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# Is knee pain information on YouTube videos perceived to be helpful? An analysis of user comments and implications for dissemination on social media

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## Abstract

**Objective:** There is little research that characterises knee pain related information disseminated via social media. However, variances in the content and quality of such sources could compromise optimal patient care. This study explored the nature of the comments on YouTube videos related to non-specific knee pain, to determine their helpfulness to the users.

**Methods:** A systematic search identified 900 videos related to knee pain on the YouTube database. A total of 3537 comments from 58 videos were included in the study. A categorisation scheme was developed and 1000 randomly selected comments were analysed according to this scheme.

**Results:** The most common category was the users providing personal information or describing a personal situation (19%), followed by appreciation or acknowledgement of others' inputs (17%) and asking questions (15%). Of the questions, 33% were related to seeking help in relation to a specific situation. Over 10% of the comments contained negativity or disagreement; while 4.4% of comments reported they intended to pursue an action, based on the information presented in the video and/or from user comments.

**Conclusion:** It was observed that individuals commenting on YouTube videos on knee pain were most often soliciting advice and information specific to their condition. The analysis of comments from the most commented videos using a keyword-based search approach suggests that the YouTube videos can be used for disseminating general advice on knee pain.

## Keywords

Healthcare education, information-seeking behaviour, knee pain, osteoarthritis, self-care, social media, YouTube

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## Introduction

Osteoarthritis (OA) of the knee joint is a common degenerative condition which is highly prevalent in older adults.[1,2] OA is understood as a progressive disorder which usually presents with vague symptoms of joint pain and discomfort in the early stages. Individuals with these early symptoms may either seek health advice from general practice and/or seek information online regarding their health condition.[3] In particular, exploring information online before or after approaching a healthcare practitioner is widespread.[4–6]

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Of many online information resources, social media websites such as Twitter and Facebook reportedly serve as a platform to enhance patient awareness of disease symptoms, treatment options and prevention measures.[7] The usefulness of these has been explored from various perspectives.[8] More recently, the impact of YouTube videos in supporting health education/healthcare has been explored in sports concussion, smoking cessation, obesity and multiple sclerosis.[9–12]

YouTube is reportedly an effective medium for healthcare communication.[13] However, the huge volumes of information with varying quality, in addition to minimal regulation of the information, may pose a significant challenge in the provision of optimal healthcare.[9–13] With little way for users to ascertain the credibility of the information presented, the comments section of YouTube videos often provides an opportunity for viewers to discuss information given in the video, in a way providing validation of videos' utility. Accordingly, a content analysis of these comments may help to determine the impact and usefulness of the information provided by the videos.[14–16]

Therefore, the purpose of this study was to investigate the nature of user comments in relation to non-specific knee pain, by creating a classification scheme from the comments. This work targeted non-specific knee pain which, by and large, precedes confirmed knee osteoarthritis.[17] For the purposes of the study, 'non-specific knee pain' is operationally defined as pain perceived in the knee which is not due to any known cause such as ligament, meniscal or hamstring injury.

## Method

### Study design

A qualitative content analysis[18] was used to analyse the comments publicly available on YouTube relating to non-specific knee pain videos. Similarly to previous research on social media,[14] the data was obtained from a public forum; therefore ethics approval was not required for this study.

### Data source and search strategy

A systematic search was executed on 23 November 2015 of the YouTube video-sharing website (www.youtube.com). The keywords to identify the videos were determined on 10 November 2015, using Google Trends.[19] Google Trends shows how often a particular search phrase is queried when compared to total search phrases entered worldwide, and also reports on phrases that commonly co-occur with those phrases. Terms such as 'osteoarthritis' 'knee pain' and 'knee arthritis' were trialled on Google Trends, which resulted in the following nine commonly used search terms: 'knee pain', 'pain in knee', 'knee joint pain', 'knee cap pain', 'knee pain treatment', 'knee pain symptoms', 'knee pain causes', 'knee arthritis' and 'arthritis in knee'.

The links to the videos from the first five consecutive result pages for each of the nine search terms were extracted. Although it is understood that 96% of users do not scroll past the first page of the search results,[20] the extraction was extended up to five pages, to counter the potential change in ranking positions with respect to geolocation of the search.[21] Links to the videos identified by the nine search terms were exported to Microsoft Excel spreadsheet, for a step by step screening process. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram[22] was adopted and modified to suit the context of the study (video selection), by screening the title of the videos followed by the description, and then the videos.

### Video selection strategy

All videos which were at least two minutes long were reviewed for their inclusion in the study. Videos pertaining to other parts of the body and/or injuries, videos in languages other than English, and those that had a specific target audience other than lay people (e.g. surgical video; video recordings of conference presentations) were excluded. Videos that had disabled commenting feature were also excluded from the study.

Videos that met the above criteria were ordered based on the number of comments received (in descending order). The top 100 commented videos were extracted and further screened by one of the investigators (PJ) who has expertise specific to the physiotherapy field. From this sample, video titles identified as relevant to the topic were included in the analysis. All comments from the included videos were then extracted on 1 December 2015 via a YouTube comment scraper website[23] and transferred to an Excel spreadsheet.

### Development of categories and testing consistency

A comment may contain several sentences, and thus, present multiple categories or expressions (e.g. a question and a critique). Therefore, a three-phase iterative process was undertaken to develop and refine coding categories, and test the inter-rater consistency of the categorisation process. The inter-rater agreement was determined using Cohen's kappa ($k$) score for all phases of coding.[24] Where more than two raters were involved, average agreement score was determined

from the $k$ values of the paired combinations.[25] The $k$-values were interpreted using the following criteria:[26] $k > 0.8$ (excellent agreement); $k = 0.6$–$0.8$ (substantial agreement); $k = 0.4$–$0.6$ (moderate agreement); $k < 0.4$ (poor agreement).

