



HAL
open science

Factors Associated With Digital Intervention Engagement and Adherence in Patients With Cancer: Systematic Review

Lucile Montalescot, Louise Baussard, Elodie Charbonnier

► **To cite this version:**

Lucile Montalescot, Louise Baussard, Elodie Charbonnier. Factors Associated With Digital Intervention Engagement and Adherence in Patients With Cancer: Systematic Review. *Journal of Medical Internet Research*, 2024, 26, pp.e52542. 10.2196/52542 . hal-04848076

HAL Id: hal-04848076

<https://hal.science/hal-04848076v1>

Submitted on 19 Dec 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Review

Factors Associated With Digital Intervention Engagement and Adherence in Patients With Cancer: Systematic Review

Lucile Montalescot, PhD; Louise Baussard, PhD; Elodie Charbonnier, PhD

Laboratoire de Psychopathologie et Processus de Santé, Université Paris-Cité, Boulogne-Billancourt, France

Corresponding Author:

Lucile Montalescot, PhD

Laboratoire de Psychopathologie et Processus de Santé

Université Paris-Cité

71 avenue Edouard Vaillant

Boulogne-Billancourt, 92100

France

Phone: 33 1 76 53 29 81

Email: lucile.montalescot@u-paris.fr

Abstract

Background: Digital interventions offer vital support for patients with cancer through education, behavior change, and monitoring. Despite their potential, patient adherence to and engagement with these self-help interventions is challenging. Factors like user characteristics, technology, and intervention design influence adherence and engagement. Existing reviews have gaps in exploring diverse factors associated with adherence in cancer care.

Objective: This systematic review aims to identify factors influencing adherence to and engagement with digital interventions with self-help components in cancer care. It examined sociodemographic, psychosocial, health-related, and intervention-related factors that affect patients' adherence to and engagement with these digital health solutions.

Methods: Following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, a search was conducted across PubMed, Embase, Cochrane Library, and PsycINFO to find studies published from January 2010 to September 2021. The studies included in this review focused on adult patients with cancer using digital interventions with self-help features. Data were extracted and synthesized using a standardized approach. Factors associated with adherence were synthesized according to their type—sociodemographic factors, psychosocial factors, health-related factors, technology-related factors, and intervention-related factors.

Results: Among 9386 studies initially screened, 61 (0.6%) were eligible for analysis. These studies covered diverse eHealth intervention types, cancer types, and outcome measures. Investigating the determinants of adherence to and engagement with digital interventions was the main objective for 43% (26/61) of the included studies. Adherence and engagement were gauged using varied measures, such as dropout rates, log-ins, and self-reported measures. Results regarding factors associated with adherence and engagement were inconsistent across studies. Most sociodemographic (eg, age) and health-related factors (eg, cancer stage) yielded mixed outcomes. However, comorbidity consistently predicted lower adherence and engagement. Results regarding psychosocial factors were more stable across studies. Specifically, higher social support was associated with lower adherence and engagement. Finally, intervention-related factors like intervention type or human support showed conflicting results. Adopting an intersectional perspective revealed that specificities vary according to intervention goals and the operationalization of adherence versus engagement, with women being more adherent and engaged than men in interventions targeting distress. When focusing on adherence rather than engagement, older patients were more adherent than younger patients.

Conclusions: This review highlights the complexity of adherence to and engagement with digital interventions in cancer care. While some factors, notably comorbidities and low social support, were consistently linked to adherence and engagement, others displayed mixed associations. The review underscores the need for standardizing measures, investigating specific intervention features, and enhancing study quality to optimize digital interventions for patients with cancer. Further research is crucial to better understand and improve adherence to digital health solutions in cancer care.

Trial Registration: PROSPERO CRD42021281028; https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=281028

(*J Med Internet Res* 2024;26:e52542) doi: [10.2196/52542](https://doi.org/10.2196/52542)

KEYWORDS

adherence; engagement; eHealth; mHealth; cancer; mobile health; app; eHealth interventions; patient; cancer care; digital health; health-related; intervention-related; sociodemographic; behavior; systematic review

Introduction

Background

Digital interventions include a range of technologies, such as telehealth, mobile health, and web-based platforms that provide health-related information, self-help, support, and monitoring [1]. They have become increasingly popular in recent years as a means of delivering health care services, promoting patient self-care, and improving their health [2], especially for patients with cancer. Indeed, the intricate trajectory of the treatment journey of patients with cancer, spanning diverse health care settings, can be significantly enhanced through the use of digital interventions [3]. By acknowledging the needs encountered by patients with cancer, these interventions proficiently cater to their requirements by providing educational materials, behavior change support, and access to self-help resources [4-6]. Furthermore, digital interventions are pivotal in fostering long-term survivorship care by facilitating the formulation of personalized treatment plans, vigilant monitoring, and advocating for healthy lifestyle choices [7]. More precisely, many digital interventions have been created and tested in the context of cancer care, to improve the patient's quality of life and symptoms as well as promote healthy behaviors [7-9].

Digital health encompasses a wide range of interventions, from forums to websites, with various objectives (eg, information, sharing of experience, self-assessment, behavior change). Numerous eHealth interventions rely on self-help [10,11] (ie, interventions that can be worked through independently by patients themselves). Patients with cancer hold a positive attitude both toward self-help and eHealth self-help, specifically [12]. Digital interventions with a self-help component seem to be cost-effective in cancer care [13] and research has shown that they could be as efficacious as in-person interventions [14]. This specific type of digital intervention seems to both address patients' needs and be efficacious in improving their quality of life and overall well-being. However, several studies have reported difficulties in the implementation of digital interventions, several of them being related to patients' engagement and adherence [15]. Although interrelated, both concepts encompass different experiences and behaviors. Engagement has been defined by Perski et al [16] as both a subjective experience characterized by focused attention, interest, and affect as well as the behaviors associated with this experience. These behaviors include the frequency and duration of use of the digital health intervention. By contrast, adherence to eHealth could be defined as the congruence between the intended use of technology and the effective use by an individual. Moreover, the justification for the intended use should be supported by theory or rationale [17].

Adherence and engagement are often used interchangeably in studies on digital interventions. For example, some operationalize "adherence" to refer to "the more use, the better," without specifying an intended use. This, of course, brings up

measurement issues and disparities [17,18]. Engagement is typically measured with log-ins, time spent on an intervention, or number of clicks [16]. Owing to the confusion between engagement and adherence, the latter is often measured with the same indicators as engagement. However, Sieverink et al [17] noted that previous studies that presented adherence, mostly used a measure of completion of the intervention (eg, number of modules accessed and completed). Indeed, previous work has shown that patients were less likely to be adherent to self-help interventions in comparison with interventions involving real-time interactions [19]. Engagement is an important predictor of the effectiveness of these interventions [14,20-22]. Indeed, the more patients use eHealth, the more it is effective. Although digital interventions have the potential to improve patient outcomes and increase access to health care services, adherence to and engagement with these interventions remain a challenge [23]. It is important to note that the patient's view of the intervention is essential to its successful implementation [15]. Understanding the factors that influence adherence to and engagement with digital interventions is critical for developing effective interventions.

Few reviews have examined the factors associated with adherence to and engagement with digital interventions. They showed that engagement depended on users' characteristics, technological aspects, and intervention features [24]. Furthermore, they highlighted that components such as personalized content, push notifications, and quizzes were associated with increased adherence and engagement [25,26]. However, the focus of these systematic reviews limits their reach. Indeed, the 3 systematic reviews that specifically explored adherence to or engagement with digital interventions focused on the intervention features that increased the said adherence and engagement or were conducted in very heterogeneous populations (eg, patients with gynecological problems, caregivers of disabled children) [24-26], without addressing the specificities of cancer care. Another problem lies in the difficulty to define adherence in the context of digital health. In most definitions, use, engagement, and adherence are considered as synonyms [17,27]. While some studies investigate digital health engagement exclusively through log data (eg, number of logins, number of clicks, time spent on a module), other authors argue that adherence should be conceptualized as the degree to which users followed the program as it was designed [27]. In summary, the diversity in the definitions of adherence and engagement makes it challenging to investigate the topic.

In sum, to date, adherence to and engagement with digital health, and particularly to self-help interventions, remains difficult to define, and the factors involved in engagement and adherence have been inadequately investigated, specifically for cancer. Indeed, most systematic reviews published to date on digital health interventions focus on their efficacy [9,28,29] or users' experience with such interventions [30,31], with a small portion of them mentioning engagement as a secondary objective [19,32].

