

REVIEW

A systematic and comprehensive review of internet use in cancer patients: Psychological factors

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Abstract

Objectives: Online resources are changing patient-professional relationship and care delivery by empowering patients to engage in decisions in order to cope with their illness and modify behaviors. This review analyses the psychological factors associated with spontaneous and health professional-guided internet use in cancer patients.

Methods: Searches were performed in the PubMed (MEDLINE), PsycINFO, and Scopus databases. Studies were included if they involved cancer patients or focused on the relationship between cancer patients and health professionals, describing either patients' spontaneous use of internet or a guided-structured eHealth psychosocial intervention.

Results: Seventy-seven scientific papers were finally included. Results described emotional and behavioral outcomes in cancer patients who accessed online information. Internet has long been used spontaneously not only as a source of medical information or symptom management but also for decision making or emotional and social support. Health professionals can guide internet use, providing specific web-based recommendations and developing intervention programs to better meet patients' needs, such as educational or information programs.

Conclusion: Online access is a complementary form of care that physicians can provide. Patients benefit from online resources, especially when both they and their health professionals increase their engagement with online interventions such as integrated systems or online communities.

KEYWORDS

cancer, cancer patients, E-Health, guided internet use, oncology, psychological impact, spontaneous internet use

1 | INTRODUCTION

Greater access and the standardization of new technologies have increased the number of people who use the internet as a source of health-related information. Access to this online information has been associated with a change in health behavior. Historically, transformations in the availability of information and its management

have had a strong impact on how populations have defined and addressed health problems. As Porter and Porter¹ pointed out, new written sources of health-related scientific, practical, and self-help knowledge began to spread quickly in the 18th century; this made information on remedies, preventive behaviors, and healthy habits available to large amounts of the increasingly literate population.

Since written sources of information have had a revolutionary impact on health-related behaviors in the past, it would not be surprising to find that the internet has produced a similar breakthrough. This review assesses this effect by focusing on psychological factors and applications of internet use in cancer patients.

Internet use of health-related resources has changed significantly in a short period of time. According to data from the last Flash Eurobarometer 404 survey,² 59% of Europeans had used the internet as a source of health-related information in the last 12 months. Internet use has progressed from being a mere source of information to providing psychoeducation, self-care, emotional and social support, and psychotherapy. Internet access has made a huge contribution to the transformation of communication strategies and the delivery of health care.^{3,4} The digital transformation is already influencing patient-professional relationships by causing a shift from the traditional paternalistic model of health care towards a relational one that focuses on the needs of patients and their families. This relational model promotes empowerment and self-responsibility, with greater user participation and autonomy.⁵

Patients with serious illnesses like cancer commonly search for health information and support⁶ to reduce uncertainty and provide narrative identities on their social and personal health.^{7,8} There has been a rapid increase in the number of cancer patients using the internet for health-related information, from a figure of 8% to 15% of occasional users in the 1990s and early 2000s,^{9,10} to the current figure of 70% to 97% of patients who use it on a daily basis.¹¹⁻¹⁴ In cancer, as in society in general, the use of online resources has progressed from an initial need to be informed to a need to stay connected. Moreover, encouraging empowerment and health-related digital literacy in patients requires an assessment of their use of internet, their ability to use it effectively, its impact on their condition, and the possible advantages that its use entails.

Studies of internet use in cancer patients fall into two main categories: spontaneous vs guided. Studies of spontaneous or natural internet use have investigated internet use not supervised or recommended by health professionals. These studies typically describe the available online resources, sociodemographic characteristics of the users, behavioral and psychosocial variables of both users and nonusers, and the impact of the internet on emotional and physical health. In contrast, especially in the past decade, studies have focused on internet use guided by health professionals describing pro-active directive online interventions. These interventions aim to provide specific knowledge and to bring about emotional, cognitive, or health-related behavioral changes. In the present study, we aim to summarize the current literature on spontaneous internet use in cancer patients, describing its expansion to a new digital provision of engagement and to pro-active online psychosocial interventions. We also aim to analyze and describe the emotional and behavioral outcomes in cancer patients resulting from spontaneous internet use vs use guided by health professionals. As a result, this systematic and comprehensive review may help to guide the development of innovative eHealth interventions that may improve psychosocial care in cancer patients.

2 | METHODS

2.1 | Literature search

A systematic and comprehensive review of the literature was conducted. Searches were performed on PubMed (MEDLINE), PsycINFO, and Scopus databases for publications dated up to December 2017. Search terms defining the disease (eg, "cancer" and "neoplasm"), the modality or platform of interest (eg, "online," "internet," and "computer-based"), and the outcome of interest (eg, "Psycho*") were run and combined without restricting the year of publication. Searches were performed by subject headings, keywords, titles, and abstracts. The reporting followed PRISMA guidelines (see Figure S1)f.

2.2 | Study selection criteria

Published primary studies were eligible for inclusion, while reviews, editorials, letters, case reports, and ongoing trials were excluded. There were no limitations regarding study design or outcome measure. The studies had to meet the following inclusion criteria: (a) written in English or Spanish; (b) involve cancer patients or focus on the relationship between cancer patients and health professionals; and (c) describe either spontaneous internet use in patients or a structured web-based psychosocial intervention. The reporting followed PRISMA guidelines, which describe the reasons for excluding publications from database searches (see Figure S1). Web-based interventions that were not primarily designed for use by cancer patients in general, such as psycho-oncological interventions replicating face-to-face psychotherapy, were excluded from the review.

2.3 | Review methods

This systematic review was registered at PROSPERO (CRD42019122446). After establishing a complete set of inclusion and exclusion criteria, a search was performed for studies describing spontaneous and guided-supervised internet use among patients, as well as online psychosocial interventions. Titles and abstracts of the identified records were screened (first-stage review), and articles were rejected if they failed to meet the inclusion criteria. Afterwards, the full text of selected articles was carefully read (second-stage review), and again, those not meeting our selection criteria were discarded. Article quality was assessed using the quality assessment tool of Kmet, Lee, and Cool.¹⁵ Three reviewers participated in this process, and discrepancies were resolved by consensus. Reference lists from the selected full texts were screened for additional relevant papers. Studies were classified as describing (a) spontaneous internet use or (b) internet use guided by health professionals.