In the first phase, a pilot scheme of categories was developed (SM and SL) by a hybrid approach, which identified new categories in addition to previously reported coding categories.[16] The comments extracted from four randomly selected videos from the list of included videos were used in the development of the categorisation scheme.[27] The developed categories were tested on 100 comments selected randomly from the four videos. The comments were coded independently by three investigators (SM, BTRS and SL), and were then compared for agreement. The discrepancies were discussed and changes required to the list of categories were undertaken. In phase 2, another set of 100 comments from the same four videos were randomly selected and tested with two investigators (SM and AT). A new coder (AT) was introduced in this phase. Discrepancies in these coding results were discussed and a final set of categories were arrived. Subsequently, another new coder (MB) was introduced to test the consistency of the final set of categories (phase 3) with another set of 100 randomly selected comments.

### Dataset and sampling

The final data analysis was completed by three independent investigators (SM, AT and MB) on a set of 1000 comments randomly selected from the pool of extracted comments. A maximum of three codes were assigned if a comment represented that many contexts.[14] Discrepancy in the results of the categorisation process was discussed among the three coders. If a consensus could not be reached, the other investigators (BTRS and SL) were approached to discuss and reach a consensus.

### Quality of video content

The quality of the video content was assessed using a nine-item checklist specifically developed for this purpose, based on the suggestions from a review on quality assessment of YouTube videos.[28] Additional items identified from the Health on Net (HON) code checklist[29] were also included and a final list of items was compiled. The videos were assessed as 'Yes', 'No' and 'Not applicable' for each item, and an overall video quality score was calculated and expressed as a percentage measure (number of 'Yes'/total number of items). Appendix 1 provides the details of the items assessed and the scoring system.

While assessing the quality, the videos were also classified based on the *Authorship* (identified from the credentials of the authors/source), *Content suitable for* and *Content category*. Technical details such as the sound, lighting and pixels were not considered in the quality assessment.

All quality assessment of the videos was completed by one of the authors with domain knowledge (PJ). Subsequently, a volunteer (LP) with similar domain expertise completed the quality assessment for all videos to determine the reliability of the quality score. The intraclass correlation co-efficient (ICC)[30] with 2, 1 was used to determine the reliability of average quality score across the nine items. The Fleiss's criteria as described before[31] was used to interpret the ICC values: ICC < 0.40 (poor); 0.40–0.75 (fair to good); ≥ 0.75 (excellent).

## Results

A flowchart of the video selection process is shown in Figure 1. Of the 900 videos identified by the search, we selected the top 100 videos based on the number of comments received. Of these, 58 videos met the criteria for inclusion in the study. Three videos that were not in English (despite the titles being in English) were excluded and a further 39 were excluded as they were identified to be irrelevant. Four videos which were used to create the initial coding scheme were also excluded. Finally 54 videos with 3192 total comments which included 2450 base comments (top comment of the thread) and 742 replies (in response to the top-level comment) were analysed. From the 54 included videos, the maximum number of comments for the top commented video was 650, the minimum number was 11, with an average of 59 comments per video. The median number of views of the 54 included videos was 64,061.5 (maximum 2,478,061; minimum 1300).

The listing category of the included videos, according to YouTube's classification were: *How-to & style* – 37% (20/54); *Education* – 20% (11/54); *People & blogs* – 20% (11/54); *Sports* – 15% (8/54); *Science & technology* – 4% (2/54); *Entertainment* and *News & politics* were 2% each.

### Consistency and development of categories

The analysis of the 100 comments in first phase suggested a poor agreement ($k = 0.37$) between the three coders, which included 22 categories. Further to the discussion among the coders, the preliminary set of categories was refined to categories and sub-categories which were tested in the second phase. An initial agreement of coding between two coders was

