The social impact of digital tools in exercise rehabilitation: Insights into professional practices, a cross sectional study

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ABSTRACT

Background: Telerehabilitation uses digital tools to provide rehabilitation care to patients at a distance. Before using the devices, professionals need to understand their utility. Several factors may influence the position taken by professionals on their utility in the context of exercise rehabilitation. The aim of the study is to assess the perceived utility of digital tools for exercise rehabilitation among professionals and to identify the factors associated with their perspectives favorable or unfavorable). **Methods**: This is a practice survey. A questionnaire was distributed via sphinx online in order to obtain the opinion of exercise training professionals (physiotherapists and physical activity teachers) on the utility of digital tools in their practice. All professionals with at least 1 year's professional experience were eligible to participate in the study. The questionnaire comprised 34 questions grouped into four main themes (personal information, professional information, knowledge of digital tools and perception of their advantages and disadvantages). **Results**: 46 professionals responded to the questionnaire, including 31 physiotherapists. 26.1% of the professionals questioned had previously used a digital tool and 69.5% perceived its utility. The main factors linked to the utility of digital tools were: workload, working in an urban area and previous use of digital tools. **Discussion**: This study highlights the parameters associated with professionals' perceptions of the utility of digital tools for exercise rehabilitation. The study could offer specific avenues for facilitating the development and use of telerehabilitation tools and, above all, remote exercise rehabilitation.

KEYWORDS: Adapted physical activity, Digital health tools, Exercise rehabilitation, Perceived utility, Physiotherapy, Telerehabilitation

Background

The latest ANSES [1] and INSERM [2] reports presented a summary of the data concerning the implementation of exercise rehabilitation (ER) programs. These programs have beneficial effects not only on disease prevention, but also on cardiovascular, cognitive and neuropsychological functions [3]. In France, according to the recommendations of the "Haute Autorité de Santé" (French National Authority for Health), the professionals in charge of designing and implementing ER programs are mainly physiotherapists and physical activity (PA) teachers [4].
Current literature highlights the importance of involving ER professionals in the design and implementation of programs. To be beneficial, they must be individualized, the intensity of the sessions must be adapted and the prescribed PA should be enjoyable, enabling patients to adhere to them over the short and long term [5]. A previous study of chronically ill patients assessed the barriers and facilitators to regular PA. The main barriers identified were intrinsic factors (lifestyle, age, advanced stage of the disease, etc.) and extrinsic factors (travel problems, availability of patients and therapists, etc.) [6]. The rapid development of digital technologies has brought about significant transformations in the healthcare field, opening up new opportunities to ensure continuity of care at a distance and improve rehabilitation interventions [7].
Telerehabilitation appears to be an interesting solution in the context of ER, offering significant opportunities for improving access to care and optimizing the effectiveness of ER programs [8, 9]. A recent review of the literature with meta-analysis showed that applications offering personalized exercise videos to accompany patients significantly improved

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physical fitness and confidence in carrying out exercise. However, in the same review, the authors showed that patient adherence over the short (less than six weeks) and long term (more than six weeks) was very low [10].

The challenges involved in integrating digital tools into rehabilitation are many and complex. The tools available are not adapted to the situations of the people cared for by rehabilitation professionals [11]. The authors (Roto & Rautava) recommend following the three stages of product and user experience design. The three stages include evaluating utility, usability, and pleasure [12].

Marc Hassenzahl defines utility in the context of users' pragmatic needs, explaining that utility focuses on how a product effectively meets users' goals and tasks. He highlights that utility is a fundamental aspect for users to find a product meaningful and satisfying [13]. The need to guarantee effective and appropriate use of these technologies also raises crucial questions about the acceptance of these tools in the practice of ER professionals [14]. A recent review of the literature by Ibarra et al. [15] presented the issues surrounding the use of digital technology by healthcare professionals and patients. The authors studied the impact of the technology used and the social interactions offered by their device. This review demonstrated the feasibility of remote interventions and sessions using digital technology [15]. However, the authors were unable to assess the device's utility and the adherence of users.

