Use of Health Improvement Tools through a Mobile Application to Improve Children's Physical Fitness

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Abstract. *Mobile health apps hold great potential for promoting children's health and wellbeing. However, there is limited understanding of how these technologies are currently designed to support children with their health concerns or wellness goals. This study provides insights for app designers, health researchers, and policymakers on strategies for engaging children and parents while also promoting children's health and wellbeing through mobile technology.*

Key words: *Screen time, blend of accessibility, personalization, and engagement, narratives, storylines, fitness trackers and smartwatches.*

Introduction

The digital age has brought with it a plethora of tools and technologies, many of which have found applications in healthcare and wellness. Among these, mobile applications focused on health improvement have emerged as a promising avenue for promoting physical fitness, especially among children. With increasingly sedentary lifestyles becoming the norm, leveraging the ubiquity and engagement of mobile apps presents a crucial opportunity to combat this trend and instill healthy habits from a young age.[1]

Modern children face an unprecedented level of inactivity. Screen time, whether for entertainment or education, often takes precedence over physical activity. This sedentary lifestyle contributes to a range of health issues, including obesity, cardiovascular problems, and even mental health challenges. Traditional methods of encouraging physical activity, such as organized sports, may not always be accessible or appealing to every child. This is where mobile applications can play a transformative role.

The aim of this article is to investigate the effectiveness of health improvement tools integrated within mobile applications for enhancing children's physical fitness. The article will explore the potential of mobile apps to address the growing concern of childhood inactivity and promote healthy lifestyles through engaging and personalized exercise programs. This research will employ a mixed-methods approach, combining quantitative and qualitative data collection and analysis. A comprehensive review of existing literature on childhood physical activity, the impact of sedentary lifestyles, and the use of mobile technology in health promotion. The discussion section will analyze the findings from the various data sources and explore the implications for promoting children's physical fitness through mobile applications. The results section will present the key findings of the research, including app

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[1] Domingues-Montanari S. Clinical and psychological effects of excessive screen time on children. Journal of Paediatrics and Child Health. 2020. P. 23.

feature analysis which is detailed analysis of the selected mobile apps and their features, highlighting their strengths and weaknesses in terms of promoting physical activity.

The Main Part

Unlike designing mobile health apps for adults, designing effective mobile apps for children's health and wellbeing presents unique challenges. One of the most important considerations is the developmental needs of children. Children's cognitive, social, and emotional development varies widely depending on age, and app designers need to take these differences into account when designing mobile health apps. For example, young children may not have their own smartphones, which may require more guidance and supervision from their caregivers or parents. Their cognitive development may also limit their understanding of comprehensive health data and other complex information.

On the other hand, older children may be more capable of navigating complex interfaces, design features, and healthcare language. Another factor to consider is the potential privacy and safety risks associated with digital technology. Children are particularly vulnerable to interactive mobile health apps, due to their still-developing mental model of safety and privacy concerns. In addition, there is a need to consider the potential impact of mobile apps on children's social and emotional development. For example, excessive screen time and social media use have been associated with negative health outcomes such as poor sleep quality and anxiety. To address these challenges, an increasing number of researchers are studying how mobile health apps can support children's health.

Mobile apps offer a unique blend of accessibility, personalization, and engagement that can be highly effective in motivating children to be more active. These apps can leverage several key features to achieve this:[2]

➤ Gamification which is integrating game-like elements, such as points, rewards, and challenges, can make exercise more fun and less of a chore. Children are naturally drawn to games, and this element can be a powerful motivator for consistent engagement.

➤ Personalized plans which are apps can tailor exercise routines to individual needs and preferences. This personalized approach ensures that the activities are appropriate for the child's age, fitness level, and interests, maximizing effectiveness and minimizing the risk of injury.

➤ Progress tracking which is monitoring progress is essential for maintaining motivation. Apps can track metrics such as steps taken, calories burned, and active minutes, providing children with a tangible sense of accomplishment and encouraging them to strive for improvement.

➤ Social interaction which is some apps incorporate social features, allowing children to connect with friends and family, share their progress, and participate in group challenges. This social element can foster a sense of community and healthy competition, further enhancing motivation.

➤ Educational content which is beyond just tracking activity, many apps also provide educational content about the benefits of exercise, healthy eating, and overall well-being. This information can empower children to make informed choices about their health and develop long-term healthy habits.