3 | RESULTS

3.1 | Study characteristics

From the 1119 articles obtained after removing duplicates, 77 were finally analyzed. All articles focused on exploring knowledge of the disease, quality of life, emotional distress, social support, health behavior, decision-making process, satisfaction with found resources, or patient-professional relationship, or combinations of these (see Tables S1 and S2). Most studies used quantitative methods to assess their results, except for eight that used qualitative methodology (10.3%) and 12 that used mixed methods (15.6%). Sample sizes ranged from 18 to 27 491 patients for quantitative studies; 10 to 41, for qualitative; and 9 to 211 for those using mixed methods. In their turn, samples were mostly composed by women, except for 14 studies that reported mostly male samples. Seventy-six studies were in English, and one was in Spanish; 96.1% studies were from Western countries (47% from North America, 86% of those from the United States; 41% from Europe, 31% of those from the Netherlands, 22% from Scandinavian Countries, 16% from the United Kingdom, and 8% from Oceania). Cultural differences between Western countries regarding internet use were not reported in the reviewed studies. However, three studies highlighted potential differences in ethnic minorities' access and internet use for psychosocial support, especially in young cancer patients.¹⁶⁻¹⁸ Figure 1 illustrates the evolution of internet use by cancer patients in the publications reviewed over the last 25 years, differentiating between spontaneous and guided use.

3.2 | Study contents

3.2.1 | Spontaneous internet use

Spontaneous internet use is described as not guided or recommended by health professionals. Inspired by Bass,¹⁹ this section focuses on (a) user characteristics and the websites visited, (b) the motivation for use, (c) the emotional and behavioral impact of the information on the patients, and (d) the effects of this use on patient-professional relationships.

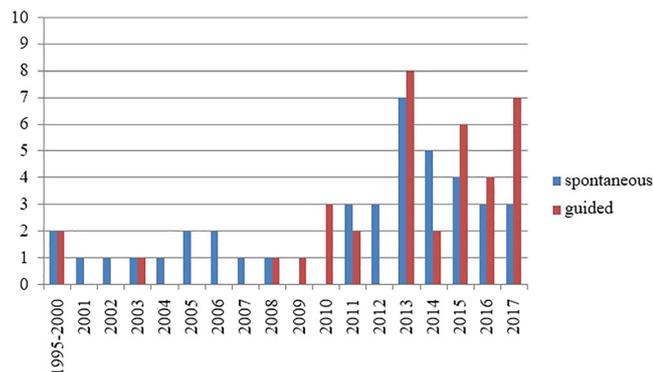


FIGURE 1 Published date of reviewed papers differentiating between spontaneous and guided use

Characteristics of the users and websites

The first studies focusing on internet use in cancer patients were descriptive. They outlined patients' interest in the internet, users' characteristics, and the types of materials available online.

Specific sociodemographic variables significantly predicted the use of the internet to obtain health information. Studies hypothesized that younger age, higher level of education, higher income status, masculine gender, Caucasian race, and health status would distinguish between online vs offline seekers,^{11,16} but some of these variables were probably associated with internet access.¹² Only a few sociodemographic variables are currently associated to proactive eHealth behavior, such as a younger age and a higher level of education.^{12,20-24} Higher internet use in younger adults is associated also with comparatively greater psychosocial benefits than in older patients^{12,25} and different motivations for use.²⁶⁻²⁹

Other variables associated with internet use and online health-related behaviors are emotional well-being, positive emotions, lower perceived social support, and active coping styles.^{20-23,30} Negative emotions have been inversely correlated with internet use and satisfaction.³¹

Although the internet is currently one of the main sources of information, it is not considered to be completely reliable due to the wide variability in the quality, readability, and accuracy of its contents.^{20,32-34} Official websites tend to offer greater quality and give more accurate information.³⁴ These websites, created more recently, are not designed for advertising purposes and provide scientific references. However, patients show difficulties in differentiating or recalling the origin of the information acquired.¹¹

Patients' motivation for internet use

As the internet was initially seen almost exclusively as a learning tool, explanations for its use were based on situational variables such as patient's dissatisfaction or increasing unresolved needs. However, this has been questioned by several studies, suggesting that (a) the main source of medical information is still the health professional for 80% to 95% of patients^{20,22,35,36}; (b) the information that patients spontaneously search for on the internet is usually complementary to the information given by the professional^{22,36}; (c) patients do not only seek medically validated information but also peer support, or they want to share their experience through asynchronous and synchronous communication^{22,26-29,37}; and (d) patients' self-responsibility and their capability" to participate in decision-making processes make them resort to information available online.³⁸

Several motivations for spontaneous internet use have been reported. As mentioned above, the internet has mostly been used as a learning tool, but patients have also used it for symptom management,^{23,27,28} decision making, or emotional and social support (see Table S1). Some interesting qualitative investigations have suggested different motivations depending on clinical variables such as cancer diagnosis, cancer stage, time since treatment, the type of treatment, and the phase of the disease process, thus indicating the changing needs of the patients.³⁸ For example, in the earlier stages of the illness, internet use promotes patients' empowerment by providing

diagnostic and prognostic information as well as peer support. During cancer treatment, the internet provides information on treatment options or effectiveness and side effects. Finally, after treatment, it helps meet the patients' interest in quality of life and/or survivorship, as long-term consequences or side effects.

Thus, sociodemographic or psychological variables play a greater role than situational or clinical variables in patients' motivation for, and satisfaction with, internet use. Although internet has mostly been used as a learning tool, increased psychosocial motivations for internet use have been observed in cancer patients, which may initially have been underestimated.⁹ As mentioned above, the motivation for internet use among younger adults focuses on their emotional needs and the need to connect with other patients,²⁶ to share experiences of health and disease,^{27,28} and to obtain or provide patient-to-patient support.²⁹

Emotional and behavioral impact

Most professionals have doubts about the emotional and behavioral impact of internet use on patients in the absence of supervision or professional guidance. Newnham et al³⁹ noted that between 75% and 91% of health professionals thought that the internet had the potential to damage patients' emotional states. Today, although health professionals acknowledge some positive effects of spontaneous internet use, they still do not consider them to be enough to meet patients' existing needs.⁴⁰

Results of studies of the impact of spontaneous internet use in cancer patients are summarized in Table S1. Most studies maintain that cancer patients who use the internet improve their knowledge of the disease and their self-efficacy. However, the unreliability of the information increases the possibility of a negative impact on patients, something that is recorded by 15% to 30% of users and is especially common among the older patients^{25,41} who report feeling more confused, anxious, or depressed after consulting the internet. Among the general population, 25% report a negative impact after looking at online health-related information.² However, 48% to 72% of cancer patients describe feeling less confused and more optimistic or confident about health-related decisions after using the internet.^{13,25,42,43} The vast majority of cancer patients report increasingly positive attitudes towards the internet for obtaining information, engaging with self-management functions, or coping better with the consequences of the illness in their daily life.²³ However, patients prefer to maintain some face-to-face contact with their physician.