Furthermore, most previous studies have focused mainly on the utility of digital solutions for chronically ill and elderly populations. Most studies are conducted with patients with the aim of tailoring the tools to their needs. Therefore, few studies are conducted with rehabilitation professionals before the development of devices [16, 17]. Utility is linked to the notions of attitude and subjective social norms. "Attitudes" are the result of judgements about an individual's position (favorable or unfavorable) with regard to beliefs about a technology [18]. Several factors specific to the profession (workload, patient base, socio-demographic characteristics) may influence professionals' perception of the utility of technologies [19]. Understanding these factors first could help to optimize and facilitate the development of systems, in particular by drawing up practical guidelines.

The aim of the study is to assess the perceived utility of digital tools for ER among professionals. This study will also allow to identify the factors associated with the professional's perspectives (favorable or unfavorable) on the utility of digital devices in their practice.

Methods

Design and setting

The STROBE guidelines (Strengthening the Reporting of Observational Studies in Epidemiology) [20] was followed to enable this cross sectional study to be carried out. This study is a practice survey in the form of a self-administered questionnaire, among professionals practicing in France.

Participants

To participate in this study, professionals had to meet the following eligibility criteria. All professionals (physiotherapists and PA teachers) must have had at least 1 year's professional experience. In addition, professionals must have conducted ER sessions with their patients as part of their practice. The main aim of the survey was to respond to the need for information on the positions taken by professionals.

Questionnaire and conduct of the study

The questionnaire began with an "introduction" section, which explained the purpose of the questionnaire and the approximate time required to complete it (**Appendix**). This introductory message explained the anonymous and confidential nature of the survey data. The questionnaire as a whole consisted of 34 questions, with the use of several "filter" questions to guide professionals according to their answers.

The topics covered in this questionnaire were developed following the recommendations of previous studies that have assessed the issues surrounding the use of digital technology in ER for people with chronic disease [8, 21]. In addition, the themes and questions were inspired by the utility parameters considered by previous studies on user experiences [12, 13]. The four main themes chosen are:

- General information about the professional
- General presentation of the practice and patients
- Knowledge of technology, ease of use
- Perception of the strengths and weaknesses of using a digital tool.

The questions were chosen by the research team on the basis of their relevance and coherence. In addition, the questionnaire was drawn up in collaboration with an expert in health sociology). The questionnaire comprised demographic questions, open-ended questions, and close-ended questions. Closed-ended questions were formulated as dichotomous questions, multiple choice, Likert scales, and rating scales. Open-ended questions enabled responses in the form of free text or short essays.

The study was carried out in two successive stages:

- **The first stage was the** study design phase (described above). At this stage, a test was carried out with five professionals in the field of rehabilitation in order to assess the length of the questionnaire, its coherence and any problems of comprehension it might pose.
- **The second stage** involved distributing the questionnaire. An initial distribution was carried out by e-mail and professional social networks (LinkedIn, Whatsapp, Facebook). Requests were sent for distribution among the regional (Nouvelle-Aquitaine) and national (France) orders of physiotherapists. Two reminders were sent out after two and four weeks respectively. The results were analyzed once the survey had been finalized.

The construction, distribution and collection of data were carried out using Sphinx Online software (version 4.12).

Statistical analysis

Data from the statistical analysis were presented as mean ± standard deviations or median [interquartile range] depending on the normality of the distribution (assessed by the Shapiro-Wilk test). Depending on the normality of the distributions, a Student's t-test or the Wilcoxon rank test was used to compare means. For qualitative variables, the results were presented using a frequency analysis. The Chi^2 test was used to compare percentages. The internal consistency of the questionnaire was assessed by calculating Cronbach's alpha coefficient. A higher Cronbach's α indicates better reliability with values of 0.7 or higher indicating acceptable reliability [22]. Sample size numbers were determined by procedures described by Cochran's formula $\left(n = E^2Z^2 \cdot p \cdot \frac{(1-p)}{(1-p)}\right)$ [23]. We calculated the required sample size based on a previous study. Twenty-five subjects were deemed to be acceptable to estimate the proportion of professionals that would perceive the utility of digital devices for ER. 36 professionals were needed to assess perceived utility of digital devices, for a minimum proportion of 30% (according to the study of Fernandes et al. [24]) of professionals who would perceive the utility of digital devices. We obtained a minimum required sample size of 44 participants using 80% power and 20% to prevent incomplete answers. The significance level was set at $p < 0.05$. Statistical analysis was performed using JASP software (version 0.18.3).

