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Original Article

Development of an application for identification and guidance on orthopedic foot diseases

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Abstract

Objective: Develop software to identify the main orthopedic diseases affecting the feet and guide patients by assessing pain intensity and the application's (APP) diagnostic accuracy.

Methods: The software was developed by the Creation Department of Unichristus University. Over two months, 22 patients seeking orthopedics assistance for foot pain were recruited. During the scheduling, they were invited to participate in the study and received a link to download the APP. After signing the informed consent form and using the APP, the patient's pain intensity and APP-suggested results were collected and compared to the medical diagnosis recorded in electronic health records after consultation.

Results: The APP was developed with information on the main orthopedic foot diseases. It showed high accuracy for hallux valgus (100%), plantar fasciitis (75%), metatarsalgia (66.67%), and calcaneal tendinopathy (66.70%). However, the overall concordance with medical diagnoses was 40.90%. Pain intensity primarily ranged between 6 and 8 (68.20%).

Conclusion: The APP yielded positive results in identifying specific orthopedic foot diseases with relevant pain intensities but did not achieve high overall concordance. Further studies are needed to create more accurate diagnostic flowcharts.

Level of Evidence; Diagnostic studies - investigating a diagnostic test.

Keywords: Mobile applications; Validation study; Health education.

Introduction

Foot and ankle-related diseases have a high incidence and are widely prevalent across the population, affecting individuals of all sexes, age groups, races, and social classes[1]. The prevalence of each pathology also varies according to these factors. For instance, hallux valgus is highly prevalent among older people and contributes to postural instability, other foot deformities, and even loss of independence in this population[2]. These conditions can lead to work-related impairments, hinder recreational and professional sports activities, cause emotional issues (such as anxiety and depression), and result in an overall reduction in individuals' quality of life[3,4].

Despite the significant impact these pathologies can have on daily life, attention to the feet and ankles is often neglected. Symptoms, including pain, are frequently ignored, and the conditions are only identified after thorough consultations or objective evaluation tools, such as the Foot Function Index (FFI)[5,6]. These diseases are treated by various healthcare professionals, including General Practitioners, General Orthopedic Surgeons, Foot and Ankle Specialists, Physical Therapists, and Podiatrists[7-9]. Treatments range from lifestyle changes, adjustments to physical activities, and shoe modifications to using pre-molded or custom orthotic insoles and surgical procedures[10]. However, these approaches are not uniformly applied, particularly in the

Study performed at the Dr. Vagner M. Paiva Clinic, Fortaleza, CE, Brazil.

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early stages, where simple measures such as weight loss, temporary modifications to physical activity, stretching, or heel lifts or insoles to correct foot alignment can significantly benefit patients[11,12].

In specialized foot and ankle orthopedic practice, it is observed that these diseases often follow a well-defined topographic pattern. As defined in the medical semiotic and semio-technical concept of "anatomical diagnosis," which relates anatomical structures to signs and symptoms, the area where the patient experiences the most intense pain is usually associated with one or two specific conditions, which can often be easily differentiated using a simple flowchart. This is because the foot's complex bony structure is designed to absorb load and support the body, while its thin subcutaneous tissue layer makes critical structures such as tendons, fasciae, retinacula, joints, and nerves easily palpable and susceptible to acute or chronic injuries, even without significant trauma. As a result, foot and ankle orthopedic specialists can often identify certain conditions without imaging studies. Similarly, patients who can pinpoint the location of their pain and have basic knowledge about foot diseases affecting that specific area could also gain an understanding of the condition affecting them[13-16].

This concept has already been implemented for pregnant women with access to approximately mobile applications providing information on risk factors for preeclampsia, enabling early medical intervention if needed[17-19]. With proper information, patients could adopt palliative measures to improve their quality of life while awaiting specialized orthopedic care. These measures might include weight loss, stretching the posterior chain of the lower limbs, adjusting physical activities to prioritize low-impact exercises, avoiding certain footwear types, and using comfort insoles[19-22]. Given this, the present study aims to develop a mobile application (APP) specifically designed for portable devices to guide the main diseases affecting each foot region. The APP will use a simple flowchart to help individuals identify potential conditions, access information about them, and initiate basic measures often sufficient for temporary symptom relief until specialized medical care is available[23-25].

Additionally, the APP will assess the intensity of pain reported by patients. We hypothesize that foot-related diseases cause significant pain intensity and that the APP will enable patients to identify the likely condition affecting their feet, gain basic knowledge about it and foot health, and implement initial measures to alleviate pain while waiting for a consultation with a specialist.

Methods

The APP was developed for the two main operating systems (OS): Google's Android® (Palo Alto, California) and Apple's iOS® (Cupertino, California). The application was developed at the Technological Innovation Laboratory of Unichristus University with a Certificate of Computer Program Registration (Process No.: BR512024001974-0). The features included in the APP creation are: A 3D video of a foot with red spots indicating painful areas, each numbered; Isolated photos of the foot with the painful area numbered corresponding to the 3D foot video; Selection of corresponding photos that can be chosen by touch; Upon selecting the photo with the painful area, an informative video opens, followed by written content about the possible condition affecting that region, with basic guidance on the pathology; A tool with touch-sensitive buttons that assist the user through shortcuts for making calls to schedule medical and physical therapy appointments, foot posture tests, and contacting insole suppliers. A validation study was conducted with a sample of 22 patients with complaints of foot pain recruited from the clinic of an orthopedic physician over two months.

