ORIGINAL RESEARCH

# Keep posting and following social media profiles about physical therapy, but be aware! A cross-sectional study of social media posts on Instagram and Twitter

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**Abstract**

*Background:* Social media is established as a communication channel that is useful to disseminate scientific information. While social media can disseminate high quality information, it can also facilitate the spread of false or misleading information. Furthermore, social media is considered a self-promotion environment that can have several aspects related to personal marketing.

*Objective:* To systematically search and review social media posts verifying whether the posts about physical therapy interventions reported sources of information; the presence of aspects suggesting conflicts of interest (COI); whether information was presented to facilitate knowledge acquisition; the reach of information posted; and the use and quality of the cited scientific references.

*Methods:* Searches were performed on Instagram and Twitter using #reabilitação for Portuguese posts, and #rehabilitation for English posts. The inclusion criteria were posts including terms related to physical therapy and presenting interventions along with their purposes. The searches and screening processes were performed by at least two independent researchers.

*Results:* Of 1,145 pre-selected posts, 632 posts were included, of which 14% cited references as source of information, 57% presented potential COI, and 9% facilitated knowledge acquisition. The posts received the mean $\pm$ SD of 88 $\pm$ 593 likes and profiles had a mean of 5,162 $\pm$ 37,240 followers. Considering the posts that cited references, most posts presented consistent information (51%) and 6% presented only positives outcomes (selection bias). Many references were of poor methodological quality (39%).

*Conclusion:* The present study enlightens the fact that most posts on Instagram and Twitter regarding physical therapy interventions did not report or use sources to support the

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information disseminated. Also, most posts were not created to facilitate knowledge acquisition.

*Registration number:* PROSPERO register database (CRD42021276941).

## Introduction

The quick dissemination of information through social media, and its widespread availability to the public in general, may help shorten the implementation gap between scientific research and clinicians, patients, and health institution managers.[1,2] If this information is of a high-quality, it could encourage evidence-based clinical practice implementation in a wider range of health services.[3]

While social media can disseminate high quality information, it can also facilitate the spread of false or misleading information.[4,5] This problem was made evident during the COVID-19 pandemic where dissemination of fake news was treated as an *infodemic*.[6] Furthermore, social media is considered a self-promotion environment that can have several aspects related to personal marketing.[7] Social media platforms have lowered entry levels and heightened the potential reach of self-branding strategies, enhancing the internalization of marketing strategies by individuals.[8] Thus, professionals use the reach of social media to advertise their services and endorse products[9] using physical therapy-related posts to capture the attention of an interested audience.

Self-promotion is not an issue; in contrast, it could be a form of self-motivation for experts to keep posting about scientific matters to maintain social engagement.[10] However, in professional fields, such as physical therapy, self-promotion may combine practices of micro-influencers endorsing products with practices used for content making in science communication, such as knowledge translation. The act of stimulating consumption or profit from products and services likely includes potential conflicts of interest (COI) when selecting information to be disclosed.[11] The appealing and lucrative aspects of a service or product may contradict scientific evidence or favor selection bias. Even unintentionally, information disseminators may ignore high-quality scientific information against their products or overstate weak information that favors the endorsed product.[11] In addition, many information disseminators are the same professionals who reported difficulties in interpreting scientific findings or understanding the language in which scientific reports were published,[12] resulting in a chain of misinformation.[4,5] One study evaluated 200 most popular YouTube videos with information about rehabilitation for low back pain and found that only half of the proposed interventions were in accordance with relevant clinical guidelines.[13] Therefore, this study aimed to systematically review posts on social media that disclose information related to physical therapy interventions and verify (i) whether the posts reported sources of information to support the content; (ii) the presence of aspects that could suggest COI; (iii) whether the information was presented to facilitate knowledge acquisition; (iv) the reach of information posted; and (v) the use and quality of the cited scientific references.

## Methods

### Design

This study is a cross-sectional study using a systematic approach to search and review social media posts about physical therapy interventions. Therefore, the study followed the Cochrane Collaboration recommendations[14] to systematically select information, reported the finding following recommendations for systematic review report,[15] and was prospectively registered with the PROSPERO register database (CRD42021276941).