Overall, spontaneous internet contributes to autonomy and quality of life inpatients by providing sources of health-related information and support to make appropriate health-related decisions, promote empowerment, and facilitate peer support and self-care. (Table S1) In addition to these potential psychosocial advantages of active online participation, one study found that members of public online communities who participate without posting (lurkers) also felt that they had received some social support.⁴⁴

However, the associated positive effects of spontaneous use appear to be moderate. Online participation and its impact might also be influenced by emotional well-being,^{31,43} perceived illness consequences,^{21,45,46} or coping style.^{16,47-49} Moreover, although the

percentages of patients reporting confusion or distress are lower than expected, they are still substantial (see Table S1). Thus, recent studies conclude that it is especially important for health professionals to give serious consideration to the patient's ability to access, understand, and use online information.

Impact on patient-professional relationship

Patients' increasingly active attitudes are changing their relationship with health professionals, with virtual interactions providing an opportunity for practitioners to collaborate with patients in their empowerment, helping them to develop their abilities to decide and resolve their own health-related problems.^{50,51} However, spontaneous internet use in patients has triggered a deep debate on physician-patient interactions.

Professionals may fear a "leveling effect,"⁵² in which the expertise of the doctor is subverted.^{53,54} In the past, the passive role of the patient, a paradigm of the paternalistic and asymmetric model in medicine, was justified by their ignorance. However, the availability of online information has made patients advocates for their own health. Moreover, only half of cancer patients who use the internet share or discuss the contents online with their health professionals.^{11,55} There are several reasons for this lack of information exchange^{3,55}: (a) the nature of the information (eg, "The information was consistent with what the doctor had already told me," "The information was not accurate or relevant," or "I read it only for my own learning") and (b) the nature of the doctor-patient relationship (eg, "I do not want the doctor to feel embarrassed or challenged" or "I do not want the doctor to think I'm worried"). There could be other causes for the lack of shared information. For example, in a study based in Spain, López-Gómez et al⁵⁶ found that the main reason for not sharing information was a lack of time during the medical visit (31%). Apparently, despite the social pressure to become active and well-informed patients, a significant percentage of subjects feel that they cannot talk about their internet use with their doctors.⁵⁵

Regarding the sites most visited by cancer patients, the literature confirms the preference for official websites and resources that have been recommended and moderated by health professionals, rather than peer-led groups.^{26,36} However, fewer than 10% have actually received these recommendations.^{30,36} Anonymity is preferred when using online resources to protect the professional-patient relationship and to participate freely.³⁵

In summary, spontaneous internet use in cancer patients has progressed and expanded, as has the research in this field. The internet was initially used as a source of information, but now, it is increasingly used for mutual support and social media, as well as for asynchronous and synchronous communication. Whereas previously, they were passive recipients of information, patients now take a much more active role in relation to their health,⁵³ although this has not led them to question the health professional's status. However, the patient-professional relationship is still one of the main obstacles in eHealth. Both patients (who feel that the relationship with their doctors might be harmed) and health professionals (who in some cases have a defensive and paternalistic attitude) are reluctant to discuss

internet use. Online information for cancer patients has suggested slight improvements in psychological well-being, enhanced quality of life, lower levels of depression and anxiety, reduced risk of hospitalization, and even decreased mortality rates. Attention to patients' needs is a central element in increasing their health status and satisfaction and in reducing the high levels of distress in cancer survivors.⁵⁷ It is the quality of attention that is important rather than the quantity. For this reason, professionally guided internet use is proposed to help to resolve the problems of congruence, security, and confidentiality.

3.2.2 | Professionally guided internet use

Despite the difficulties just mentioned, online methods for delivering information and support are being developed as a complement to standard health care. Diverse types of relationships between technology and health have been studied in a variety of devices such as telephone-based, computer-based, or mobile phone apps. Unlike spontaneous internet use, professionally guided internet use aims to influence patients. In this review, we categorized articles on professionally guided internet use according to the purpose of the technology-based intervention and professional involvement, inspired by McAlpine et al⁴: (a) educational or information resources and (b) resources focusing on patient-patient or patient-professional relationships. Different characteristics of the online resources are shown in Table 1. Many online resources for cancer patients consist of informational websites and mutual support groups, which were the first to appear, aimed at general cancer patients.

Informative/educational interventions

Professionally guided online informative/educational interventions aim to offer scientific information or reference materials and to broaden patients' knowledge of their disease. Internet prescription or web prescription by health professionals overcomes the problems associated with spontaneous internet use, such as a lack of customized information, accessibility, availability, reliability, and comprehensibility. Thus, health professionals guide patients to websites with reliable health information. Apart from website recommendations,

psychoeducational interventions have been developed online with a variety of goals; most try to increase patients' knowledge of the disease or improve strategies for managing symptoms.

However, the results regarding the efficacy of these interventions are inconsistent (Table S2). Most studies have indicated that the interventions significantly increase knowledge about the illness, yet some have reported no significant differences in terms of learning outcomes between online and standard care resources. Small effects or no significant differences between online information and information provided face-to-face have also been found for self-efficacy, quality of life, emotional distress, and other impact variables (see Table S2). Nevertheless, patients have been found to report high levels of satisfaction with online educational web-based interventions.