The study consisted of three phases. The first phase involved the development of the application; the second phase evaluated the intensity of pain and the APP's accuracy compared to the medical diagnosis. The target audience sample size was calculated using relevant indices for validation, based on the formula $n = 1.96^2.p.(1-p)/d$, and the mean convenience population, where p is the estimated proportion in the population and d is the precision with a 95% confidence level[2,24,25]. The study was conducted at the Dr. Vagner M. Paiva Clinic in Fortaleza, Ceará, Brazil. Study participants were selected through sampling calculations for validation, including 22 patients who sought orthopedic medical care with complaints of foot pain. Participants included individuals over 14 years (when foot growth cartilage is closed) who agreed to participate by signing the Free and Informed Consent Form (ICF). Exclusion criteria were patients under 14 years, those with cognitive deficits or limiting psychiatric disorders, and individuals who refused to participate. All patients received clear information about the project objectives and provided online consent via Google Forms. The patients were then guided by the evaluator to download the APP and follow the flowchart provided within the software.

Finally, the evaluator recorded the condition suggested by the APP and the pain intensity, and two questionnaires were applied: System Usability Score (SUS) and Technology Acceptance Model (TAM). During the orthopedic medical consultation, the diagnosis was documented via the electronic medical record. The following tests were applied for results analysis: Kolmogorov-Smirnov, parametric and non-parametric Mann-Whitney or Kruskal-Wallis tests, X test or Fisher's exact test. Data collection and analysis were conducted using Microsoft Office Excel and IBM SPSS Statistics. Regarding ethical aspects, patients were invited to participate in the study before the outpatient consultation, and only those who agreed and signed the ICF underwent the study procedures. It was emphasized before, during, and after the questionnaires that participants could withdraw without affecting their orthopedic consultation. Furthermore, this research and its procedures were submitted for review and approved by the Unichristus Ethics Committee under the number 5647.2622.6.0000.5049.

Results

Initially, a presentation screen was displayed, and the patient's initial registration was completed (Figure 1). After initial registration, the user clicks "Proceed" to access the other APP functions. A video with numbered red spots is shown to help the user identify the corresponding marked pain region (Figure 2). Screens with ten photos are presented, each showing a single numbered pain point corresponding to the painful area identified in the video (Figures 3 and 4).

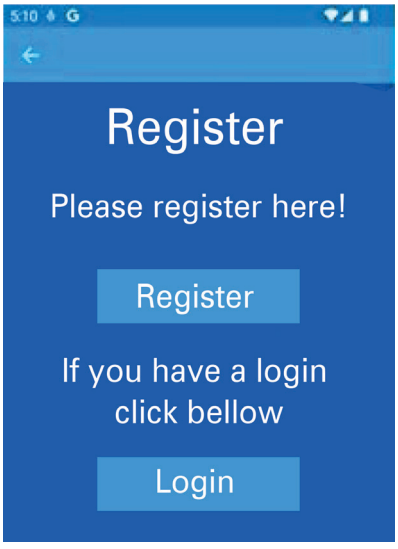

Figure 1. Registration screen.
Source: App Pés com Dor (Portuguese).

Upon clicking on an image, the user is redirected to a screen with an explanatory video and text about the main condition associated with that location (Figures 5, 6, and 7). Only one of the painful areas presents two possible conditions. A flowchart, accompanied by an explanatory video, guides the user to the screen corresponding to their probable condition (Figure 8). After completing this flowchart, the APP follows the same pattern as the other conditions.

In analyzing results for orthopedic conditions related to the feet, a table was created correlating the pain scale, the diagnosis provided by the APP, and the diagnosis obtained during the medical consultation. Regarding pain intensity, it was observed that pain levels ranged from 3 to 10, with the majority (15 cases) falling between 6 and 8 (68.2%). One patient reported pain level 3, with both the medical diagnosis and the APP-suggested condition being calcaneal tendon tendinitis (1). Another user reported pain level 4, with both the medical diagnosis and the APP-suggested condition being metatarsalgia (1). Two users reported pain level 5, with one receiving a medical diagnosis of lateral foot overload (1) and the other a diagnosis of a tumoral lesion (1). Eight users reported pain level 6, with medical diagnoses including plantar fasciitis (2), lateral foot overload (2), posterior tibial tendinitis (1), calcaneal tendon tendinitis (1), calcaneal tendon

Figure 2. Pain localization screens.
Source: App Pés com Dor (Portuguese).