This Review

In this systematic review, we aim to identify and synthesize the existing literature on the factors associated with adherence or engagement with digital interventions presenting a self-help component in cancer care. Specifically, we examine the sociodemographic, psychosocial, health-related, and intervention-related factors that influence digital health adherence. We also investigate specificities according to intervention goal, operationalization of adherence and engagement, and intervention type.

Methods

Overview

The review was conducted according to the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. This systematic review has been registered in the PROSPERO database (CRD42021281028).

Search Strategy

A comprehensive search strategy was developed by EC and LM to identify relevant studies. The following databases were searched: PubMed, Embase, Cochrane Library, and PsycINFO. The search terms included cancer, eHealth interventions, adherence, and related synonyms. The search strategy is presented in [Multimedia Appendix 1](#). The last systematic review with a similar objective was published in 2011 [24]. Therefore, the search was limited to studies published in English from January 2010 to September 2021.

Study Selection and Data Extraction

Two reviewers (EC and LM) independently screened titles and abstracts to identify potentially eligible studies through Rayyan software (Rayyan Systems, Inc). Once the blind was off, disagreement was resolved through consensus. Full-text articles were retrieved for studies that met the inclusion criteria. Studies were included if the following criteria were met: (1) they investigated factors associated with adherence to or engagement with digital interventions, (2) said interventions included a self-help component (ie, components that could be worked through independently by patients themselves and implied an

active participation from them), and (3) included adult patients with cancer. Studies were excluded if they (1) were not original research (eg, reviews, editorials, and commentaries), (2) did not report empirical data, (3) were qualitative studies, (4) were not intervention trial, (5) only included information modules, (6) included symptom reporting only, without an active component, or (7) included a communication module with health care providers, without an active component.

Three reviewers extracted data from eligible studies using a standardized data extraction form. The following data were extracted: authors, year, country, title, study design, population, intervention type, aim of the intervention, operationalization of adherence and engagement, adherence or engagement measure, intervention duration, study length, primary outcome of interest, analysis, and factors associated with adherence ([Multimedia Appendix 2](#)).

Data Synthesis

A narrative synthesis was conducted owing to the heterogeneity of the included studies in terms of study design, intervention type, and outcome measures. Factors associated with adherence and engagement were synthesized according to their type: sociodemographic factors, psychosocial factors, health-related factors, technology-related factors, and intervention-related factors. We also performed subgroup synthesis according to the intervention goal, operationalization of adherence and engagement, and intervention type.

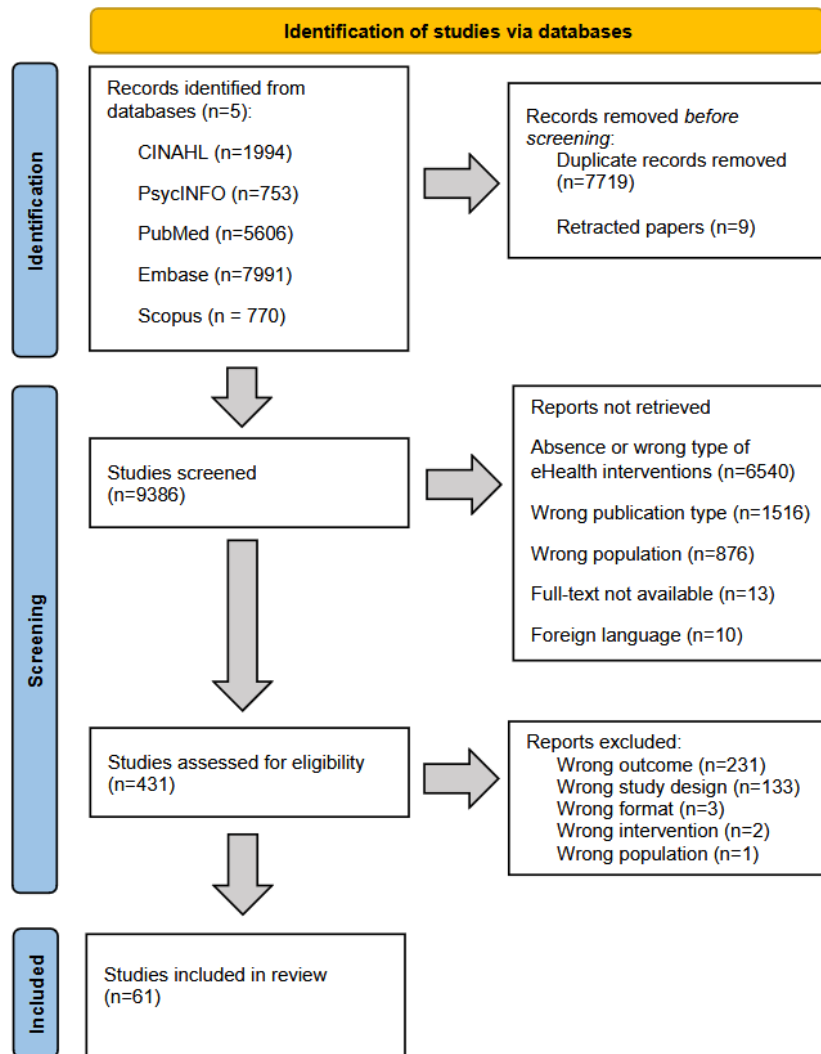
The quality of the included studies could not be assessed with a standardized evaluation grid because of the variety of designs and objectives. However, we proceeded to a narrative critical appraisal of the methods used across studies. We also quantified the studies for which we identified missing summary statistics.

Results

Overview

The search identified 9386 potentially eligible studies, of which 61 (0.6%) [33-93] were included in the final review. A detailed flowchart is available ([Figure 1](#)).

Figure 1. Studies flowchart.



The interventions included web-based interventions (39/61, 64%), mobile-based interventions (18/61, 30%), other types of digital health interventions, and a combination of different types of technologies (4/61, 7%). The goals of the interventions varied (eg, decreasing distress and behavior change). Regarding the population, breast cancer was the most common cancer type across studies (41/61, 67%). Furthermore, a large portion of studies targeted specifically cancer survivors (25/61, 41%). Adherence and engagement were assessed with several measures in 57% (35/61) of the included studies. The measures used included dropout rates (20/61, 33%), time spent on the intervention (20/61, 33%), number of log-ins (18/61, 30%), number of patients' actions within the intervention (eg, message sent, clicks; 15/61, 25%), number of pages or modules viewed (12/61, 20%), completion of the intervention or its modules (10/61, 16%), self-reported measures of use (7/61, 12%), number of active days or weeks (6/61, 10%), specific measures linked

to the use of wearables (3/61, 5%), and intention to use the application (2/61, 3%). About 10% (6/61) of the included studies used adherence measures specific to their intervention (eg, doing several specific actions, such as creating a user profile and posting >2 messages to a group). Even within these categories, discrepancies in measures are of note (eg, binarization of log-ins measures, completion of the intervention as a whole vs its modules, and number of pages viewed vs view of a specific page). Finally, investigating the determinants of adherence to eHealth was the main objective for 43% (26/61) of the included studies. Factors associated with adherence and engagement included sociodemographic factors, psychosocial factors, health-related factors, and intervention-related factors. Unsurprisingly, adherence was highly associated with other measures of engagement [33-37]. Table 1 summarizes the characteristics of the included studies while Multimedia Appendix 2 presents each study individually in greater detail.

Table 1. Descriptive statistics for the included studies (n=61).

	Studies, n (%)
Type of study	
RCT ^a	31 (51)
Secondary analysis of RCT	15 (25)
Observational	15 (25)
Studies where most of the patients had breast cancer	41 (67)
Studies on cancer survivors	25 (41)
Adherence operationalization	
Intention	2 (3)
Engagement	32 (52)
Adherence without justification	25 (41)
Adherence with justification	2 (3)
Measures	
Combination	35 (57)
Dropout rate	20 (33)
Time spent on the intervention	20 (33)
Number of log-ins	18 (30)
Number of actions within the intervention	15 (25)
Number of page views	12 (20)
Completion of intervention or modules	10 (16)
Self-reported measures of use	7 (11)
Number of active days or weeks	6 (10)
Measures of wearables	3 (5)
Intention to use the app	2 (3)
Specific measures	6 (10)
Type of intervention	
Web-based intervention	39 (64)
Mobile-based intervention	18 (30)
Others or combination	4 (7)
Goal of the intervention	
Distress	15 (25)
Nutrition and physical activity	10 (16)
Quality of life and symptom management	10 (15)
Others	14 (23)
Combination	12 (20)

^aRCT: randomized controlled trial.