Table 1 Characteristics of professionals according to their according to their perspectives on the utility of digital tools in ER

Features	Total (N=46)[a]	Perceived benefit of digital tools		p[b]
		No	Yes	
Age (years)*	**35 ± 8,4**			**0,01**
[20 - 30]	13	3	10	
]30 - 40]	16	2	14	
]40 and over]	17	9	8	
Seniority (years)**	**7,5 [11,4]**			0,303
[0 - 10]	16	8	8	
]10 - 20]	28	5	23	
20 or more]	2	1	1	
Gender ##				0,3
Men	21	8	13	
Women	25	6	19	
Practice setting ##				**0,01**
Rural	15	1	14	
Urban	31	13	18	
Patients per day (numbers) *	**18[12 ,5]**			**0,01**
[0 - 10]	8	4	4	
]10 - 20]	22	5	17	
20 or more]	16	5	11	
Sessions prescribed to patients (number) #				0,35
[0 - 15]	29	8	21	
]15 - 30]	2	0	2	
30 or more]	15	6	9	
Patient drop-out (percentage) **	**20 [39,3]**			**0,03**
Less than 50	31	9	22	
50% or more	15	5	10	
Duration of ER sessions (minutes) *	**45 [30]**			0,09
[0 - 30]	14	3	11	
]30 - 60]	30	11	19	
]60 and over]	2	0	2	
Number of exercises per session (number)**	**5 [1,8]**			0,7
At least 5	33	8	25	
More than 5	13	6	7	
Work sector ##				0,97
Public	6	2	4	
Private	37	11	26	
Mixed[c]	3	1	2	
Using digital technology for ER				**0,04**
No	14	13	1	
Yes	32	21	11	
Occupation #				0,21
Physiotherapists	35	9	26	
Physical activity teachers	11	5	6	

a: mean ± Standard deviation, median [Interquartile range]; *Student's t test; **Mann-Whitney test; #Pearson's chi-square test; ##Fisher's exact test. ER: Exercise rehabilitation; %: Percentage; p: level of significance set at 0.05; b: comparison of means or percentages of professionals according to their perspective regarding the utility of digital tools (yes/no) of using digital technology for ER sessions; c: mixed activity including services in both sectors (private and public).

Table 2 Characteristics of professionals according to previous use of digital devices for ER

Features	Use of digital technology		p[a]
	No	Yes	
Age (years)*			0,58
[20 - 30]	8	5	
]30 - 40]	13	3	
]40 and over]	13	4	
Seniority (years)**			0,69
[0 - 10]	19	7	
]10 - 20]	14	4	
20 or more]	1	1	
Gender ##			0,74
Men	16	5	
Woman	18	7	
Work site ##			**0,01**
Rural	10	5	
Urban	24	7	
Patients per day (numbers) *			**0,05**
[0 - 10]	8	2	
]10 - 20]	16	7	
20 or more]	10	3	
Sessions prescribed to patients (number) #			**0,01**
[0 - 15]	0	2	
]15 - 30]	20	9	
30 or more]	13	12	
Patient drop-out (percentage) **			0,95
Less than 50	23	8	
50% or more	11	4	
Duration of ER sessions (minutes) *			0,13
[0 - 30]	13	1	
]30 - 60]	20	10	
]60 and over]	1	1	
Number of exercises per session **			0,67
At least 5	24	9	
More than 5	10	3	
Activity mode ##			0,42
Public	5	1	
Private	26	11	
Mixed[b]	3	0	
Occupation#			
Physiotherapists	25	10	0,49
Physical activity teachers	9	2	

*Student's t test; **Mann-Witney test; #Pearson's chi-square test; ##Fisher's exact test; %: Percentage; p: Significance level set at 0.05; a: comparison of averages or percentages of professionals according to their position on previous use (yes/no) of digital technology for ER sessions; b: mixed activity including services in both sectors (private and public).