Figure 3. Pain localization screens.
Source: App Pés com Dor (Portuguese).

rupture (1), and ankle instability (1). One user reported pain level 7, with medical diagnoses of metatarsalgia (1) and lateral foot overload (1). Six users reported pain level 8, with medical diagnoses of metatarsalgia (1), ankle instability (1), posterior tibial tendinitis (1), plantar fasciitis (1), hallux valgus (1), and metatarsalgia with lateral foot overload (1). One user reported pain level 9, with both the medical diagnosis and the APP-suggested condition being lateral foot overload (1). Two users reported pain level 10, with medical diagnoses of plantar fasciitis (1) and plantar clavus (1). These findings are detailed in Table 1.

The results comparing the condition suggested by the APP with the medical diagnosis revealed an overall agreement of 40.9% (Table 2). The orthopedic conditions where the APP had the highest concordance were hallux valgus (1:1, 100%), plantar fasciitis (3:4, 75%), metatarsalgia (2:3, 66.67%), and calcaneal tendon tendinitis (2:3, 66.67%).

For the remaining conditions, the correlation between the APP-suggested diagnosis and the medical diagnosis was as follows: lateral foot overload (1:3, 33.33%), fibular tendinitis (0:2, 0%), and posterior tibial tendinitis (0:1, 0%). Ten

Figure 4. Pain localization screens.
Source: App Pés com Dor (Portuguese).

questions were used for the SUS and TAM analysis, as shown in Table 3. Table 4 shows the evaluation of user acceptance, as assessed using the TAM criteria. By cross-referencing the data to relate the two aforementioned evaluations, Figure 9 shows the Spearman correlation.

Discussion

The developed application serves various purposes, from guiding the ten main orthopedic conditions related to the foot and ankle to educating users with accessible language about practical measures for maintaining foot and ankle health. These measures include weight management, appropriate footwear use, posterior chain stretching, adjusting physical activities, and using comfort insoles while waiting for specialized orthopedic care.

Additionally, the application assists users in finding services with specialized professionals, such as scheduling medical appointments (virtual or in-person), physiotherapy evaluations, gait analysis, and contacting companies that sell insoles.

Orthopedic foot and ankle conditions are a public health issue due to their high prevalence in the general population, ranging from 61%–79%. These conditions are particularly prevalent among physically active individuals. For example, plantar fasciitis affects 17.4% of runners[26], flatfoot (often associated with posterior tibial tendinitis) occurs in 5%[27], and hallux valgus affects 19% of the general population[28]. These conditions result in economic impacts due to work absences and decreased efficiency, and they impair physical activity performance, which can have repercussions on patient's physical health, such as increased obesity rates, hypertension, and diabetes. Mental health is also affected, as conditions like plantar fasciitis can lead to increased levels of anxiety, depression, and stress. Furthermore, these conditions particularly affect women by limiting their ability to wear certain types of footwear[29,30].

The study confirmed this impact, as 15 out of 22 users (68.2%) reported pain intensity levels between 6 and 8 after being told that pain level 10 would be the greatest pain a human being could endure, causing daily discomfort