Sociodemographic Factors Associated With Adherence to and Engagement With Digital Interventions in Patients With Cancer

We found that 38 of 61 (62%) studies investigated the links between sociodemographic factors and engagement with and adherence to digital interventions, with many inconsistent results between studies. First, of the 14 studies concerning age, 6 (43%)

showed that older patients tended to be more adherent and engaged than younger ones [34,38-42], 4 (29%) concluded that younger patients were more adherent and engaged [43-46], while 3 (21%) showed no significant associations between age and adherence or engagement [33,47,48]. Finally, 1 (7%) of these studies showed a differential association between age and engagement with digital health interventions; participants' age was not significantly related to smartwatch-wearing compliance

but was significantly and positively correlated with higher symptom rating compliance [49].

Second, of the 13 studies concerning education level, 5 (38%) studies reported that a higher level of education was associated with higher engagement or adherence [38,41,43,50,51], 3 (23%) reported the contrary [34,44,52], and 5 (38%) yielded nonsignificant results [33,39,40,47,53]. One (8%) study reported that patients with some college degree showed the highest decline in engagement compared with high school graduates and college graduates without reporting any statistical tests [39]. Reliable trends regarding economic factors were difficult to determine because of inconsistent results. Among the 5 studies that investigated these links, 2 (40%) showed that being from a privileged background was associated with better adherence and engagement [41,54], while 3 (60%) showed nonsignificant results [33,35,47]. One (20%) study highlighted how income and employment status were associated with the differential use of specific modules [41].

Third, of the 9 studies concerning employment, 4 (44%) studies showed that employed patients were also found to be more adherent and engaged than those who did not work [39,43,50,55], 2 (22%) reported they were less likely to be adherent and engaged [56,57], and 3 (33%) reported nonsignificant results [33,39,53].

Fourth, of the 7 studies concerning gender, 3 (43%) studies showed that women were more adherent or engaged than men [43,50,58], 1 (14%) showed the contrary [34], while 3 (43%) showed no significant association [47-49]. One (14%) study showed that women were more likely to use the printed materials of a hybrid intervention than men [48].

Fifth, of the 5 studies that examined the association between marital status and adherence, 2 (40%) studies suggested that married patients may be more adherent and engaged [38,43], 2 (40%) studies yielded nonsignificant results [39,47], and 1 (20%) showed that married patients were less adherent and engaged [59]. One (20%) study showed that a higher number of people in the household was associated with lower engagement. This same article highlighted that widowed or divorced patients and participants in single households showed a greater decline in engagement, but no statistical test was reported [39].

Sixth, of the 3 studies on race, 2 (67%) studies yielded nonsignificant associations [33,35], and 1 (33%) reported a significant association that showed White women were more likely to use a discussion group module [44].

Finally, 3 studies reported that patients who were more experienced with technology were found to be more adherent and engaged. Although experience with technology was found to be associated with higher use in 2 (67%) studies [33,43], it was not associated with higher use of specific modules [60]. Beyond experience, access to technology was associated with better digital health engagement in 1 (33%) study [35].

Health-Related Factors Associated With Adherence to and Engagement With Digital Interventions in Patients With Cancer

We found that 30 of 61 (49%) studies reported the links between health-related factors and adherence to digital interventions, with, again, many inconsistent results between studies. First, of the 7 (23%) studies that described the stage of cancer, 3 (43%) studies showed that patients living with a more advanced cancer stage were more adherent and engaged [44,61,62], while 3 (43%) did not show any significant associations [33,41,48]. The last 1 (14%) showed that patients living with cancer stage II had the lowest engagement rate. This same study argued that patients who had breast cancer stage III showed a greater decline in engagement, without reporting any statistical test [39].

Second, of the 5 (8%) studies concerning symptoms, 2 (40%) studies showed that patients with more symptoms tended to be more adherent and engaged [34,63], while 3 (60%) reported no significant associations [39,64,65].

Third, of the 4 (7%) studies concerning comorbidity, patients with comorbidities were found to be less adherent and engaged in 2 (50%) studies [38,60], 1 (25%) study reported nonsignificant associations [41], and in 1 (25%) study, the significance of this association depended on the time of the intervention and the comorbidity measure used [39].

Fourth, of the 3 (5%) studies concerning weight or other related measures, 1 (33%) study showed that patients with a higher percentage of body fat were less adherent and engaged [66], 2 (67%) reported no significant association [39,41], and 1 (33%) study highlighted a greater decline in engagement in participants with high BMI without reporting statistical tests [39].

Fifth, among the 3 (5%) studies that investigated the links between diagnosis date and adherence or engagement, 1 (33%) showed that patients with an older date of diagnosis date had higher engagement [47] and the other 2 (67%) reported no significant results [39,67]. The moment patients are proposed to use the intervention also seems to play a role in their adherence and engagement [35,44,45,52,62]. Only 2 (40%) studies showed no significant associations [33,67]; however, authors used very different indicators (eg, summertime, time since diagnosis, and pre or postsurgery status), which makes it difficult to identify trends.

Sixth, of the 2 studies that examined the association between cancer type, 1 (50%) study showed that patients with breast cancer had higher engagement [62], while 1 (50%) study showed no significant differences in adherence according to cancer type [48]. Finally, 1 (2%) study among the 61 included, although not directly having cancer type as a predictor, demonstrated that the predictors of engagement differed between patients with breast cancer and those with prostate cancer [38].

Seventh, 5 (8%) studies investigated the role of treatments. Four (80%) showed that treatments and medical services could be associated with adherence or engagement [41,42,50,53], but the type of treatments investigated varied greatly (eg, surgery, sleeping medication) and the operationalization of these variables differed across studies (eg, medical service, cycles of

chemotherapy). One (20%) study did not show any difference in engagement between patients who underwent chemotherapy and those who did not [39].

Finally, 1 (2%) study showed that patients with cancer had higher engagement scores than participants who did not have cancer [68]. However, in this study, no significant differences emerged in other adherence markers, such as homework completion.

Psychosocial Factors Associated With Adherence to and Engagement With Digital Interventions in Patients With Cancer

Despite fewer studies examining psychosocial factors (14/61, 23%), they yielded more consistent results. First, of the 13 (93%) studies concerning distress, 6 (46%) studies showed that patients who were distressed were more adherent or engaged [33,44,57,58,69,70], 4 (31%) showed the contrary [35,47,50,71], and 3 (23%) did not report any significant results [36,39,72]. All the studies that showed a positive association used a measure of cancer-related distress [33,44,57,58,69-71]. In comparison, among those that showed the contrary, only 1 (25%) used a cancer-specific measure [47]. Moreover, 1 (8%) of these studies showed how distress was associated with engagement with different modules depending on patients' gender [71]. One (8%) study showed a differential association depending on the operationalization of engagement (eg, binarization of use vs use of specific modules) [71]. Finally, 1 (8%) study showed that although distress was a predictor of continuous app use, when controlling for gender, this association was no longer significant [58].

Second, of the 7 (50%) studies that investigated the link between quality of life and adherence or engagement, 3 (43%) studies showed that patients with better quality of life were more adherent or more engaged [65,71,73], 1 (14%) reported the contrary [44], and 3 (43%) did not report significant results [39,56,60].

Third, of the 6 (43%) studies investigating social support, 4 (67%) studies showed that greater social support was associated with decreased adherence or engagement [44,60,69,70] and 1 (17%) showed the contrary [34]. Moreover, 1 (17%) of these studies showed a differential association between social constraints and engagement with digital interventions; participants' social constraints were positively associated with duration of use but negatively with unique module views [33]. As with distress, 1 (17%) study highlighted a different pattern of association between social support and adherence depending on the gender of the participants [60].

Fourth, although self-efficacy was investigated in only 3 (21%) studies, it was found to be positively associated with adherence and engagement in 2 (67%) studies [47,65], while the remaining 1 (33%) reported nonsignificant results [60].

Fifth, positive perceptions of digital interventions (eg, perceived ease of use, perceived usefulness) were consistently associated with better adherence and higher engagement in the 5 (8%) studies that investigated this factor [37,46,59,74,75]. However, 1 (20%) of these studies showed a differential association

between intervention perception and adherence; perceived usefulness was positively associated with the intention to use the intervention, but perceived ease of use was not [74].

Sixth, the 3 (5%) studies that investigated the link between information competence and adherence and engagement reported nonsignificant results [33,44,76]. However, 1 (33%) of these 3 studies showed a differential association between information competence and engagement with specific modules; the more patients had high information competence, the less they used "ask the expert" and interactive services, but not information services [44].

Seventh, 3 (5%) studies investigated the links between resistance (such as lack of motivation or difficulty with change) and adherence or engagement. One (33%) of the 3 studies showed a positive association [58], another 1 (33%) showed a negative association [35], and the last 1 (33%) had no significant results [77]. In 1 (33%) study, although resistance to change was a predictor of continuous app use, when controlling for gender, this association was no longer significant [58].