Ethical considerations

This is a practice survey study. This is a study in the social and human sciences in health involving professionals and does not include patients. Under current French legislation, this type of study is not regulated by the "Jardé" law [25]. In addition, the questionnaire was anonymous and all participants in the study gave their written consent to take part. Also, apart from reminders, no canvassing or remuneration was carried out to encourage respondents to take part in this study.

Results

Description of the population

Around 300 professionals were contacted (100 directly by email and around 200 via social networks). A total of 46 professionals completed the questionnaire. The response rate to the questionnaire was around 15%. The average time taken to complete the questionnaire was 12 minutes, and all the questions in this study were compulsory so that we could obtain qualitative feedback from the professional respondents. Table 1 shows the socio-demographic characteristics of the professionals and the factors linked to their perception of the utility of digital technology in the context of the ER. We found a higher Cronbach's α (0.82) that indicates better reliability of the study's questionnaire.

Characteristics of professionals The sample consisted of 35 physiotherapists and 11 PA teachers, most of whom were self-employed (80.4%) in urban areas (67.4%). The average age of the professionals was 35 ± 8.4 years and their length of service in the profession was 7.5 ± 5.1 years. Participants worked either in the private sector (80.4%) (practice, home rehabilitation), the public sector (13.1%) (hospital, medico-social sector, other rehabilitation centers) or had a mixed activity including services in both sectors (6.5%).

Description of sessions The organization of the professionals' days depended on their working methods. The professionals carried out individual (63%), group (28.3%) and mixed ER sessions including individual and group sessions (8.7%). Professionals working in public institutions did more group sessions than professionals working in private practice. With regard to group sessions, most professionals (66.7%) held sessions with at least 5 patients. During an ER session, several types of exercise were proposed, grouped into different categories: muscle strengthening (according to 89.1% of professionals), stretching (according to 50% of professionals), walking (according to 65.2% of professionals), aerobic exercise (according to 80.4% of professionals), joint mobilization (according to 37% of professionals), and balance (according to 67.4% of professionals). The average duration of the ER sessions was 45 minutes, with an average number of exercises equal to 5. The equipment used (cycloergometers, mats, dumbbells, elastics, balls, serious games) varied according to the objective of the ER program and the patient's functional capacity. The professionals stated that they regularly monitored the patients' state of fitness in order to adapt and individualize the content of the ER sessions as much as possible. The assessments frequently carried out by the professionals were as follows: pain and perception of effort (73.9%), walking tests (65.2%), muscular strength and endurance (65.2%) and balance (58.7%).

Patients characteristics Frequently encountered pathologies included: musculoskeletal musculoskeletal (82.6%), cardiovascular and respiratory (82.6%), neurological (76.1%), orthopaedic (71.7%), rheumatic (69.6%) and neuromuscular (41.3%). The majority of patients involved in ER were aged between are between the ages of 61 and 70 (95.7%) and 71 and 80 (95.7%). The sessions prescribed (on prescription) or scheduled were between 15 and 30 sessions for 65.2% of professionals, and more than 30 sessions for 30.4%. The average rate of patients who did not complete all the sessions planned or prescribed was 32.3% according to the professionals. The main reasons for dropping out were: patients' health problems (69.6%), lack of motivation (41.3%), transport problems (43.4%), or death and other reasons (34.8%).