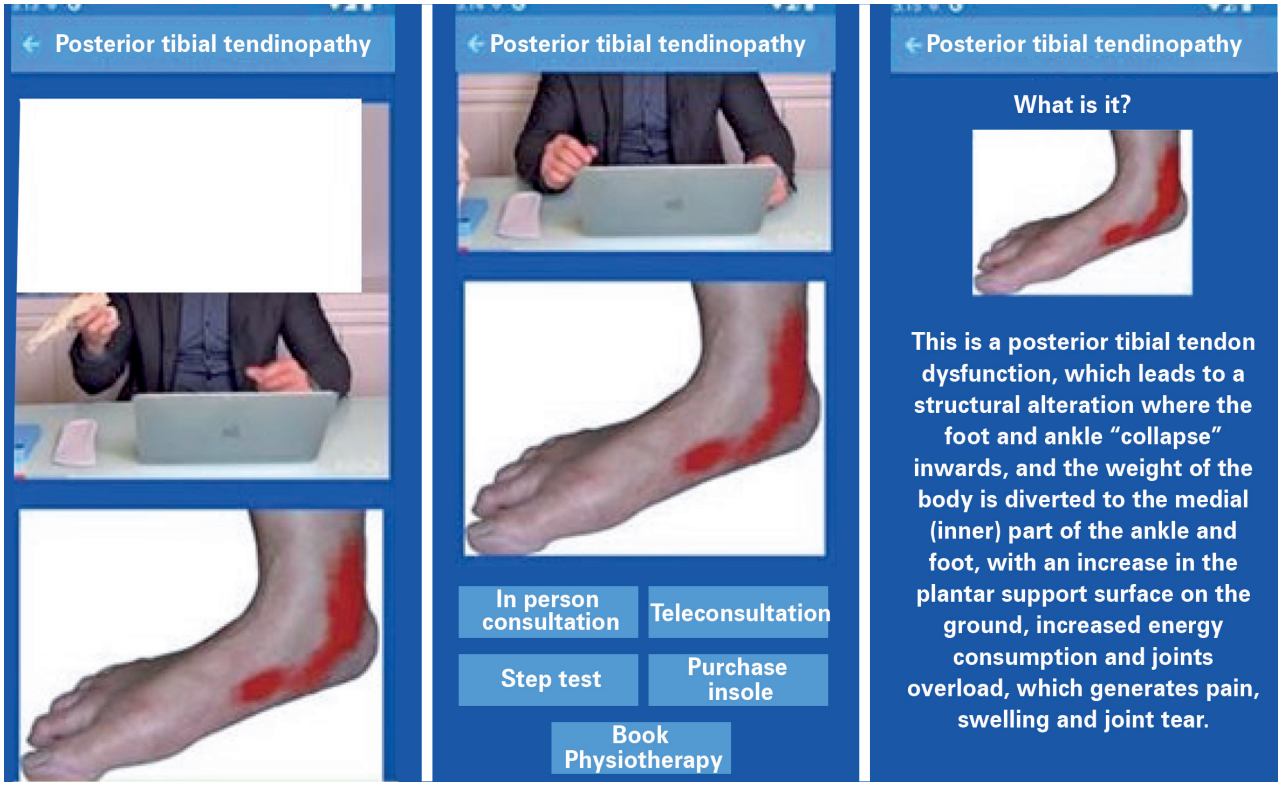

Figure 5. Informative screens about the condition and appointment shortcuts.
Source: App Pés com Dor (Portuguese).

Figure 6. Informative screens about the condition.
Source: App Pés com Dor (Portuguese).

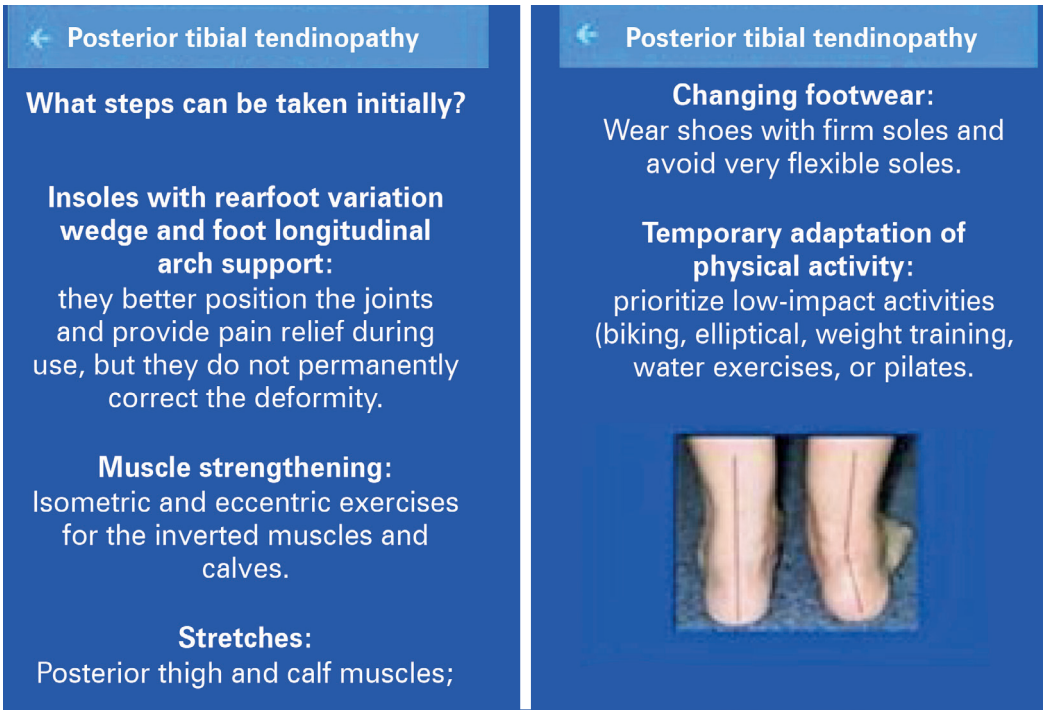

Figure 7. Informative screens about the condition and appointment shortcuts.
Source: App Pés com Dor (Portuguese).

Figure 8. Flowchart screens for conditions affecting the hallux (Valgus vs. rigid).
Source: App Pés com Dor (Portuguese).

and impairing their professional and sporting activities. Continuous population education through advertising tools, applications, or software, like the one studied here, can effectively improve patient's physical and mental health indices and overall quality of life.

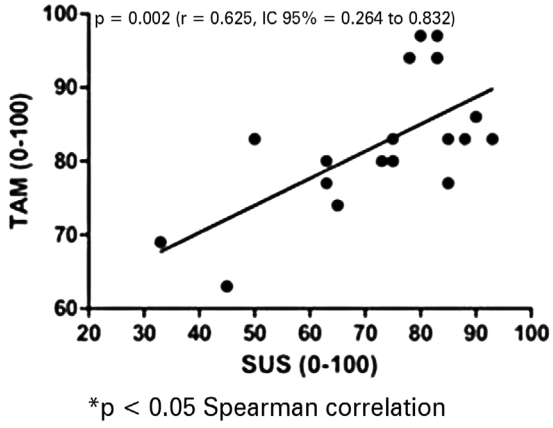

Figure 9. Correlation between usability and acceptance.