Finally, other psychosocial factors have been found to be associated with adherence or engagement in single studies, such as decisional conflict [76], health perceptions [35], coping (helplessness and anxious preoccupation) [72], personality (openness) [58], previous experience with a similar intervention (mindfulness) [50], fatigue [55], and unmet sexual and physical needs [57]. Other studies investigated different factors without highlighting significant results like therapeutic alliance [78]. One (7%) study stated that patients reporting fatigue showed a greater decline in adherence without reporting statistical tests [39].

Intervention-Related Factors Associated With Adherence to and Engagement With eHealth Interventions in Patients With Cancer

Twenty-six of 61 (43%) studies investigated the links between intervention-related factors and adherence to digital interventions. First, of the 11 (42%) studies concerning intervention type, most studies compared adherence or engagement with digital intervention with other interventions which made it difficult to summarize these results. Four (36%) studies compared digital interventions with paper pamphlets; 3 (75%) of them showed that participants were more adherent and engaged to the digital version of the intervention [45,79,80], and the last 1 (25%) showed no significant differences between the 2 types of intervention [54]. Two (18%) studies compared digital interventions with usual care; 1 (50%) showed that participants in the digital group engaged more in survivorship care plans than people who did not use the digital intervention [37], while the other 1 (50%) showed no significant differences in dropout rates between the digital group and the usual care group [69]. Two (18%) studies compared interactive digital interventions with information-only portals; 1 (50%) yielded inconsistent results depending on the measure used [81], and the other 1 (50%) had nonsignificant results [72]. Two (18%) studies compared eHealth interventions with face-to-face ones; 1 (50%) showed that participants who participated in the eHealth intervention were less adherent than those who participated in

its face-to-face version [78], and the other 1 (50%) did not show any significant differences [34]. Two (18%) studies compared phone interventions with digital ones showing no significant differences [54,66]. Finally, 4 (36%) studies compared 2 different interactive digital interventions; 3 (75%) did not show any significant differences [39,82,83], while 1 (25%) highlighted inconsistent results depending on the chosen measure of engagement [51]. Interestingly, the possibility of interactions between patients yielded nonsignificant associations in the 2 (100%) studies that investigated this topic [74,84].

Second, the link between human support (ie, help from a human with the use of the intervention) and adherence has been studied in only 2 (8%) studies, and the results were conflicting. Of the 2 studies, 1 (50%) showed that human support was associated with increased adherence [85], while the other 1 (50%) showed the contrary [64]. However, it is worth mentioning that 1 (50%) of these studies showed a differential association between human support and engagement and adherence; participants in the technician-guided group logged in more frequently than the self-help group but no significant differences were observed in the proportion of participants who completed lesson 5 between both groups [85].

Third, of the 2 (8%) studies that investigated the effect of time on engagement, 1 (50%) study showed that log-in attrition was significant across the 3 months of the study [33], while the other 1 (50%) showed no significant effect of time on engagement [86].

Finally, although most studies included in this review did not examine the differential use of modules (only 1 study reported no significant differences in module use [87]), a subset of studies investigated the impact of specific features on adherence and engagement. Findings from these studies suggest that a tunneled intervention, in which modules are presented in a fixed sequence, may lead to higher engagement than a free-choice intervention [51]. In addition, reminders were found to be effective in improving adherence and engagement [88,89], regardless of the type of reminder used [90]. Finally, patients were found to consult modules more frequently when informed through interventions tailored to meet their needs [59].

Intersectional Approach to Adherence to and Engagement With Digital Health Interventions

Given the high heterogeneity of studies and interventions as well as the contrasting results presented above, we examined these data with an intersectional approach. Indeed, we chose to investigate these factors by type of intervention, specifically the types of goals the included studies focused on (eg, physical activity and psychological distress), operationalization of the outcome (ie, engagement and adherence with or without justification for dose), and type of intervention (ie, web-based vs mobile-based). We reported on factors investigated by at least 2 studies in each subcategory.

Intervention Aims

Quality of Life and Symptom Management

A total of 13 (21%) interventions centered on quality of life or symptom management, including 3 (23%) that focused on other

aims as well (eg, distress). For interventions that targeted quality of life, 2 (15%) studies examined the association between marital status and adherence and engagement, leading to inconsistent results. One (8%) suggested that married patients had a higher engagement [38], and another 1 (8%) showed contrary results [59]. Regarding comorbidities, patients with comorbidities had a lower engagement in the 2 (15%) studies that investigated this factor [38,60].

Among the 3 studies that investigated the link between quality of life and adherence and engagement, the results were inconsistent. One (33%) of the 3 studies showed that better quality of life was associated with higher adherence [73], another 1 (33%) reported the contrary [44], and the last 1 (33%) did not report significant results [60]. The 2 (67%) studies that investigated social support showed that greater social support was associated with decreased adherence or engagement [44,60].

Regarding intervention-related factors, reminders were found to be effective in improving engagement [88,89]. This was the only factor investigated by >2 studies.

Psychological Distress

Twenty-one out of 61 (34%) interventions centered on psychological distress, including 6 (10%) that focused on other aims as well (eg, decisional conflict, self-efficacy). Regarding sociodemographic factors, 1 (33%) study reported that a higher level of education was associated with higher engagement [43], while 2 (67%) others yielded nonsignificant results [33,47]. The 2 (100%) studies that investigated economic background showed nonsignificant results [33,47]. Concerning employment, a reliable trend could not be identified as 1 (33%) study found that employed patients were more adherent than those who did not work [43], another 1 (33%) reported they were less likely to be adherent [57], and the last 1 (33%) reported nonsignificant results [33]. Regarding gender, 2 (67%) studies showed that women were more adherent and engaged than men [43,58], and 1 (33%) showed no significant association [47]. No reliable trend could be identified regarding marital status as 1 (33%) study suggested that married patients may be more adherent [43], another 1 (33%) yielded nonsignificant results [47], and the last 1 (33%) showed that married patients were less adherent [59]. Finally, experience with technology was found to be associated with higher use in 2 (100%) studies [33,43].

Regarding health-related factors, 2 (67%) studies showed that patients living with a more advanced cancer stage were more adherent [61], while 1 (33%) did not show any significant associations [33]. No reliable trend could be identified regarding the time the intervention was proposed to the patients. Indeed, 1 (50%) study showed significant results [62] while the other 1 (50%) showed no significant associations [33].

Concerning distress, 5 (56%) studies showed that patients who were distressed had higher levels of adherence or engagement [33,57,58,69,70], 2 (22%) showed the contrary [47,71], and 2 (22%) did not report any significant results [36,72]. Regarding social support, 2 (100%) studies showed that greater social support was associated with decreased engagement [69,70].

Regarding intervention-related factors, the 2 (100%) studies that compared digital interventions with paper pamphlets showed

that participants were more adherent to the digital version of the intervention [79,80]. Two (10%) studies compared interactive digital interventions with information-only portals; 1 (50%) yielded inconsistent results depending on the measure used [81], and the other 1 (50%) yielded nonsignificant results [72].

Physical Activity and Nutrition

Twelve out of 61 (57%) interventions centered on physical activity and nutrition, including 2 (17%) that also focused on other aims as well (eg, smoking). First, concerning age, 1 (25%) study showed that older patients tended to engage with the intervention more than younger ones [39], 2 (50%) showed the contrary [45,46], while 1 (25%) study showed no significant associations between age and adherence [48]. No reliable trend could be identified for education; 1 (33%) study reported that a higher level of education was associated with higher engagement [51], 1 (33%) reported the contrary [52], and the last 1 (33%) yielded nonsignificant results [39]. Regarding gender, the 3 (100%) studies that investigated the topic showed no significant association [48,49].

Regarding health-related factors, 1 (50%) study out of 2 did not show any significant associations between cancer stage and engagement [48], while 1 (50%) showed that patients living with cancer stage II had the lowest engagement rate [39]. Concerning symptoms, 1 (50%) study showed that patients with more symptoms tended to have higher engagement while the other 1 (50%) reported no significant associations [39]. Regarding weight or other related measures, 1 (50%) study showed that patients with a higher percentage of body fat had lower engagement [66] and the other 1 (50%) reported no significant association [39]. Finally, the moment patients are proposed to use the intervention also seems to play a role in their engagement among the 3 (100%) studies that investigated this topic [35,45,52].

Regarding psychological factors, no reliable trend regarding distress could be established as it was investigated by only 2 (17%) studies with contradicting results; 1 (50%) showed that more distressed patients had lower engagement [35], and the other 1 (50%) did not report any significant results [39]. However, positive perceptions of digital interventions were associated with better adherence in the 2 (100%) studies that investigated this factor within this subcategory [46,59].