### Search strategy

The searches were performed on the social media platforms Instagram and Twitter during the month of October 2021 (14th and 15th October for searches in Portuguese, and 18th and 19th October for searches in English) by two independent researchers (Fig. 1). A new user profile was created just for the searches in this study to minimize the influence of the social media algorithm for targeting content. The searches were performed using the hashtag "#reabilitação" for posts in Portuguese, and "#rehabilitation" for posts in English. No limit for publication period was applied.

As we intended to include at least 100 posts per platform in each language, we reran the search on Twitter for posts in Portuguese on 26th October 2021, considering we included just 86 posts from the first search (Fig. 1).

### Eligibility criteria

To be included, the posts had to (i) be written in Portuguese or English; (ii) include, in any location of the post (caption, text, hashtags, or images), the terms "fisioterapia", "fisioterapeuta" and/or "fisio" for posts in Portuguese, and "physical therapy", "physical therapist", "physiotherapy", "physiotherapist" and/or "physio" for posts in English; (iii) suggest, explain, or present at least one physical therapy intervention; and (iv) report some objective, purpose, or focus of the discussed intervention targeting a condition or an outcome. Posts were excluded if they (i) were expressly intended to endorse, sell, or offer services, products, or lectures/courses; (ii) presented interventions outside the physical therapy scope, e.g. prescription of medication or surgery techniques; (iii) were from scientific journals profiles; (iv) and/or only shared links from other social media. In the case of reposts, the original post was searched and analyzed for eligibility. English language was selected considering that the majority of scientific evidence is published in this language, and a secondary language (Portuguese) was included because language is an important barrier for the understanding of scientific information[12] and the language
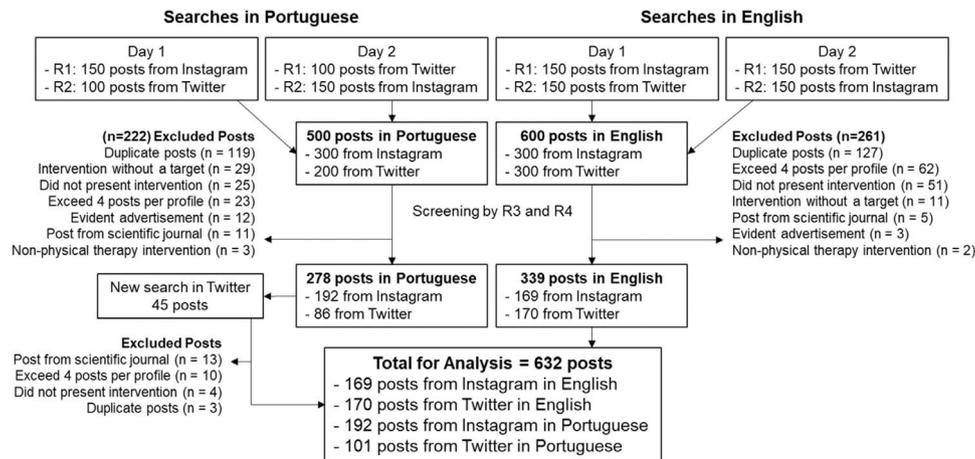
**Fig. 1**  Flow diagram of post selection process.

translation is likely a factor influencing the consistency of information.[16]

## Screening process

- 1st step: the posts reached using #reabilitação/#rehabilitation were sorted by publication date (most recent to oldest), and each independent researcher pre-selected the most recent 150 posts for both social media platforms, and both languages, applying the eligibility criteria (Fig. 1). Twitter was the exception, each reviewer pre-selected 100 posts in Portuguese (Fig. 1). This platform presented less eligible content in Portuguese, so we reached outdated posts (early 2000s). Therefore, we included fewer posts to try and maintain a chronological uniformity.
- 2nd step: another two independent researchers confirmed the eligibility of pre-selected posts and excluded duplicates. In cases of inconsistency in the selection, a fifth researcher was consulted to resolve the differences. During this step we also verified the number of posts per profile. We set a limit of a maximum of four most recent posts per profile to reach a greater diversity of content authors.