The APP showed a low overall agreement (40.9%) between its results and diagnoses provided by a foot specialist orthopedic doctor, but some findings deserve attention. When the selected condition was hallux valgus, an easily identifiable and well-known deformity, the agreement was 100%. Despite the low sample size (n = 1), larger samples would likely follow this trend.

When the selected condition was metatarsalgia, the agreement rate was 66.67%. In the single case of divergence, the doctor diagnosed lateral foot overload, a condition often associated with metatarsalgia. This limitation of the software in analyzing associations between multiple conditions might have influenced the results. When combining forefoot conditions (hallux valgus and metatarsalgia), the agreement between the software and the orthopedic doctor reached 75% (Hallux Valgus 1:1 and metatarsalgia 2:3). This suggests the APP might be more accurate for forefoot conditions.

Plantar fasciitis, suggested by the APP in four cases, corresponded to the medical diagnosis in three patients (75%). The diagnosis was plantar clavus (a rare tumor-like lesion) in the single case of divergence. This condition likely falls outside the APP's decision flowchart, suggesting that larger samples would maintain similar concordance rates.

Table 1. Description of the pain scale and correlation between the conditions suggested by the APP and the medical consultation diagnosis

Pain Scale (1 to 10)	Condition suggested by the APP	Medical consultation diagnosis
5	Fibular tendinitis	Lateral foot overload
6	Plantar fasciitis	Plantar fasciitis
6	Unspecified condition	Lateral foot overload
6	Lateral foot overload	Posterior tibial tendinitis
4	Metatarsalgia	Metatarsalgia
5	Unspecified condition	Tumoral lesion (Not included in the APP)
4	Metatarsalgia	Metatarsalgia
6	Plantar fasciitis	Plantar fasciitis
8	Unspecified condition	Ankle Instability (Not included in the APP)
6	Calcaneal tendinitis	Posterior tibial tendinitis
8	Lateral foot overload	Plantar fasciitis
8	Plantar fasciitis	Plantar fasciitis
10	Calcaneal tendinitis	Plantar fasciitis
3	Calcaneal tendinitis	Calcaneal tendinitis
8	Hallux valgus	Hallux valgus
10	Plantar fasciitis	Plantar clavus (Not included in the APP)
8	Unspecified condition	Metatarsalgia + lateral overload (Multiple conditions)
6	Posterior tibial tendinopathy	Calcaneal tendon rupture (Not included in the APP)
9	Lateral foot overload	Lateral foot overload
6	Metatarsalgia	Lateral foot overload
6	Fibular tendinitis	Ankle instability (Not included in the APP)
7	Unspecified condition	Metatarsalgia + lateral overload (Multiple conditions)

Calcaneal tendon tendinitis showed agreement in two out of three cases (66.67%). The divergent case was linked to plantar fasciitis, a neighboring condition often associated with calcaneal tendinitis, as their causal factors are similar. The divergence might result from the APP analyzing only a single condition, not from true incompatibility. The initial management measures for both conditions are similar, so when combining hindfoot/heel conditions (Plantar fasciitis and calcaneal tendon tendinitis), the agreement was 85.6% (6 out of 7 patients).

Table 2. Percentage analysis of pain intensity, the condition suggested by the APP, and the medical diagnosis. Data expressed in absolute and percentage frequencies.

Pain Scale (0-10)	n (%)
3	1 (4.5%)
4	1 (4.5%)
5	2 (9.1%)
6	8 (36.4%)
7	1 (4.5%)
8	6 (27.3%)
10	2 (9.1%)
Suggested diagnosis	
Unspecified condition	5 (22.7%)
Plantar fasciitis	4 (18.2%)
Hallux valgus	1 (4.5%)
Metatarsalgia	3 (13.6%)
Lateral foot overload	3 (13.6%)
Calcaneal tendinitis	3 (13.6%)
Fibular tendinitis	2 (9.1%)
Posterior tibial tendinopathy	1 (4.5%)
Real diagnosis	
Plantar clavus	1 (4.5%)
Plantar fasciitis	4 (18.2%)
Hallux valgus	1 (4.5%)
Ankle instability	2 (9.1%)
Tumoral lesion	1 (4.5%)
Metatarsalgia	2 (9.1%)
Metatarsalgia + Lateral overload	2 (9.1%)
Calcaneal tendon rupture	1 (4.5%)
Lateral foot overload	4 (18.2%)
Calcaneal tendinitis	2 (9.1%)
Posterior tibial tendinitis	2 (9.1%)
Diagnostic agreement	**9 (40.9%)**
SUS	
SUS ≤ 70%	6 (27.3%)
SUS > 70%	16 (72.7%)
TAM	
TAM ≤ 70%	2 (9.1%)
TAM > 70%	20 (90.9%)

These results demonstrate that the APP can be highly accurate for specific and common foot conditions. By grouping some conditions into syndromic diagnoses with overlapping initial management strategies, such as heel conditions, the APP's accuracy could be improved. This would provide greater pain relief for patients while waiting for specialist consultations, which can take months or even years, depending on their location and healthcare system (public or private).

