Assessment of the objective, subjective quality and perceived impact of a group of mobile applications used for the development of body flexibility

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Abstract

Body flexibility is crucial for physical performance, injury prevention and health maintenance. With the rise of mobile applications, it is necessary to review the quality of their content and determine if they really do what they offer. The purpose of the study was to evaluate the objective, subjective quality as well as the perceived impact of a group of mobile applications used in the development of body flexibility. The Delphi research was adopted, allowing evaluation of five mobile applications

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through the consensus by a panel of experts. This panel included physiotherapists, fitness professionals, flexibility specialists and sports professionals. The instrument used was the user version of the Mobile Application Rating Scale (uMARS). The results showed that the "Exercises for children at home" app excelled in terms of objective quality, highlighting its interactivity and intuitive graphics. The "Stretching" application was the best rated in subjective quality, offering customizable options and configurable reminders that were highly appreciated by users. Meanwhile, "Stretching exercises, flexibility training" stood out for its perceived impact, providing structured training plans that significantly improved the flexibility and postural health of users. In conclusion, it is necessary to carry out thorough reviews of the impact and quality of mobile applications developed in the field of sports and other areas of knowledge, emphasizing the importance of these technological resources in promoting the health and well-being of people.

Keywords: body flexibility, mobile applications, objective quality, subjective quality, perceived impact.

Evaluación de la calidad objetiva, subjetiva y el impacto percibido de un grupo de aplicaciones móviles utilizadas para el desarrollo de la flexibilidad corporal

Resumen

La flexibilidad corporal es determinante para el rendimiento físico, la prevención de lesiones y el mantenimiento de la salud. Con el auge de las aplicaciones móviles, es necesario revisar la calidad de su contenido y determinar si realmente cumplen con lo que prometen. El objetivo del estudio fue evaluar la calidad objetiva, subjetiva e impacto percibido de un grupo de aplicaciones móviles utilizadas en el desarrollo de la flexibilidad corporal. Se adoptó la metodología Delphi de investigación, permitiendo la evaluación de cinco aplicaciones móviles mediante el consenso de un panel de expertos. Este panel incluyó fisioterapeutas, profesionales en acondicionamiento físico, especialistas en flexibilidad y profesionales en deporte. El instrumento utilizado fue la versión de usuario de la Escala de Calificación de Aplicaciones Móviles (uMARS). Los resultados evidenciaron que la aplicación "Ejercicios para niños en casa" sobresalió en términos de calidad objetiva, destacándose por su interactividad y gráficos intuitivos. La aplicación "Estiramientos" fue la mejor valorada en calidad subjetiva, ofreciendo opciones personalizables y recordatorios configurables que fueron muy apreciados por los usuarios. Por su parte, "Stretching exercises, flexibility workout training" se destacó por su impacto percibido, proporcionando planes de entrenamiento estructurados que mejoraron significativamente la flexibilidad y la salud postural de los usuarios. En conclusión, es necesario realizar revisiones profundas sobre el impacto y la calidad de las aplicaciones móviles desarrolladas en el campo del deporte y otras áreas del conocimiento, enfatizando la importancia de estos recursos tecnológicos en la promoción de la salud y el bienestar de las personas.

Palabras clave: flexibilidad corporal, aplicaciones móviles, calidad objetiva, calidad subjetiva, impacto percibido.

Introduction

In a globalized world with constant digital advancements, the integration of mobile applications into daily life has become a common practice, significantly impacting health and physical well-being of people. The innovative implementation of these technologies in various areas of study, without traditional time and space limitations, presents an invaluable opportunity to promote continuous improvements in performance and quality of life (González-Valencia et al., 2019). In this context, sports have not been an exception. Mobile applications designed to promote exercise and physical activity have experienced exponential growth, underscoring the increasing interest in tools that facilitate the development of physical capabilities (Isaza-Gómez et al., 2024). This scenario suggests the need to assess the quality of such applications to ensure their effectiveness and suitability in the context of sports training.