Some studies propose that psychoeducational interventions should aim to transform the current status quo rather than maintain the current unidirectional model. As stated above, simply obtaining information is probably no longer enough for patients; other key elements also play a role, such as the scientific accuracy of the information, its accessibility (reachable and understandable), and its appropriateness with regard to the user's needs. Therefore, for the information to have a cognitive and behavioral correlate, professionals should now consider sociodemographic, psychological, and illness-related variables as well as the patient's specific needs in order to resolve any doubts and questions, ideally during the medical visit. Patients should be encouraged to bring these topics up with their health professionals to validate or help to manage and understand the information.

Support interventions

Online health-related contacts between peers (patients) and professionals are one step ahead of the traditional and unidirectional paternalistic model. Patients do not just seek static and medically validated information, they want to be able to share information and check it with professionals and other patients, looking for social support and mutual experiences.^{22,26}

Support interventions are professionally guided or designed interventions that not only provide information but also connect patients to one another or to health professionals without acting as therapeutic

TABLE 1 Distinctive characteristics of the two types of professional online interventions

	Informative/Educational Interventions	Support Interventions
Target population	General cancer patients	General cancer patients
Main purpose	Providing cancer-related information	Connecting patients one to another and to punctually contact with a consultant health care professional
Professional involvement	Health care professional provides patients of recommendations	Health care professional as a consultant
Communication type	Asynchronous	Asynchronous and exceptionally written synchronous
Components	Written or video-based sources; informational or educational contents	Self-supporting and communication services
Number of patients involved	Individual intervention	Individual or communities-based intervention

facilitators. These individual or community interventions are more participative than informative and mostly involve asynchronous communication. Furthermore, when synchronous interaction is possible, it tends to be written and secondary.

The research in this area has shown its feasibility and positive effects on a variety of cancer patients (Table S2). Initially, internet-based support interventions were studied as complementary to face-to-face psychosocial care. However, most web-based resources used alone have been reported to produce no significant effect on the overall results compared with face-to-face interventions (see Table S2). Indeed, although some studies report negative effects, patients record high levels of subjective satisfaction with online interventions (see Table S2), suggesting at least some self-perceived benefits. However, despite the subjective satisfaction with online psychoeducational or psychosocial resources, cancer patients are unsatisfied with only asynchronous web-based medical follow-up and still need face-to-face physical appointments.

At present, controlled online support integrated systems or community's area growing area of research. Comprehensive Health Enhancement Support System (CHESS),⁵⁸ Project Connect Online (PCO),^{59,60} WebChoice,^{61,62} or CONNECT^{63,64} are examples of interactive web-based packages for cancer patients that produce evidence-based results from controlled trials. These structured interventions combine health information with social support, decision support, or behavioral change support through asynchronous communication; some also include supplemental synchronous interactions (chat rooms between peers or with a health professional).

Online support systems seem to have greater positive effects than spontaneous internet use or informative/educational interventions.^{25,58,59,64-67} Interventions combining more levels of interaction, participation, and integral communication are expected to meet higher needs in a greater number and diversity of patients due to their greater flexibility and adaptability. Encouraging patients to participate is also easier when a professional facilitator is involved in the intervention.⁶⁸

4 | DISCUSSION

This review analyzed cancer patients' internet use and its progression from spontaneous to a more integrated patient-centered web-based health care. The internet constitutes an interactive channel of meaning construction, continuously and dynamically transforming attitudes toward health and disease. This access to participatory information and support networks generates new needs and challenges in "digitally" active patients.

The internet has been spontaneously used by patients as a source of information. Internet is unseating other sources of information such as family and friends, newspapers, medical pamphlets, television, or radio⁶⁹ outranked only by the information given by clinicians.^{22,38} However, patients' online interests vary from medically validated information to factors that may improve quality of life, decision making, or provide peer support.^{22,23,25-29,42}

After reviewing eligible studies, we conclude that high levels of spontaneous internet use may be associated with patients' growing sense of engagement and responsibility for their health. Most studies confirm positive or neutral effects of nonsupervised internet use on patients' health-related behavior and emotions. Thus, to achieve better results, it seems important that both patients and professionals share information on internet use and become mutually involved. A lack of communication between patients and health professionals regarding internet is one of the main obstacles impeding the use of the internet as a useful and therapeutic tool to meet patients' changing demands and expectations. This hurdle needs to be overcome if health care institutions are to adapt to the need to provide new patient-centered digital care.⁶¹

As part of this process, professionals have been engaging in guiding and providing internet use and utilities. Professionally guided internet use would be expected to achieve greater positive effects on patients' health than their own spontaneous use. Small effect sizes have been found for educational interventions in self-efficacy, autonomy, competence, depression, anxiety, and other psychosocial outcomes,^{17,66,67,70} while promising results have been observed for support interventions regarding quality of life, emotional distress, empowerment, self-efficacy, and perception of social support. Positive effects increase when both patients and health professionals increase their engagement with online interventions. Possible reasons for this have been reported,⁷¹ including instrumental arguments such as the possibility of anonymity, reasonable or nonexistent fees, or the absence of geographical barriers (which may also help balance family and working life with psychosocial treatments). Moreover, there are therapeutic advantages, such as the ability to "lurk" before becoming comfortable with the group, overcoming some of the interpersonal discomfort that can occur in face-to-face settings and the reduced likelihood of being overwhelmed by overt expressions or interactions.⁷¹⁻⁷³ However, there are also some disadvantages to online interventions,^{71,74} such as low participation (commonly associated with technological issues or perceived problems with websites),⁷⁴ the lack of nonverbal communication in asynchronous interactions and synchronous chat rooms, and the longer time needed to develop interpersonal impressions of the other participants. Other emerging problems include socially aggressive interactions and the appearance of informal leaders or individuals who delay seeking face-to-face or professional help and rely too much on online assistance.^{71,73}

The literature reviewed did not include web-based psycho-oncological interventions led by health professionals (usually via synchronous communication). The review by Klemm et al⁷³ reported that most online peer support groups available to cancer patients are not led or moderated by a professional. However, participants tend to read and post significantly more messages in professionally moderated online support groups than in peer-led groups.^{68,75} Thus, it is important to involve health professionals in online interventions not only as consultants on web-based platforms but also as agents of change and therapists who run evidence-based psycho-oncological treatments.⁷⁵

Future research should define the differences in the efficacy of synchronous and asynchronous communication, which offer different ways of participating. Synchronous communication facilitates live contact with a clinician or with other patients offering empathy or reacting to the patient's nonverbal cues.⁷⁶ Educational and support interventions are mostly asynchronous, while the psycho-oncological interventions targeting cancer patients are usually synchronous.^{76,77} Better results in emotional and behavioral outcomes are expected in future interventions integrating different levels of engagement and communication.