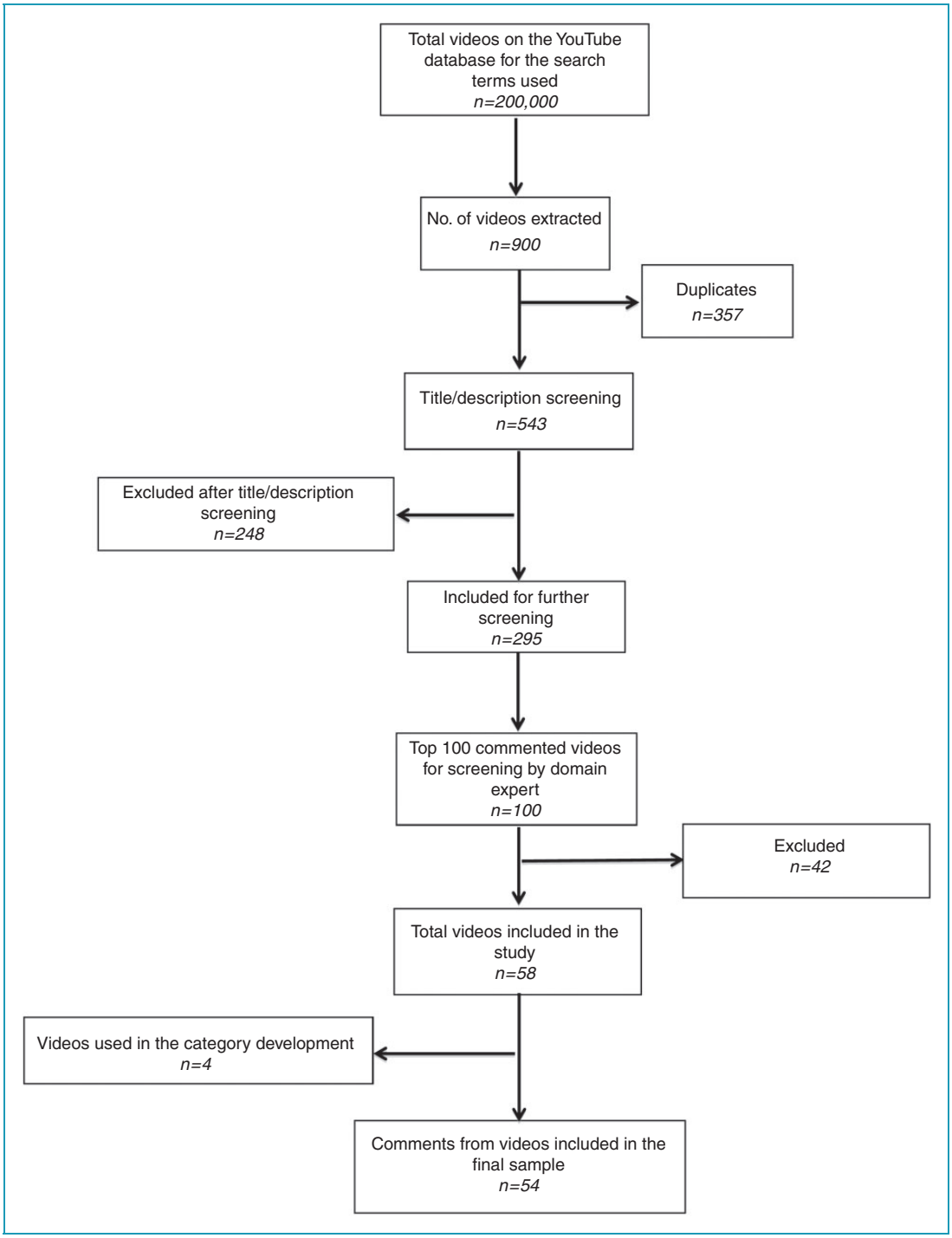


**Figure 1.** Flowchart of the video selection process.

substantial with $k = 0.61$, and the agreement after arbitration was excellent with $k = 0.95$. In the subsequent phase (phase 3) the categories were tested with three coders which yielded an excellent average agreement between three coders ($k = 0.84$), after arbitration. The average agreement between three coders in the analysis of 1000 comments was substantial ($k = 0.65$) prior to discussion and excellent ($k = 0.83$) after discussion among the coders. Consensus was not able to be achieved for 1.5% of the comments ($n = 15$). The final list of categories used to code the dataset is outlined in Table 1.

**Table 1.** Final categories scheme with examples.

| Code | Category | Description | Example | Source of classification category |
|---|---|---|---|---|
| 1 | Question | A comment in which a person asks for information, ideas or assistance. This does not need to be in question format (e.g. 'please help'). Includes requests for personal/situational details. | 'Hello! could you be kind to let me know the name of the machine you demonstrated at 9:26? I'd like to purchase one but I could not find the link you mentioned in the video. Thank you.' | Madden et al.[16] |
| 2 | Response | A comment in which a person offers information, ideas or assistance in response to a question or another comment. | '+. . . Yes to the small heel. you can do lunges and squats but I would use light weights- and they should be pain free. Good luck.' | Madden et al.[16] |
| 3 | Give (general) feedback | A comment expressing the commenter's view, feelings or reaction to a person, video or topic. Might be unsolicited. This could be general or neutral. Includes a comment which suggests content for a future video. | 'Very helpful . . . wish you had emphasised wt loss—probably more important than the purse comments, but those are spot on too! The other thing is to recommend swimming!' | Madden et al.[16] |
| 4 | Give feedback (positive/agree) | A comment expressing the commenter's view, feelings or reaction to a person, video or topic in a positive light or with agreement. | 'Like your videos. Thanks! My husband even listened to you, so you must be entertaining and to the point.' | Madden et al.[16] |
| 5 | Give feedback (negative/disagree) | A comment expressing the commenter's view, feelings or reaction to a person, video or topic in a negative light or with disagreement. | 'Thats the most stupidest response ever.' | Madden et al.[16] |
| 6 | Appreciation/ acknowledgement | A comment that expresses a simple 'Thanks' or appreciation, for the video or another comment. | 'Great vid! Keep up the good stuff:)' | New category |
| 7 | Give personal information/situation | A comment which gives some details of personal information or situation (including self, friend or family). Often included with other categories such as 'Question' and 'Feedback'. | 'My sister has spent tens of thousands of dollars on diagnosing her knee problems but they dont find any solutions. its in both her knees.' | Sullivan et al.[14] |
| 8 | Personal action | A comment which indicates an action the commenter will or will not take, after watching the video or taking on board advice given from other comments. | 'Thank you very much!:) I am going to give it a try!:)' | New category |
| 9 | Spam/promotion | A comment that provides a link or suggests looking at something (i.e. using Google) that is deemed irrelevant to the video or is unwanted. If a comment is assigned to this category, this is the only category it can be assigned to. | 'Have you heard about 'Atomic Max Muscle?' (do a Google search for it) It is a quick way to bulk up fast.' | Madden et al.[16] |
| 10 | Unclassifiable | A comment that does not fit any of the existing categories, and is therefore a diagnosis of exclusion. Includes blank comments and comments not in English. | 'Battlecruiser operational.' | Madden et al.[16]/ Sullivan et al.[14] |

### Categorisation of comments

The number of codes assigned to each category, the percentage of total codes, and percentage of comments (out of the 1000 comments) are included in Table 2. The most common category of comments were *Give personal information/situation* ($n = 311$, 19%). The second most predominant category was *Appreciation* ($n = 275$, 17%), followed by *Question* ($n = 248$, 15%) and *Response* ($n = 209$, 13%). The sub-category analysis conducted on four categories (namely *Question*, *Response*, *Feedback* and *Personal action)* suggested that a major proportion of *Question* (33%) were seeking help (*what to do*) while that of the response was *Answer* to the questions (56%). A major percentage of *Personal action* was 'I'll try it' (72%). A significant proportion of negative comments were negative about the video content (27%) or disagreement with the content (16%). The break-down of codes assigned to subcategories under four selective categories are as shown in Table 3.

### Quality of video content

Table 4 shows the results of the quality assessment for the video content and credibility. The quality assessment was performed in December 2016 and it was noted that two of the included videos had been removed from the database. Therefore the quality scoring has been presented for 52 videos. The authorship was not able to be determined in at least 48% of the included videos while 23% ($n = 12$) were from healthcare professionals (doctor, physiotherapist, osteopath and chiropractor) and 17% ($n = 9$) were from other trained/certified professional such as fitness instructor, massage therapist, and nutritional specialist. As determined by the domain expert author of this study, the video content in 73% ($n = 38$) of the videos were suitable for general lay audience.