The use of mobile applications for physical training has become an accessible, convenient, and reliable tool for many athletes worldwide. Specifically, applications designed to improve body flexibility have gained popularity thanks to their ability to offer specific routines and programs that can be performed anywhere and at any time. Flexibility is a fundamental physical ability that manifests in the mobility of all joints of the body, allowing a wide variety of movements with great amplitude (Polevoy, 2024). Besides, Kauki et al. (2024) argue that flexibility is not only crucial for the efficient execution of movements but also influences other aspects of athletic performance, such as coordination, strength, power, speed, and frequency of movement. However, lack of flexibility can compromise musculoskeletal health, affect the functional processes of the body and increase the risk of injury (Ortega-Borja et al., 2020).

Villaquirán-Hurtado et al. (2020) highlight the importance of identifying the level of flexibility of athletes to assess injury risk and make timely decisions in the planning, organization, and implementation of injury prevention programs. In this regard, Ilisástigui-Avilés (2020) states that the development of flexibility not only contributes to injury prevention but also plays a fundamental role in rehabilitation processes.

Given the above, mobile applications designed to improve body flexibility optimize these processes by offering clear instructions, demonstration videos, and

structured programs, facilitating the practice of stretching and mobility exercises. Proper flexibility development is essential for achieving optimal ranges of joint motion, preventing injuries, and complementing strength and power training. In the comprehensive preparation of an athlete, flexibility development is as important as the development of physical conditioning and the refinement of the specific skills of each discipline (Ilisástigui-Avilés, 2020).

However, the quality and effectiveness of these applications can vary significantly. The success of these tools depends on several factors (Moran, 2024). It is essential to evaluate both the objective and subjective quality of these applications to ensure that users receive reliable and safe content. While a growing number of mobile applications are available, little is known about their differences in terms of features, quality, and effectiveness (De León, 2021). In addition, the user integration process plays a decisive role in overall satisfaction with the use of these applications in developing body flexibility.

Evaluating the objective quality of mobile applications involves analyzing various factors, such as the accuracy of instructions, the variety and relevance of exercises, and the usability of the interface. Applications need to be increasingly intuitive to reduce the likelihood of errors (Paniagua, 2020). Upon market launch, mobile applications are expected to achieve a certain level of user acceptance, which will depend on the features each user considers important. However, evaluating any type of mobile application is a complex task due to the diversity of usage contexts (Enríquez & Casas, 2014).

On the other hand, the subjective quality of mobile applications for developing body flexibility is reflected in the perceptions of ease of use, the motivation, and overall satisfaction of the users. According to Machini & Casas (2019), quality is a crucial factor for users when using a mobile application in which context, quality includes gathering user feedback (Sócola et al., 2019). Additionally, usability is a key quality characteristic that must be ensured to provide a good user experience (De Castro & Macías, 2016).

While research on the impact of the quality of mobile applications on physical activity is not progressing at the same pace as the development of these technologies, the global sports sector is adopting them to achieve significant improvements in their processes. This article seeks to expand the analysis of the objective and

subjective quality as well as the perceived impact of a group of mobile applications used for developing body flexibility, considering that this aspect is fundamental for improving the performance of athletes in various disciplines.

Mobile applications are growing exponentially every day, and in the current curriculum, within key competencies, there are new opportunities and challenges regarding digital competence, closely related to the use of technology and the influence of artificial intelligence (Rodríguez & Extremera, 2019). This development represents a new strategy for influencing and motivating groups of people, especially in the sports field, to integrate the use of mobile applications into their training processes (García et al., 2017). These authors also point out that applications have emerged in the sports field that have influenced changes in user habits, motivation, and loyalty.

The use of mobile devices opens a wide range of possibilities and offers countless resources to improve the user experience (Aznar et al., 2019). In various sports disciplines, these possibilities can have a direct impact on the performance of athletes, including aspects such as flexibility. The use of smart devices and the analysis of the data they generate in real-time are transforming the world of sports, allowing athletes to optimize their performance and adjust their training using technology (Fava et al., 2018). However, the growing market offers a wide variety of applications to improve physical activity, where the next challenge will be to discern between applications that have a consistent effect and those that do not favor physical activity (Díaz et al., 2019). In this context, user ratings and reviews can be used as key indicators of the quality and reliability of these applications (Barahona, 2020). In this order of ideas, the aim of this study was to evaluate the objective and subjective quality as well as the perceived impact of a group of mobile applications used in the development of body flexibility.

