Original Article

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The Perception, Behaviour, and Preferred Features of Mobile Applications Screening Tools for Pediatric Feeding Disorders Among Caregivers and Speech Therapists

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Abstract:

Objective: To explore the perception, behaviour, and preferred features of caregivers and speech therapists in the design of a mobile application for the screening of Pediatric Feeding Disorders (PFD).

Material and Methods: A cross-sectional study was conducted using a Perception, Behaviour and Preferred Features of Mobile Applications Screening (PBF-MAS) questionnaire. The participants included 30 caregivers and 30 speech therapists recruited from Malaysian public healthcare facilities. Sociodemographic profiles were obtained, and the PBF-MAS questionnaire consisted of domains related to the perception, behaviour, importance of early screening for PFD, and the preferred features of mobile applications. Data were analysed using Statistical Package for the Social Sciences (SPSS) version 29.0.

Results: Most caregivers were female (90%), aged between 19 and 49 years, while speech therapists were predominantly female (93.3%), aged between 25 and 44 years. A majority of respondents expressed a high interest in mobile applications, particularly in features such as screening questionnaires (83.3%), educational resources (75%), meal planning (63.3%), and feeding progress tracking (66.7%). Statistically significant differences were observed between caregivers and speech therapists in preferred features such as educational resources (p-value<0.001), progress tracking (p-value=0.028), customizable profiles (p-value<0.001), meal tracking (p-value<0.001), and feeding schedule reminders (p-value<0.001). Despite the interest, actual usage remained low, with only 10% of caregivers and 6.7% of speech therapists having downloaded feeding-related apps, indicating a gap between interest and practical use.

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Conclusion: Digital health tools can facilitate early intervention and alleviate the burdens on caregivers and speech therapists of PFD. Healthcare providers must offer training to caregivers on using these digital tools effectively. Application developers should focus on creating user-friendly, culturally relevant applications. Future research should examine the long-term impacts of these tools on feeding issues and quality of life.

Keywords: pediatric feeding disorders, mobile application, early screening, feeding therapy

Introduction

Pediatric feeding disorders (PFD) are defined as inappropriate oral intake for age associated with dysfunction across medical, nutritional, feeding skills, or psychosocial areas[1]. It is now more widely recognised as a complex and often overlooked issue in children's health, particularly during the early clinical stages[2]. Global studies from Western countries indicate that feeding difficulties affect between 25% and 45% of typically developing children, rising to over 85% among children diagnosed with conditions, such as autism or cerebral palsy[3,4]. In Malaysia, the actual prevalence of PFD remains underrepresented. According to Visvalingam & Sivanesom[5], cultural norms that accept selective eating habits and insufficient national data lead to significant underreporting, causing caregivers to perceive feeding challenges as transient and delaying professional intervention.

Early development of feeding skills is critical during the first 2 years of life, and delays can result in persistent feeding difficulties, nutritional deficiencies, and developmental delays[6–8]. Misconceptions among caregivers, who often perceive feeding issues as behavioural, and limited training among healthcare providers contribute to delayed intervention and increased caregiver stress[9,10]. These delays lead to repeated hospital visits, financial strain, and reduced caregiver employment[11,12].

Speech therapists play a central role in early identification and intervention, but both they and caregivers face barriers, such as a lack of tools, resources, and time[13,14]. Many primary care providers lack training in early PFD detection, delaying referrals and increasing caregiver anxiety, especially in complex cases[9,15]. In addition, speech therapists encounter challenges, including inadequate digital assessment tools, insufficient caregiver education resources, high workloads, and time constraints[13,14]. Caregivers frequently lack access to straightforward and reliable tools tailored specifically to their needs, struggle to identify early indicators of feeding problems, or experience limited social support[16–19]. These delays lead to repeated hospital visits, financial strain, and reduced caregiver employment[11,12,20].

While digital health technologies, particularly mobile apps, offer promising solutions through screening, education, and caregiver support[21,22], culturally relevant and user-friendly tools remain scarce in Malaysia[23,24]. Therefore, this study aimed to explore the perceptions, behaviours, and desired features of mobile screening tools for PFD among caregivers and speech therapists, with the goal of informing the development of effective digital solutions to improve feeding management, child health outcomes, and caregiver well-being.