This software is similar to existing health-related foot care APPS, such as those designed for diabetic foot care. These APPS recommend foot care measures, self-assessment for diabetic neuropathy complications, and personalized foot and ankle exercises[31]. A similar approach was used to support nurses in decision-making for the topical treatment of diabetic foot ulcers[32].

Structurally, another APP is similar to this study's application, utilizing the expertise of specialists in diabetic foot care and providing educational content through animated videos and adaptive learning for patients and caregivers[33].

Comparing this APP to others in healthcare, similarities in usability (classified as good and acceptable) were found with APPS like "MY PICC"[34]. Moreover, as highlighted in this study, the importance of technologies that facilitate patient access to information was observed, aligning with innovations in the healthcare field reported in literature reviews[35,36]. Similar results were observed in a study comparing the acceptance of a health data storage APP, showing good user receptivity while highlighting the need for further studies[37].

Thus, despite positive results and similarities with other studies, further research and analysis are needed to generalize findings to larger populations and ensure greater alignment with general population needs. According to the SUS method, ten questions were used for the usability assessment, as shown in Table 3. Eighteen people (equivalent to 81.8%) voted that they agreed or strongly agreed with the question, "I think I would like to use this application frequently." Nineteen (86.3%) responded that they disagreed or strongly disagreed with "I found this application unnecessarily complex." Twenty (90%) agreed or strongly agreed with "I find the application easy to use." As for "I think I would need technical support to use this application," 15 (68%) responded that they disagreed or strongly disagreed, while four (18.2%) neither agreed nor disagreed. Twenty (90%) agreed or strongly agreed with "I thought the various features of the application were well integrated." Sixteen (72%) disagreed or strongly disagreed with "I thought there was a lot of inconsistency in the application," with four (18.2%) neither agreeing nor disagreeing. Nineteen (86.3%) responded as agreeing or strongly agreeing to "I imagine most people can learn to use this application very quickly." The same number responded as disagreeing or strongly disagreeing, saying, "I found the application very complicated to use." Sixteen (72%) felt very confident using the APP, while 18 (81%) disagreed with "I had to learn several things before I could start using this application."

Table 3. User perception of the application's usability. Data expressed as absolute and percentage frequencies.

Question	Mean ± SD	Cronbach's α	Likert Scale				
			1	2	3	4	5
SUS	**73.18**	**0.850**					
S1. I think I would like to use this application frequently.	3.91 ± 0.68	0.873	0 (0.0%)	1 (4.5%)	3 (13.6%)	15 (68.2%)	3 (13.6%)
S2. I found this application unnecessarily complex.	1.91 ± 0.87	0.756	7 (31.8%)	12 (54.5%)	1 (4.5%)	2 (9.1%)	0 (0.0%)
S3. I found the application easy to use.	4.27 ± 0.77	0.838	0 (0.0%)	1 (4.5%)	1 (4.5%)	11 (50.0%)	9 (40.9%)
S4. I think I would need technical assistance to use this application.	2.09 ± 1.06	0.860	8 (36.4%)	7 (31.8%)	4 (18.2%)	3 (13.6%)	0 (0.0%)
S5. I thought the various features of the application were well integrated.	3.77 ± 0.61	0.836	0 (0.0%)	0 (0.0%)	1 (4.5%)	4 (18.2%)	16 (72.7%)
S6. I thought there was a lot of inconsistency in the application.	2.23 ± 0.97	0.824	4 (18.2%)	12 (54.5%)	4 (18.2%)	1 (4.5%)	1 (4.5%)
S7. I imagine most people can learn to use this application very quickly.	3.91 ± 0.61	0.813	0 (0.0%)	1 (4.5%)	2 (9.1%)	17 (77.3%)	2 (9.1%)
S8. I found the application very complicated to use.	2.00 ± 0.82	0.758	5 (22.7%)	14 (63.6%)	1 (4.5%)	2 (9.1%)	0 (0.0%)
S9. I felt very confident using this application.	3.59 ± 0.91	0.851	1 (4.5%)	2 (9.1%)	3 (13.6%)	15 (68.2%)	1 (4.5%)
S10. I had to learn several things before I could start using this application.	1.95 ± 0.90	0.776	7 (31.8%)	11 (50.0%)	2 (9.1%)	2 (9.1%)	0 (0.0%)

Table 4. Analysis of user acceptance of the application. Data expressed as mean ± SD or absolute and percentage frequencies.