Methodology

The study adopted a mixed approach, combining qualitative and quantitative methods to obtain a comprehensive and detailed evaluation of the selected applications. The Delphi method, known for its effectiveness in reaching consensus among experts through successive rounds of questionnaires, was used to collect and synthesize the opinions of a diverse panel of specialists. This panel included specialists in flexibility development (4), physiotherapists (4), sports professionals

(4) and physical activity professionals (4), who evaluated five free mobile applications for the Android operating system available in the Google Play store in Colombia. The use of the uMARS (User Version of the Mobile Application Rating Scale) instrument allowed a structured and standardized evaluation of applications in terms of engagement, functionality, aesthetics and information. Previous studies have shown that the Delphi method is effective in developing consensual guidelines and assessment in complex and multidisciplinary contexts (Hsu & Sandford, 2007).

This study was categorized as exploratory-descriptive research due to its aim of exploring and describing the objective and subjective quality as well as the perceived impact of mobile applications on flexibility. The exploratory nature of the study was reflected in the initial search for applications and their evaluation across multiple qualitative and quantitative dimensions. On the other hand, the descriptive dimension was manifested in the detailed characterization of each application based on the criteria established by the uMARS and the opinions of experts. The choice of a mixed approach and an exploratory-descriptive design allowed for a deep and nuanced understanding of the assessed applications, consistent with previous research that highlights the importance of combining methods to address complex phenomena (Creswell & Plano, 2011).

Sources of Information

The sources of information used focused on applications that promote the development of flexibility within the Android operating system, specifically Google Play Colombia. Initially, 52 mobile applications related to the development of this conditional physical capacity were identified. A rigorous selection process was carried out to ensure the quality and relevance of the evaluated applications. Initially, 63% of apps were excluded because they required some type of payment, as the study focused on free apps. Seven additional apps were subsequently removed due to issues related to their update time, ensuring that only apps with recent maintenance and updates were considered. Additionally, some apps were not available in the store and were therefore excluded. This rigorous selection process is consistent with the methodology used in previous studies, which emphasize the importance of having clear and consistent criteria for the inclusion of mobile applications in the research (Boudreaux et al., 2014).

Finally, the five best evaluated applications by users were selected, excluding those with a rating below four stars. This selection criterion, based on user ratings, ensured that the selected apps were not only technically adequate but also well received by the public. Selection based on user ratings is a common practice in mobile apps assessment, as these ratings can reflect the overall satisfaction and perceived usefulness of a broad user base (Stoyanov et al., 2015). This approach ensured that the applications included in the study were of high quality and relevant to users interested in improving their flexibility when using mobile technology (Figure 1).

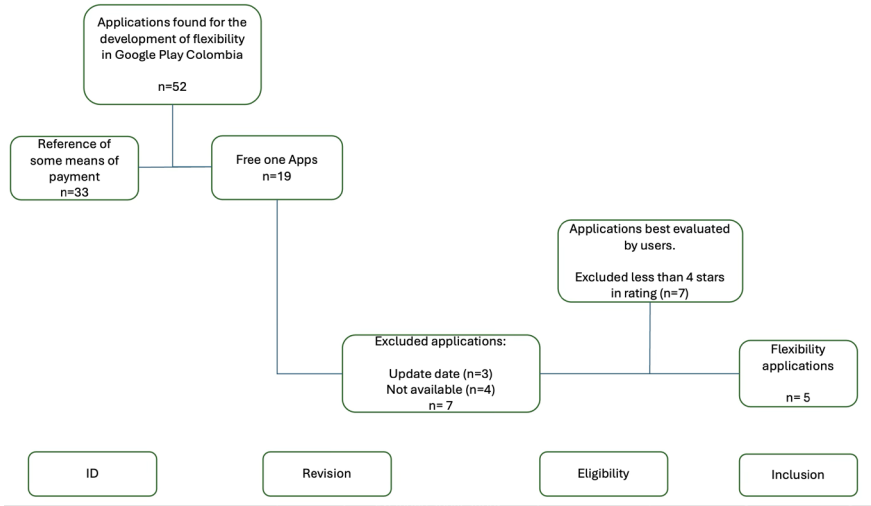


Figure 1. *Flowchart for the selection of applications that guide the development of flexibility.*

Note: Created by the authors

Instruments

The user version of the Mobile Application Rating Scale (uMARS) was the instrument used. This instrument allowed a detailed evaluation of the objective quality, subjective quality as well as the perceived impact of the selected mobile applications. The instrument is a validated tool widely used in research to evaluate health and wellness applications, providing a systematic structure for mobile applications assessment (Stoyanov et al., 2016).