Material and Methods

A cross-sectional study was carried out between June and August 2024 at the outpatient and speech therapy clinics of Hospital Pakar Universiti Sains Malaysia (HPUSM), a tertiary teaching hospital that serves a diverse

population from both urban and semi-urban areas along the east coast of Peninsular Malaysia. HPUSM was chosen as the primary study site due to its role as a regional referral centre for paediatric and rehabilitative services, including speech therapy.

Ethical approval for this study was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (USM/JEPeM/KK/24010134).

The study included primary caregivers of children aged 6 months to 7 years old who demonstrated observable feeding difficulties and were already referred to or receiving services from speech therapy clinics. Common conditions observed among these children included speech and language delay, suspected autism spectrum disorder, Down syndrome, global developmental delay, and sensory-based feeding problems. This inclusive clinical cohort reflects real-world diversity in pediatric feeding presentations and supports the generalizability of the findings for developing a universal screening tool. The caregivers were also proficient in the Malay language. Caregivers with hand dexterity issues, intellectual disabilities, or uncorrected visual or hearing impairments were excluded. Speech therapists were recruited nationwide from both public and private healthcare sectors via professional networks and associations. Eligible participants included therapists with at least 5 years of clinical experience managing PFD and fluency in either Malay or English. A total of 60 participants were selected through convenience sampling, comprising 30 caregivers and 30 speech therapists. Face-to-face interviews were conducted with caregivers at the outpatient and speech therapy clinics at the HPUSM using a questionnaire. Speech therapists were recruited online through professional networks. Study details and the questionnaire were shared via email and online groups.

The questionnaire was developed based on a comprehensive review of the existing literature, tailored specifically to the local context, and aligned with the study objectives. This newly developed instrument was named the Perception, Behaviour, and Preferred Features of Mobile Applications Screening (PBF-MAS) questionnaire, and it underwent rigorous psychometric evaluation, including content and face validity assessments. The Content Validity Index (CVI) revealed robust validity indicators, including an Item-level CVI (I-CVI) of 0.86, a Scale-level CVI Average (S-CVI/Ave) of 0.97, and a Scale-level CVI Universal Agreement (S-CVI/UA) of 0.80. Furthermore, the Scale-level Face Validity Index demonstrated excellent validity, with S-FVI/Ave and S-FVI/UA scores both attaining perfect scores (1.00), affirming the clarity, relevance, and comprehensibility of the questionnaire items.

The PBF-MAS questionnaire consisted of 2 parts. Part A gathered sociodemographic data (e.g., gender, age, ethnicity, marital status, education, employment), while Part B included 10 questions across 4 domains: perceptions of mobile applications (5 items), behaviours related to mobile app usage (3 items), importance of early screening (1 item), and preferred features in a mobile screening app (multiple-choice with 9 options).

The perception domain comprises 5 statements regarding attitudes towards the use of mobile applications, which were scored on a 5-point Likert scale, ranging from "Never/Strongly disagree" to "Always/Strongly agree". Positive perceptions were scored as 1, whereas negative perceptions were scored as 0. The total scores ranged from 0 to 5. Higher scores represented more positive perceptions towards mobile applications for managing feeding disorders.

For the behaviour section, questions assessing the participants' mobile app downloading and usage behaviours employed categorical responses. Question *"I have downloaded mobile applications for feeding disorders management"* was scored as "Yes" (1) or "No" (0). The subsequent questions, *"I use mobile applications for feeding*

disorders management" and *"I always look for available and suitable mobile applications for PFD management,"* were scored on a 5-point Likert scale ranging from "Never" to "Always". The total behaviour scores ranged from 0 to 5. Higher scores indicated more frequent or active behaviours regarding mobile device application usage.

The importance of the early screening section comprised a single statement rated using a 5-point Likert scale, ranging from "Strongly disagree" to "Strongly agree". Positive attitudes were scored as 1, whereas negative attitudes were scored as 0. The total attitude scores ranged from 0 to 1. Higher scores indicated stronger support for the integration of self-screening mobile device applications in PFD management.

The overall score for participant responses was calculated by summing the scores from each section separately. Higher total scores in each section indicated more favourable behaviours, perceptions, or stronger agreement on the importance of early screening using mobile applications.

Data were analysed using IBM SPSS version 29.0. Descriptive statistics summarized participant demographics and response patterns. Categorical variables were reported as frequencies (n) and percentages (%), while continuous variables were expressed as means and standard deviations (S.D.). Independent t-tests compared mean scores between caregivers and therapists, and Chi-square tests assessed associations between participant type and preferred app features. A significance level of 0.05 (two-tailed) was used for all analyses.