Characteristics of professionals according to their perception of the utility of digital tools for ER

The proportion of professionals who perceived the utility of digital tools for their patients' ER was 69.5% (32 professionals). Analysis of the data showed that parameters such as professionals' age (young) ($p = 0.01$), practice area (urban area) ($p = 0.01$), number of patients treated per day (over 10 patients) ($p = 0.01$) and the high number of patients dropping out ($p = 0.03$) before the end of the ER programs were statistically associated with professionals' favorable view of the utility of digital ER devices. The perception of the utility of digital devices for ER was observed among professionals practicing in urban areas ($p = 0.01$). Also, professionals who had already used a digital tool (26.1%) for ER sessions tended to better appreciate the utility of digital tools ($p = 0.04$) as a means of providing support for their patients.

Characteristics of professionals according to previous use of a digital tool for ER

The proportion of professionals who had already used a digital tool for ER with their patients was 26.08% (12 professionals). Previous use of digital technology was found to be influenced by several different factors. Significant differences were observed according to the place of practice (rural/urban, $p = 0.01$), the number of patients per day ($p = 0.05$), and the average number of sessions prescribed per patient ($p = 0.01$). See Table 2 for details.

Digital tools used by professionals

The tools used are mainly:

- **Connected devices** such as pedometers, connected watches and heart rate monitors. Professionals felt that these tools were effective in assessing and monitoring patients' activity levels, but that they posed a problem in terms of providing support in reproducing exercises. These tools were perceived as easy to access because they were available on the market at prices that are often attractive to patients.
- **The web platforms and applications** frequently used by professionals were: Kobus, Kinexer6, Weasyo, Axomove, Kinvent Physio, Physitrack, TEAMS, Activedos. The main purpose of using these tools was to support patients during remote sessions. Professionals used web platforms to encourage PA both during and outside conventional sessions.

The professionals (16/46) felt that the combination of these two types of digital tools would be complementary in providing effective support for their patients. Finally, according to 54% of professionals, the objectives of working with patients remotely were to maintain what patients had learned, rather than to improve their state of health.

Strengths and weaknesses in the use of digital tools

Table 3 sets out the views of professionals on the use of digital devices for ER. It presents the weaknesses and the strengths of the use of digital devices as reported by the different professionals. Professionals (30%) who thought that digital devices were not useful mentioned that the platforms were very expensive and difficult to use. As a precautionary measure, most ER professionals (87%) cited the lack of feedback on patients' fitness during remote sessions as a key factor in their reluctance to use digital devices. Also, for those professionals who had already used digital tools for ER, the lack of tools enabling them to assess their patients' physical fitness remotely via standardized clinical tests was cited.

Table 3 Strengths and weaknesses of digital use as reported by professionals

Highlights (%) *	Weak points (%) *
• More advanced technologies (15) • Allows you to have fun and take your mind off the effort (37) • Allows you to customize your training programs (50) • Accurate measurements, innovative equipment, ease of measurement for the operator (30) • Facilitates monitoring and evaluation to adapt treatment (57) • Remote program adjustment, pain monitoring and compliance monitoring (47).	• The high cost of digital tools (87) • Older people are not used to digital technology (57) • Difficulty of adaptation for elderly patients, especially those with cognitive problems (77) • Equipment set-up time too long (47) • Waste of time if the tools are unsuitable (47) • Fragile equipment breakdowns and battery life (27) • Lack of patient compliance if it is to be used (30) • Lack of security and control of patient practice (87).

* The proportion of responses reported by professionals was presented in percentages.

Discussion

This study assessed the perceived utility of digital tools in the context of ER with professionals in the field and identified the factors associated with their position (favourable or unfavorable). The main findings of the study were, on the one hand, a low level of previous use of digital tools and, on the other hand, a favorable view of the utility of these tools for patient self-management. To our knowledge, no prior study has focused on those factors specific to the perspectives (favorable or unfavorable) of ER professionals on the utility of digital tools. These results are thus difficult to compare with data in the existing literature. However, it seems possible to make a link with studies involving patients in order to discuss some of the results of this study.

Several factors (workload, place of work and seniority of the professionals interviewed) were significantly associated with the previous use and perceived utility of digital tools for ER.