## Data extraction

Data extraction was performed by two independent researchers and coordinated to be realized in the same day. Conflicts were resolved by consensus. Data extracted from the post were: publication date; number of likes, comments, and shares (when available); description of the interventions; objective of the intervention; references cited supporting the information; presence of endorsement or advertisement of products or services. Data extracted from the profile which posted the content were: number of followers; professional information disclosed in the profile description; and presence of endorsement or advertising in other posts in the last two years from the date of the post selected.

## Data analysis

The analyses and classifications were performed by two independent researchers, and when consensus was not reached, a third researcher was consulted.

## Presentation of information sources

We analyzed whether the posts cited scientific references as basis for their information.

## Potential conflict of interest (COI)

We considered a potential COI if the analyzed post included professional contacts for selling products or services; or if in the past two years, the profile had published posts endorsing, advertising, or encouraging the consumption of products or services offered by them or in partnerships with organizations or other professionals. We also considered the presence of a potential COI in posts presenting only the positive outcomes from the cited reference, omitting negative and/or non- significant results (selection bias).

## Type of dissemination

The feature of the publication regarding information dissemination was classified as:

- *Facilitated information*: when the profile was not considered to have COI, and the post content was developed to facilitate knowledge acquisition of the referenced scientific information. For this, the posts could use different tools, such as infographics, illustrations, or videos.
- *Facilitated information with potential COI*: the post content was developed to facilitate knowledge acquisition of the referenced scientific information; however, the post or profile presented indications of having potential COI.
- *Simple dissemination*: the post or profile did not present indications of having potential COI, yet it did not facilitate knowledge acquisition of the referenced scientific information; or it facilitated the understanding, but the content was not based on scientific references.
- *Simple dissemination with potential COI*: the post or profile presented indications of having potential COI and did

not facilitate knowledge acquisition of the referenced scientific information; or it facilitated the understanding, but the content was not based on scientific references.

- *Self-promotion*: posts which presented scientific information (or not), with or without facilitation of the understanding, and directly associated professional contacts with the content disclosed, such as clinic/clinician name and/or brand, telephone, e-mail, etc. Posts presenting pre-post treatment performed by the profile's owner were also considered self-promotion.

### Reach of information posted

To verify the reach of the posts and engagement of followers, the absolute number of followers, likes, comments and shares were analyzed.

### Reference analysis

We analyzed the following aspects:

- *Level of evidence regarding intervention*: the Oxford centre for Evidence-based Medicine scale was applied considering the methodological design used in the references.[17]
- *Methodological quality*: the scales were applied according to the methodological design. Randomized controlled trials were assessed using PEDro scale (good-quality ≥6 points, low-quality ≤5 points)[18-20]; Systematic reviews were assessed using the tool AMSTAR II (good-quality = none, one or more non-critical weakness, low-quality = one or more critical flaws)[21]; Observational studies were assessed via Epidemiological Appraisal Instrument (EIA) (good-quality >1 point; low-quality ≤1 point)[22,23]; and Clinical guidelines were assessed via the tool AGREE II (good-quality ≥50% at domain 3, low-quality <50% at domain 3).[24,25] Other designs were not assessed considering the low relevance for intervention evidence.
- *Impact of the references*: was assessed using the greater citation numbers on Scopus or Web of Science database, and the Altmetric score.
- *Consistency of the information*: verified whether the post information was consistent with the cited reference. Posts were classified as 'accurate' when the post information matched the reference; 'inaccurate' when the post information was not supported by the reference;

and 'partial' when the information agreed with the reference, however, the post (i) did not present all the primary results of the study; (ii) presented only image from manuscript omitting important parts; or (iii) did not present all the results that fulfill the aims mentioned in the original reference, when primary outcomes were not determined.