Results

A total of 60 respondents (30 caregivers and 30 speech therapists) participated in the study. Most caregivers were female (90%), aged 30–34 years old, and married. The majority held bachelor's degrees and were housewives. Speech therapists were mostly government-employed females aged 25–34 years old. Table 1 presents the results of this study.

Perceptions towards mobile apps

Table 2 represents the participants' perceptions of the usefulness of mobile applications in feeding disorders management. Over 85% of caregivers and speech therapists expressed a desire to have and use mobile apps for PFD management. A high agreement was found in recommending such apps and believing in their benefits, reflected by the mean scores above 4.0 for all perception items.

Table 1 Participants' demographic profile (n=60)

Profiles	Caregivers (n=30) n (%)	Speech therapists (n=30) n (%)
Gender		
Female	27 (90.0)	28 (93.3)
Male	3 (10.0)	2 (6.7)
Age range (years)		
19–24	2 (6.7)	–
25–29	6 (20.0)	2 (6.7)
30–34	10 (33.3)	14 (46.7)
35–39	6 (20.0)	11 (36.7)
40–44	4 (13.3)	3 (10.0)
45–49	2 (6.7)	
Ethnicity		
Malay	30 (100)	24 (80.0)
Chinese	–	6 (20.0)
Marital status		
Married	27 (90.0)	22 (73.3)
Single	3 (10.0)	8 (26.7)
Education level		
Master's degree	–	2 (6.7)
Bachelor's degree	16 (53.3)	28 (93.3)
Diploma	4 (13.3)	–
Secondary School	10 (33.3)	–
Employment Sector		
Government	5 (16.7)	27 (90.0)
Private	1 (3.3)	–
Self-employment	7 (23.3)	3 (10.0)
Housewife	17 (56.7)	–

Table 2 Perceptions towards mobile apps (n=60)

Items	Scale	Caregivers, n (%)	Speech Therapists n (%)	Mean (S.D.)[a]
"I wish I have mobile applications for feeding disorders management."	Never:	–	1 (3.3)	4.2 (0.97)
	Rarely:	–	2 (6.7)	
	Sometimes:	4 (13.3)	6 (20.0)	
	Often:	9 (30.0)	6 (20.0)	
	Always:	17 (56.7)	15 (50.0)	
"I want to use mobile applications in feeding disorders management."	Never:	–	–	4.1 (0.95)
	Rarely:	–	3 (10.0)	
	Sometimes:	4 (13.3)	10 (33.3)	
	Often:	9 (30.0)	6 (20.0)	
	Always:	17 (56.7)	11 (36.7)	
"I believe that I will benefit much from using mobile applications in feeding disorders management."	Strongly disagree:	–	–	4.5 (0.59)
	Disagree:	–	–	
	Neutral:	1 (3.3)	2 (6.7)	
	Agree:	10 (33.3)	17 (56.7)	
	Strongly agree:	19 (63.3)	11 (36.7)	
"I believe that the speech therapists and caregivers want to use mobile applications as feeding disorders management tools."	Strongly disagree:	–	–	4.3 (0.70)
	Disagree:	–	–	
	Neutral:	2 (6.7)	6 (20.0)	
	Agree:	13 (43.3)	13 (43.3) (13)	
	Strongly agree:	15 (50.0)	11 (36.7)	

S.D.=standard deviation, [a]Min score=0, Max score=5

Behaviours towards mobile app use

Table 3 shows the participants' behaviours related to downloading, using, and recommending mobile applications for feeding disorders management. Only 10% of caregivers and 6.7% of speech therapists had downloaded feeding-related applications. However, they showed a high interest in using mobile apps. Approximately 36.7% of caregivers and 16.7% of speech therapists reported "always" seeking relevant mobile apps.

Importance of early screening

Table 4 shows the participants' opinions on the importance of self-screening mobile applications. Both groups agreed on the importance of early self-screening tools for caregivers.