Operationalization of Adherence and Engagement

Overview

We found that 2 out of 61 (3%) studies used measures of intention to continue using the intervention as an outcome. The others were classified according to the classification proposed by Sieverink et al [17]: engagement, adherence with justification for intended use, and adherence without justification for intended use [17]. However, only 2 out of 59 (3%) studies justified the intended use specified in the article. No similarity could be reported as their methods and results differed greatly. Therefore, we only report the results for studies that investigated engagement versus the ones that investigated adherence without justification for the intended use.

Engagement

We found that 32 out of 61 (52%) articles used measures of engagement according to the classification proposed by Sieverink et al [17]. First, concerning age, 10 studies investigated this topic: 4 (40%) studies showed that older patients tended to engage more than younger ones [38-41], 3 (30%) studies showed that younger patients engaged more [44-46], while 3 (30%) studies showed no significant associations between age and engagement [33,47,48]. Second, concerning the level of education, 3 (33%) studies reported that higher education was associated with higher engagement [38,41,51], 2 (22%) reported the contrary [44,52], and 4 (44%) yielded nonsignificant results [33,39,40,47]. Among the 4 (13%) studies that investigated economic factors, 1 (25%) showed how being from a privileged background was associated with better engagement [41], while the other 3 (75%) showed nonsignificant results [33,35,47]. Concerning employment, no reliable trend could be identified as the 3 (9%) studies that investigated the topic reached different conclusions; 1 (33%) showed that employed patients were found to have higher engagement than those who did not work [39], 1 (33%) reported they were less likely to engage in the intervention [56], and the last 1 (33%) reported nonsignificant results [33]. The 3 (100%) studies that investigated gender showed no significant association [47,48]. Regarding marital status, 1 (33%) study suggested that married patients may have higher engagement [38], and 2 (67%) studies yielded nonsignificant results [39,47]. For race, 2 (67%) studies yielded nonsignificant associations [33,35], and only 1 (33%) reported a significant association and showed that White women were more likely to use a discussion group module [44]. Finally, experience with technology was found to be associated with higher use in 1 (50%) study [33] but was not associated with higher use of specific modules in another (n=1, 50%) study [60].

Regarding health-related factors, 3 (50%) studies showed that patients living with a more advanced cancer stage had higher engagement [44,61,62], while 3 (50%) did not show any significant associations [33,41,48]. Patients with comorbidities were found to be less engaged in 2 (50%) studies [38,60], 1 (25%) reported nonsignificant associations [41], and in the other 1 (25%), the significance of this association depended on the time of the intervention and the comorbidity measure used [39]. Concerning symptoms, 3 (100%) reported no significant associations [39,65]. One (33%) study showed that patients with a higher percentage of body fat had lower engagement [66], while 2 (67%) reported no significant association [39,41]. No reliable trend could be identified regarding the date of diagnosis as 1 (50%) study showed that patients with an older date of diagnosis had higher engagement [47], and the other 1 (50%) reported no significant results [39]. The moment patients are proposed to use the intervention also seems to play a role in their engagement as shown in 5 studies (83%) [35,44,45,52,62]. Only 1 (17%) study showed no significant associations [33]. Regarding cancer type, 1 (50%) study showed that patients with breast cancer had higher engagement [62], while the other 1 (50%) showed no significant differences in engagement according to cancer type [48]. The association between engagement and treatments or medical services yielded

inconsistent results. One (50%) study showed significant differences [41], while another 1 (50%) did not show any difference in engagement between patients who underwent chemotherapy and those who did not [39].

Regarding psychological factors, 4 (40%) studies showed that distressed patients had higher engagement [33,44,69,70], 4 (40%) showed the contrary [35,47,50,71], and 2 (20%) did not report any significant results [39,72]. Two (33%) studies showed that patients with a better quality of life had higher engagement [65,71], 1 (17%) reported the contrary [44], and 3 (50%) did not report significant results [39,56,60]. Concerning social support, 4 (100%) studies showed that greater social support was associated with decreased engagement [44,60,69,70]. Self-efficacy was found to be positively associated with engagement in 2 (67%) studies [47,65], while the remaining 1 (33%) reported nonsignificant results [60]. Positive perceptions of digital interventions were associated with better engagement in the 2 (%) studies that investigated this factor in this subcategory [37,46]. Finally, the 3 (100%) studies that investigated the links between information competence and engagement reported nonsignificant results [33,44,76].

Relative to intervention-related factors, 2 (100%) studies showed that participants had better engagement with a digital version of the intervention compared with paper pamphlets [45,79]. Two (6%) studies compared digital interventions with usual care; 1 (50%) showed that participants in the digital intervention group were more engaged in survivorship care plans than people who did not use the intervention [37], while 1 (50%) study showed no significant differences in dropout rates between the digital group and the usual care group [69]. Two (6%) studies compared interactive digital interventions with information-only portals; 1 (50%) yielded inconsistent results depending on the measure of engagement used [81], and the other 1 (50%) yielded nonsignificant results [72]. Finally, 4 (13%) studies compared 2 different interactive digital interventions; 3 (75%) did not show any significant differences [39,82,83], while the other 1 (25%) highlighted inconsistent results depending on the chosen measure of engagement [51]. Two (6%) studies investigated the effect of time on engagement; 1 (50%) study showed that log-in attrition was significant across the 3 months of the study [33], while the second 1 (50%) showed no significant effect of time on engagement [86]. In addition, reminders were found to be effective in improving engagement [88,89].

Adherence Without Justification for Intended Use

We found that 25 out of 61 (41%) articles used measures of adherence without a justification for intended use, according to the classification proposed by Sieverink et al [17].

Regarding sociodemographic factors, 2 (100%) studies showed that older patients tended to be more adherent than younger ones [34,42]. Two (50%) studies showed that employed patients were more adherent than those who did not work [43,55], 1 (25%) reported they were less likely to be adherent [57], and 1 (25%) reported nonsignificant results [53]. Regarding gender, 2 (50%) studies showed that women were more adherent than men [43,58], 1 (25%) showed that men were more adherent [34], while 1 (25%) showed no significant association [49].

Regarding health-related factors, 2 (67%) studies showed that patients with more symptoms tended to be more adherent [34,63], while 1 (33%) reported no significant associations [64]. Two (100%) studies showed that treatments and medical services could be associated with adherence [42,53].

Regarding psychological factors, 2 (50%) studies showed that patients who were distressed were more adherent [58,69], 1 (25%) showed the contrary [71], and 1 (25%) did not report any significant results [36]. Two (100%) studies showed that patients with a better quality of life were more adherent [71,73]. Concerning social support, 1 (50%) study showed that greater social support was associated with decreased adherence [69], and 1 (50%) showed the contrary [34]. One (50%) study showed a positive association between resistance and adherence [58], and the second 1 (50%) showed no significant results [77].

Concerning intervention type, 1 (50%) study showed that participants were more adherent to a digital version of the intervention compared with a paper pamphlet [80], while the other 1 (50%) showed no significant differences between the 2 types of intervention [54]. Two (8%) studies compared eHealth interventions with face-to-face ones; 1 (25%) showed that participants who participated in the eHealth intervention were less adherent than those who participated in its face-to-face version [78], while the other 1 (25%) did not show any significant differences [34]. Second, the results regarding the links between human support and adherence were conflicting. One (50%) study showed that human support was associated with increased adherence [85], and the other 1 (50%) showed the contrary [64].

Type of Intervention

We chose to investigate factors associated with adherence and engagement according to the type of intervention (web-based or mobile-based). Two interventions could not be classified in either category.

Web-Based Intervention

We found that 41 out of 61 (67%) articles reported on web-based interventions, including 2 (5%) that also included other components (ie, CD-ROM, wearables). Regarding sociodemographic variables, 4 (40%) showed that older patients tended to be more adherent and engaged than younger ones [34,39,40,42], 3 (30%) showed the contrary [44-46], while 3 (30%) studies showed no significant associations [33,47,48]. Regarding the level of education, 3 (30%) studies reported that a higher level of education was associated with higher engagement [43,50,51], 2 (20%) reported the contrary [34,44] and 5 (50%) yielded nonsignificant results [33,39,40,47,53]. The studies that investigated economic factors showed nonsignificant results [33,47]. Concerning employment, 4 (50%) studies showed that employed patients were found to be more adherent or had higher engagement than those who did not work [39,43,50,55], 1 (13%) reported the contrary [57], and 3 (38%) reported nonsignificant results [33,39,53]. Two (40%) studies showed that women had higher engagement than men [43,50], 1 (20%) showed the contrary [34], while 2 (40%) showed no significant association [47,48]. One (25%) study suggested that married patients may be more adherent [43], 2 (50%) studies

yielded nonsignificant results [39,47], and another 1 (25%) showed the contrary [59]. Regarding race, 1 (50%) study yielded nonsignificant associations [33] and the only 1 (50%) that reported a significant association showed that White women were more likely to use a discussion group module [44]. Although technology experience was found to be associated with higher use in 2 (100%) studies [33,43], it was not associated with higher use of specific modules in another [60].