The breakdown of quality of the content according to *Authorship* and *Content suitable for* are as illustrated in Figure 2. Figure 3 illustrates the quality scoring of the videos that were determined to be suitable for *General audience* ($n = 38$), broken down according to the *Content category*. The lack of quality was predominantly found in issuing a statement about the care required in the use/uptake of information and encouragement in seeking help from healthcare personnel as appropriate (see the last row of values for items 7 and 8 in Table 4). The mean ± standard deviation (SD) quality scoring for all videos, as determined by two raters (PJ and LP) were 62% ± 21% and 59.92% ± 25.08%, respectively. The reliability of scoring between the raters was 'fair to good', with ICC = 0.63 (95% confidence interval: 0.36–0.79).

## Discussion

The primary purpose of this study was to investigate the nature of user comments on non-specific knee pain related videos, in order to understand user's perspective

**Table 2.** Number of codes assigned to each category and their respective percentages.

| Code | Name | Number of codes | Percentage of codes | Percentage of comments |
|---|---|---|---|---|
| 1 | Question | 248 | 15% | 24.8% |
| 2 | Response | 209 | 13% | 20.9% |
| 3 | Feedback – give (general) | 87 | 5% | 8.7% |
| 4 | Feedback – give (positive/agree) | 247 | 15% | 24.7% |
| 5 | Feedback – give (negative/disagree) | 101 | 6% | 10.1% |
| 6 | Appreciation/ acknowledgement | 275 | 17% | 27.5% |
| 7 | Give personal information/situation | 311 | 19% | 31.1% |
| 8 | Personal action | 61 | 4% | 6.1% |
| 9 | Spam/promotion | 31 | 2% | 3.1% |
| 10 | Unclassifiable | 38 | 2% | 3.8% |
| **Total** | | **1608** | **100%** | |

**Table 3.** Breakdown of codes assigned to subcategories under four selective categories.

| Code | Name of the category and subcategories | No. of comments | Percentage within the category |
|---|---|---|---|
| | **Question** | | |
| Q1 | *Video specific question* | 53 | 21.37% |
| Q2 | *Related topic question* | 27 | 10.89% |
| Q3 | *Help/what to do* | 82 | 33.06% |
| Q4 | *Personal question - to video creator* | 7 | 2.82% |
| Q5 | *Reply question -request for more details/information* | 30 | 12.10% |
| Q6 | *Will 'x' work for me/condition?* | 41 | 16.53% |
| Q7 | *Other* | 8 | 3.23% |
| | **Total** | **248** | **100%** |
| | **Response** | | |
| R1 | *Answer* | 116 | 55.50% |
| R2 | *Explanation given* | 25 | 11.96% |
| R3 | *Additional information included* | 15 | 7.18% |
| R4 | *Answer with question* | 7 | 3.35% |
| R5 | *General response* | 9 | 4.31% |
| R6 | *Reply - additional response* | 15 | 7.18% |
| R7 | *See 'x'* | 17 | 8.13% |
| R8 | *Other* | 5 | 2.39% |
| | **Total** | **209** | **100%** |
| | **Feedback — give (negative/disagree)** | | |
| N1 | *Disagree* | 16 | 15.84% |
| N2 | *Inappropriate/unnecessarily negative* | 27 | 26.73% |
| N3 | *Negative - in response to another negative/stupid comment* | 12 | 11.88% |
| N4 | *Situational comment* | 10 | 9.90% |
| N5 | *Negative about video* | 27 | 26.73% |
| N6 | *Negative about related video topic* | 6 | 5.94% |
| N7 | *Other* | 3 | 2.97% |
| | **Total** | **101** | **100%** |
| | **Personal action** | | |
| P1 | *Check/look into something* | 4 | 6.56% |

(continued)

**Table 3.** Continued.

| Code | Name of the category and subcategories | No. of comments | Percentage within the category |
|---|---|---|---|
| P2 | *Communicate to another person* | 4 | 6.56% |
| P3 | *I'll go see 'x'* | 2 | 3.28% |
| P4 | *I'll take your advice* | 2 | 3.28% |
| P5 | *I'll try it* | 44 | 72.13% |
| P6 | *I'll update you* | 1 | 1.64% |
| P7 | *Negative* | 1 | 1.64% |
| P8 | *Other* | 3 | 4.92% |
| | **Total** | **61** | **100%** |

of the utility of these videos. It is understood that the commenting feature of YouTube provides a space that users find beneficial to discuss individual experiences (personal situations), ask questions, offer suggestions, express approval or disapproval and affirm positive actions. It was found that in 19% of the comments, users had provided their personal situation and in 15% of the comments, questions have been asked with regard to the video and/or with respect to their personal situation. While more than a quarter (26%) of the comments had provided feedback on the videos, only 6% of those were identified to be a negative feedback or in disagreement with the video content.

*Give personal information/situation* (19%) was the most common category. It was often accompanied by comments of other categories, and for only 12.5% of the time was it coded by itself. In a typical comment where a user had given their personal information or situation, it was often to contextualise the rest of their comment such as with a *Question* or *Appreciation* category.

> User A: My damage is in the cartridge underneath the patella. Until I can do lubricating injections, will this application work, or should I use the application for patella tendonitis?
> User B: Thanks a lot . . . You turned out to be a god for me. My knee use to grind real bad. Now it has reduced . . .)

It is not uncommon for some to share personal information online with social media, with a sense of community it can be appealing to share with others who have similar health issues.[14] Although, as Fernandez-Luque and colleagues[15] noted, there is an inherent risk to the user's privacy with the public availability of their comments, even if the user chose to remain anonymous.

The *Question* category was the third most common category (15%), with 248/1608 coded as having questions. Due to the nature of these videos, the users were most likely seeking answers or remedies to their knee problems. From the sub-category analysis, it was evident that 33% (82/248) of comments were in search of some form of advice (Q3), while 17% (41/248) were questioning the applicability of the content to a particular condition (Q6). Notably, 55% (137/248) of the comments in the *Question* category were also categorised under the *Give personal information/situation*. This implies that users in general provide their own personal situation before asking a question. Often videos were for specific conditions which supposedly forced the users to query the usefulness of the video to their condition (Q6).

