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Advanced modeling techniques to enhance toilet training in children

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Abstract
Toilet training in children is a crucial developmental milestone, focusing on teaching them to control defecation and urination. The absence of effective toilet training can result in several challenges, including social embarrassment when interacting with toilet-trained peers and increased stress and anxiety for both the child and parents. This study aims to evaluate the effectiveness of oral and modeling techniques in enhancing toilet training. Utilizing a case study design, we employed participatory observation, unstructured interviews, and documentation to gather data. The sample consisted of a pediatric patient aged 18-24 months. Data analysis was performed using domain analysis after tabulation. The findings indicate that employing oral and modeling techniques significantly improves toilet training outcomes in children. These methods are recommended for parents to implement in-home care settings to facilitate successful toilet training.

Keywords: Toilet training; oral techniques; modeling techniques; pediatric care; innovation in pediatric care

Introduction

Toilet training is a significant developmental milestone for children and involves teaching them to recognize and control their bodily functions to use the toilet (Kiddoo, 2012). This process typically begins between the ages of 18 months and 3 years, although the exact timing can vary widely among children. It requires a combination of physical readiness, emotional readiness, and developmental milestones (Baird, Bybel, & Kowalski, 2019). Physically, children need to develop the necessary muscle control to hold and release urine and stool. Emotionally, they must be willing to take this new step, which includes showing interest in the process and a desire for independence. Parents and caregivers play a crucial role by providing a supportive and positive environment, using praise and encouragement to reinforce successful attempts (Wyndaele, Kaerts, Wyndaele, & Vermandel, 2020). The process of toilet training involves several stages, starting with familiarizing the child with the bathroom and toilet. Introducing a potty chair or seat can help make the child comfortable and reduce fear. Gradually, the child is encouraged to sit on the potty at regular intervals, particularly after meals and before bedtime, when the urge to urinate or defecate is usually stronger (Choby & George, 2008). Consistency and routine are key factors, helping the child to associate specific times of the day with using the toilet. Parents should be patient and prepared for accidents, as it is common for children to take time to fully master this skill. Positive reinforcement, such as praise, stickers, or small rewards, can motivate the child and make the learning process more enjoyable (Canadian Paediatric Society, 2000). Challenges in toilet training can arise, such as resistance from the child, fear of the toilet, or regression due to changes in routine or environment. In such cases, it's essential for parents to remain calm and avoid punitive measures, which can create anxiety and further delay progress (Lang, 2008). Professional guidance from pediatricians or child psychologists may be beneficial if issues persist. Additionally, it is important to be mindful of the child's individual pace and not to compare their progress with others (de Carvalho Mrad et al., 2021).

Every child is unique, and pushing them too hard can lead to frustration and setbacks. Successful toilet training is achieved through a combination of patience, encouragement, and understanding of the child's cues and readiness (Klassen et al, 2006). Toilet training is a pivotal developmental milestone, but numerous barriers can complicate the process for both children and their caregivers **(Figure 1)**. One significant barrier is the child's

physical readiness. Toilet training requires a child to have developed sufficient bladder and bowel control, which typically happens between the ages of 18 months and 3 years (Tarhan et al., 2015). However, developmental variability means some children may not be physically ready until later. Children must recognize the sensations associated with needing to urinate or defecate and have the muscle control to hold and release at appropriate times. Premature attempts at toilet training, before a child is physically capable, can lead to frustration for both the child and the parents, resulting in negative experiences that may hinder progress (Cocchiola, Martino, Dwyer, & Demezzo, 2012). Another substantial barrier is emotional readiness and the child's psychological comfort with the process. Some children may experience anxiety or fear related to the toilet itself, the bathroom environment, or the act of using the potty. This fear can stem from various sources, such as the loud flushing sound, the perceived threat of falling in, or simply the unfamiliarity with the new routine (Wiggins et al., 2022). Emotional readiness also involves the child's willingness to part with their bodily waste, as some children may see their stool as an extension of themselves. This can create resistance to letting go, literally and figuratively (Choby & George, 2008). Moreover, the pressure from parents or caregivers, whether perceived or real, can add to the child's anxiety, making them more resistant to training (Law, Yang, Coit, & Chan, 2016). Emotional barriers are often exacerbated by significant life changes, such as the arrival of a new sibling, moving to a new home, or starting daycare, all of which can disrupt a child's sense of security and routine (Sclar & Mosler, 2022).