The uMARS consisted of three main sections. Objective quality aspects assessed user interaction, functionality, aesthetics, and application information. Interaction included criteria such as interactivity and entertainment, while functionality assessed ease of use, performance, and reliability. Aesthetics focused on the visual design and appeal of the interface, and feedback encompassed the quality and quantity of content offered by the app. Subjective quality, on the other hand, was based on the personal perception users had of the application, including their overall experience and satisfaction. Finally, perceived impact assessed how users believed the application affected their knowledge, attitudes, and behavior regarding flexibility. This comprehensive approach allowed capturing a holistic view of the evaluated applications, reflecting both technical criteria and user perceptions (Stoyanov et al., 2015).

Data Analysis

The uMARS instrument was used, which allowed a detailed evaluation of the assessments made by different groups of experts: professionals specialized in the flexibility development, physiotherapists, physical activity professionals and sports professionals. The grouping of assessments included the calculation of descriptive statistics such as mean, standard error, median, mode, standard deviation, variance, kurtosis, skewness coefficient, range, minimum, maximum, sum, and p-value. These parameters provided a comprehensive view of the data behavior and facilitated the identification of patterns and discrepancies between assessments by different experts' groups (Smith et al., 2018; Johnson & Lee, 2020).

In addition, standardized quartile analyzes were performed using the SPSS version 25 software, which allowed a more precise examination of data variability and dispersion. This approach provided a detailed view of the distribution of ratings across different quartiles, facilitating comparison between expert groups and the identification of potential biases or areas of consensus (Williams & Thompson, 2019). The analyses performed helped interpret the consistency and reliability of the assessments and adjust the strategies based on the evidence obtained. This study has an ethics committee approved by the National School of Sports University Institution (17, 245).

Results

The study made it possible to know the perception of experts in the field of sports and health who identified the objective and subjective quality as well as the perceived impact of five free mobile applications for the Android operating system from Google Play Colombia, used for the development of body flexibility. Tables 2, 3 and 4 show the descriptive statistics resulting from the evaluations carried out by the professionals.

Table 1. *Objective quality*

	Exercises for children at home	Stretches	Stretching exercises, flexibility workout training	Stretching exercises workout flexibility	How to have more flexibility in 30 days
x̄	4.45	4.43	4.40	3.85	2.98
AND	0.19	0.22	0.13	0.34	0.74
MD	4.55	4.35	4.40	3.85	3.20
Mo.	#N/A	#N/A	#N/A	#N/A	#N/A
S.D.	0.39	0.43	0.26	0.68	1.49
Var(X)	0.15	0.19	0.07	0.46	2.22
Kurt	2.36	-0.04	-1.20	-2.91	0.61
TO	-1.38	0.83	0.00	0.00	-0.79
R	0.90	1.00	0.60	1.50	3.50
Min.	3.90	4.00	4.10	3.10	1.00
Max.	4.80	5.00	4.70	4.60	4.50
Σ	17.80	17.70	17.60	15.40	11.90
p	0.62	0.69	0.41	1.08	2.37

Note: Elaborated by the authors

Table 2. *Subjective Quality*

	Stretches	Stretching exercises, flexibility workout training	Exercises for children at home	Stretching exercises workout flexibility	How to have more flexibility in 30 days
x̄	4.50	4.05	3.78	3.70	2.65
AND	0.29	0.46	0.28	0.37	0.89
MD	4.50	4.10	3.90	3.60	2.30
Mo.	5.00	#N/A	#N/A	#N/A	#N/A
S.D.	0.58	0.91	0.56	0.74	1.78
Var(X)	0.33	0.84	0.31	0.55	3.16
Kurt	-6.00	-3.20	1.82	-2.72	-0.41
TO	0.00	-0.20	-1.20	0.48	0.88
R	1.00	2.00	1.30	1.60	4.00
Min.	4.00	3.00	3.00	3.00	1.00
Max.	5.00	5.00	4.30	4.60	5.00
Σ	18.00	16.20	15.10	14.80	10.60
p	0.92	1.46	0.88	1.18	2.83