Question	Mean ± SD	Cronbach's α	Likert Scale				
			1	2	3	4	5
T1. I consider the video with the 3D foot model and pain site indicators easy to understand.	4.18 ± 0.59	0.775	0 (0.0%)	0 (0.0%)	2 (9.1%)	14 (63.6%)	6 (27.3%)
T2. I consider the flowchart used by the application easy to understand.	4.00 ± 0.69	0.760	0 (0.0%)	1 (4.5%)	2 (9.1%)	15 (68.2%)	4 (18.2%)
T3. I consider the language used in explaining the conditions easy to understand.	4.14 ± 0.56	0.762	0 (0.0%)	0 (0.0%)	2 (9.1%)	15 (68.2%)	5 (22.7%)
T4. I consider it a useful technology for informing about foot-related conditions.	3.95 ± 0.95	0.857	1 (4.5%)	1 (4.5%)	1 (4.5%)	14 (63.6%)	5 (22.7%)
T5. The application contributes to understanding foot pain.	4.23 ± 0.53	0.740	0 (0.0%)	0 (0.0%)	1 (4.5%)	15 (68.2%)	6 (27.3%)
T6. I believe that disseminating the application to the general population will help improve foot pain.	4.23 ± 0.53	0.740	0 (0.0%)	0 (0.0%)	1 (4.5%)	15 (68.2%)	6 (27.3%)
T7. I believe the information about the prevention of foot conditions will reduce the number of people affected.	4.18 ± 0.50	0.845	0 (0.0%)	0 (0.0%)	1 (4.5%)	16 (72.7%)	5 (22.7%)

Regarding the TAM assessment in Table 4, 20 (90%) agreed or strongly agreed with the statement, "I consider the video with the 3D foot model and pain site indicators easy to understand". Nineteen (86.3%) agreed or strongly agreed with "I consider the flowchart used by the application easy to understand." Twenty (90%) agreed or strongly agreed with "I consider the language used in explaining diseases to be easily accessible." Nineteen (86.3%) agreed or strongly agreed with "I consider it a useful technology for informing about foot-related conditions." Twenty-one (95.4%) strongly agreed with "The application contributes to understanding foot pain." Likewise, the same number responded in the same way to "I believe that disseminating the application to the general population will help improve foot pain" and "I believe the information about the prevention of foot conditions will reduce the number of people affected."

Conclusion

An informative APP was developed with good accuracy for some foot conditions, although it showed low overall agreement for the target audience. Further studies are needed to improve the APP's accuracy and develop better flowcharts. The usability and acceptance evaluation of the platform demonstrated the APP's relevance in educating and empowering users, guiding them about the main foot conditions while waiting for a specialist consultation, which remains indispensable and irreplaceable.