5 | CONCLUSIONS

Internet is widely used by cancer patients as a source of information and connection with other patients. This use has not only broadened patients' knowledge of the disease but has also increased their empowerment. However, as the information on internet is not always reliable, physicians are needed to screen and prescribe information to their patients. As a consequence, internet has the power to strengthen the relationship between physicians and patients. In addition, as the results of this systematic review indicate, online communities and interventions are useful for optimizing the benefits of internet use, including psychological well-being and quality of life and for reducing distress and then risk of hospitalization among patients.

5.1 | Study limitations

Although the results of online interventions are promising, they should be interpreted with care. This review has some limitations related to the terms included in the searches, the selection of articles available as full texts and written only in English or Spanish, and the methodological heterogeneity of the studies included. Limitations regarding the papers analyzed included a lack of theoretical basis in some of the interventions, small samples with low diversity,^{4,41,74,78} and the use of self-reported measures. The methodology used in the studies varied strongly in terms of design, which makes it difficult to compare the results. In fact, comparison between qualitative and quantitative outcomes is complex to address, due to the differences in the sample sizes, the information analyses, and the type of information. There are some studies that have shown no significant differences when web-based resources are added to individual face-to-face interventions. Furthermore, informative or support interventions attract significantly more lurkers who are not actively involved in online communities, a circumstance that probably make active patient groups less diverse than assumed.^{71,74}

5.2 | Clinical implications

Digital transformation requires more than merely understanding and addressing patients' requirements: They must be involved in the development of useful and effective technology-based health interventions. In the future, online communities or systems combining

more levels of intervention, participation, and communication are likely to achieve better health results, adherence and participation, as well as more professional and patient engagement. Online communities should use a bottom-up approach, in which participants and their opinions take the leading role. These comprehensive online communities will be able to meet patients' changing demands and expectations, improve the collaboration between professionals and patients for better access to eHealth, and promote health-related behaviors. These integrated systems or communities may establish themselves as a key global resource for patients.

Inside these communities, verified and validated information should be made available or prescribed according to the patients' needs and demands and built with their help. The information should also be adapted to the type of cancer diagnosed and the phase of the illness.^{22,23} Psychoeducation should be provided using concise, clear, concrete, coherent, and creative language if required or requested. Spaces for anonymous communication between patients and professionals, as well as between patients themselves, should also be provided to facilitate participation³⁵ and, thus, guarantee protection and security for asynchronous or synchronous interactions.

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CONFLICT OF INTERESTS

The authors declare no conflict of interests.

DATA AVAILABILITY STATEMENT

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

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REFERENCES

- Porter D, Porter R. *Patient's Progress: doctors and doctoring in eighteenth-century England*. Cambridge: Polity Press; 1989 Available from: <http://doi.wiley.com/10.1111/1467-9566.ep11343150>.
- European Commission. European Citizens' Digital Health Literacy [Internet]. Flash Eurobarometer 404 - TNS Political & Social. 2014. Available from: http://ec.europa.eu/public_opinion/index_en.htm
- D'Agostino TA, Ostroff JS, Heerdt A, Dickler M, Li Y, Bylund CL. Toward a greater understanding of breast cancer patients' decisions to discuss cancer-related internet information with their doctors: an exploratory study. *Patient Educ Couns*. 2012;89(1):109-115.