At least half of the comments in the *Response* category (116/209) were straight answers (R1) which implies that the YouTube comments section is being used as a discussion forum. Nevertheless, comments and answers are generally not moderated and the credibility of responses is questionable. Also there is an inherent risk associated with incorrect interpretation of the information which may compromise the healthcare received. It is also important to note that 10.1% of all comments either showed disagreement or negativity in some way. Of the 101 comments, 27 (27%) were negative about the video, whilst another 27 (27%) were inappropriate.

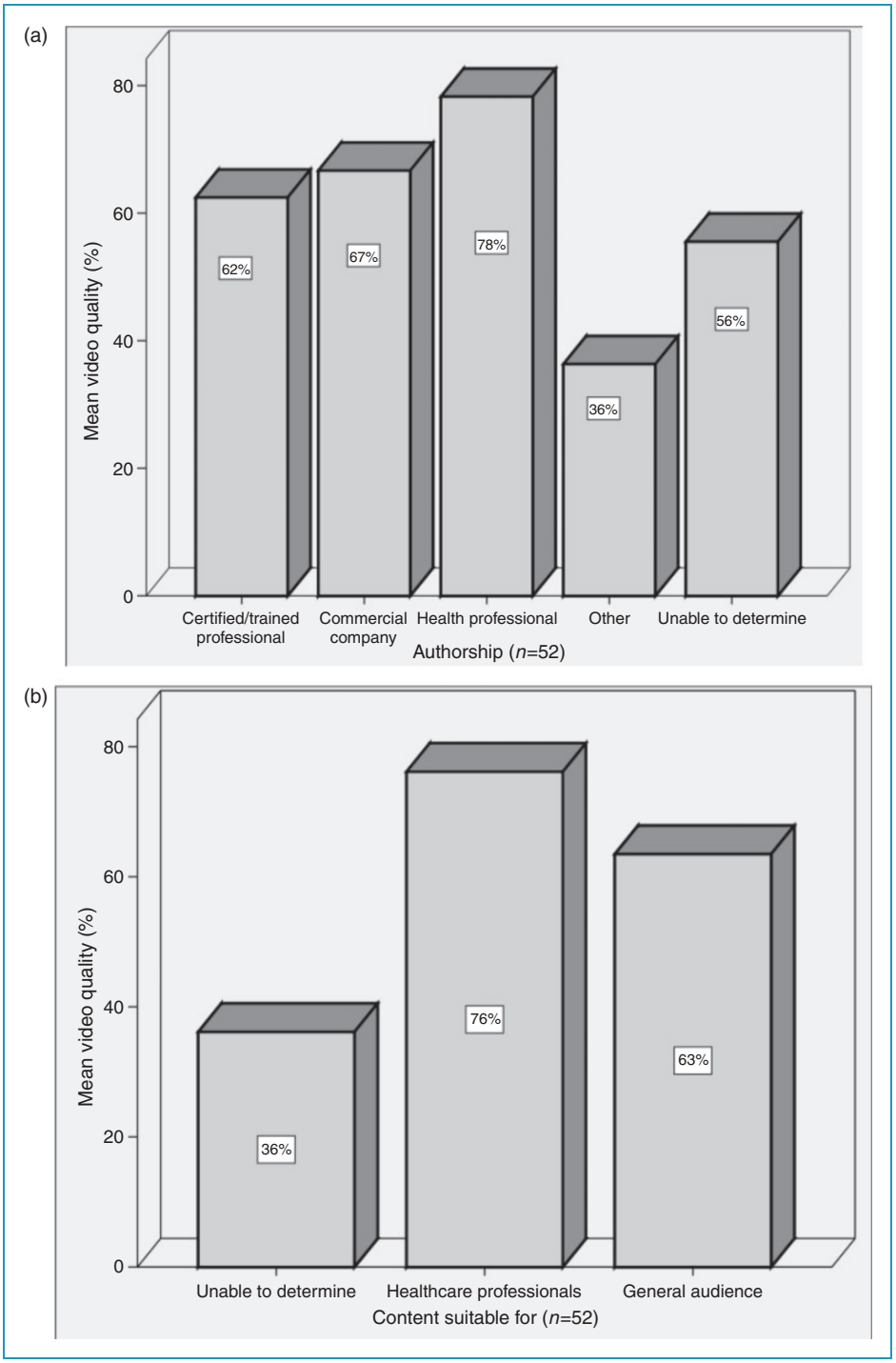


**Figure 2.** Breakdown of mean video quality score according to (a) authorship (b) content suitable for.

The key advantages of using social media in healthcare are the ease of communication of health information[7] and facilitation of a networked community to discuss, evaluate and critique health conditions.[14] In fact, in the communication process on social media a sense of community also leads to the disclosure of very personal information, towards the goal of overcoming health issues and facilitating personal actions to be taken. It was found in this study that at least 6.1% of the comments were *Personal action* category and 4.4%