Several specific features within mobile apps have proven particularly effective in promoting children's physical activity. For example, interactive challenges that involve completing specific exercises or reaching certain activity goals can be highly motivating. Augmented Reality (AR) integration can overlay digital elements onto the real world, creating interactive and immersive exercise experiences. For example, children might chase virtual creatures or complete a scavenger hunt while running and jumping. Incorporating narratives and storylines into exercise routines can make them more engaging and enjoyable for younger children. Integration with wearable devices are

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[2] Agapie E, Chang K, Patrachari S, Neary M, Schueller SM. Understanding Mental Health Apps for Youth: Focus Group Study With Latinx Youth. JMIR Form Res. 2022 Oct 18. P. 12

connecting apps to fitness trackers and smartwatches allows for more accurate data collection and personalized feedback.[3]

While mobile apps offer significant potential, several factors need to be considered for their effective implementation. For example, parents play a crucial role in guiding children's app usage and ensuring that physical activity is balanced with other activities. Selecting apps specifically designed for the child's age group is essential to ensure safety and engagement. Carefully reviewing the app's privacy policy and ensuring data security is paramount. Mobile apps should complement, not replace, other health promotion initiatives in schools and communities.

Mobile health apps hold great potential for promoting children's health and wellbeing. However, there is limited understanding of how these technologies are currently designed to support children with their health concerns or wellness goals. We analyzed the primary users and their expectations as well as the methods of engagement and involvement adopted. Based on our findings, we discussed the opportunities to support children with chronic illnesses through mobile apps, design for dual use, and design for age appropriateness and digital health safety. This study provides insights and recommendations for app designers, health researchers, and policymakers on strategies for engaging children and parents while also promoting children's health and wellbeing through mobile technology.[4]

With the increasing smartphones and tablets availability, mobile applications have become a popular tool for promoting health and wellbeing among children. These consumer health technologies have the potential to provide children with personalized and engaging content that can support their physical, emotional, and mental health in their daily lives. For example, apps have been developed to provide children with tools (e.g., illness diary) and resources (e.g., educational content) to improve their nutrition and physical activity levels or manage chronic conditions such as asthma or diabetes. They can also provide children with content to support their mental health, such as mindfulness exercises or coping strategies for managing stress and anxiety.[5]

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[3] Saksono H, Castaneda-Sceppa C, Hoffman J, Morris V, Seif El-Nasr M, Parker AG. Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems New York, NY, USA: Association for Computing Machinery; 2020. Storywell: Designing for Family Fitness App Motivation by Using Social Rewards and Reflection; pp. p. 1–13.

[4] Pina L, Sien SW, Song C, Ward TM, Fogarty J, Munson SA, et al. DreamCatcher: Exploring How Parents and School-Age Children can Track and Review Sleep Information Together. Proc ACM Hum-Comput Interact. 2020 May 28;4(CSCW1):070:1–070:25. doi: 10.1145/3392882.

[5] Domingues-Montanari S. Clinical and psychological effects of excessive screen time on children. Journal of Paediatrics and Child Health. 2020. P. 23

[6] Iio M, Miyaji Y, Yamamoto-Hanada K, Narita M, Nagata M, Ohya Y. Beneficial Features of a mHealth Asthma App for Children and Caregivers: Qualitative Study. JMIR mHealth and uHealth. 2020 Aug 24;8(8):e18506. doi: 10.2196/18506.

In fact, the health informatics community has long been interested in studying and designing mobile health technologies to support children's health and wellbeing. For instance, researchers have examined the effectiveness of mobile apps in improving children's physical activity levels, nutrition, sleep quality, and mental wellness. They have also explored how app design can be tailored to children's developmental needs and preferences, by adopting gamification, storytelling, and interactive features (e.g., customized health data stickers) to engage and motivate children.

While mobile apps offer significant potential, several factors need to be considered for their effective implementation. For example, parents play a crucial role in guiding children's app usage and ensuring that physical activity is balanced with other activities. Selecting apps specifically designed for the child's age group is essential to ensure safety and engagement. Carefully reviewing the app's privacy policy and ensuring data security is paramount. Mobile apps should complement, not replace, other health promotion initiatives in schools and communities.

Conclusion

Mobile applications represent a powerful tool for promoting physical fitness among children. By leveraging gamification, personalization, and social interaction, these apps can effectively engage children in regular physical activity and instill healthy habits. Careful consideration of implementation strategies and ongoing evaluation are essential to maximize the positive impact of these technologies on children's health and well-being. As technology continues to evolve, mobile health apps will likely play an increasingly important role in shaping a healthier future for the next generation.

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