4. McAlpine H, Joubert L, Martin-Sanchez F, Merolli M, Drummond KJ. A systematic review of types and efficacy of online interventions for cancer patients. *Patient Educ Couns*. 2015;98(3):283-295. Available from: <http://www.scopus.com/inward/record.uri?eid = 2-s2.0-84921503739&partnerID = 40&md5 = e58c10a83ab443f98fe342f674210175>
5. Anderson RM, Funnell MM. Patient empowerment: Reflections on the challenge of fostering the adoption of a new paradigm. *Patient Educ Couns Elsevier*. 2005 [cited 2018 Jul 8];57:153-157. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15911187>
6. Casellas-Grau A, Sumalla EC, Lleras M, et al. The role of posttraumatic stress and posttraumatic growth on online information use in breast cancer survivors. *Psychooncology*. 2018;27(April):1971-1978. Available from: <http://ovidsp.ovid.com/ovidweb.cgi? T = JS&PAGE = reference&D = medp&NEWS=N&AN = 29740909>
7. Sontag S. *La malaltia com a metàfora*. Empúries: Barcelona; 1997.
8. Brodie M, Kjellson N, Hoff T, Parker M. Perceptions of Latinos, African Americans, and Whites on media as a health information source. *Howard J Commun*. 1999;10(3):147-167.
9. Ehrenberger HE. Cancer clinical trial patients in the information age: a pilot study. *Cancer Pract*. 2001;9(4):191-197.
10. Biley A, Robbe I, Laugharne C. Sources of health information for people with cancer. *Br J Nurs*. 2001;10(2):102-106.
11. van de Poll-Franse LV, van Eenbergen MCHJ. Internet use by cancer survivors: current use and future wishes. *Support Care Cancer*. 2008;16(10):1189-1195. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18293014>
12. Nagler RH, Puleo E, Sprunck-Harrild K, Emmons KM. Internet use among childhood and young adult cancer survivors who smoke: implications for cessation interventions. *Cancer Causes Control*. 2012 Apr;23(4):647-652.
13. Nguyen SKA, Ingledew PA. Tangled in the breast cancer web: an evaluation of the usage of web-based information resources by breast cancer patients. *J Cancer Educ*. 2013;28(4):662-668.
14. Bender JL, Wiljer D, Sawka AM, Tsang R, Alkazaz N, Brierley JD. Thyroid cancer survivors' perceptions of survivorship care follow-up options: a cross-sectional, mixed-methods survey. *Support Care Cancer*. 2016;24(5):2007-2015. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84946145928&doi = 10.1007%2F00520-015-2981-5&partnerID = 40&md5 = 2c7d08576cbf9026fa081604efd62875>
15. Kmet L, Lee R, Cook L. *Standard quality assessment criteria for evaluating primary research papers from a variety of fields*. Edmonton: HTA initia. The Alberta Heritage Foundation for Medical Research; 2004.
16. Fogel J, Albert SM, Schnabel F, Ditkoff BA, Neugut AI. Racial/ethnic differences and potential psychological benefits in use of the internet by women with breast cancer. *Psychooncology*. 2003 Mar;12(2):107-117.
17. Johnson-Turbes A, Schlueter D, Moore AR, Buchanan ND, Fairley TL. Evaluation of a web-based program for African American young breast cancer survivors. *Am J Prev Med*. 2015;49(6):S543-S549. <https://doi.org/10.1016/j.amepre.2015.09.003>
18. Chee W, Lee Y, Im E-O, et al. A culturally tailored Internet cancer support group for Asian American breast cancer survivors: a randomized controlled pilot intervention study. *J Telemed Telecare*. 2017;23(6):618-626. <https://doi.org/10.1177/1357633X16658369>
19. Bass SB. How will Internet use affect the patient? A review of computer network and closed internet-based system studies and the implications in understanding how the use of the internet affects patient populations. *J Health Psychol*. 2003;8(1):25-38. Available from: <http://www.scopus.com/scopus/inward/record.uri?eid = 2-s2.0-0037250170&partnerID = 40&rel = R8.0.0>
20. Muusses LD, van Weert JCM, van Dulmen S, Jansen J. Chemotherapy and information-seeking behaviour: characteristics of patients using mass-media information sources. *Psychooncology*. 2012 Sep;21(9):993-1002.
21. Beatty L, Scott K. Examining eHealth use as a coping strategy for cancer-adjustment: An application of the Chronic Illness Model. *E-Journal Appl Psychol*. 2013;9(1):9-18. Available from: <http://pandora.nla.gov.au/tep/147390>
22. Valero-Aguilera B, Bermúdez-Tamayo C, García-Gutiérrez JF, et al. Information needs and Internet use in urological and breast cancer patients. *Support Care Cancer*. 2014;22(2):545-552. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24122406>
23. Jansen F, van Uden-Kraan CF, van Zwieten V, Witte BI, Verdonck-de Leeuw IM. Cancer survivors' perceived need for supportive care and their attitude towards self-management and eHealth. *Support Care Cancer*. 2015 Jun;23(6):1679-1688.
24. Kowalski C, Kahana E, Kuhr K, Ansmann L, Pfaff H. Changes over time in the utilization of disease-related Internet information in newly diagnosed breast cancer patients 2007 to 2013. *J Med Internet Res*. 2014;16(8):e195.
25. Rising CJ, Bol N, Kreps GL. Age-related use and perceptions of eHealth in men with prostate cancer: a web-based survey. *JMIR Cancer*. 2015 Jun 25;1(1):e6. Available from: <http://www.jmir.org/2015/1/e6/>
26. Abrol E, Groszmann M, Pitman A, Hough R, Taylor RM, Aref-Adib G. Exploring the digital technology preferences of teenagers and young adults (TYA) with cancer and survivors: a cross-sectional service evaluation questionnaire. *J Cancer Surviv*. 2017 Dec;11(6):670-682.
27. Keim-Malpass J, Baernholdt M, Erickson JM, Ropka ME, Schroen AT, Steeves RH. Blogging through cancer: young women's persistent problems shared online. Vol. 36, *Cancer Nursing*. Keim-Malpass, Jessica: School of Nursing, University of Virginia, PO Box 800826, Charlottesville, VA, US, 22908-0826, jk2t@virginia.edu: Lippincott Williams & Wilkins; 2013. p. 163-172.
28. Kim B, Gillham DM. The experience of young adult cancer patients described through online narratives. Vol. 36, *Cancer Nursing*. Kim, Bora: University of South Australia, City East Campus, Frome Road, Adelaide, SA, Australia, 5000, bora.kim@student.adelaide.edu.au: Lippincott Williams & Wilkins; 2013. p. 377-384.
29. Suzuki LK, Beale IL. Personal Web home pages of adolescents with cancer: self-presentation, information dissemination, and interpersonal connection. *J Pediatr Oncol Nurs*. 2006;23(3):152-161.
30. Beesley VL, Janda M, Eakin EG, et al. Gynecological cancer survivors and community support services: referral, awareness, utilization and satisfaction. *Psychooncology*. 2010 Jan;19(1):54-61.
31. Beekers N, Husson O, Mols F, Van Eenbergen M, Van De Poll-Franse LV. Symptoms of Anxiety and Depression Are Associated with Satisfaction with Information Provision and Internet Use among 3080 Cancer Survivors: Results of the PROFILES Registry. *Cancer Nurs*. 2015;38(5):335-342.
32. Muhamad M, Afshari M, Mohamed NA. Internet use and breast cancer survivors. *Turk Online J Educ Technol*. 2011;10(4):241-247. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-80053961172&partnerID = 40&md5 = ea76c93fc7e840c350baa4932022c90e>
33. Alba-Ruiz R, Bermúdez-Tamayo C, Pernet JJ, Garcia-Gutierrez JF, Cózar-Olmo JM, Valero-Aguilera B. Adapting the Content of Cancer Web Sites to the Information Needs of Patients: Reliability and Readability. *Telemed J E Health*. 2013;19(12):956-966.