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References

1. Luciano AP, Lara LCR. Estudo epidemiológico das lesões do pé e tornozelo na prática desportiva recreacional. Acta Ortop Bras. 2011;20(6):339-42.
2. Ferrari SC, Santos FC, Araújo MSL, Cendoroglo MS, Trevisani VFM. Patologias no pé do idoso. RBCEH. 2009;6(1):106-18.
3. Cotchett MP, Whittaker G, Erbas B. Psychological variables associated with foot function and foot pain in patients with plantar heel pain. Clin Rheumatol. 2015;34(5):957-64.
4. FerreiraE,PortellaMR,DoringM. Changes to the feet of institutionalized elderly persons. Rev Bras Geriatr Gerontol. 2018; 21(3):363-70.
5. Marin MJS, Maciel MC. [Characterization of feet problems in community elderly in a city of São Paulo state, Brazil]. Rev Bras Geriatr Gerontol. 2014;17(2):243-53. Portuguese
6. Stéfani KC, Pereira Filho MV, Oliveira PR, Wun PYL. Translation, cultural adaptation and validation of the Foot Function Index - Revised (FFI-R). Acta Ortop Bras. 2017;25(5):188-93.
7. López-López D, García-Mira R, Palomo-López P, Sánchez-Gómez R, Ramos-Galván J, Tovaruela-Carrión N, et al. Attitude and knowledge about foot health: a Spanish view. Rev Lat Am Enfermagem. 2017;25:1-8.
8. Artioli DP, Tavares ALF, Bertolini GRF. Foot reflexology in painful conditions: systematic review. BrJP. 2021;4(2):145-51.
9. Medeiros CM, Henao JES, Rohenkohl C, Hirata LM, Baruffi NA, Klein Junior A, etal. Functional evaluation of surgically-treated intra-articular fractures of the calcaneus. Rev Bras Ortop. 2008; 43(11/12):482-9.
10. Silva APS. Fratura-luxação de Lisfranc. In: Pozzi I, Almeida SRMV, Cristante AF (org.). Manual de Trauma Ortopédico. São Paulo, SBOT; 2011. p. 219-222.
11. Kahwage Neto SG, Braga TKK, Portella MB, Andriolo RB. [The Teaching of Clinical Skills and the Applicability of a Simplified Guide for Physical Examination in the Undergraduate Medical Program]. Rev Bras Educ Med. 2017;41(2):299-309. Portuguese
12. Martins GIC, Frag PHG, Teixeira LB, Valle BRG, Martins Filho LF, Gama MP. Functional Evaluation and Pain Symptomatology of the Foot and Ankle in Individuals with Severe Obesity - Controlled Transversal Study. Rev Bras Ortop. 2020;56(2):235-43.
13. Oliveira APC, Gabriel M, Poz MR, Dussault G. Challenges for ensuring availability and accessibility to health care services under Brazil's Unified Health System (SUS). Cienc Saude Coletiva. 2017;22(4):1165-80.
14. Silva SA, Nogueira DA, Paraizo CMS, Fracolli LA. Assessment of primary health care: health professionals' perspective. Rev Esc Enferm USP. 2014;48(1):126-32.
15. Silva CR, Carvalho BG, Cordoni Junior L, Nunes EP. Difficulties in accessing services that are of medium complexity in small municipalities: a case study. Cienc Saude Coletiva. 2017;22(4):1109-20.
16. Resch S. Functional anatomy and topography of the foot and ankle. In: Myerson MS, editor. Foot and ankle disorders. Philadelphia: WB Saunders; 2000.
17. Vianna DL, Greve JMD. [Relationship between ankle and foot mobility and the magnitude of the vertical ground reaction force]. Braz J Phys Ther. 2006;10(3):339-45. Portuguese
18. Alexander IJ. The foot: examination and diagnosis. 2nd ed. New York: Churchill Livingstone; 1997.
19. Lacerda CA, Vasconcellos HA. Foot movements: anatomical basis. Rev Bras Ortop. 1981;16(4):135-9.
20. Rodrigues FL, Waisberg G. Entorse de Tornozelo. Rev Assoc Med Bras. 2009;55(5):497-520.
21. Gomes MLS, Rodrigues IR, Moura NS, Bezerra KC, Lopes BB, Teixeira JJD, et al. Evaluation of mobile Apps for health promotion of pregnant women with preeclampsia. Acta Paul Enferm. 2019;32(3):275-81.
22. Guimarães CQ, Teixeira-Salmela LF, Rocha IC, Bicalho LI, Sabino GS. [Factors related to compliance with biomechanical insole use]. Braz J Phys Ther. 2006;10(3):271-7. Portuguese
23. Fernandes RS. Effects of prescribed physical activity in patients with advanced osteoarthritis of the knee. Rev Bras Med Esporte. 2016;22(4):302-5.
24. Bolfarine H, Bussab WO. Elementos de Amostragem. São Paulo: Edgar Blücher; 2005. 274 p.
25. Weyne GR. Determinação do tamanho da amostra em pesquisas experimentais na área de saúde. Arq Med ABC. 2004;29(2):87-90.
26. Rhim HC, Kwon J, Park J, Borg-Stein J, Tenforde AS. A systematic review of systematic reviews on the epidemiology, evaluation, and treatment of plantar fasciitis. Life. 2021;11(12):1287.
27. Ortiz CA, Wagner E, Wagner P. Arthroereisis: what have we learned? Foot Ankle Clin N Am. 2018;23(4):415-34.
28. Cai Y, Song Y, He M, Zhong X, Wen H, Wei Q. Hallux valgus epidemiology and risk factors: a systematic review. J Foot Ankle Res. 2023;16(63).
29. Cotchett M, Munteanu SE, Landorf KB. Depression, Anxiety, and Stress in People With and Without Plantar Heel Pain. Foot Ankle Int. 2016;37(8):816-21.
30. Harutaichun P, Pensri P, Boonyoung S. Physical and psychological predictors of pain intensity in conscripts with plantar fasciitis. Braz J Phys Ther. 2020;24(3):249-55.
31. Ferreira JSSP, Sacco ICN, Siqueira AA, Almeida MHM, Sartor CD. Rehabilitation technology for self-care: customized foot and ankle exercise software for people with diabetes. PLoS ONE. 2019;14(6):e0218560.

32. Colodetti R, Prado TM, Bringuente ME, Bicudo SD. Mobile application for the management of diabetic foot ulcers. ActaPaul Enferm. 2021;34:eAPE00702.
33. Liew H, Pienkowska A, Ang CS, Mahadzir MDA, Goh KFI, Lodh N, et al. Adaptive learning in diabetic foot care: an educational application. JMIR Res Protoc. 2023;21:e52036.
34. Mota ANB, Turrini RNT. Usability assessment of a mobile app for patients with peripherally inserted central catheters. Rev Lat Am Enfermagem. 2022;30:e3666.
35. Silva LVF, Santos JS, Carvalho ALA de, Andrade DM de, Sá DD de, Alves Érica P, et al. Usabilidade do aplicativo móvel em saúde: uma revisão bibliométrica. REAS. 2021;13(4):e6676.
36. Dominguete GL. Usabilidade de aplicativos móveis voltados para a saúde acopláveis a diferentes equipamentos vestíveis [dissertação]. Minas Gerais: Universidade Federal de Lavras; 2020.
37. Souza R, Ribeiro W, Silva P. O uso de aplicativo móvel meu DigiSUS. REVA. 2019;4:390-406.