Preferred features

Table 5 summarizes the preferred features among caregivers and speech therapists for a PFD screening mobile application. Participants could choose multiple preferred features. There were statistically significant associations between participant type and most of the features (p-value<0.05), except for the screening questionnaire (p-value=0.488) and nutritional information (p-value=0.136), where no significant differences were found. Speech therapists showed higher preferences than caregivers for customizable profiles (78.4%), meal tracking (75.0%), feeding schedule reminders (75.0%), meal planning (68.4%), educational resources (64.4%), and progress tracking (60.0%).

Table 3 Behaviour toward mobile app use (n=60)

Questions	Scale	Caregivers, n (%)	Speech Therapists, n (%)	Mean (S.D.)[a]
"I have downloaded mobile applications for feeding disorders management."	Yes No	3 (10.0) 27 (90.0)	2 (6.7) 28 (93.3)	0.83 (0.29)[a]
"I use mobile applications for feeding disorders management."	Never: Rarely: Sometimes: Often: Always:	29 (96.7) – – – 1 (3.3)	28 (93.3) – 2 (6.7) – –	1.13 (0.62)[b]
"I always look for available and suitable mobile applications for feeding disorders management."	Never: Rarely: Sometimes: Often: Always:	1 (3.3) 2 (6.7) 9 (30.0) 7 (23.3) 11 (36.7)	8 (26.7) 8 (26.7) 8 (26.7) 1 (3.3) 5 (16.7)	3.2 (1.40)[b]

S.D.=standard deviation, [a]Min score=0, Max score=1, [b]Min score=0, Max score=5

Table 4 Importance of Early Screening (n=60)

Questions	Scale	Caregivers n (%)	Speech Therapists n (%)	Mean (S.D.)[a]
"I believe that it is important to consider the self-screening mobile applications among caregivers as feeding disorders management tools."	Strongly disagree: Disagree: Neutral: Agree: Strongly agree:	– – 1 (3.3) 11 (36.7) 18 (60.0)	– – 2 (6.7) 13 (43.3) 15 (50.0)	4.5 (0.60)

S.D.=standard deviation, [a]Min score=0, Max score=5

Table 5 Preferred features of mobile apps (n=60)

Feature	Number of participants preferred, n (%)		Chi-square (χ^2)	df[a]	p-value
	Speech therapist	Caregiver			
Screening questionnaire	24 (48.0)	26 (52.0)	0.48	1	0.488
Educational resources	29 (64.4)	16 (35.6)	15.02	1	<0.001
Nutritional information	25 (55.6)	20 (44.4)	2.22	1	0.136
Progress tracking	24 (60.0)	16 (40.0)	4.80	1	0.028
Meal planning	26 (68.4)	12 (31.6)	14.07	1	<0.001
Customizable profiles	29 (78.4)	8 (21.6)	31.09	1	2.463
Food diary	25 (18.5)	12 (32.4)	11.92	1	<0.001
Meal tracking	24 (75.0)	8 (25.0)	17.14	1	3.472
Feeding schedule reminders	21 (75.0)	7 (25.0)	13.13	1	<0.001

[a]degree of freedom

Discussion

This study was conducted in Hospital Pakar Universiti Sains Malaysia (HPUSM) to reflect the real-world challenges faced by caregivers of children with feeding disorders and their healthcare professionals within Malaysia's public healthcare system. This study provides critical insights into caregivers' and speech therapists' perceptions, behaviour, and preferences related to mobile applications for PFD.

Perception towards mobile app usage

The findings revealed a strong positive perception of mobile applications for managing PFD among caregivers and speech therapists, with over 85% expressing interest and confidence in their use. They align with previous studies showing widespread app adoption and positive attitudes among speech therapists[25,26]. However, despite high interest, practical barriers, such as limited training and technical support, may hinder effective implementation[27,28,29]. The uniformly positive responses may reflect biases like social desirability or self-selection, possibly influenced by a shift toward digital health solutions. Future research should explore qualitative and practical aspects to guide the development of effective mobile apps for PFD.

Behaviour towards mobile app usage

Despite participants expressing overwhelmingly positive perceptions and interest in mobile application use for PFD management, actual adoption remains low. Only 10% of caregivers and 6.7% of speech therapists had downloaded relevant apps, creating a significant disparity between perceived usefulness and real-world engagement. This conflict highlights the presence of an "intention-behaviour gap," a common phenomenon in digital health where interest does not automatically translate into usage[26,30]. Several factors may contribute to this disconnect, including limited digital literacy, low awareness of available tools, and a mismatch between existing app features and user expectations[27,28,30]. While caregivers and therapists reported high perceived usefulness of mobile apps (mean perception scores >4.0), the lack of locally tailored, culturally appropriate, and clinically validated applications may hinder practical implementation[24]. Understanding this contradiction is important for guiding future development of mobile applications. The application designers must prioritize not only feature richness, but also usability, accessibility, and training support to promote sustained adoption in real-world settings. Therefore, while enthusiasm for mobile screening tools is high, actual usage remains limited, emphasizing the need to bridge the gap through thoughtful design that emphasizes relevance, simplicity, and user empowerment.