34. D'Silva S, van Kessel K. An evaluation of the quality and content of web sites on cancer related fatigue. *J Consum Health Internet*. 2014;18(4):313-336.
35. Cho J, Smith KC, Roter D, Guallar E, Noh D-Y, Ford DE. Needs of women with breast cancer as communicated to physicians on the Internet. *Support Care Cancer Off J Multinatl Assoc Support Care Cancer*. 2011 Jan;19(1):113-121.
36. Katz JE, Roberge D, Coulombe G. The cancer patient's use and appreciation of the internet and other modern means of communication. *Technol Cancer Res Treat*. 2014;13:477-484. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24000994>
37. Lewallen AC, Owen JE, Bantum EO, Stanton AL. How language affects peer responsiveness in an online cancer support group: implications for treatment design and facilitation. *Psychooncology*. 2014;23(7):766-772. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84903814878&doi = 10.1002%2Fpon.3477&partnerID = 40&md5 = de57600a18df27b6c775ef6e552033dc>
38. Sacks AA, Hernando SP, Aguilar PS, Vega EF, Fernández RM. Necesidades de información y uso de Internet en pacientes con cáncer de mama en España. *Gac Sanit*. 2012;27(3):241-247.
39. Newnham GM, Burns WI, Snyder RD, et al. Attitudes of oncology health professionals to information from the Internet and other media. *Med J Aust*. 2005 Aug;183(4):197-200.
40. Emond Y, De Groot J, Wetzels W, Van Osch L. Internet guidance in oncology practice: determinants of health professionals' Internet referral behavior. *Psychooncology*. 2013;22(1):74-82. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84872085333&doi = 10.1002%2Fpon.2056&partnerID = 40&md5 = be9d93355c68fa5ed8e514f052eb6e56>
41. Bolle S, Romijn G, Smets EMA, Loos EF, Kunneman M, Van Weert JCM. Older cancer patients' user experiences with web-based health information tools: a think-aloud study. *J Med Internet Res*. 2016;18(7):e208. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84989823279&doi = 10.2196%2Fjmir.5618&partnerID = 40&md5 = fffc516495e8c3e6d597b9de61930c92>
42. Seymour-Smith S. A reconsideration of the gendered mechanisms of support in online interactions about testicular implants: a discursive approach. *Health Psychol*. 2013 Jan [cited 2018 Jan 24];32(1):91-99. Available from: <http://doi.apa.org/getdoi.cfm?doi = 10.1037/a0029507>
43. Algtewi E, Owens J, Baker SR. Online support groups for head and neck cancer and health-related quality of life. *Qual Life Res*. 2017 Sep;26(9):2351-2362.
44. Setoyama Y, Yamazaki Y, Namayama K. Benefits of peer support in online Japanese breast cancer communities: differences between lurkers and posters. *J Med Internet Res*. 2011;13(4):e122. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84859911132&partnerID = 40&md5 = cdf45e9c3654be59125ecf7b9fe8b237>
45. Batenburg A, Das E. Virtual support communities and psychological well-being: the role of optimistic and pessimistic social comparison strategies. Vol. 20, *Journal of Computer-Mediated Communication*. Batenburg, Anika: Department of Communication and Information Studies, Centre for Language Studies, Radboud University, Erasmusplein 1, Nijmegen, Netherlands, 6525 HT, a.batenburg@let.ru.nl: Wiley-Blackwell Publishing Ltd.; 2015. p. 585-600.
46. Rising CJ, Bol N, Burke-Garcia A, Rains S, Wright KB. Perceived stress in online prostate cancer community participants: examining relationships with stigmatization, social support network preference, and social support seeking. Vol. 22, *Journal of Health Communication*. Rising, Camella J.: Department of Communication, College of Humanities and Social Sciences, George Mason University, 4400 University Drive, MSN 3D6, Fairfax, VA, US, 22030, crising@gmu.edu: Taylor & Francis; 2017. p. 469-476.
47. Fogel J. Internet Breast Health Information Use and Coping among Women with Breast Cancer. Vol. 7, *CyberPsychology & Behavior*. Fogel, Joshua: Johns Hopkins University, Bloomberg School of Public Health, 624 North Broadway, Ste. 861, Baltimore, MD, US, 21205, jfogel@jhsph.edu: Mary Ann Liebert, Inc.; 2004. p. 59-63.
48. Seçkin G. Satisfaction with health status among cyber patients: testing a mediation model of electronic coping support. *Behav Inf Technol*. 2013;32(1):91-101. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84873348169&doi = 10.1080%2F0144929X.2011.603359&partnerID = 40&md5 = 8dc6f2ff9fe3b2daf863877701b5f425>
49. Batenburg A, Das E. Emotional coping differences among breast cancer patients from an online support group: a cross-sectional study. *J Med Internet Res*. 2014 Feb;16(2):e28.
50. Safeer R, Keenan J. American family physician. *Am Fam Physician*. 2005 [cited 2018 Jul 10];72(3):463-468. Available from: <https://www.aafp.org/afp/2005/0801/p463.html>
51. Suñer R, Santiñà M. Alfabetització per a la salut: definicions, conceptes i la seva relació amb la salut. In: Suñer R, Santiñà M, eds. *Alfabetització per a la salut: estàndards i recomanacions per als professionals de la salut*. Girona: Documenta Universitaria; 2014:13-26.
52. Gerber BS, Eiser AR. The patient-physician relationship in the internet age: future prospects and the research agenda. *J Med Internet Res*. 2001 [cited 2016 Jul 23];3:112-123. Available from: <http://www.jmir.org/2001/2/e15/>
53. McMullan M. Patients using the internet to obtain health information: how this affects the patient-health professional relationship. *Patient Educ Couns*. 2006 Oct [cited 2016 Jul 25];63(1-2):24-28. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16406474>
54. Shen MJ, Dyson RC, D'Agostino TA, et al. Cancer related internet information communication between oncologists and patients with breast cancer: a qualitative study. *Psychooncology*. 2015;24(11):1439-1447.
55. Bylund CL, Gueguen JA, D'Agostino TA, Imes RS, Sonet E. Cancer patients' decisions about discussing internet information with their doctors. Vol. 18, *Psycho-Oncology*. Bylund, Carma L.: Memorial Sloan-Kettering Cancer Center, 641 Lexington Ave., 7th Poor, New York, NY, US, 10022, bylundc@mskcc.org: John Wiley & Sons; 2009. p. 1139-1146.
56. López-Gómez M, Ortega C, Suárez I, et al. Internet use by cancer patients: should oncologists "prescribe" accurate web sites in combination with chemotherapy? A survey in a spanish cohort. *Ann Oncol*. 2012 Jun 1 [cited 2016 Mar 29];23(6):1579-1585. Available from: <http://annonc.oxfordjournals.org/cgi/content/long/23/6/1579>
57. Jefford M, Tattersall MHN. Informing and involving cancer patients in their own care. *Lancet Oncol*. 2002 [cited 2018 Jul 12];3:629-637. Available from: <http://oncology.thelancet.com>
58. Lu H-Y, Shaw BR, Gustafson DH. Online health consultation: examining uses of an interactive cancer communication tool by low-income women with breast cancer. *Int J Med Inform*. 2011 Jul;80(7):518-528. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1386505611000773>
59. Cleary EH, Stanton AL. Mediators of an internet-based psychosocial intervention for women with breast cancer. *Health Psychol*. 2015 May;34(5):477-485. Available from: <http://doi.apa.org/getdoi.cfm?doi = 10.1037/hea0000170>
60. Stanton AL, Thompson EH, Crespi CM, Link JS, Waisman JR. Project connect online: randomized trial of an internet-based program to

