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An Exploration of Prioritizing Risk Factors of Coffee Consumption in Kindergarten Children

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ABSTRACT

Background: This study aimed to explore the mechanisms of prioritizing risk factors of coffee consumption in kindergarten children based on parental perceived changeability and importance. It was conducted in a local Chinese kindergarten, with study participants involving 40 parents.

Methods: Qualitative data were generated by conducting semi-structured interviews and analyzed employing a thematic inductive analysis approach.

Results: Multiple risk factors related to high doses of coffee consumption in children were identified. Notably, children's mobile phone use and sleep behavior were considered relatively more changeable and more important risk factors, which should be addressed in intervention development. Moreover, other identified risk factors, including later diner times, physical activity participation, parental coffee consumption before sleep, and parental perceived benefits and barriers of coffee consumption, require further contextual investigation.

Conclusion: Future intervention development should target parental influences on children's coffee consumption and sleep health. The aim should be to promote awareness of sleep hygiene behaviors in both children and parents as a starting point. The intervention development process could be an iterative and back casting approach, necessitating extensive information gathering and in-depth consideration of critically revisiting the existing data to enhance the potential success and effectiveness of the intervention.

1. Introduction

Coffee consumption in children is an emerging research area that may include many basic questions unaddressed. The key question is whether children should be provided with coffee by their parents or others, given the potential negative impacts on their health (Bramstedt, 2007; Seifert et al., 2011; Shrestha & Jawa, 2017). Torres-Ugalde et al. (2020) systematically reviewed the evidence and posed both benefits and disadvantages related to children's coffee consumption. More specifically, it may hamper children's body growth and cognitive development; on the other hand, it may also help activate the children's central nervous systems and effectively manage their brain energy. Similarly, Temple's review argued that small and moderate amounts of coffee consumption in children are considered relatively safe and that high doses (above 400 mg) of coffee consumption in this group, however, may cause physiological, psychological, and behavioral harm (Temple, 2019). The above conflicting findings and the relatively scarce evidence on this topic have some important implications. Future research is required to explore to what extent children should be provided with coffee. It is worthwhile to thoroughly investigate the contextual

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information related to children's coffee consumption. Key questions to consider may include: 1-What factors contribute to children's coffee consumption? 2- To what extent can interventions effectively reduce high doses of coffee consumption in children?

However, given the limited empirical research on children's coffee consumption, it is difficult to provide consolidated evidence to inform healthy practices of coffee consumption among children. Therefore, as a starting point, this qualitative study aimed to address this gap to understand the contextual factors related to children's coffee consumption. Drawing upon the primary data previously collected by the research team, this study, a formative evaluation part of intervention development, aimed to understand parental perceived risk factors of children's high doses of coffee consumption and to explore how parents ranked these factors in terms of their perceived changeability and importance. The theoretical underpinning of this study is based on the key premise of the Precede-Proceed model (Green et al., 2005). That is, such a model, relative to other extant well-known health program planning and evaluation frameworks (e.g. Health Promotion Planning Cycle, Program Logic Model), has a unique focus on understanding how negative health issues occur (e.g. multilevel risk factors of the chosen health issues), employing a retrospective diagnostic analysis approach through Phases 1-3 (Green et al., 2005; Porter, 2015). In turn, intervention practitioners and/or relevant stakeholders (e.g. intervention participants of co-designing) can rank the identified risk factors in terms of their perceived changeability and importance. The proposed intervention strategies should, therefore, act on relatively more changeable and more important risk factors (Green et al., 2005; Porter, 2015). Such mechanisms attend to the needs of intervention recipients, the level of feasibility of the intended intervention strategies, as well as individual psychological activities in the ranking process of prioritizing risk factors of health issues. Examining how relevant stakeholders rank risk factors of high doses of coffee consumption in children, based on their perceived importance and changeability, could offer more in-depth implications when planning intervention strategies, concurrently furthering the understanding of this topic in health psychology. This study is part of a community-based health project in China. The preliminary informal research of this project by the research team has synthesized two major behavioral risk factors associated with high doses of coffee consumption in kindergarten children. These factors are: (1) children's mobile phone use; and (2) children's sleep behaviour. This study, a formative evaluation, aimed to explore how parents ranked these factors in terms of their perceived changeability and importance, which is the overarching evaluation question underpinning this research. The specific aims of this study were to understand the contextual mechanisms of risk factors of children's coffee consumption from the perspective of parents and to explore the level of importance and changeability of these factors.