### Statistical analysis

Data were analyzed descriptively using measures of central tendency and variability, or frequencies, percentages, and absolute values. After checking the primary data, in a *post hoc* analysis, we aimed to verify whether (i) posts using scientific references reach more people or engage more followers compared to posts without references; (ii) posts of profiles with potential COI reach more people or engage more followers compared to posts of profiles without COI; (iii) the non-use of scientific reference is related to profiles with COI; and (iv) facilitation of knowledge acquisition is related to scientific references of good quality. Therefore, the Mann-Whitney test was used to verify whether there were differences regarding the number of followers and likes between posts that cited or not scientific reference and between profiles with or without COI. Data were analyzed using R statistical software 4.1.1 (packages stats and pairwiseCI). Additionally, a Pearson's chi-square test was used to verify the association between the use of scientific reference and presence of COI, and between the type of dissemination and the quality of reference used. Data were analyzed using SPSS version 26.0 (IBM SPSS Inc., Chicago, IL, USA). The confidence level was set at 5% for all the analyses.

## Results

### Post selection and characteristics

From 1,145 pre-selected posts, 632 posts were included in the analysis, of which 339 posts were in English and 293 in Portuguese (Fig. 1). The included posts were published between June 2011 and September 2021. The most cited intervention was exercise (Fig. 2A), and the main target of the interventions was pain management (Fig. 2B). The dataset used in the analyses is available in the supplementary material 1.
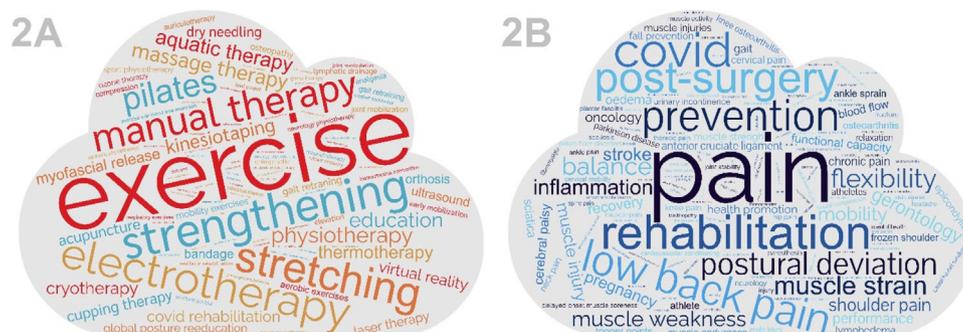


**Fig. 2** A — Interventions included in social media posts; B — Targets of the interventions included in social media posts.

**3A - Citation of Information Sources**

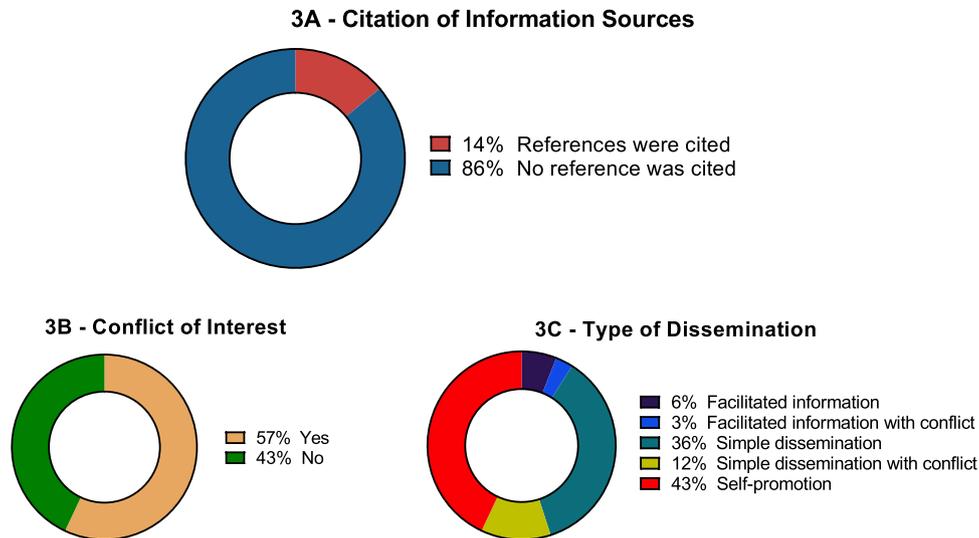**3B - Conflict of Interest**

**3C - Type of Dissemination**

**Fig. 3**   Data on use of references, potential conflict of interest and communication aspects (*n* = 632).

## Citation of information sources

From 632 posts, 14% (*n* = 89) cited references in which their information was based, and 86% (*n* = 543) did not cite any source of information (Fig. 3A).