Regarding health-related factors, 3 (50%) studies showed that patients living with a more advanced cancer stage were more adherent [44,61,62], while 2 (33%) did not show any significant associations [33,48]. The last 1 (17%) showed that patients living with cancer stage II had the lowest adherence rate [39]. Patients with comorbidities were found to be less adherent in 1 (50%) study [60], and in another 1 (50%), the significance of this association depended on the time of the intervention and the comorbidity measure used [39]. Concerning symptoms, 2 (50%) studies showed that patients with more symptoms tended to be more adherent or more engaged in the intervention [34,63], while 2 (50%) reported no significant associations [39,64]. Concerning weight or other related measures, 1 (50%) study showed that patients with a higher percentage of body fat had lower engagement [66], and 1 (50%) reported no significant association [39]. Among the 3 (7%) studies that investigated the link between diagnosis date and adherence and engagement, 1 (33%) showed that patients with an older date of diagnosis date had higher engagement [47], and the other 2 (67%) reported no significant results [39,67]. The moment patients are proposed to use the intervention also seems to play a role in their engagement (3/5, 60%) [44,45,62]. Only 2 (40%) studies showed no significant associations [33,67]. Two (5%) study examined the association between cancer type, 1 (50%) study showed that patients with breast cancer had higher engagement [62], while 1 (50%) study showed no significant differences in engagement according to cancer type [48]. Three (75%) studies showed that treatments and medical services could be associated with engagement [42,50,53], but 1 (25%) study did not show any difference in engagement between patients who underwent chemotherapy and those who did not [39].

Regarding psychological factors, 5 (50%) studies showed that patients who were distressed had higher engagement or adherence [33,44,57,69,70], 2 (20%) showed the contrary [47,50], and 3 (30%) did not report any significant results [36,39,72]. Of the 3 (7%) studies that investigated the links between quality of life and adherence, 1 (33%) reported that patients with a lower quality of life had lower engagement [44], and 2 (67%) did not report significant results [39,60]. Concerning social support, 4 (80%) studies showed that greater social support was associated with decreased adherence or engagement [44,60,69,70], and 1 (20%) showed the contrary [34]. Self-efficacy was found to be positively associated with engagement in 1 (50%) study [47], while the remaining 1 (50%) reported nonsignificant results [60]. Moreover, the 3 (100%) studies that investigated the links between information competence and adherence or engagement reported nonsignificant results [33,44,76]. Regarding resistance, 1 (33%) study showed a positive association with adherence [58], another

1 (33%) showed a negative one [35], and the last 1 (33%) showed no significant results [77].

Concerning intervention-related factors, the 2 (100%) studies that compared web-based interventions with paper pamphlets showed that participants had higher engagement or adherence with the digital version of the intervention [45,80]. Two (5%) studies compared interactive digital interventions with information-only portals. One (50%) study yielded inconsistent results depending on the measure used [81], and the other 1 (50%) yielded nonsignificant results [72]. Two (5%) studies compared eHealth interventions with face-to-face ones; 1 (50%) showed that participants who participated in the eHealth intervention were less adherent than those who participated in its face-to-face version [78], while the other 1 (50%) did not show any significant differences [34]. Finally, 2 (5%) studies compared 2 different interactive digital interventions; 1 (50%) did not show any significant differences [39], while the other 1 (50%) highlighted inconsistent results depending on the chosen measure [51]. Regarding human support the results were conflicting. One (50%) study showed that human support was associated with increased adherence [85], and the other 1 (50%) showed the contrary [64]. Finally, reminders were found to be effective in improving engagement [88,89].

Mobile-Based Intervention

We found that 18 out of 61 (30%) articles reported on mobile-based interventions. Regarding sociodemographic factors, 2 (67%) studies showed that older patients tended to engage less with the interventions than younger ones [38,41], and 1 (33%) showed the contrary [46]. Two (50%) studies reported that higher education was associated with higher engagement [38,41], 1 (25%) reported the contrary [52], and 1 (25%) yielded nonsignificant results [39]. Moreover, 2 (100%) studies showed how being from a privileged background was associated with better adherence or engagement [41,54]. Reliable trends could not be established concerning employment as 1 (33%) study showed that employed patients were found to be more engaged than those who did not work [39], 1 (33%) reported the contrary [56], and 1 (33%) reported nonsignificant results [39]. One (50%) study showed that women were more adherent than men [58], and the other 1 (50%) showed no significant association [49]. One (50%) study suggested that married patients had higher engagement [38], while the other 1 (50%) yielded nonsignificant results [39].

Among health-related factors, patients with comorbidities had a lower engagement in 1 (50%) study [38] and 1 (50%) reported nonsignificant associations [41]. The moment patients are proposed to use the intervention also seems to play a role in their adherence [35,52].

One (33%) showed that distressed patients were more adherent [58], while 2 (67%) showed the contrary [35,71]. Two (67%) studies showed that patients with better quality of life had higher engagement [65,71], and 1 (33%) did not report significant results [56]. Positive perceptions of digital interventions were consistently associated with better adherence and engagement in the 4 (100%) studies that investigated this factor [37,46,74,75]. One (50%) study showed a positive association between resistance and adherence [58], while another 1 (50%)

showed a negative association [35]. Regarding intervention-related factors, 1 (25%) study showed that participants were more adherent to the digital version of the intervention than to a paper pamphlet [79], and the other 1 (25%) showed no significant differences between the 2 types of intervention [54]. Finally, 2 (50%) studies did not show any significant differences [82,83].

Quality of the Included Studies

The quality of the included studies could not be assessed with a standardized evaluation grid, because for several studies, examining the factors associated with adherence was a secondary objective. Therefore, the quality of the method used to assess this objective may not reflect the overall quality of the articles examined.

The results reported in the previous sections varied greatly, including in the same study, depending on the operationalization of the factors under study (eg, social support vs social constraints), their measures (eg, dichotomization of a variable), the way adherence was conceptualized (eg, active app days, percent of messages read) [37], as well as the composition of the sample under investigation (eg, samples composed of people aged ≥ 65 years [40]). Moreover, some of these results may be imputable to other confounding variables (eg, cancer type and gender).

Finally, it is noteworthy that 15 of the 61 (25%) articles reported a nonsignificant association between some variables under study and adherence, without specifying which ones. This may lead to an overestimation of the effects of said variables, especially sociodemographic and health-related ones [27,35,36,54,56,60,61,69,70,72,77,78,91-93].

Discussion

Principal Findings

This review aimed to highlight factors associated with adherence to digital interventions in cancer care. Despite the large number of articles included in this review, most results were heterogeneous across studies. For illustration, sociodemographic factors were the most investigated, but our review showed that these had the most inconsistent results. This may be due to the heterogeneity in the types of intervention under study (ie, duration, objective, and format), the diversity of the populations included (eg, adolescents and young adults, patients with breast cancer), as well as the inconsistency in the measures of adherence (eg, log-ins, time spent, self-reported measures), and its predictors. However, it is also important to note that some results were consistent across most studies. For example, the most adherent patients to digital health were those who were older, without comorbidities, with a positive perception of the intervention, and a low level of social support. Given the large number of factors covered by this review and the heterogeneity of the results, this discussion will focus exclusively on the most surprising results as well as those that were most widely agreed upon in the included studies.

Regarding health-related factors, the factor on which there is the greatest consensus is the presence of comorbidity. Indeed, the association between comorbidities and low adherence to

digital health is noteworthy. Similar results have been found in previous studies in older adults and patients living with rheumatoid arthritis [94,95]. The authors highlight that some comorbidities may prevent access to digital interventions (eg, cognitive functioning and vision problems) [95]. Another explanation for these results may be that current digital interventions in cancer care do not address the complexity of these patients' health and care journeys [96]. These data suggest that the presence or absence of comorbidities must absolutely be taken into account in the conception of adequate digital interventions for patients with cancer.