- chronicle the cancer experience and facilitate communication. *J Clin Oncol*. 2013 Sep;31(27):3411-3417.
61. Ruland CM, Andersen T, Jeneson A, et al. Effects of an internet support system to assist cancer patients in reducing symptom distress: a randomized controlled trial. *Cancer Nurs*. 2013 [cited 2017 May 20];36(1):6-17. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22495503>
 62. Borosund E, Cvancarova M, Ekstedt M, Moore SM, Ruland CM. How user characteristics affect use patterns in web-based illness management support for patients with breast and prostate cancer. *J Med Internet Res*. 2013;15(3):e34. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84877293264&doi = 10.2196%2Fjmir.2285&partnerID = 40&md5 = e6c49c3c2758c551d5114fc3a4a1caf6>
 63. Fleisher L, Buzaglo J, Collins M, et al. Using health communication best practices to develop a web-based provider-patient communication aid: The CONNECT™ study. *Patient Educ Couns*. 2008;71(3):378-387.
 64. Meropol NJ, Egleston BL, Buzaglo JS, et al. A Web-based communication aid for patients with cancer. *Cancer*. 2013 Apr 1;119(7):1437-1445. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84875382806&doi = 10.1002%2Fncr.27874&partnerID = 40&md5 = d6fade07af32d846db933e3a59ec9d31>
 65. Comello MLG, Francis DB, Marshall LH, Puglia DR. Cancer survivors who play recreational computer games: motivations for playing and associations with beneficial psychological outcomes. *Games Health J*. 2016 Aug;5(4):286-292. Available from: <http://online.liebertpub.com/doi/10.1089/g4 h.2016.0003>
 66. Brotto LA, Dunkley CR, Breckon E, et al. Integrating quantitative and qualitative methods to evaluate an online psychoeducational program for sexual difficulties in colorectal and gynecologic cancer survivors. *J Sex Marital Ther*. 2017 Oct 3;43(7):645-662. <https://doi.org/10.1080/0092623X.2016.1230805>
 67. Song L, Rini C, Deal A, Nielsen M, Chang H, et al. Improving couples' quality of life through a web-based prostate cancer education intervention. *Oncol Nurs Forum*. 2015 Mar 1;42(2):183-192. Available from: <http://onf.ons.org/onf/42/2-0/improving-couples-quality-life-through-web-based-prostate-cancer-education-intervention>
 68. Owen JE, Curran M, Bantum EO, Hanneman R. Characterizing social networks and communication channels in a web-based peer support intervention. *Cyberpsychol Behav Soc Netw*. 2016;19(6):388-396. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84975706562&doi = 10.1089%2Fcyber.2015.0359&partnerID = 40&md5 = 5914901b11e20d2e4118cb327464abe5>
 69. Lee C, Gray SW, Lewis N. Internet use leads cancer patients to be active health care consumers. *Patient Educ Couns*. 2010 Dec;81:S63-S69. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0738399110005525>
 70. Schover LR, Yuan Y, Fellman BM, Odensky E, Lewis PE, Martinetti P. Efficacy trial of an Internet-based intervention for cancer-related female sexual dysfunction. *J Natl Compr Canc Netw*. 2013; 11(11):1389-1397. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24225972%5Cnhttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid = PMC3831175>
 71. Finfgeld DL. Therapeutic groups online: the good, the bad, and the unknown. *Issues Ment Health Nurs*. 2000 Jan 9 [cited 2016 Nov 23];21(3):241-255. <https://doi.org/10.1080/016128400248068>
 72. Leykin Y, Thekdi SM, Shumay DM, Muñoz RF, Riba M, Dunn LB. Internet interventions for improving psychological well-being in psycho-oncology: review and recommendations. Vol. 21, *Psycho-Oncology*. Dunn, Laura B.: Department of Psychiatry, University of California, San Francisco, 401 Parnassus Avenue, Box 0984-F, San Francisco, CA, US, 94143-0984, laura.dunn@ucsf.edu: John Wiley & Sons; 2012. p. 1016-1025.
 73. Klemm P, Bunnell D, Cullen M, Soneji R, Gibbons P, Holecek A. Online cancer support groups: a review of the research literature. *Comput Informatics, Nurs CIN*. 2003;21(3):136-142. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12792194>
 74. Gorlick A, Bantum EO, Owen JE. Internet-based interventions for cancer-related distress: Exploring the experiences of those whose needs are not met. *Psychooncology*. 2014;23(4):452-458. Available from: <https://www.scopus.com/inward/record.uri?eid = 2-s2.0-84897580094&doi = 10.1002%2Fpon.3443&partnerID = 40&md5 = 58dde3d0a3385e59b6c25c7f47d7b2fc>
 75. Klemm P. Effects of online support group format (Moderated vs Peer-Led) on depressive symptoms and extent of participation in women with breast cancer. *CIN—Comput Informatics Nurs*. 2012;30(1):9-18.
 76. Melton L, Brewer B, Kolva E, Joshi T, Bunch M. Increasing access to care for young adults with cancer: Results of a quality-improvement project using a novel telemedicine approach to supportive group psychotherapy. *Palliat Support Care*. 2017 Apr;15(15):176-180. Available from: http://www.journals.cambridge.org/abstract_S1478951516000572
 77. Lleras M, Ochoa Arnedo C, Sumalla E, Rodríguez A, Borrás J. Randomized control trial (RCT) of online vs presential positive group psychotherapy. 2017.
 78. Rabin C, Dunsiger S, Ness KK, Marcus BH. Internet-based physical activity intervention targeting young adult cancer survivors. *J Adolesc Young Adult Oncol*. 2011 Dec;1(4):188-194.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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