2. Materials and Methods

This qualitative study, conducted in 2023, employed a purposive sampling approach to recruit 40 parents of kindergarten children enrolled in a local kindergarten in China. All participants provided written informed consent to participate. This kindergarten, apart from regular teaching and learning activities, has a strategic plan for implementing a broad range of health promotion interventions to improve children's health (Lu, 2023). This study is part of the community-based "Coffee in Kids" (CIK) health project in China, which is founded on the Precede-Proceed model (Green et al., 2005). The CIK project aims at planning, implementing, and evaluating a three-month parent-led behavioral educational intervention to reduce high doses of coffee consumption in kindergarten children. Recruitment strategies included word of mouth, text messaging, and emailing, with assistance from kindergarten teachers. Participants were informed that they could withdraw from the study at any stage without consequence. Ethics approval was obtained from the Human Research Ethics Committee of the local kindergarten. Participating parents ranked the aforementioned risk factors in terms of their perceived changeability and importance. Specifically, each parent categorized these factors into "more important/less important" and "more changeable/less changeable", in accordance with the guidelines of the Precede-Proceed model (Green et al., 2005). Each of the 40 parents participated in an individual face-to-face semi-structured interview in a private meeting room, with each interview lasting approximately 30 minutes. Given the semi-structured nature of the interviews, interviewers only asked basic prompts (e.g., "How did you rank this factor?") to encourage parents to think broadly about the importance and changeability of the identified risk factors. All 40 interviews were audio recorded and transcribed verbatim by the research team. All interviews were conducted in English given that all participating parents and the entire research team could speak fluent English. The research team was led by a health promotion practitioner with extensive experience in planning, implementing, and evaluating health promotion interventions in educational settings. The team consisted of practitioners from various disciplines of early childhood education, nutrition, public health, and health promotion. All researchers involved in this study had extensive expertise and experience in interviewing parents of young children, which was deemed appropriate and adequate to capture the original meanings of the transcripts. In particular, the notion of reflection in health promotion education was employed in the data analysis process, allowing researchers to view parents as relatively equal parents in interpreting the data and their related life experiences. Individual reflections (e.g., expertise, life experiences) could be used to inform intervention development (Hickman et al., 2022). The whole research team read all transcripts frequently and carefully, ensuring that they were familiar with the parents' original meaning. The two primary researchers then examined all data, and all

possible relevant points were open-coded inductively. An additional two researchers created additional codes to closely reflect other pertinent meanings extracted from transcripts. All researchers reviewed, refined, and finalized all codes, with all disagreements discussed, elucidated, and resolved. Once the coding process was completed, the resultant themes were generated. All themes were reviewed and refined by the research team to ensure optimized trustworthiness. Following discussion within the research team, the results of themes are presented in the following Results section. The data gathered from the 40 interviews were deemed thematically saturated given no new information forthcoming.

3. Results and Discussion

The demographic details of 40 parents interviewed in this study are presented in Table 1 for illustrative purposes.

Table 1. Demographic details of parents interviewed (n = 40)

	Number of parents interviewed in this study (N = 40)
Mean age	36.7 years (SD = 3.4, range = 32-40)
Education level (N)	Master's degree (28) Bachelor's degree (11) Secondary school (1)
Gender (N)	Male (24) Female (16)
Residential area (N)	Urban area (35) Rural area (5)
Parental employment status (N)	Full-time (40)

Most parents perceived "children's mobile phone use" and "children's sleep behavior" as more changeable and more important risk factors. Most positioned "extensive amount of physical activity in children" as a less changeable yet more important risk factor, while most considered "later dinner times" as a more changeable but less important risk factor. A detailed exploration of how parents ranked these factors is presented here.