## Potential conflict of interest (COI)

We identified that 57% (*n* = 362) of the posts/profiles presented materials which suggest potential COI (Fig. 3B and supplementary material 2 [Table 2.A]). For selection bias, 6% (*n* = 6) of the posts presented only the positive results from the cited references (supplementary material 2 [Table 2.C]).

## Type of dissemination

Most included posts were characterized as self-promotion post (43%; *n* = 270), with only 9% (*n* = 51) using approaches to facilitate knowledge acquisition of the scientific information disclosed (Fig. 3C and supplementary material 2 [Table 2.A]).

## Reach of information posted

The social media profiles posting information on physical therapy interventions had a mean ± SD of 5,162 ± 37,240 followers (Table 1). In total, the posts received a mean of 88 ± 593 likes, 2 ± 9 comments, and 1 ± 7 share (Table 1). The results for each language and social media are presented in supplementary material 2 (Table 2.B).

## Reference analysis

One hundred and one references were cited as source of information. We could not access the full text of six references (three original manuscripts, two books, and one undergraduate thesis). The characteristics of references used in the included posts are presented in Fig. 4 and supplementary material 2 (Table 2.C).

The most frequent methodological design was systematic reviews (33%) (Fig. 4A). In addition, the most frequent level of evidence based on the Oxford scale was 1a (20%) which indicates results from systematic reviews (Fig. 4B).[17] Regarding the methodological quality, most references were of poor quality (39%) (Fig. 4C). The average number of citations on Scopus or Web of Science was 25 (SD=58, median=2, min-max values=0−417) and the average Altmetric score was 152 (SD=558, median=31, min-max values=0−5,188). When comparing the information presented in the posts with the information from references, half of the posts presented accurate information (51%) (Fig. 4D).

## *Post hoc* analysis

Details of the *post hoc* analysis are presented in the supplementary material 2 (Tables 2.D−G). The *post hoc* analysis indicated that posts using scientific references as source of information did not reach more people via the number of followers compared to posts without references (median difference= −73 followers, 95% CI: −297, 302). In contrast, posts without references caught more attention of the audience receiving more likes than posts which used references

**Table 1**   Number of followers, likes, comments, and shares of the included posts (*n* = 632).

| Followers | Likes | Comments | Shares |
|---|---|---|---|
| 5,162 ± 37,240 | 88 ± 593 | 2 ± 9 | 1 ± 7 |
| 485 [0−834,000] | 7 [0−10,073] | 0 [0−141] | 0 [0−80] |

*Data are presented as mean ± SD and median [min-max].

**4B - Level of Evidence (Oxford scale)**

not applicable — 35%
Level 5 — 3%
Level 4 — 4%
Level 2b — 18%
Level 2a — 13%
Level 1b — 8%
Level 1a — 20%

**4A - Methodological Design**

Others — 6%
Book — 2%
Editorial — 3%
Case studies — 4%
Guidelines — 4%
Cross-sectional Studies — 10%
Cohort Studies — 12%
Narrative Reviews — 13%
Randomized Controlled Trials — 14%
Systematic Reviews — 33%