Source: Elaborated by the authors

Table 3. *Perceived impact*

	Stretching exercises, flexibility workout training	Stretches	Stretching exercises workout flexibility	Exercises for children at home	How to have more flexibility in 30 days
x̄	4.08	4.05	3.78	3.35	2.80
AND	0.36	0.17	0.56	0.71	0.92
MD	3.90	4.15	3.90	3.65	2.60
Mo.	3.50	4.30	#N/A	#N/A	#N/A
S.D.	0.72	0.33	1.11	1.42	1.84
Var(X)	0.52	0.11	1.24	2.00	3.39
Kurt	-1.86	-0.05	1.59	-1.05	-2.92
TO	0.75	-1.10	-0.65	-0.84	0.39
R	1.50	0.70	2.70	3.10	4.00
Min.	3.50	3.60	2.30	1.50	1.00
Max.	5.00	4.30	5.00	4.60	5.00
Σ	16.30	16.20	15.10	13.40	11.20
p	1.15	0.53	1.77	2.25	2.93

Note: Elaborated by the authors

In terms to objective quality, the application best rated on average by professionals was *Exercises for children at home,* followed by *Stretching.* In terms of subjective quality and perceived impact, the highest rated apps were *Stretching* and *Stretching exercises and flexibility training.* On the other hand, the app with the lowest average rating in all three categories was *How to have more flexibility in 30 days.*

Evaluation of each expert group:

The objective quality assessment was configured based on the perception of the following elements: the possibility of user engagement with the app, its functionality, aesthetics (design and graphics), and finally, the information provided to users, in this sense. Table 5 shows the average rating of each expert group.

Table 4. *Objective quality by expert group*

	Physio	PPC	PSF	PS	AVG
Exercises for children at home	4.6	4.5	3.9	4.8	4.45
Stretches	5.0	4.0	4.5	4.2	4.43
Stretching exercises, flexibility workout training	4.7	4.5	4.3	4.1	4.40
Stretching exercises workout flexibility	4.6	3.5	3.1	4.2	3.85
How to have more flexibility in 30 days	4.5	3.6	2.8	1.0	2.98

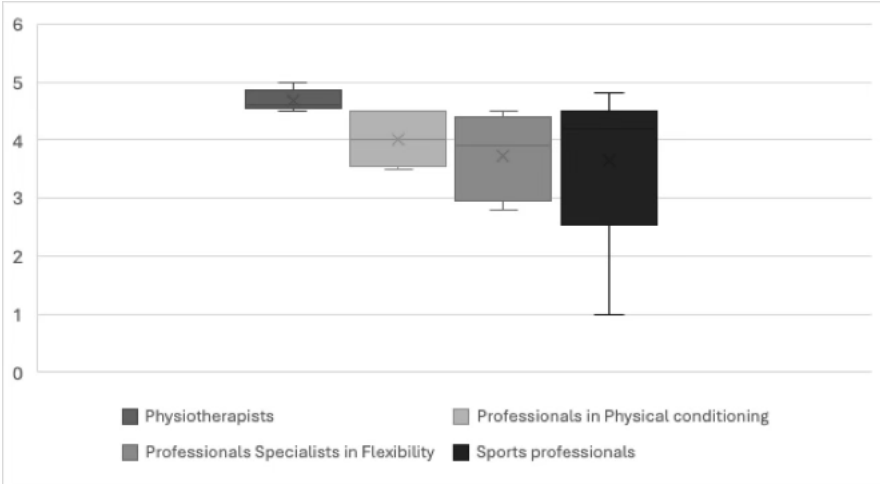
Note: Elaborated by the authors. PSF= Professionals Specialists in Flexibility. Physio=Physiotherapists. PCP= in Physical conditioning Professionals. PS=Sports professionals. AVG= Average.

Regarding objective quality, there were divided opinions among the different professionals. For physiotherapists and specialists in the development of flexibility the best rated application was *Stretching,* while for physiotherapists the best application was *Stretching.* Finally, sports professionals chose *Exercises for children at home,* and as mentioned earlier, this was the best rated application on average by everyone.

Graph 1 below evidence, the dispersion of objective quality assessments by each group of professionals.

