digital tools disrupt the parent-child relationship: "I don't necessarily want a tool, a robot, to replace that connection with my child.". They emphasized the importance of professional interfaces, quality assurance, and rigorous linguistic review in both French and English. One parent noted, "small typos are fine, but blatant errors diminish the value of the questionnaire and makes it look less professional... it makes the results seem less valid."

Identified needs for a digital tool

Parents described specific content needs for a digital lifestyle intervention tool, notably the desire for tailored guidance on complex topics such as eating

behaviors and sleep challenges. They emphasized "If you don't seek out information, you just do what you can, but you don't really know what best practices (...) [guidance] should come directly to us, you know, so we don't have to go looking for it."

Clinician Perspectives on Automation and Screening

Clinicians generally supported automated lifestyle habits screening to reduce clinical burden. One stated: "In a perfect world, it wouldn't be the family doctor conducting lifestyle habit screening." They saw value in the tool providing personalized information, while underscoring the importance of follow-up dialogue: "Our role is then to discuss how to apply it concretely in daily life (...) like motivational interviewing."

Some participants supported broader automation, comparing the tool to mental health self-care platforms: "More programs designed to be accessible to the public, encouraging them to try self-care interventions. The more information you provide - especially if it's increasingly personalized and from reliable sources - the better. I fully support that."

Implementation Challenges and Opportunities

Workflow Integration

Clinicians highlighted several barriers to completing the tool in clinic. Filling it out in the waiting room was seen as unrealistic due to time constraints, late arrivals, and the difficulty of managing young children. Additionally, receiving

results by email limited clinicians' ability to review in time for the consultation.

To improve integration, clinicians strongly preferred embedding the tool in the electronic medical record (EMR), describing it as a straightforward and efficient solution. One noted "if it's a result [in the EMR], (...) we have no choice but to read it, otherwise, it will always stay highlighted as an incomplete task note. This definitely encourages clinicians to check it out."

Feasibility and Added Value in Clinical Practice in Use Prior to the Appointment

Participants agreed it would be more practical to send the questionnaire before the appointment, ideally alongside the appointment confirmation, so clinicians can review it beforehand and tailor the visit. Some emphasized the importance of doing so even for walk-in visits, where vulnerable families may be reached unexpectedly: "That's often where we catch them, especially since parents usually come for regular check-ups up to the age of 3-4, and after that, we tend to lose them." This suggests the tool could play help maintain contact with families beyond early childhood, when routine follow-ups become less frequent.

Adherence and engagement with the tool

Challenges

Maintaining long-term engagement, a prevalent issue in digital health literature[65,66], was a shared concern. Both clinicians and parents noted that after age 2, appointments become infrequent, making regular follow up difficult. Motivation was seen as key: "I'd need to be fully committed," said one parent.

Engagement also tended to decrease with subsequent children “it’s nice when it’s your first child (...) then parents lose interest.”

Clinicians saw value in a follow-up system to track engagement and identify families at risk of dropping off.

Suggested solutions

- Reminders linked to appointment: Implementing email notifications that encourage parents to schedule follow-up appointments to discuss lifestyle habits after long gaps between visits: “Email notifications could help.”
- Involvement of nurse practitioners: As they often see families more regularly, they could reinforce messages and ensure continuity.
- Motivational prompts and progress tracking: Parents welcomed the idea of periodic check-ins: “[if I am] asked, ‘Do you agree to receive the link again in a few weeks to check your progress?’. Then yes, I’d definitely do it.”
- Trusted framing: Parents stressed the importance of the tool appearing credible and tied to a medical source (e.g., doctor’s office or public health institution).
- Multi-child usability: A suggested addition was the ability to complete the tool for more than one child at a time.

Perceived limitations and improvement of the screening tool

Sleep Habits Screening

Clinicians initially found the sleep section too limited, focusing mainly on duration with little attention to sleep hygiene. One noted that sleep problems often emerge indirectly, such as through academic or attention issues. A suggested addition: “Has the teacher reported any fatigue, sleepiness, or attention problems with your child?” to better capture underlying concerns.

Nutrition Screening

Both parents and clinicians found the initial emphasis on sugar-sweetened beverage (SSB) too narrow. One parent noted, “There are many other aspects of nutrition that are more relevant to me than sugary drinks”. A clinician also observed that dietary discussions often go beyond SSBs, pointing out, “Parents are very concerned about the amount of food that is eaten.” and that “it’s surprising how often families don’t eat together”.

Key nutrition-related challenges raised by parents included:

- Food exploration and parental education: exposure to disliked foods is still important, especially between ages 0-5.
- Picky eating: a common source of stress in early childhood.
- Time constraints and meal planning: balancing work and family limits time for healthy meals.
- Teen autonomy: teens make more independent and sometimes less healthy choices.