Importance of early screening in PFD management

The caregivers and speech therapists shared a strong belief in the value of self-screening mobile applications for managing PFD. These results align with the study's expectations, reinforcing the idea that early identification tools can enhance feeding disorder management, improve child health outcomes, and reduce caregiver stress. This growing acceptance of digital tools in healthcare mirrors broader trends in the literature. Previous studies have consistently underscored the importance of early screening in enabling timely intervention, improving clinical outcomes, and easing caregiver distress[26,31]. While the overall perception was positive, a small percentage of neutral responses among caregivers (3.3%) and among speech therapists (6.7%) suggests some uncertainty. This may stem from limited exposure to or experience with digital screening tools, highlighting the need for further education and training. Other possible factors include digital literacy challenges, varying comfort levels with technology, or scepticism about the reliability of mobile apps for clinical

use. Future research should explore these concerns to support broader acceptance and effective integration of mobile screening tools in PFD care.

Preferred features of the mobile app

Both groups favoured essential features such as screening questionnaires, educational resources, nutritional information, and tracking tools. However, statistical analysis revealed significant differences in feature preferences between the two groups. Speech therapists showed significantly stronger preferences for educational resources, customizable profiles, meal planning, meal tracking, food diaries, progress tracking, and feeding schedule reminders, reflecting their clinical perspective and professional roles in managing pediatric feeding challenges.

These results align with expectations by highlighting critical functionalities required by both user groups. The high consensus on the screening questionnaire and nutritional information indicates a universally recognized value in features supporting early identification and nutritional guidance. The findings correspond with the existing literature, emphasizing educational resources and progress tracking as integral for caregiver knowledge enhancement, clinical effectiveness, patient adherence, and treatment outcomes[32–35].

Unexpectedly, caregivers showed relatively lower preferences for meal planning and customizable profiles compared to speech therapists, potentially due to unfamiliarity with the practical benefits or perceived complexity of these features[33]. Caregivers may prioritize simpler, immediate support tools over features perceived as complex or less directly relevant to their daily tasks.

The current initial study was designed to first understand the views of speech therapists as the main screening professionals responsible for the early assessment, diagnosis, and intervention of PFD in Malaysia. In addition, their expertise in oral–motor skills, behavioural feeding strategies, and caregiver education positions them at the forefront of PFD management. The limitations of this study include a relatively small sample size, limiting broader generalization, and focusing primarily on initial perceptions rather than actual app usage experiences. Therefore, future research should involve the dietitians and occupational therapists, acknowledging their significant roles in the multidisciplinary management of PFD to capture a broader perspective for app development. Future research should also explore caregiver–specific app navigation and practical preferences that can enhance future app design, ensuring better alignment with their everyday needs. Ultimately, these insights will inform the development of effective mobile screening tools, significantly improving pediatric feeding management, enhancing child health outcomes, and reducing caregiver burdens.

Conclusion

This study highlights the strong interest and positive perceptions among caregivers and speech therapists regarding mobile application screening tools for managing PFD. The findings underscore the need for culturally relevant, user–friendly applications that incorporate the main features, such as screening questionnaires, educational resources, and progress tracking. The longitudinal impacts and effectiveness of optimising mobile health interventions to improve pediatric feeding outcomes and caregiver support also need to be explored.

Ethical approval statement

Ethical approval for this study was obtained from the Human Research Ethics Committee of Universiti Sains Malaysia (USM/JEPeM/KK/24010134).

Author contributions

A.S.Z. and N.A.R. conceptualized and designed the study; M.M.A. conducted the data analysis and interpretation; J.S. and S.S. supervised the project. All authors contributed to manuscript writing and approved the final version.

Data availability statement

Data from this study are available upon request from the corresponding author.

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Conflict of interest

The authors declare that there is no conflict of interest.

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