As evidenced, the group of professionals who showed the least dispersion regarding the objective quality assessment of mobile applications were physiotherapists, while sports professionals had a more dispersed assessment in relation to the assessment of this group of apps.

The subjective evaluation was based on the quality of the application compared to its stated objective and its various potential uses. This section assesses whether professionals with expertise in this field of knowledge would be willing to download it and use it over the next 12 months to benefit from the information provided. On this line of thought, table 6 below shows the average ratings for each expert group.



Graph1. *Dispersion versus objective quality*
Note: Elaborated by the authors

Table 5. *Subjective quality assessment by each expert group.*

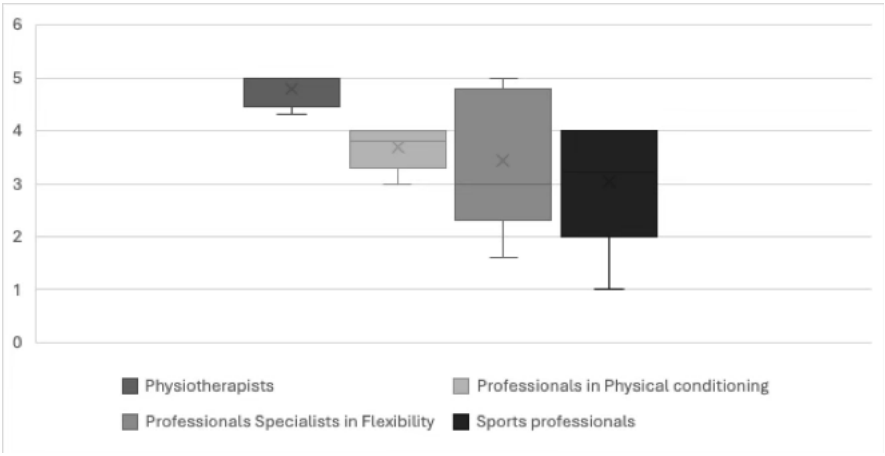
	Physio	PPC	PSF	PS	AVG
Stretches	5.0	4.0	5.0	4.0	4.50
Stretching exercises, flexibility workout training	5.0	3.6	4.6	3.0	4.05
Exercises for children at home	4.3	3.8	3.0	4.0	3.78
Stretching exercises workout flexibility	4.6	4.0	3.0	3.2	3.70
How to have more flexibility in 30 days	5.0	3.0	1.6	1.0	2.65

Note: Elaborated by the authors PSF= Professionals Specialist in Flexibility. Physio=Physiotherapists. PPC=Professionals in Physical conditioning. PS=Sports professionals. AVG= Average.

Regarding subjective quality, the different groups of professionals agreed that the *Stretching app* is the best and would be willing to download it. Likewise, each group of experts also found other highly rated apps, with some differences in the type of app they would use in their everyday life.

Figure 2 below shows the level of dispersion comparing subjective quality assessments by each group of professionals.

Graph2. *Dispersion versus subjective quality*



Note: Elaborated by the authors.

As it could be observed, physiotherapists, on average, achieved higher ratings for the applications, and it is also evident that this group of professionals had more consistent evaluation, that is, less dispersed. On the other hand, flexibility development specialists had less consistent evaluations in terms of subjective quality.

The assessment of perceived impact is determined by the possibilities that applications generate for the appropriation and use of the acquired knowledge the attitudes and intentions of the users regarding the content found and their possibilities to put it into practice. In this context, the perceived impact of the uMARS instrument refers to how users value the usefulness and effectiveness of the application in relation to their ability to integrate and apply the acquired knowledge. Table 7 below shows the average ratings in this section for each group of professionals.