Tool Revisions and Validation

After the first focus groups, the screening tool was revised to incorporate parent feedback. Sleep questions were refocused on hygiene and quality, and the nutrition section was broadened to reflect overall dietary behaviors and the mealtime environment. Language was simplified, and examples were added for clarity (Multimedia Appendix 2).

In the second set of focus groups, these changes were well-received. A clinician described the updated items as “excellent, very detailed”, noting that “Eating behavior is really interesting. (...) [and] “relevant.” A parent highlighted the focus on “observable behaviors” and appreciated the educational aspect: “It tells me, ‘this is what a sleep routine is’. It kind of educates me at the same time as giving advice.”

Feedback on Screening Report and Intervention

Presentation and Content of the Screening Results

Participants responded positively screening report’s format and tone. Clinicians appreciated the inclusion of all behavior domains, regardless of the results, and the clear, color-coded layout: “Presenting all four sections, regardless of the results, is very positive (...) The positive approach to encouraging them and the available resources are very well designed.” The tool was considered simple and accessible for most families. The report’s emphasis on autonomy was also valued: “It’s really good to let the parent decide which area they want to be

informed about because having 3 or 4 areas to work on, (...) take small steps on their own with your recommendations."

Relevance and Usability of Information

Parents appreciated receiving individualized data and contextual data, especially charts comparing their child's behavior with national guidelines and clinic averages: "The comparative aspect is still fun, because we say we shouldn't compare ourselves, but at the same time, we all like to compare." However, the phrase "Top 10% of the clinic's most performing children" was criticized for being too competitive: "It should be about healthy lifestyle habits, not performance."

Opinions varied on the level of detail in the graphs, some wanted more specificity (e.g., types of activities, frequency, age-group distinction), while others felt the current indicators (individual scores, recommendations, and averages) were sufficient. The relevance and appropriateness of within-clinic comparisons was also questioned by one participant.

Intervention and Resources

Participants valued the clarity, concreteness, and relevance of the resources. One parent said, "It's informative to know the impacts it has. The healthy goals. I also like seeing that, for example, the link for a tax credit provides information that we don't have. The resources are clickable on one of the links. It's very comprehensive, so it's interesting." They appreciated "immediate, applicable

solutions,” like links to recipes or planning tools. Suggestions included practical tips for limiting screen time and integrating local resources by postal code (e.g., green spaces, cycling paths). The intervention was seen as supportive of gradual, realistic change: “Sometimes it’s nice to (...) take small steps by ourselves with the recommendations. I think that’s the whole point.”

Feedback on encouragement messages and follow-up

Tailored follow-up messages were seen as essential, particularly for families whose results did not improve. One parent noted: “if [it hasn’t worked] what can we do to help these families if it hasn’t worked? (...) maybe we haven’t seen improvements because you’ve maintained the same behavior. Did you know that there is another approach or reference?” Personalized resources, whether to maintain progress or adjust strategies, were deemed essential to sustaining motivation.

Perceived Clinical Value and Opportunity Costs

Clinicians found the refined version of the tool efficient and user-friendly: “I really like that the recommendations for clinicians take only 20 seconds to read.” Its brevity was seen as a strength that facilitated dialogue: “It opens the door for discussion.” Both clinicians and parents viewed it as time-saving and accessible. As one parent noted: “It’s straightforward. (...) you don’t really feel like filling out long tools while waiting in the clinic. I think you mentioned 15 minutes to complete it, but it felt more like 5. »

Clinicians highlighted three key strengths of the tool:

- Time savings: “It will save us time... and it aligns with a motivational interviewing approach since you’ve already started the work.”
- Initiation of the behavior change process: “prompting them to come with an answer, a rationale, or a potential solution at the next appointment. I think that could be beneficial.”
- Increased parental engagement: “I think it's good to send this to all parents in any consultation context; I think it can be a good opportunity to just raise their awareness.”

However, the tool’s perceived value varied by family. Parents with prior knowledge or motivation felt it might be too basic, while those with less awareness could find it overwhelming: “If it’s for families who are already looking to improve behaviors, it might not go far enough for them. But for a family that really has no idea and needs to make changes, it might feel overwhelming.”

DISCUSSION

This study highlights the potential of a co-developed digital tool for screening and promotion of healthy lifestyle habits in pediatric primary care. The participatory approach enabled iterative refinement based on clinicians’ and parents’ input, ensuring high acceptability, usability, and relevance (Multimedia Appendix 2 and Multimedia Appendix 3). Key features such as personalized,

immediate, and normative feedback, and access to concrete resources, were consistently valued by participants and align with known drivers of engagement and sustained behavior change [67,68].