Figure 1. Illustration of toilet training (*Courtesy of unsplash.com*).

Environmental and situational factors also play a critical role in the success or failure of toilet training. Consistency and routine are paramount in this process, but maintaining a consistent schedule can be challenging for families with busy lifestyles, irregular work hours, or multiple caregivers (Hussain et al., 2017). Inconsistent

training methods or differing expectations between caregivers can confuse the child and delay progress. Additionally, access to child-friendly toilet facilities is essential. Homes and daycare centers must be equipped with potties or toilet seats suitable for young children, and these facilities need to be readily accessible (Luiselli, 1997). In public settings, the lack of appropriate facilities can hinder toilet training efforts, as parents may revert to using diapers for convenience. Moreover, socio-cultural attitudes towards toilet training can influence the approach and timing, with some cultures advocating early and intensive training while others take a more relaxed and child-led approach (deVries & deVries, 1977). These external factors can create a complex environment that either supports or undermines the toilet training process. The combination of physical, emotional, and environmental barriers highlights the multifaceted challenges of toilet training. Parents and caregivers must navigate these obstacles with patience, understanding, and flexibility, recognizing that each child is unique and will progress at their own pace (Rinald & Mirenda, 2012). Addressing physical readiness involves waiting for clear signs that a child is developmentally prepared, such as staying dry for extended periods, showing interest in the toilet, and having regular bowel movements. Emotional barriers can be mitigated by creating a positive and supportive atmosphere, using encouragement and praise rather than punishment. Familiarizing the child with the bathroom, allowing them to observe others using the toilet, and incorporating playful elements can reduce fear and build confidence. Consistency in routine, clear communication between all caregivers, and ensuring access to appropriate facilities are crucial in overcoming environmental barriers (Little, Wallisch, Dunn, & Tomchek, 2023).

The need for innovation in improving toilet training skills in children is paramount due to the diverse challenges parents and caregivers face in this crucial developmental phase. Traditional methods, while effective for many, often do not account for the wide range of individual differences in children's physical, emotional, and cognitive readiness (Hetherington, Eggers, Wamoyi, Hatfield, Manyama, Kutz, & Bastien, 2017). Innovative approaches can offer more tailored solutions, addressing these variances more effectively. For instance, advancements in smart technology can provide real-time feedback and reminders, helping children to recognize and respond to their body's signals more promptly (Mruzek et al., 2019). Apps designed for toilet training can gamify the process, making it more engaging and less intimidating for children. These tools can track progress, offer rewards, and provide parents with valuable insights into their child's readiness and development (Wu, 2013). Another area ripe for innovation is the design of toilet training equipment. Traditional potty chairs and toilet seats often lack adaptability for different stages of a child's growth and development. Innovatively designed potty systems that grow with the child, incorporating adjustable heights and supportive features, can enhance comfort and ease of use. Additionally, incorporating sensory elements, such as lights and sounds, can make the potty more appealing to children, reducing anxiety and encouraging use. Portable and travel-friendly potty solutions are also needed to maintain consistency in training, even when away from home (Bauza, Reese, Routray, & Clasen, 2019). Such innovations can significantly alleviate the logistical challenges parents face and ensure that children have access to appropriate facilities wherever they are (Piccin, Crippa, Nobile, Hardan, & Brambilla, 2018). Moreover, educational resources and support systems for parents and caregivers are critical areas for innovation. Many parents lack the knowledge or confidence to effectively guide their children through toilet training. Comprehensive, evidence-based training programs and workshops can equip them with the necessary skills and strategies. Online platforms and communities offer spaces for parents to share experiences, seek advice, and receive encouragement. Integrating expert consultations via telehealth services can provide personalized support, addressing specific concerns and challenges. Leveraging technology and modern educational tools can create a more supportive environment that empowers parents and caregivers, ultimately leading to more successful and less stressful toilet training experiences for children. Therefore, this study aimed to develop an advanced method for toilet training children at home.