Table 6. Perceived impact

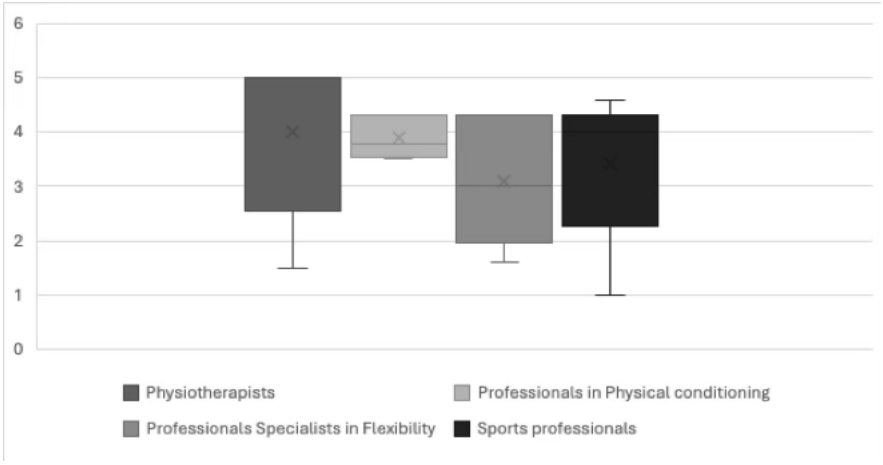
	Physio	PPC	PSF	PS	AVG
Stretching exercises, flexibility workout training	5.0	3.5	4.3	3.5	4.08
Stretches	3.6	4.3	4.3	4.0	4.05
Stretching exercises workout flexibility	5.0	3.8	23	4.0	3.78
Exercises for children at home	1.5	4.3	3.0	4.6	3.35
How to have more flexibility in 30 days	5.0	3.6	1.6	1.0	2.80

Note: Elaborated by the authors. PSF= Professionals Specialists in Flexibility. Physio=Physiotherapists. PPC=Professionals in Physical Conditioning. SP=Sports professionals. AVG= Average.

The assessments of the different professionals regarding the perceived impact were varied. Some agreed on different applications but there is no consensus regarding their overall impact. For physiotherapists the most highly rated applications were: *Stretching, exercises, flexibility training; Stretching exercises for flexibility;* and *how to get more flexibility in 30 days.* For Physical Activity Professionals, the best rated apps were: *Stretching and Exercises for children at home.* For flexibility specialists, the best evaluated apps were: *Stretching, exercises, flexibility training* and *stretching.* Finally, for Sports Professionals, the best app was *Exercises for children at home.* In this sense, each group of experts had different assessments of the perceived impact of mobile applications that promote flexibility development.

Graph 3 below shows the level of dispersion regarding the assessments of each group of experts in relation to the perceived impact.

Graph 3. *Dispersion vs. perceived impact*



Note: Elaborated by the authors.

As evidenced by the previous graph, it was the Physical Activity Professionals who had a less dispersed evaluation of the perceived impact. On the contrary, the Flexibility Specialists had more dispersed evaluations in this section.

Discussion

The purpose of the study was to assess the objective and subjective quality, as well as the perceived impact of a group of the Android mobile applications from Google Play Colombia by different groups of experts in the field of sports, physical activity and health. The results showed that, in terms of the average assessment of objective quality by the group of experts, the best rated application was 'Exercises for children at home'. Regarding subjective quality, the best rated application was 'Stretching', and finally, in terms of perceived impact, the best rated application was 'Stretching, flexibility training'. Studies such as the one by Isaza-Gómez, et al. (2024) have concluded that reaching a consensus on the assessment of the objective and subjective quality, as well as on perceived impact of mobile applications used in sports, has been difficult.

The use of mobile applications is becoming increasingly common among the population. Studies such as those by Sulca (2021), Lessard (2023), and Mateo (2024) have recognized the contributions of these tools to the promotion and

practice of physical activity. Likewise, studies such as those by Cuevas (2023) have shown how the use of mobile applications in university students has had a positive effect on their health through physical activity.

Despite the proliferation of mobile applications in different fields of knowledge, it is urgent and necessary to review the quality of the mobile applications that are put at the service of society daily. Martin-Payo, et al. (2021); Lambrecht, et al. (2021); Delgado-Morales & Duarte-Hueros (2023); González, et al. (2024); Isaza-Gómez, et al. (2024) have managed to carry out different studies where the objective, subjective quality and perceived impact of mobile applications are assessed through the uMARS instrument, not only in the field of sports, but also in the field of health and nutrition.

The "*Exercises for children at home" application* was the best rated in terms of objective quality. With more than 500,000 downloads, this app focuses on yoga and meditation exercises for children, promoting concentration and emotional well-being through relaxing activities. User interaction is facilitated through daily goals and 30-day challenges, making it intuitive and easy to use. Its good graphics and the ability to adjust the level of effort of the exercises are standout features that increase its appeal and functionality. Research by Rosales, et al. (2020), Serrano (2021) and Marín (2023) agree on the importance of incorporating stretches during the day, especially in the context of training, highlighting the value of these apps in the daily routine of children.