While integrating of stakeholder supports participatory design, organizational factors such as timing of distribution, follow-up mechanisms, appointment coordination, and communication between families and professionals must be addressed for effective clinical implementation. These align with known implementation challenges in feedback-based interventions, where mode, frequency, and source of feedback influence the impact [69].

As mentioned by participants, equitable access remains challenging, especially for families facing structural barriers (e.g., financial constraints, fragmented services, logistical difficulties). To address this, the tool was co-developed with parents and clinicians, and tailored strategies with concrete support were prioritized to reduce contextual barriers and foster engagement [70]. Still, the recruitment process may have introduced selection bias, as participating clinicians were likely more engaged in lifestyle-related screening, and some parents may have been more motivated or available.

This could limit the tool's applicability to less engaged or more vulnerable populations-the very groups for whom equitable access is most critical. Conducted in a single clinic with a small sample, the study's findings may lack generalizability. However, the primary objective was to gain insight into key concepts essential for the tool development, rather than to produce exhaustive results. To address this limitation, the tool will be presented to clinicians in other

settings.

Verbatim translation from French to English may have introduced bias; efforts were made to preserve meaning within feasibility constraints [71]. Additionally, the sample size and the mix of focus groups and individual interviews, may have influenced interaction dynamics, though the consistency of perspectives across formats strengthens the credibility of the findings [72].

Despite these limitations, the study lays a strong foundation for future work. Subsequent phases will include a feasibility study and a broader engagement with stakeholders to assess tool's adaptability. This will be followed by a pilot study and a randomized controlled trial to rigorously evaluate its effectiveness in improving pediatric health outcomes.

CONCLUSION

To our knowledge, no similar pre-appointment screening tool exists in general pediatric care. This study provides early evidence for the feasibility and relevance of a co-developed digital tool to promote healthy lifestyle behaviors in pediatric primary care. Its participatory design and user-valued features support its potential for future evaluation and implementation. This work represents the initial phase of its development.

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Conflicts of interest: None declared.

Data availability statement: The datasets generated and/or analysed during the current study are not publicly available due to confidentiality concerns, given the small number of focus group participants but are available from the corresponding author on reasonable request.

Authors' contributions:

Conceptualization: OD (lead), MK (equal), TP (equal), TvM (equal), AM (supporting)

Data curation: AM (lead), TP (supporting)

Formal analysis: AM (lead), OD (supporting), TP (supporting)

Funding acquisition: OD (lead), TP (equal)

Investigation: AM

Methodology: OD (lead), TP (equal), AM (supporting)

Project Administration: OD (lead), TP (equal)

Resources: OD (lead), TP (equal), AM (supporting)

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Visualization: AM

Writing – original draft: AM (lead), TP (supporting)

Writing – review & editing: AM (lead), MK (equal), OD (equal), TP (supporting)

List of abbreviations:

SBIRT: Screening, Brief Intervention, Referral to Treatment

GMF-U: Groupe de Médecine de Famille Universitaire (Family Medicine Group)

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Supplementary Files

Figures

SBIRT core components.

Component	Description
1- Screening	Parents complete a digital, self-administered questionnaire covering the family's demographic information and the child's health behaviors (physical activity, sleep, nutrition, screen time). The questions were informed by the results of a prior needs assessment.
2 - Brief Intervention	After screening, families receive a personalized report summarizing all behaviors and highlighting those not meeting national health guidelines. Feedback, co-developed with Evolution Health™ (van Mierlo CEO), and family partners, includes behavioral strategies (e.g., Specific, Measurable, Achievable, Relevant, Timebound (SMART) goals, nudges). Age-appropriate educational materials are emailed, and results are shared with clinicians to support counseling.
3 - Referral to Resources	For each behavior not meeting guidelines, parents receive a curated list of community resources tailored to their child's age and needs. These resources, selected with input from healthcare professionals and parent partners, are emailed upon selection.

Multimedia Appendixes

The detailed guides of the different focus groups discussions.

URL: <http://asset.jmir.pub/assets/d81b60bba82891742c6e6af38c6d532e.docx>

The detailed version of the screening questionnaire included in the DISCO tool.

URL: <http://asset.jmir.pub/assets/bb7de26b3def1cd8c3787369383ea26c.docx>

Screenshots of interfaces and visuals included in the intervention of the DISCO tool.

URL: <http://asset.jmir.pub/assets/142d88ebf69c17cd44bfb0c59ca85d51.docx>