The proportion of professionals with prior experience of digital tools and reported their utility was 26.08% and 69.5% respectively. This result shows the difference between the perception of the utility of a digital tool and its actual use in professional practice. In fact, these results are similar to a previous study of patients evaluating the use of digital technology in rehabilitation [26]. This study found that 80% of patients did not use the device. In fact, just like the patients in the study by Tousignant et al. [26] professionals evaluated the use and usability of the tools according to their professional identity (including training, personality, professional habits, etc.) [27]. According to Dubar [28] this goes beyond their organizations and the way they function, and can be explained by the environmental and social context in which ER professionals operate. Consequently, our results show the need to pay particular attention to the process of co-construction of digital devices by the primary users and the ER professionals, before deployment to patients.

In a recent systematic review of the literature (Including 18 studies with 9 randomized controlled trials), Ramachandra et al. assessed the utility, acceptance and usability of a cardiac telerehabilitation device for patients with coronary heart disease [29]. Authors found that home-based cardiac telerehabilitation usability, utility, acceptability, and acceptance were high; yet, a number of external variables influenced utility. The authors recommended that future studies take into account the needs and expertise of ER professionals [29].

Professionals practicing in urban environments and those treating a higher number of patients per day showed significantly greater appetite for using digital tools. These results suggest that the benefits of digital tools would be more pronounced in urban environments and among professionals managing a higher volume of patients per day. The results also indicate that 67.4% of professionals working in urban environments perceive the utility of digital tools, while only 32.6% of professionals in rural environments share this perception. This disparity suggests a possible influence of the work environment on the perception of digital tools, underlining a preference for these technologies in urban contexts. Derisson and Shahyari found the same rate (67%) of perception of the utility of digital technology by professionals in the rehabilitation of patients (adults and children) with language disorders. In another study by Touhami et al., the authors found a different result from ours. In fact, 80% of the rehabilitation professionals in their study found that the use of digital tools made a positive contribution to the treatment of dyslexic children. This higher rate found in their study can be explained by the fact that the professionals had the same tool for dyslexia rehabilitation with children [30] unlike our study, which evaluates the practices of professionals, who use very different digital tools for the rehabilitation and effort training of their patients.

Among professionals who used digital tools, 79% said they were "satisfied" or "very satisfied". It should be noted that no professional using digital tools declared being dissatisfied. This rate of satisfaction was found by Toussignant et al., in their randomized trial (77.3%) of physiotherapists and their patients in the context of rehabilitation after knee arthroplasty [26]. For the purposes of this study, the digital tools used by professionals were mainly connected objects and web platforms. These tools are chosen by professionals according to the objective they are pursuing. Although professionals perceive their roles to be complementary, the existing systems do not incorporate the standardized clinical assessments that professionals frequently use. This parameter could be an important lever in the design and use of an innovative device combining both a web platform and a wearable sensor capable of assessing patients' physical fitness.

As part of the development of a mobile tele-rehabilitation solution (Télé-Mouv) Bughin et al. [31] studied the key points and obstacles associated with the use of a digital solution as part of their therapeutic management with 151 patients. The results of this study are similar to our own and show that the key points for the perception of social utility and adherence to the digital solution are the personalization of the health program and feedback on the patient's state of health. Finally, the authors point out that the regular wearing of a connected object is not a real barrier to adherence to and use of a digital device, but would represent a favourable factor for improving feedback between patient and therapist. Finally, as in our study, the patients questioned seemed to be fairly favourable to the use of digital tools.

The difference between the current study and that of Bughin et al. concerns the cost associated with the use of digital tools. In the Bughin et al. study, over 90% of patients surveyed said that the cost was a moderate or major inconvenience, whereas in our study, only 33% of professionals cited the cost as a barrier to the use of digital technology. Furthermore, unlike our study, data transmission was not perceived as a problem in

the Bughin et al. study. One methodological point differs between the Bughin et al. study and our own. In the Bughin et al. study, the Télé-mouv system was presented to each patient before the questionnaire was administered. In contrast, our study was carried out only with ER professionals, and no digital device was developed prior to the study and given to the professionals to test.