3.1 Children's mobile phone use (more changeable, more important)

Nearly all parents reported that children's mobile phone use was a major causal factor contributing to children's high doses of coffee consumption, as children proactively wanted coffee to stay active. These parents reported that their children spent a lot of time utilizing mobile phones before sleep, such as watching movies, playing games, and sending texts to their friends. Half, though not all, of parents, based on their life experiences, believed that most preschool children frequently used mobile phones. They noted, however, that children's mobile phone use was an extremely easily changeable factor in that most children did not have their mobile phones and used their parents' mobile phones. Given this, simply discouraging children from using their parents' mobile phones or putting their parents' mobile phones in a place where children are unable to see might be very useful in reducing their demands for coffee consumption. The representative quotes are presented as below:

"I think, at this stage, most children, including my son, wanted coffee as they like to use mobile phones and coffee helps energy". (Parent 12)

"It is a very important risk factor, however, I think it's very easy to change because my son doesn't have his mobile phone, he uses mine". (Parent 14)

"My daughter knows that coffee could help her stay active... she drinks a lot of coffee and plays mobile phone games... I could simply ask my daughter to go to bed and put my mobile phone in my bag or elsewhere... she could not touch". (Parent 21)

3.2 Children's sleep behavior (more changeable, more important)

Parents reported that their children habitually had later sleep timing. Such a behavior usually occurred given that most parents consumed coffee before sleep and their children expressed the same interest in doing so, especially when they observed their parents who were consuming coffee. In particular, parents often willingly provided their children with coffee as long as their children made requests. Some parents expressed that although they understood the harms of coffee consumption concerning children's sleep quality, they tended to unintentionally forget these harms and, thus, to meet their children's requests. For parents who provided children with coffee, most indicated during the interviews, however, that they would avoid having coffee in front of their children and avoid providing coffee to their children before sleep. They, therefore, perceived children's sleep behavior as an easily changeable risk factor. Of importance, only a minority of parents demonstrated that they would avoid coffee consumption before sleep, and the majority of parents would continue with such behavior, although all parents would be willing to discourage their children from coffee consumption before sleep. The representative quotes are cited below:

"My daughter likes to have some coffee before going to bed because I like to have coffee in the evening, every time she sees it, she would like me to cook a cup of coffee for her". (Parent 13)

"When my son asks to... have some coffee before (going to) bed, I am willing to give it, sorry, I know it is not very good for sleep, but I don't have this in mind when he asks...". (Parent 34)

"I am sure most the parents, like my generation, have the habit of having coffee, well, coffee is a bit harmful to children's sleep, so I will avoid my child's coffee consumption, it's very easy to do so, but I will continually have coffee in the evening because of too much work to do". (Parent 40)

"It is a nice conversation (with the interviewer), obviously, I won't allow my daughter to have coffee before sleep anymore... in the future, I will avoid having coffee before I go to bed as well". (Parent 27)

3.3 Extensive amount of physical activity in children (less changeable, more important)

The majority of parents felt that an extensive amount of physical activity amongst children was a less changeable yet more important risk factor. More than half of parents reported that their children continually played various forms of physical games and kept walking and running around the house before sleep. To continually do so, children would proactively seek coffee. They pointed to the difficulty in encouraging their children to reduce the amount of physical activity at home and, thus, perceived this risk factor as less changeable, as illustrated by the following parents:

"My son kept running and jumping around the house, he will find coffee and keep playing. He never sits quietly". (Parent 24)

"I almost never see my daughter be calm... jumping, playing games... with drinking coffee, I tried many ways to ask her to reduce physical activity but failed". (Parent 37)

"My son and daughter always have endless energy and never feel tired, and they like coffee at the same time". (Parent 38)

3.4 Later dinner times (more changeable, less important)

Most parents considered later dinner times as a more changeable but less important risk factor. The representative quote is evident below:

"I normally have very late dinner with my son, so he normally drinks coffee as a snack, well, I could have had dinner earlier, but I don't think it matters about his coffee consumption". (Parent 33)

This study, underpinned by the Precede-Proceed model, discusses the detailed ranking process, from parents' perspectives, to identify relatively changeable and important risk factors relating to high doses of coffee consumption amongst kindergarten children. The salient finding is that children of parents in this study had an awareness that coffee could support energy, given the finding that children would proactively seek coffee to continually use mobile phones participate in physical activity-related games, and maintain the behavior of later sleep timing. This reveals that children may to a large extent have an awareness of the functions of coffee rather than consider it as a type of drink. The research team notes that mobile phone use among kindergarten children may be a prevalent risk factor for coffee consumption. Most parents in the study believed that this factor was easy to change, given that many children did not have their mobile phones, allowing parents to limit their access. This reveals that children's coffee consumption behavior could be modified by both children themselves and their parents, considering that much of the empirical research suggests that parental behavior is closely associated with children's health (Bektas et al., 2021; de Buhr & Tannen, 2020; Pyper et al., 2016). Likewise, most parents in this study would be willing to prepare coffee for their children. This implies that parents may not effectively translate their existing health literacy (i.e. negative health impacts of coffee consumption) into their behavior. In considering the theoretical constructs of the transtheoretical model of behavior change (Hashemzadeh et al., 2019), these parents appeared to have extremely limited "pre-contemplation" (e.g. not considering changing their behavior of coffee consumption provision for children). Most parents in this study, however, were aware of the side effects of coffee consumption, a simple awareness-raising intervention strategy (e.g. brief text reminders), for instance, may effectively change this behavior. Interestingly, the research team finds that most parents' health literacy could be effectively "awakened" by participating in the interviews. A growing body of evidence reveals that simple and easily accessible, rather than didactic and traditional, health education intervention strategies show promise in promoting the development of healthy lifestyles (Kumar & Preetha, 2012). Of importance, most parents in this study, whilst indicating that they would not prepare coffee for their children, felt that they would continually consume coffee before sleep. Only a minority of parents expressed that they would avoid having coffee before sleep. This finding has several important implications. First, given that most parents in this study were aware of the side effects of coffee consumption, they may pay more attention to their children's sleep health than theirs. Second, these parents may have some yet inadequate health literacy (i.e. side effects of coffee consumption), and feel that the benefits of coffee consumption (e.g. energy maintenance for work) are more important than its harms. This is consistent with the Health Belief Model illustrating the steps of health behavior change, mainly including perceived susceptibility, perceived severity, health motivation, perceived benefits, and perceived barriers (Jones et al., 2014). In this case, there may be a lack of awareness, amongst parents, relating to the likely incidence of chronic diseases and long-term health risks resulting from coffee consumption. One possible explanation is that most parents may not observe or experience the serious disadvantages of coffee consumption. Given that most parents in this study showed a willingness to help avoid coffee consumption for their children but to maintain this behavior for themselves, it is predictable that parents may be more likely to provide coffee for their children in practice due to mutual parental influence at the family setting, as evidenced by the social cognitive theory (Tougas et al., 2015). Bradshaw et al. (2021), for example, observed that teenagers were more likely to smoke if their parents smoked habitually. Teenagers who have quit smoking may be more likely to smoke again if they are usually exposed to the environment in which their peers smoke (Harvey & Chadi, 2016). Parents in this study observed that an extensive