Regarding psychosocial factors, the results concerning the effect of distress level on adherence were surprising. While distress was found to be positively associated with adherence to digital interventions in little more than half the studies, the results remained inconsistent across other studies. These contradictory results could be explained by the variability of definitions and measures of distress. In patients presenting a mental illness, adherence to digital interventions for depression and anxiety is often low to moderate and predicted by their severity [97-100]. Symptoms of such disorders (eg, anhedonia, lack of motivation) could hinder adherence to these interventions. In the context of cancer, we highlighted that all the studies that showed that higher distress was associated with increased adherence used cancer-specific measures of the concept. Here, the association with distress may be more of an indicator of the need for support regarding their cancer experience than severe symptoms of psychological distress, or even mental illness. In other words, cancer-related distress is an indicator of cancer-related needs; the more patients report such needs, the more likely they are to use digital interventions. The association between distress and adherence to digital health highly depends on how distress is conceptualized (eg, depression, cancer-related distress, anxiety). Consequently, identifying the type and level of distress of patients is crucial to addressing their needs and improving their adherence to the digital interventions offered.

Still among the psychosocial factors, one predictor of adherence that seemed to enjoy consensus in the studies included in this review was social support. More specifically, most studies have shown that low social support was associated with better adherence. This is congruent with studies that showed that cancer patients with low social support were more likely to seek health information on the web [101]. Connection with peers is part of the experience of digital health users, and some interventions include components to foster interactions between them [31]. Indeed, they can successfully improve perceived social support in patients with cancer [102]. Meeting similar people through a shared digital intervention could create a sense of community and decrease feelings of isolation [103,104]. However, not everyone is comfortable with social network features, so these aspects may be less relevant for people who already have a satisfying level of social support [104]. Finally, social support has been linked to better psychosocial outcomes and self-management behaviors in patients [105-107]. Consequently, patients with high levels of social support may be less inclined to use such interventions.

The adoption of an intersectional lens allowed us to highlight specificities according to intervention goals and

operationalization of adherence versus engagement. For interventions targeting distress in patients with cancer, gender might play a more important role than in other types of intervention, with women being more adherent and engaged than men. This might be explained by more negative attitudes toward mental health interventions in men [108,109]. Similarly, patients who are distressed seem to be more adherent to distress-focused interventions than other types of interventions. This may be explained by the relevance of such interventions to their needs. However, these results remain inconsistent across studies. Finally, when focusing on adherence rather than engagement, older patients were more adherent than younger patients. This aligns with previous research highlighting that older patients are more adherent than their younger counterparts [110].

Limitations

This systematic review has limitations worth mentioning. The main one is the significant heterogeneity of the articles included in this review, both conceptually and methodologically. From a conceptual point of view, the absence of a consensus on the definition of adherence in eHealth is a major obstacle. This echoes previous research highlighting a lack of consistency in the definition of this concept in the context of digital health [17]. Due to the wide variation of terms used to refer to adherence (eg, engagement, use, and usage), some relevant studies may not have been included. From a methodological point of view, the analysis of the included studies relies on the content of the articles, yet some of them presented incomplete data (eg, the details of the results and the nonsignificant associations with adherence were not reported). This may lead to an overestimation of the effect of some factors. Examining factors associated with adherence was the main objective of less than half of these studies which may explain the lack of details in some articles. In the future, it seems essential to better conceptualize adherence and to deepen the research into its determinants. Finally, our review included studies with patients with all types of cancers and at different stages of cancer. However, breast cancer was overrepresented in our review which

may affect the external validity of our results. In future research, it could be interesting to target a particular type of cancer.

Despite these limitations, we may provide recommendations for the development of future digital interventions targeting patients with cancer. Personalization, specifically, seems to be essential. The platform should consider individual needs, including age, comorbidities, distress type (ie, cancer-specific or nonspecific), and levels. It should target isolated patients to provide tailored support and address gender-specific preferences (eg, regarding mental health). Usability and accessibility are essential, with continuous evaluation for ongoing improvement. Such an intervention would enhance patients' adherence and engagement, and ultimately, patient outcomes.

Conclusions

In summary, this systematic review examined factors associated with digital health adherence, aiming to provide a comprehensive understanding of the current state of research in this field. Our analysis revealed several key findings that shed light on the complexity of eHealth adherence. The results underscore the importance of health-related factors and psychosocial factors in predicting adherence. More specifically, the presence of comorbidities and the level of social support appear to be important factors to consider in ensuring patient adherence to digital interventions. However, our review also highlights the need for further investigation in this area, particularly by studying the effects of promising but poorly considered factors, such as self-efficacy. Finally, to gain a clear understanding of the factors involved in adherence to digital interventions for patients with cancer, it seems essential that future research should pay more attention to investigating the effects of specific features (eg, gamification, peer-support modules), standardizing other factors (eg, human support, comparison to other interventions), and homogenization of adherence measurements to enhance study quality. For example, a significant number of studies did not report which variables they investigated when they did not yield significant results. By addressing these gaps and limitations, future research can contribute to improving digital interventions and ultimately enhancing patient outcomes in this digital health care era.

Acknowledgments

This work was funded by myCharlotte.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Search strategies.

[\[DOCX File, 19 KB-Multimedia Appendix 1\]](#)

Multimedia Appendix 2

Descriptive table of the included studies.

[\[XLSX File \(Microsoft Excel File\), 72 KB-Multimedia Appendix 2\]](#)

Multimedia Appendix 3

PRISMA 2020 Checklist.

[\[PDF File \(Adobe PDF File\), 969 KB-Multimedia Appendix 3\]](#)