Method

In this study, a case study approach was employed, utilizing purposive sampling techniques to select participants. The research was specifically carried out in a village in Magelang, which provided a controlled environment for examining the effectiveness of the proposed toilet training methods. This approach allowed the researchers to focus on a specific population of interest—children under the age of 3 who had not yet achieved the developmental milestones of independent urination and defecation. The purposive sampling technique ensured that the selected sample was directly relevant to the research question, allowing for a more targeted investigation into the challenges and solutions associated with toilet training in this age group **(Figure 2)**. By choosing a village setting, the study also

aimed to understand how the method could be implemented in a real-world, community-based context. The inclusion criteria for this study were specifically designed to focus on children who were below 3 years old and had not yet mastered the ability to manage their own toileting needs, provided that they had supportive parental involvement. This age range was selected because children in this group are at a critical stage of developing toilet training skills. Conversely, children over the age of 5 were excluded from the study as they are typically past the initial stages of toilet training, and their needs and challenges would differ significantly from those of younger children. The data collection process involved a combination of educational methods, demonstrations, physical examinations, and assessments of the children's abilities. This multi-faceted approach aimed to provide a comprehensive evaluation of the effectiveness of the toilet training techniques being studied. Data collection occurred from July 5 to July 8, 2024, and included four sessions of education and demonstrations. This timeframe allowed for consistent and thorough interaction with the participants, ensuring that the training methods could be adequately assessed. The research adhered to ethical standards, with approval obtained from the Ethics Committee of the Faculty of Health Sciences at Muhammadiyah University of Magelang prior to the commencement of data collection. This ethical clearance ensured that the study was conducted with respect for the participants' rights and well-being, and that all procedures followed rigorous ethical guidelines. By incorporating these elements, the study aimed to contribute valuable insights into effective toilet training methods that could potentially be applied in similar settings.

Figure 2. Illustration of toilet (*Courtesy of pexels.com*).

Results

Despite the ongoing need for substantial parental assistance, the physical examination results provided valuable insights into the patient's current condition. The patient, a 22-month-old male, presented with a heart rate of 98 beats per minute, a normal body temperature of 36°C, and a respiratory rate of 22 breaths per minute. These vital signs were within expected ranges for his age, suggesting overall good health. However, his continued reliance on

diapers for both urination and defecation indicated that he had not yet achieved the developmental milestones necessary for independent toileting. This persistent dependence highlighted the importance of addressing his toilet training needs through targeted interventions and support. The study involved a comprehensive approach to toilet training, incorporating both educational and practical demonstrations over a four-day period. The training utilized oral instruction and modeling techniques to guide the patient and his parents through the process. The result was a marked improvement in the patient's ability to manage urination and defecation. The structured sessions not only educated the parents on effective toilet training strategies but also provided hands-on experience for the child, facilitating a smoother transition from diaper use to independent toileting. This progress underscores the effectiveness of the applied techniques and the importance of sustained, interactive training in achieving developmental goals. The parents' engagement and support played a crucial role in the success of the training program. Their positive attitude and active participation in the educational sessions were instrumental in reinforcing the new skills and practices being introduced. They expressed strong support for the initiative, driven by the hope that their child would soon gain the ability to manage toileting independently. This collaborative effort between the research team and the family exemplifies the importance of a supportive environment in facilitating developmental milestones and achieving long-term behavioral changes. The promising results of this study suggest that with appropriate guidance and support, similar outcomes could be achieved for other children facing challenges with toilet training.

Discussion

The findings from this study offer significant insights into the effectiveness of targeted educational interventions for toilet training in young children. The physical examination of the patient, a 22-month-old male, indicated normal vital signs with a heart rate of 98 beats per minute, a body temperature of 36°C, and a respiratory rate of 22 breaths per minute. These measurements confirm that the patient was in good health, which is an important consideration when evaluating the impact of educational interventions on developmental milestones (Ertem, Dogan, Srinivasan, Yousafzai, & Krishnamurthy, 2022). The patient's reliance on diapers throughout his early years underscores the need for tailored strategies to address his specific toilet training challenges. This persistent dependency highlights the broader issue of toilet training difficulties in children who have not yet reached the developmental stage of independent toileting. The intervention employed in this study involved a combination of oral instruction and modeling techniques conducted over a four-day period. This approach aimed to provide both theoretical knowledge and practical, hands-on experience for both the child and his parents. The results demonstrated a significant improvement in the patient's ability to manage urination and defecation. This progress can be attributed to the structured nature of the training, which combined clear explanations with practical demonstrations, allowing the patient to gradually adapt to the new behaviors associated with toilet training (Kroeger & Sorensen, 2010). The success of these methods highlights the potential benefits of integrating educational and demonstrative techniques in addressing developmental challenges. The active participation and support of the parents were crucial to the observed improvements. Their engagement in the educational sessions not only facilitated the application of the training techniques but also created a supportive environment conducive to behavioral change (Ito & Inoue, 2022). The parents' positive response and encouragement were instrumental in reinforcing the new skills being introduced. This finding underscores the importance of involving parents in the training process, as their involvement can significantly enhance the effectiveness of the intervention (van Nunen, Kaerts, Wyndaele, Vermandel, & Hal, 2013). The study demonstrates how parental support can be a key factor in achieving successful outcomes in toilet training. The study provides a valuable framework for developing and implementing effective toilet training strategies, emphasizing the need for continued innovation and support in early childhood developmental practices (Cagliani, Snyder, & White, 2021).