amount of physical activity in children was an additional risk factor that was perceived as more important and less changeable. Given the scope of this study, the research team has limited information around the contextual and quantitative information related to children's physical activity of coffee consumption. Future research should understand more about why and how physical activity was potentially associated with high doses of coffee consumption in this sample. Furthermore, most parents perceived later dinner times as more changeable yet less important. However, extensive literature has contended that late food intake is associated with inadequate sleep quality (Duan et al., 2021; Kinsey & Ormsbee, 2015). This suggests that later dinner times may be considered an important family environmental risk factor that causes high doses of coffee consumption in children and other unhealthy lifestyles. Future research therefore should incorporate the content of parental nutrition literacy relating to children's coffee consumption into the intervention planning process. This study has important implications for the next phase, planning intervention strategies. Typically, informed by the Precede-Proceed model, intervention strategies should act on relatively more changeable and more important risk factors (Green et al., 2005). Later dinner times, for example, although not perceived as more important by parents, should be taken into consideration when planning intervention strategies. More importantly, this study identified additional risk factors potentially contributing to children's coffee consumption, such as parental coffee consumption before sleep, parental perceived benefits and barriers of coffee consumption, and inadequate parental nutrition literacy relating to coffee consumption and sleep health. Such factors should be carefully considered in the intervention planning process to optimize the effectiveness of the proposed intervention. Of importance, parental practices in home routines, such as role modeling in health promotion activities, are key to assisting in the sustainable maintenance of healthy lifestyles in children. Moreover, this study has practical implications for applying the Precede-Proceed model. Theoretically, such a model requires intervention planners to conduct a sequential and linear exploration process (from Phase 1 to Phase 4) in the intervention planning process (Green et al., 2005). This study, similar to the work by Bibri (2018) and Johnson et al. (2020), reaffirms that intervention planning can be an iterative and backcasting exploration process, with multiple information gathering meaningfully required at each stage. Put simply, the process of ranking risk factors in terms of importance and changeability may generate additional and important risk factors, as previously discussed. These factors should be integrated into the intervention planning process and warrant in-depth consideration by intervention planners. There is a significant lack of published evidence documenting intervention planning processes employing qualitative approaches (Ricotti et al., 2021; Stokols, 1996; Tougas et al., 2015; Wigginton et al., 2020). Only recently did one Australian study report on the intervention planning process in greater detail (Bendotti et al., 2023). Most published evidence reported scant information on how intervention strategies are planned. In order to redress this gap, this study, underpinned by the Precede-Proceed model, detailed the key step, prioritizing risk factors in terms of changeability and importance, in the intervention planning process. One disadvantage is that this study did not involve kindergarten children, who may provide more meaningful insights into the importance and changeability of identified risk factors. This study has important implications. First, practitioners should develop the skills of revisiting the intervention development process, which has a great potential to generate new ideas. For example, by having parents comment on the risk factors in this study, researchers could gather useful, practical, and additional information that can be used to inform intervention development and epidemiological studies. Second, when employing a co-design approach, it is meaningful to have intervention participants (e.g. parents in this study) reflect on the previous findings (Wigginton et al., 2018), such a process can timely identify unknown or unrecognized areas that could have been incorporated effectively in the proposed intervention strategies. A formation evaluation, including the reflection from intervention participants, and others closely related to participants, researchers, and practitioners, should be a field of research in its own right. Given that this study is qualitative research, further studies could employ quantitative designs to explore the potential inferential associations between these risk factors.

4. Conclusion

Children's mobile phone use and sleep behavior were relatively more changeable and more important risk factors that should be addressed in the intervention planning process. In addition, late dinner times, children's physical activity participation, parental coffee consumption before sleep, parental perceived benefits and barriers of coffee consumption, and inadequate parental nutrition literacy relating to coffee consumption and sleep health were identified as additional risk factors that warrant further consideration. Future intervention development should focus on parental influences on children's coffee consumption. Intervention planning can be an iterative and backcasting exploration process, with multiple information gathering required at each stage. Intervention practitioners should critically re-evaluate existing information in the intervention planning process to further the understanding of the implementation context.

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Yanming Lu, Daohan Sun: Data collection and analysis and manuscript writing.

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Conflicts of Interest

The authors declared no conflicts of interest.

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Ethical considerations

Ethics approval was received by the Human Research Ethics Committee of Haian Second Experimental Kindergarten, Haian City, Jiangsu Province, China (approval number 374683).

Using artificial intelligence

Artificial intelligence techniques were not employed for this study.

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