**4C - Methodological Quality**

not applicable — 29%
Poor quality — 39%
Good quality — 32%

**4D - Information Consistency**

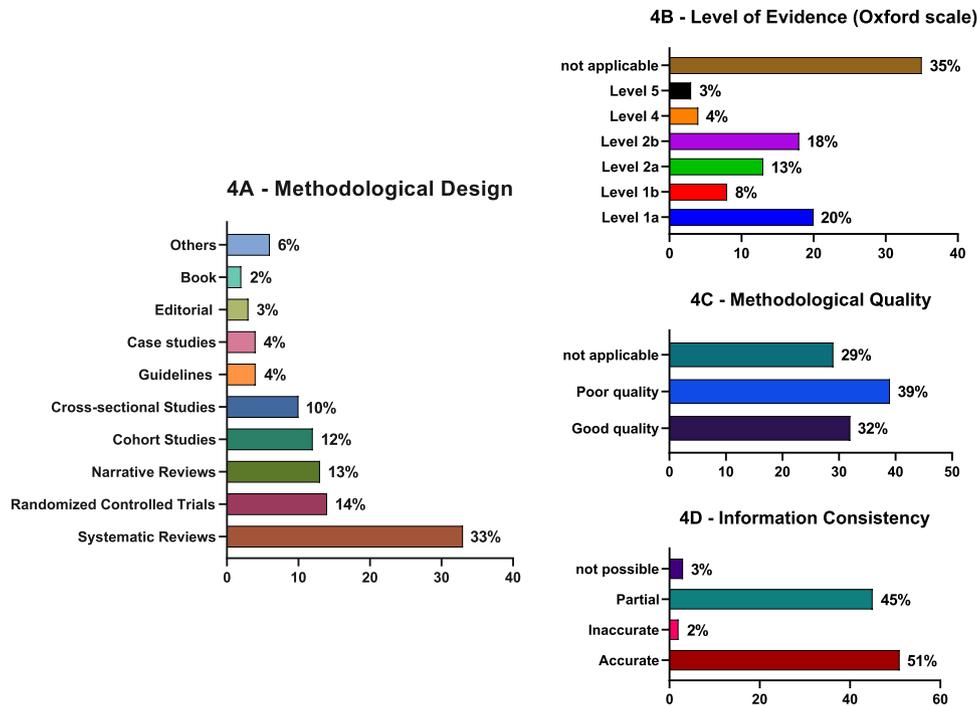not possible — 3%
Partial — 45%
Inaccurate — 2%
Accurate — 51%

**Fig. 4**  Data on references analysis.

as source of information (median difference= −6 likes, 95% CI: −8, −2).

Profiles presenting potential COI did not reach higher numbers of followers (median difference= 201 followers, 95% CI: −2,356) or receive more likes (median difference= 0 likes, 95% CI: −4, 3) compared to profiles without evident COI.

Posts with no reference as source of information were associated to the presence of a potential COI (Chi-Square, $p < 0.001$; Phi=0.248), and posts which used some approach to facilitate knowledge acquisition were associated to information based in studies with good methodological quality (Chi-Square, $p = 0.02$, Phi=0.288).

## Discussion

The present study found that most posts on social media regarding physical therapy interventions did not present a source of information. Additionally, most profiles presented information with a possible COI. Most posts were not designed to facilitate knowledge acquisition, focusing only on author/profiles' self-promotion. Although several cited references presented poor methodological quality, most references were considered as high level of evidence based on methodological design (systematic reviews) and relevance to the literature based on the number of citations and Altmetric scores.

Although social media has been noted as a valuable tool to engage students,[26] the use of information from social media to build academic and technical knowledge requires caution. Kyung-Sun et al.[27] reported that almost 100% of their undergraduate students sampled from different disciplines used posts from social media as a source for academic works; and almost 60% of the students reported that they never check if the information acquired from social media

sites is based on trustful sources. We found that the majority of social media posts regarding physical therapy interventions did not cite a source of information. Information from social media posts without references might be accurate and based on strong evidence. However, without cited references, we should consider the information as a personal opinion. The evaluation of information quality is therefore, limited to other aspects, such as the public knowledge or subjective perception about the personal characteristics of whom disseminated the information.

Expert opinion is considered a level of evidence[28] and social media is a good channel to share expert opinions to a broader audience.[10] But, the person disseminating scientific or health information may not have proper knowledge or understanding of the topic; social media logic facilitates the personification of an "expert."[29] We can determine the potential lack of knowledge about scientific methodology by checking the study designs used to base information about interventions; in our study less than half of posts with references based their information on randomized controlled trials or systematic reviews. Furthermore, people may post information or ideas based on motivations with potential COI, as confirmed in the present study. The non-use of references was associated with profiles presenting potential COI. Also, more than half of the included profiles present some content suggesting a COI, mainly related to the offer of physical therapy services.