Healthcare professionals play a pivotal role in the toilet training process, providing essential guidance and support to both parents and children. Their involvement begins with assessing the child's readiness for toilet training, which involves evaluating developmental milestones, physical health, and behavioral indicators (Schickedanz & Halfon, 2020). Professionals utilize their expertise to determine if a child is sufficiently mature and physically prepared to begin the process, considering factors such as bladder and bowel control, motor skills, and cognitive development (Tesfay, Sebsibe, & Tesfaye, 2021). This initial assessment helps in setting realistic goals and expectations, ensuring that the training process aligns with the child's individual needs and capabilities (Choo, Yeleswarapu, How, & Agarwal, 2019). Once a child is deemed ready for toilet training, healthcare professionals offer

invaluable advice on appropriate training methods and techniques. Healthcare professionals provide evidence-based recommendations tailored to the child's age, developmental stage, and specific needs **(Figure 3)**. This guidance often includes practical strategies for introducing the concept of toilet training, such as creating a consistent routine, using positive reinforcement, and addressing common challenges that may arise. Healthcare professionals help parents select and implement the most effective approaches for their child, enhancing the likelihood of successful outcomes (Nilsson, Leijon, Sillén, Hellström, & Skogman, 2022). In addition to offering practical advice, healthcare professionals also play a critical role in educating parents about the toilet training process.

Figure 3. Illustration of healthcare professionals in pediatric care (*Courtesy of pexels.com*).

Healthcare professionals address common concerns and misconceptions, helping parents understand the typical timelines and expectations associated with toilet training. This educational component is crucial for reducing parental anxiety and ensuring that parents are well-equipped to support their child throughout the training process (Thompson, May, Leach, Smith, & Fereday, 2023). Professionals may conduct workshops, provide informational materials, or offer one-on-one consultations to ensure that parents have access to accurate and relevant information (Boelsma, Bektas, Wesdorp, Seidell, & Dijkstra, 2021). Healthcare professionals also serve as a supportive resource for troubleshooting and problem-solving during the toilet training process. They assist parents in addressing issues such as resistance, accidents, or setbacks that may occur. Professionals help parents navigate these challenges and maintain a positive and encouraging approach by offering practical solutions and coping strategies. This ongoing support is essential for maintaining progress and ensuring that the child remains motivated and engaged in the training process. Finally, the role of healthcare professionals extends to monitoring and evaluating the child's progress throughout the toilet training journey. They assess the effectiveness of the training methods being used, make necessary adjustments based on the child's responses, and provide feedback to parents on their child's progress. This continuous oversight ensures that the training remains on track and adapts to

the child's evolving needs. Moreover, healthcare professionals contribute to a more successful and less stressful experience for both the child and the family. Their comprehensive support and expertise are instrumental in achieving positive outcomes and fostering long-term success in toilet training.

Conclusion

The findings from this study contribute to a deeper understanding of how targeted educational interventions can address toilet training difficulties in young children. The combination of oral and modeling techniques proved effective in facilitating the transition from diaper use to independent toileting, illustrating the potential for these methods to be applied in similar contexts. Healthcare professionals along with family member play important roles in this training. Future research could expand on these findings by exploring different age groups, varying intervention durations, and additional factors that may influence the success of toilet training.

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Author's perspective

Key points

- Toilet training in children is a crucial developmental milestone
- Professionals help parents navigate these challenges and maintain a positive and encouraging approach
- The combination of oral and modeling techniques proved effective in facilitating the transition from diaper use to independent toileting

Potential areas of interest

- How do targeted educational interventions specifically address toilet training difficulties in young children?
- How can family members support and enhance the toilet training process for young children?
- How might varying the duration of interventions impact the success of toilet training in young children?

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