In terms of subjective quality, the "*Stretching" app* received the highest rating. With over 10 million downloads, this application allows users to select exercises according to their needs, whether for warm-up, recovery, pain relief, relaxation or postural correction. It also offers the ability to set goals, create reminders, design training programs, and generate activity reports. This advanced functionality provides valuable information for both users and professionals who downloaded it. Delgado-Morales & Duarte-Hueros (2023) have highlighted the importance of the quality of information in mobile applications, while Quintero, et al. (2022) emphasize the concern about security and the use of personal data, critical aspects for the development and acceptance of these applications.

Compared to the perceived impact, the best rated application was "*Stretching exercises, flexibility training".* This app stands out for its ability to offer structured

training plans, including morning, afternoon, and full-body sessions, without requiring additional equipment. The proposed warm-up and stretching exercises are designed to increase flexibility, improve posture and build strength. This comprehensive approach to physical activity highlights the role of mobile apps as effective tools for promoting healthy habits and improving the overall physical fitness of the users. Recent studies, such as those by Avilés-Morales et al. (2023), Novoa (2023) and Veloz, et al. (2024), highlight the positive impact of these applications on health and sports performance, evidencing a significant transformation in how people approach their physical well-being.

The development of bodily flexibility implies a series of benefits for people and in older adults it is crucial to work on it consistently. Studies such as those by Matos-Duarte & Berlanga (2020), Chalapud-Narváez, et al. (2021), and Ríos (2023) have identified greater independence in the elderly among its benefits, as well as improved stability and balance in their daily activities. There is also evidence that improved flexibility improves athletic performance (Rodríguez, 2014; Huck, 2024; Zilli & Gómez, 2024; and Tamay, 2024). In addition, developing flexibility helps prevent injuries (Grigelmo-Hernández & Riesgo-Álvarez, 2020; Ilisástigui-Avilés 2020; Guerra, 2024; Quintero, et al., 2024). In this order of ideas, the benefits of developing flexibility on health are remarkable, making it advisable to perform daily exercises that enhance it.

The development of mobile applications that promote flexibility is booming, including yoga, stretching and wellness apps. However, there is a lack of significant specific studies on the benefits of these applications for flexibility. Meanwhile, much research focuses on identifying the increase in mobile applications aimed at the development of physical fitness, as evidenced by the results of the studies by Duque & Fernández (2019), (2022), Chacón, et al. (2024). Also, mobile applications focused on prescribing physical exercise have been created (Mas, Sampol & Conti, 2016; Muntaner, 2019, Cárcamo-Regla, et al., 2023; Avilés-Morales, et al., 2023) so that, despite recognizing the benefits of exercises that promote flexibility, these results have been found within studies focused on conditional physical capacity.

Regarding specific results on the stimulation and development of flexibility, there are small studies on the use of mobile applications that promote its development, among which noteworthy experiences include those of Ochoa, et al. (2023), who, through video-based instructional sequences, succeeded in strengthening the

physical abilities of secondary school students. Also, noteworthy are studies such as those by Ayala (2015), who studied the Flex-Measure, as a technological tool to evaluate flexibility.

Conclusion

The use of mobile applications for flexibility development has been shown to have a significant impact on various areas including health, sports performance and injury prevention. This study assessed the objective and subjective quality as well as the perceived impact of several Android applications available on Google Play Colombia, obtaining results that highlight the potential of these tools. The "*Exercises for children at home"* application stood out for its objective quality, facilitating meditation and yoga for children with a focus on relaxing and concentration exercises. "*Stretching*" received the highest rating for subjective quality, offering personalized options for different stretching needs, while "*Stretching flexibility, training"* stood out for its perceived impact with training plans that improve flexibility and body posture. Despite the growing adoption of these applications, it is essential to constantly review their quality to ensure their effectiveness and safety. The benefits of flexibility, including improved stability, balance, and injury prevention, are widely recognized in the literature. However, specific evidence on the benefits of mobile apps in this regard is still limited, which underscores the need for more research in this emerging field.

Conflict of interest:

The authors declare that they have no conflict of interest.

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