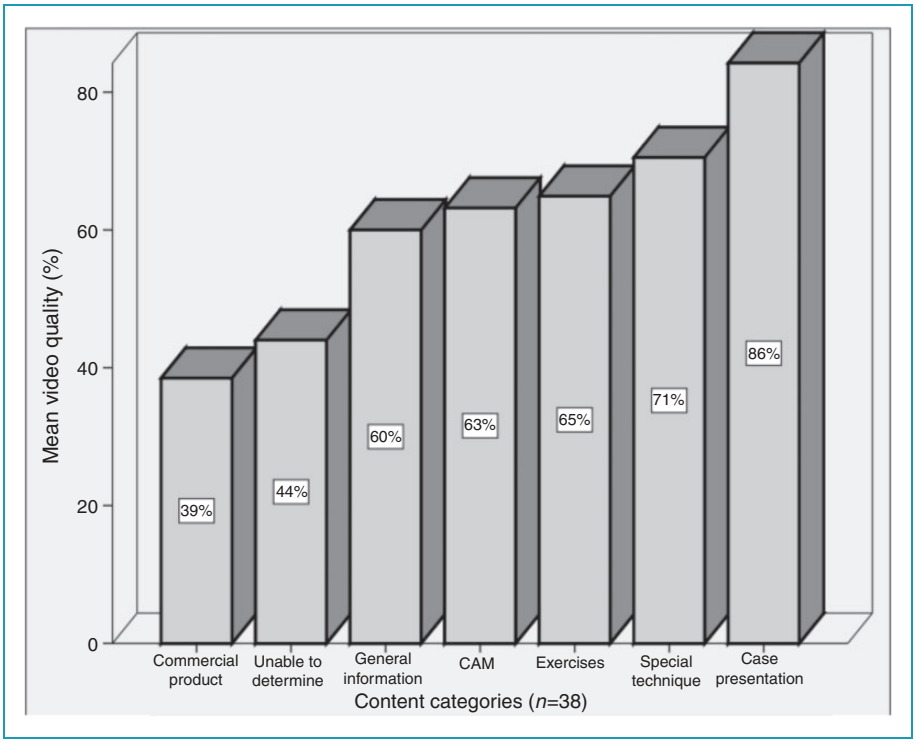


**Figure 3.** Breakdown of mean video quality score according to category of content, for videos suitable for general audience. CAM: complementary and alternative medicine.

of the total analysed comments were about making a positive action statement (e.g. trying the exercise prescribed). This demonstrates the meaningful impact the YouTube videos have on users. Even though this is a small percentage, it only represents the population who used the comments section. Potentially there may have been other non-commenting video users pursuing a positive action.

Overall, the significant proportion of comments identified in this study represented the *Question* and *Give personal information/situation* category, which raises issues such as the specificity of the video content to the users' needs and comprehensibility of the information given. Also, only 12 of the included videos were identified to be from health professionals and the authorship was unable to be determined in at least 48% ($n = 25$) of the included videos. These findings raise an interesting question on whether the videos provided the right level of information needed by the users. Further research is needed to explore this as it may have implication for provisioning videos with appropriate information, particularly given the substantial proportion of questions (49.5%), which sought advice.

While dissemination of health care information via social media may assist with wider reach, application of the information in videos and/or any un-moderated comments has to be at an individual's discretion, which may compromise the optimal care for their situation. The HON code suggests that online information source should explicitly state that the information is not to be considered as a replacement of care from a regular health care professional, and consumers should seek care from an appropriate health care provider. However, only seven of the included videos had incorporated this in their description and/or in the video. As the users of any online information are mostly unsure of the credibility of the information and acknowledge that there may be inaccuracies or misinformation,[32] it is imperative that the authors/sources suggest the level of use of the information provided in the video.

The major strength of this study is the rigorous process employed in developing the categories driven by the data, and testing the consistency. A sample of 1000 comments was finally analysed, with the assumption that the resultant percentages in each category would be proportional to the rest of the comments. It is not known if the analysis of all comments will have yielded different findings. This is a limitation of our study. The findings of the study are restricted to people who actively seek information online. The opinions of the videos users without an account and/or non-commenting user may yield different results. It has to be noted that these findings are derived from videos related to knee pain. Although the categories identified in this study may apply to other health conditions, the findings have to be interpreted with due caution.

**Table 4.** Quality assessment of the included videos for content and credibility.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 1. | https://www.youtube.com/watch?v=WCXtvKrjCno | The Massage Group – Treatment for a swollen knee / knee pain | Certified/trained professional | Special technique – massage | HP | 1 | 1 | 1 | 0 | NA | 0 | NA | NA | 0 | 50 | 3/6 |
| 2. | https://www.youtube.com/watch?v=5EB9dEupdIY | 23 Ways to get rid of inflammation and joint pain – Saturday strategy | Certified/trained professional | General information | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 78 | 7/9 |
| 3. | https://www.youtube.com/watch?v=A7gPajdzje0 | Knee exercises to strengthen muscles around the patella to avoid knee pain | Certified/trained professional | Exercises – Pilates | GA | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 1 | 67 | 6/9 |
| 4. | https://www.youtube.com/watch?v=FWvNxZrgK1w | Easy exercises for knee pain.wmv | Certified/trained professional | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 78 | 7/9 |
| 5. | https://www.youtube.com/watch?v=PqD7GngHiOo | Yoga remedies: Yoga for knee arthritis | Certified/trained professional | Yoga | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 56 | 5/9 |
| 6. | https://www.youtube.com/watch?v=telmmGoaN0 | Egoscue – exercises for knee pain | Certified/trained professional | Special technique – Egoscue | GA | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 89 | 8/9 |
| 7. | https://www.youtube.com/watch?v=TG7XD9uaJBM | The BEST exercises for patellar tracking disorder \| knee pain | Certified/trained professional | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 67 | 6/9 |
| 8. | https://www.youtube.com/watch?v=cKxwwQ4EfoI | How to relieve hip & knee pain\| Reflexology | Certified/trained professional | Special technique – reflexology | UD | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 9. | https://www.youtube.com/watch?v=uUVBnt54Yg4 | Acupuncture for knee pain | Certified/trained professional | CAM | UD | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 33 | 3/9 |
| 10. | https://www.youtube.com/watch?v=DCg8tuneIPo | Knee pain: Symptoms, treatment, and prevention | Commercial company | General information + commercial product | GA | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 | 1 | 78 | 7/9 |

(continued)