Strengths and limitations of the study

This study is one of the few to evaluate the professional practice of physiotherapists and PA teachers based on specific factors linked to the utility of digital devices for ER. Another strong point of this work is the large number of variables collected (variables specific to the practice of professionals concerning the use of digital technology and the characteristics of professionals). The age and pathologies most represented among the patients of the professionals in this study were similar to those found in a previous study of 687 physiotherapists from 100 French departments [32]. In fact, the pathologies frequently encountered by the medical practitioners in this study (Panchout et al.) and the professionals in the current study are chronic pathologies, specifically cardiovascular and respiratory or musculoskeletal disorders. We could therefore observe a good representativeness of the conditions encountered by the professionals in the two studies, which could bring the present study closer to the actual practice of the professionals.

Despite these strengths, our study has certain limitations. This study is a practice survey and our sample was calculated in relation to the target population. However, the results may not necessarily be extended to the practice of professionals in other regions. Indeed, the investigators have sent requests for distribution to the regional ("Nouvelle-Aquitaine") and national (France) orders of physiotherapists. During the year, physiotherapists receive a large number of requests to complete questionnaires. In addition to the fact that the subject may be of greater interest to younger professionals, and the high level of demands upon professionals may also explain the small number in our sample. In addition, our study sample was not large enough for multivariate analysis.

The self-questionnaire could also create a social desirability bias, as it is possible that the professionals who took part in this study have an attraction to the use of digital technology in general. We are therefore unable to determine to what extent this limitation might have had an impact on the professionals' responses.

Implications for practice

Variables specific to the practice of ER, such as workload, age and seniority of professionals, could, like other areas of acceptability, influence the actual use of digital devices. The study highlights some important practical information to consider when developing digital devices for ER:

- Future devices must be adapted as far as possible to the practice of professionals, and it is essential to consider the feedback that devices must offer in order to maintain the patient-caregiver relationship between patients and their professionals. The relationship between professionals and their patients must be preserved in order to increase patient adherence to the use of devices, as professionals play an important role in changing their patients' behaviour.
- Physiotherapists would feel a greater need to use digital tools for ER in addition to rehabilitation sessions. The reduced time available for ER sessions in institutions (practices or centres, etc.) is thought to be linked to this need.
- ER support systems should be as close as possible to professional practice, with automated patient assessment by professionals.
- Finally, patient empowerment should be an integral part of patient management from the outset of sessions, to enable patients to get used to the technologies used, even if they seem simple to use.

Implications for research

Telerehabilitation offers great potential as a complement to conventional therapies. If the devices are to be used by therapists and their patients over the long term, it will be essential to explore the parameters identified in this study, including the cost of the devices. Medico-economic studies should therefore be carried out to assess the real benefits of using digital devices and explore the conditions for their availability to patients and their therapists. The results of this work constitute a significant contribution to the current literature and provide a solid basis for guiding future initiatives aimed at optimizing the use of digital tools in clinical ER practice.

Conclusion

These results call for in-depth reflection on strategies for integrating digital tools into the daily practice of ER. This survey provides contextual information about the perception of utility of digital devices by therapists. By highlighting the contexts favorable to the perception of the utility of digital devices, this study could offer specific avenues for promoting the successful adoption of digital technologies in the field of ER. The perspective of professionals on the utility of digital tools for ER is not definitive and could evolve favorably if the recommendations of users (e.g. the desire for continuous feedback between professionals and their patients) are regularly considered. It is therefore necessary to adopt an iterative approach when building devices so that they can evolve in collaboration with therapists.

Statement and declaration

Authors' contribution

Conceptualization, K.G.A., J.L and S.M.; methodology and research, K.G.A., FT; software, writing - preparation of original version, K.G.A., J.L.; writing - revision and editing, all authors; project administration and acquisition of funds, S.M. All authors have read and approved the published version of the manuscript.

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare they have no conflicting interests with the content of the article.

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