One could affirm that social media users should know how to select information or profiles to follow, but it seems that followers are unaware of potential COI or the veracity of information. We observed that posts without references received more engagement from followers compared to posts with references. The act of not citing references is likely a choice based on the creator's purposes, indicating their interests are more related to self-branding than to knowledge

dissemination. A recent study reported that the majority of popular videos on YouTube about low back pain do not follow strong recommendations about its management.[13] Therefore, our and previous findings call the attention of the public to the need to be cautious about physical therapy content on social media, of content producers to the need to base their posts on high-quality sources and cite their references, and of social media platform content moderators, community managers, and guideline makers to the quality management of the content circulating on their platforms.

Our results suggest that knowledge translation was not the main motivation for posting content about physical therapy interventions. Only 9% of the posts handled the information in a way that facilitated its understanding, and most posts citing references, disseminated information from studies with questionable quality. Perhaps content producers are unaware of the process of knowledge translation and its effectiveness. Thus, our results highlight the need for educating content producers about the knowledge translation methodology. Therefore, encouraging them to keep posting valuable information about physical therapy using means to facilitate the understanding and reducing the gap between research and clinical practice. A positive finding was that posts which handled the information facilitating its understanding were associated with the use of studies with good methodological quality, indicating that good methodological quality is valued and this scenario of contestable information can be changed in the future.

### Limitations

We cannot affirm that the search strategy was specific enough to capture all posts regarding physical therapy interventions on the platforms. Our decision regarding the search terms was based on a pilot study: i) we searched different hashtags, and #rehabilitation/#reabiltitação presented the greatest number of linked posts; ii) posts linked to #rehabilitation/#reabilitação were most likely to fulfill the eligibility criteria; and iii) most posts linked to abbreviated hashtags, such as #physio, presented content related to activities of daily living without technical information. Therefore, we chose the search strategy to facilitate a systematic search and improve our chances to reach posts that discussed physical therapy interventions. The used metrics to check social media engagement is another potential limitation, and we acknowledge that they do not necessarily represent real engagement with the presented information. We included posts from two social media platforms, and the non-inclusion of others, such as Facebook, is likely another study limitation. Nevertheless, besides the limitations, our results properly reflect the content which is available for general population of physical therapists.

### Implication

Most of the analyzed posts were missing vital information needed to be trustworthy and to report useful information for supporting clinical decision. The lack of important information to properly understand interventions is not a flaw unique to social media content producers. Recent studies reported that infographics published by scientific journals do not report sufficient information to allow professionals to make clinical decisions,[30] and official government websites present inaccurate content about the management of low back pain.[31] Therefore, during the process of knowledge acquisition and clinical making decisions, it is crucial to search for trustful sources with complete information. This does not mean that social media should be disregarded. However, consuming information on social media requires caution. Readers should check the presented information references and be aware of the methodological quality, COI, studied population, intervention description, comparators, outcomes, clinical meaningfulness, harms, and others.[30,32,33] Hence, it is advisable to look for high-quality studies and read the full-text version. We acknowledge that the access and interpretation of scientific papers are important barriers mentioned by physical therapists.[34] Nevertheless, there are valuable sources, such as PEDro database (https://pedro.org.au/), that provide the tools to facilitate the understanding of research and trials in physical therapy.

### Conclusion

Our analysis of physical therapy social media posts found that most posts did not present a source of information to base their content on interventions; most profiles presented aspects indicating potential COI; very few posts reported scientific information in a way that facilitates knowledge acquisition; the included posts reached thousands of followers who seemed to not engage with them; and most posts that mentioned their references presented information from studies with poor methodological quality. Therefore, our results reinforce the importance of physical therapists being cautious about the physical therapy content they consume on social media.

### Conflicts of interest

The authors declare that they have no competing interests and no financial affiliation or involvement with any commercial organization that has a direct financial interest in any matter included in this manuscript.

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### Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.bjpt.2023.100484.

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