**Table 4.** Continued.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 11. | https://www.youtube.com/watch?v=m2qJMbzwA3w | Knee injection with Euflexxa — non-surgical knee pain relief | Commercial company | Special technique | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 89 | 8/9 |
| 12. | https://www.youtube.com/watch?v=-KlxvzWczAA | Knee anatomy and patellofemoral pain | Commercial company | Commercial product | GA | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 33 | 3/9 |
| 13. | https://www.youtube.com/watch?v=2HHJb6BYgMM | How to treat knee pain (patellofemoral pain syndrome) using Kinesiology tape | HP | Special technique — taping | HP | 1 | 1 | 1 | 0 | 1 | 1 | NA | NA | 1 | 86 | 6/7 |
| 14. | https://www.youtube.com/watch?v=AAqU0mu3-ic | How to apply kinesiology tape for knee pain — patella femoral syndrome / Osgood Schlatters syndrome | HP | Special technique — taping | HP | 1 | 1 | 1 | 1 | 1 | 1 | NA | NA | 1 | 100 | 7/7 |
| 15. | https://www.youtube.com/watch?v=HdBD268zoY0 | How to treat knee pain / Patella femoral syndrome / Tendonitis using kinesiology taping | HP | Special technique — taping | HP | 1 | 1 | 1 | 0 | 1 | 1 | NA | NA | 1 | 100 | 6/7 |
| 16. | https://www.youtube.com/watch?v=rRAcJXXXNac | Patella (anterior knee pain) testing and taping treatment for mal-tracking syndrome | HP | Case presentation | HP | 1 | 1 | 1 | 1 | 1 | 1 | NA | NA | 1 | 100 | 7/7 |
| 17. | https://www.youtube.com/watch?v=xWC4fLSSV6E | 3 Best exercises for: chondromalacia patella & patellofemural pain (knee pain) | HP | Exercises | HP | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 78 | 7/9 |
| 18. | https://www.youtube.com/watch?v=4z5W03XutXg | Hip pain & knee pain exercises, seated — ask Doctor Jo | HP | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 100 | 9/9 |
| 19. | https://www.youtube.com/watch?v=600fdkaVhvI | Top 3 stretches for patellofemoral syndrome or knee cap pain | HP | Exercises — stretches | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 67 | 6/9 |

(continued)

**Table 4.** Continued.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 20. | https://www.youtube.com/watch?v=aPkmo5Xqqtw | How to apply kinesiology taping for knee pain — patella tendonitis and patella femoral pain | HP | Special technique — taping | GA | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 67 | 6/9 |
| 21. | https://www.youtube.com/watch?v=PT7ahLIerys | Knee pain: Fix it forever | HP | Exercises/taping | GA | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 56 | 5/9 |
| 22. | https://www.youtube.com/watch?v=yHFVo96_RF0 | 18. Physiotherapy North Sydney: Exercise for knee-cap pain | HP | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 56 | 5/9 |
| 23. | https://www.youtube.com/watch?v=XHw1eJmeXQ0 | Knee pain — reasons & relief | HP | Case presentation | GA | 1 | 1 | 1 | 1 | 1 | 1 | NA | NA | 0 | 86 | 6/7 |
| 24. | https://www.youtube.com/watch?v=BbwssAUL8tg | Low back, legs, neck, hands & knee pain all GONE in 7 minutes | HP | Case presentation | UD | 1 | 0 | 1 | 0 | 0 | 1 | NA | NA | 1 | 57 | 4/7 |
| 25. | https://www.youtube.com/watch?v=OTUqeJudraY | Natural remedy for joint pain over night (pre-recorded Friday) | Other (personal) | CAM | GA | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 67 | 6/9 |
| 26. | https://www.youtube.com/watch?v=ia-EMVd8GVI | How to cure arthritis pain-joint pain remedy.wmv | Other (personal) | UD | UD | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 22 | 2/9 |
| 27. | https://www.youtube.com/watch?v=kBriikao3nU | Inflammatory arthritis of the knees | Other (personal) | Case presentation | UD | 1 | 0 | 0 | 0 | NA | 0 | NA | NA | NA | 20 | 1/5 |
| 28. | https://www.youtube.com/watch?v=Fj95GCWNDoQ | Knee pain how to address knee valgus and varus | UD | Special technique — biomechanics | HP | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 33 | 3/9 |
| 29. | https://www.youtube.com/watch?v=CssWqOwhIZw | Knee pain reduced in 30 seconds / Patella release technique — Dr Mandell | UD | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 78 | 7/9 |
| 30. | https://www.youtube.com/watch?v=gnsYIyGximw | Best combo exercise for low back pain, hip pain, and knee pain | UD | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 67 | 6/9 |

(continued)

**Table 4.** Continued.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 31. | https://www.youtube.com/watch?v=gQ5u5cehK7g | Knee pain relief from home remedies — how to get knee pain relief at home | UD | CAM | GA | 1 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 78 | 7/9 |
| 32. | https://www.youtube.com/watch?v=GyKP6TBJ2Go | Stop knee pain now \| The yoga solution with Tara Stiles | UD | CAM — yoga | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 56 | 5/9 |
| 33. | https://www.youtube.com/watch?v=hl7izRWnEQQ | Knee joint pain relief — step 3 | UD | Exercises and stretches | GA | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 34. | https://www.youtube.com/watch?v=IKC52uYdGQ4 | Osteoarthritis of the knee | UD | General information | GA | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 44 | 4/9 |
| 35. | https://www.youtube.com/watch?v=Jl5v_6sRed4 | Burning on sides of knee — chronic knee pain treatment | UD | UD | GA | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 36. | https://www.youtube.com/watch?v=K6IQ3Y-9ITY | Arthritis — knee pain — forever freedom | UD | Commercial product | GA | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 37. | https://www.youtube.com/watch?v=l4flRGTFwEo | Exercises for chondromalacia patella knee pain — video 1 of 4 | UD | Special technique — massage | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 67 | 6/9 |
| 38. | https://www.youtube.com/watch?v=lSaTJXJ_Maw | How to fix chronic knee pain | UD | Exercises — posture | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 78 | 7/9 |
| 39. | https://www.youtube.com/watch?v=mcX9arx1Y_o | Reduce knee pain with these exercises! (part 1 of 2) | UD | Exercises | GA | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 40. | https://www.youtube.com/watch?v=o8wSDS9wcUw | Yoga for the knees | UD | CAM — yoga | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 78 | 7/9 |
| 41. | https://www.youtube.com/watch?v=oDnOAtdDrbU | How to fix your knee pain by realigning your knees | UD | Exercises — stretches | GA | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 67 | 6/9 |

(continued)

**Table 4.** Continued.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 42. | https://www.youtube.com/watch?v=oGB4ESyq9hY | 'Knee strengthening' – how do I eliminate my knee pain | UD | Exercises | GA | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 44 | 4/9 |
| 43. | https://www.youtube.com/watch?v=owxbnmV9mwU | What causes knee pain and how to stop severe knee pain | UD | General information | GA | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 33 | 3/9 |
| 44. | https://www.youtube.com/watch?v=q43wnlrUitE | TENS electrode placements for knee pain | UD | Special technique – TENS | GA | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 45. | https://www.youtube.com/watch?v=syBi8gw4dsA | 10 Best exercises for knee arthritis, full physio sequence | UD | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 56 | 5/9 |
| 46. | https://www.youtube.com/watch?v=TO7AF7cs5H0 | The squat myth that causes knee pain | UD | Exercises | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0.56 | 5/9 |
| 47. | https://www.youtube.com/watch?v=VcKX7PLB0ew | Nighttime knee pain gel | UD | CAM | GA | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 44 | 4/9 |
| 48. | https://www.youtube.com/watch?v=YgA7Ti28ojo | The 'knee pain' guru on how to (relieve nerve pressure in your knee) | UD | Exercises – stretches | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 78 | 7/9 |
| 49. | https://www.youtube.com/watch?v=YlSpadtHa0I | Knee joint pain relief – step 1 | UD | Special technique – massage | GA | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 67 | 6/9 |
| 50. | https://www.youtube.com/watch?v=z9kPF1G_EfI | The knee pain guru on 'how to' deal with painful stiff swollen knees | UD | General information | GA | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 67 | 6/9 |
| 51. | https://www.youtube.com/watch?v=FH0jDpQBZAg | How to fix knee pain (jumper's knee) | UD | UD | UD | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 33 | 3/9 |
| 52. | https://www.youtube.com/watch?v=vQdnxc2s34 | Squat exercise form (with knee pain / problems) | UD | UD | UD | 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 44 | 4/9 |

(continued)

**Table 4.** Continued.

| Sl No. | URL | Video title | Authorship | Actual content | Content suitable for | Quality scoring items | | | | | | | | | Quality score (%) | Total items |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | |
| 53. | https://www.youtube.com/watch?v=6jVHFeV9SFU | Dr Joel Wallach avoid joint replacement and how you can reverse arthritis | *Video not available – failed access on 13 December 2016* | | | | | | | | | | | | | |
| 54. | https://www.youtube.com/watch?v=xfx62PVg36Q | Arthritis knee exercise & yoga for arthritis | *Video not available – failed access on 13 December 2016* | | | | | | | | | | | | | |
| | *Total number of videos met the criteria for each item (in %)* | | | | | 96 | 88 | 73 | 78 | 80 | 44 | 15 | 26 | 37 | | |

CAM: complementary and alternative medicine; GA: general audience; HP: healthcare professional; TENS: Trans-cutaneous Electrical Nerve Stimulation; UD: unable to determine.

## Conclusion

This study provides insight into nature of users' comments about videos on non-specific knee pain located on YouTube video sharing database. Generally, it is observed that individuals commenting on YouTube videos on knee pain were most often soliciting advice and information specific to their condition. At least 20% of the comments were complimentary of the videos, which suggests some form of usefulness of the videos.

### *Practical implications*

The findings reported in the paper are particularly important for health professionals. The findings point to the importance of reviewing the information available on YouTube and other social media platforms, and provide appropriate directions to the patients towards use of these resources. Additionally, health professionals may support public health information by posting and sharing material (and mediating when appropriate through comments) to act as credible source of information to enhance the quality available.

The findings of this study encourage the use of YouTube as a medium for disseminating generalised healthcare education and information to lay audience. Although OA is more commonly reported in older adults, the typical onset of the disease is between 40–50 years of age, with some earlier occurrences in individuals with a previous knee injury. YouTube may be an effective medium only in the communication of general advice on prevention and monitoring strategies for knee pain. However, further longitudinal research is necessary to understand the implications of this dissemination, with a moderated comments section.

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**Contributorship:** The research question, study design and methods was developed by BTRS, SL and PJ. The data collection and extraction was done by SM. The preliminary development of categories and analysis for consistency was done by SM, SL and BTRS. Analysis of final data set (1000 comments) was done by SM, AT and MB. PJ developed the quality assessment tool for the video content, in consultation with BTRS and SL. PJ completed screening of titles for inclusion and the video quality assessment. SM prepared the first report of the research which was reviewed and commented by BTRS, SL and PJ. PJ reviewed and modified the second draft of the report, tailoring it for publication – which was further edited by other authors (BTRS, SL, AT and MB).

**Declaration of Conflicting Interests:** The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethical approval:** The study utilised the data (comments) on a public forum, voluntarily posted by the users. According to the University of Otago Human Ethics Committee's guidelines, our study was classified as not requiring ethical approval.

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**Guarantor:** PJ

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## Appendix 1

| No. | Items with objective scoring | Marked as |
|---|---|---|
| 1. | Description of the video (text/verbal) | Yes (1) |
| | | No (0) |
| 2. | Video content/information enough to identify its objective | Yes (1) |
| | | No (0) |
| 3. | Self-explanatory title which reflects the content/objective of the video | Yes (1) |
| | | No (0) |
| 4. | Intended target audience can be ascertained | Yes (1) |
| | | No (0) |
| 5. | Does not claim sole benefits of specific treatment, commercial product or service | Yes (1) |
| | | No (0) |
| 6. | Contact details of the author/source provided | Yes (1) |
| | | No (0) |
| 7. | Issues statement that the information is complementary and does not replace a health professional's advice or information | Yes (1) |
| | | No (0) |
| | | Not applicable |
| 8. | Encourage care from appropriate healthcare personnel for individualised care | Yes (1) |
| | | No (0) |
| | | Not applicable |
| 9. | Provide information about access to other appropriate information | Yes (1) |
| | | No (0) |
| | | Not applicable |
| | **Items of categorical identification** | |
| 1. | Authorship (as identified by the author and/or description) | Health professional; other trained professional; commercial; individual; |
| 2. | Content suitable for (as determined by the domain expert author) | Professionals; general audience |
| 3. | Content category | As appeared in the video |

# Is knee pain information on YouTube videos perceived to be helpful? An analysis of user comments and implications for dissemination on social media

Meldrum S

2017-03-29