References

1. Shaw T, McGregor D, Brunner M, Keep M, Janssen A, Barnet S. What is eHealth (6)? Development of a conceptual model for eHealth: qualitative study with key informants. *J Med Internet Res*. Oct 24, 2017;19(10):e324. [[FREE Full text](#)] [doi: [10.2196/jmir.8106](https://doi.org/10.2196/jmir.8106)] [Medline: [29066429](https://pubmed.ncbi.nlm.nih.gov/29066429/)]
2. Meier CA, Fitzgerald MC, Smith JM. eHealth: extending, enhancing, and evolving health care. *Annu Rev Biomed Eng*. 2013;15:359-382. [doi: [10.1146/annurev-bioeng-071812-152350](https://doi.org/10.1146/annurev-bioeng-071812-152350)] [Medline: [23683088](https://pubmed.ncbi.nlm.nih.gov/23683088/)]
3. den Bakker CM, Schaafsma FG, Huirne JA, Consten EC, Stockmann HB, Rodenburg CJ, et al. Cancer survivors' needs during various treatment phases after multimodal treatment for colon cancer - is there a role for eHealth? *BMC Cancer*. Dec 04, 2018;18(1):1207. [[FREE Full text](#)] [doi: [10.1186/s12885-018-5105-z](https://doi.org/10.1186/s12885-018-5105-z)] [Medline: [30514325](https://pubmed.ncbi.nlm.nih.gov/30514325/)]
4. Kapoor A, Nambisan P, Baker E. Mobile applications for breast cancer survivorship and self-management: a systematic review. *Health Informatics J*. Dec 2020;26(4):2892-2905. [[FREE Full text](#)] [doi: [10.1177/1460458220950853](https://doi.org/10.1177/1460458220950853)] [Medline: [32842830](https://pubmed.ncbi.nlm.nih.gov/32842830/)]
5. Putranto D, Rochmawati E. Mobile applications for managing symptoms of patients with cancer at home: a scoping review. *Int J Nurs Pract*. Aug 2020;26(4):e12842. [doi: [10.1111/ijn.12842](https://doi.org/10.1111/ijn.12842)] [Medline: [32347599](https://pubmed.ncbi.nlm.nih.gov/32347599/)]
6. Keaver L, Loftus A, Quinn L. A review of iPhone and Android apps for cancer patients and survivors: assessing their quality, nutrition information and behaviour change techniques. *J Hum Nutr Diet*. Jun 16, 2021;34(3):572-584. [doi: [10.1111/jhn.12857](https://doi.org/10.1111/jhn.12857)] [Medline: [33453133](https://pubmed.ncbi.nlm.nih.gov/33453133/)]
7. Adam R, McMichael D, Powell D, Murchie P. Publicly available apps for cancer survivors: a scoping review. *BMJ Open*. Sep 30, 2019;9(9):e032510. [[FREE Full text](#)] [doi: [10.1136/bmjopen-2019-032510](https://doi.org/10.1136/bmjopen-2019-032510)] [Medline: [31575584](https://pubmed.ncbi.nlm.nih.gov/31575584/)]
8. Rincon E, Monteiro-Guerra F, Rivera-Romero O, Dorronzoro-Zubiete E, Sanchez-Bocanegra CL, Gabarron E. Mobile phone apps for quality of life and well-being assessment in breast and prostate cancer patients: systematic review. *JMIR Mhealth Uhealth*. Dec 04, 2017;5(12):e187. [[FREE Full text](#)] [doi: [10.2196/mhealth.8741](https://doi.org/10.2196/mhealth.8741)] [Medline: [29203459](https://pubmed.ncbi.nlm.nih.gov/29203459/)]
9. Haberlin C, O'Dwyer T, Mockler D, Moran J, O'Donnell DM, Broderick J. The use of eHealth to promote physical activity in cancer survivors: a systematic review. *Support Care Cancer*. Oct 2018;26(10):3323-3336. [doi: [10.1007/s00520-018-4305-z](https://doi.org/10.1007/s00520-018-4305-z)] [Medline: [29909476](https://pubmed.ncbi.nlm.nih.gov/29909476/)]
10. Triberti S, Savioni L, Sebri V, Pravettoni G. eHealth for improving quality of life in breast cancer patients: a systematic review. *Cancer Treat Rev*. Mar 2019;74:1-14. [doi: [10.1016/j.ctrv.2019.01.003](https://doi.org/10.1016/j.ctrv.2019.01.003)] [Medline: [30658289](https://pubmed.ncbi.nlm.nih.gov/30658289/)]
11. Morrison LG, Yardley L, Powell J, Michie S. What design features are used in effective e-health interventions? A review using techniques from critical interpretive synthesis. *Telemed J E Health*. Mar 2012;18(2):137-144. [[FREE Full text](#)] [doi: [10.1089/tmj.2011.0062](https://doi.org/10.1089/tmj.2011.0062)] [Medline: [22381060](https://pubmed.ncbi.nlm.nih.gov/22381060/)]
12. 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*. Jun 26, 2015;23(6):1679-1688. [doi: [10.1007/s00520-014-2514-7](https://doi.org/10.1007/s00520-014-2514-7)] [Medline: [25424520](https://pubmed.ncbi.nlm.nih.gov/25424520/)]
13. van der Hout A, Jansen F, van Uden-Kraan CF, Coupé VM, Holtmaat K, Nieuwenhuijzen GA, et al. Cost-utility of an eHealth application 'Oncokompas' that supports cancer survivors in self-management: results of a randomised controlled trial. *J Cancer Surviv*. Feb 12, 2021;15(1):77-86. [[FREE Full text](#)] [doi: [10.1007/s11764-020-00912-9](https://doi.org/10.1007/s11764-020-00912-9)] [Medline: [32656739](https://pubmed.ncbi.nlm.nih.gov/32656739/)]
14. Matis J, Svetlak M, Slezackova A, Svoboda M, Šumec R. Mindfulness-based programs for patients with cancer via eHealth and mobile health: systematic review and synthesis of quantitative research. *J Med Internet Res*. Nov 16, 2020;22(11):e20709. [[FREE Full text](#)] [doi: [10.2196/20709](https://doi.org/10.2196/20709)] [Medline: [33196452](https://pubmed.ncbi.nlm.nih.gov/33196452/)]
15. Schreiweis B, Pobiruchin M, Strotbaum V, Suleder J, Wiesner M, Bergh B. Barriers and facilitators to the implementation of eHealth services: systematic literature analysis. *J Med Internet Res*. Nov 22, 2019;21(11):e14197. [[FREE Full text](#)] [doi: [10.2196/14197](https://doi.org/10.2196/14197)] [Medline: [31755869](https://pubmed.ncbi.nlm.nih.gov/31755869/)]
16. Perski O, Blandford A, West R, Michie S. Conceptualising engagement with digital behaviour change interventions: a systematic review using principles from critical interpretive synthesis. *Transl Behav Med*. Jun 2017;7(2):254-267. [[FREE Full text](#)] [doi: [10.1007/s13142-016-0453-1](https://doi.org/10.1007/s13142-016-0453-1)] [Medline: [27966189](https://pubmed.ncbi.nlm.nih.gov/27966189/)]
17. Sieverink F, Kelders SM, van Gemert-Pijnen JE. Clarifying the concept of adherence to eHealth technology: systematic review on when usage becomes adherence. *J Med Internet Res*. Dec 06, 2017;19(12):e402. [[FREE Full text](#)] [doi: [10.2196/jmir.8578](https://doi.org/10.2196/jmir.8578)] [Medline: [29212630](https://pubmed.ncbi.nlm.nih.gov/29212630/)]
18. Donkin L, Christensen H, Naismith SL, Neal B, Hickie IB, Glozier N. A systematic review of the impact of adherence on the effectiveness of e-therapies. *J Med Internet Res*. Aug 05, 2011;13(3):e52. [[FREE Full text](#)] [doi: [10.2196/jmir.1772](https://doi.org/10.2196/jmir.1772)] [Medline: [21821503](https://pubmed.ncbi.nlm.nih.gov/21821503/)]
19. Ownsworth T, Chan RJ, Jones S, Robertson J, Pinkham MB. Use of telehealth platforms for delivering supportive care to adults with primary brain tumors and their family caregivers: a systematic review. *Psychooncology*. Jan 2021;30(1):16-26. [doi: [10.1002/pon.5549](https://doi.org/10.1002/pon.5549)] [Medline: [32915517](https://pubmed.ncbi.nlm.nih.gov/32915517/)]

20. Norman GJ, Zabinski MF, Adams MA, Rosenberg DE, Yaroch AL, Atienza AA. A review of eHealth interventions for physical activity and dietary behavior change. *Am J Prev Med.* Oct 2007;33(4):336-345. [FREE Full text] [doi: [10.1016/j.amepre.2007.05.007](https://doi.org/10.1016/j.amepre.2007.05.007)] [Medline: [17888860](https://pubmed.ncbi.nlm.nih.gov/17888860/)]
21. Shams F, Wong JS, Nikoo M, Outadi A, Moazen-Zadeh E, Kamel MM, et al. Understanding eHealth cognitive behavioral therapy targeting substance use: realist review. *J Med Internet Res.* Jan 21, 2021;23(1):e20557. [FREE Full text] [doi: [10.2196/20557](https://doi.org/10.2196/20557)] [Medline: [33475520](https://pubmed.ncbi.nlm.nih.gov/33475520/)]
22. Coley N, Andre L, Hoevenaar-Blom MP, Ngandu T, Beishuizen C, Barbera M, et al. Factors predicting engagement of older adults with a coach-supported eHealth intervention promoting lifestyle change and associations between engagement and changes in cardiovascular and dementia risk: secondary analysis of an 18-month multinational randomized controlled trial. *J Med Internet Res.* May 09, 2022;24(5):e32006. [FREE Full text] [doi: [10.2196/32006](https://doi.org/10.2196/32006)] [Medline: [35385395](https://pubmed.ncbi.nlm.nih.gov/35385395/)]
23. Eysenbach G. The law of attrition. *J Med Internet Res.* Mar 31, 2005;7(1):e11. [FREE Full text] [doi: [10.2196/jmir.7.1.e11](https://doi.org/10.2196/jmir.7.1.e11)] [Medline: [15829473](https://pubmed.ncbi.nlm.nih.gov/15829473/)]
24. Hardiker NR, Grant MJ. Factors that influence public engagement with eHealth: a literature review. *Int J Med Inform.* Jan 2011;80(1):1-12. [FREE Full text] [doi: [10.1016/j.ijmedinf.2010.10.017](https://doi.org/10.1016/j.ijmedinf.2010.10.017)] [Medline: [21112244](https://pubmed.ncbi.nlm.nih.gov/21112244/)]
25. Xie LF, Itzkovitz A, Roy-Fleming A, Da Costa D, Brazeau AS. Understanding self-guided web-based educational interventions for patients with chronic health conditions: systematic review of intervention features and adherence. *J Med Internet Res.* Aug 13, 2020;22(8):e18355. [FREE Full text] [doi: [10.2196/18355](https://doi.org/10.2196/18355)] [Medline: [32788152](https://pubmed.ncbi.nlm.nih.gov/32788152/)]
26. Oakley-Girvan I, Yunis R, Longmire M, Ouillon JS. What works best to engage participants in mobile app interventions and e-health: a scoping review. *Telemed J E Health.* Jun 2022;28(6):768-780. [FREE Full text] [doi: [10.1089/tmj.2021.0176](https://doi.org/10.1089/tmj.2021.0176)] [Medline: [34637651](https://pubmed.ncbi.nlm.nih.gov/34637651/)]
27. Short CE, DeSmet A, Woods C, Williams SL, Maher C, Middelweerd A, et al. Measuring engagement in eHealth and mHealth behavior change interventions: viewpoint of methodologies. *J Med Internet Res.* Nov 16, 2018;20(11):e292. [FREE Full text] [doi: [10.2196/jmir.9397](https://doi.org/10.2196/jmir.9397)] [Medline: [30446482](https://pubmed.ncbi.nlm.nih.gov/30446482/)]
28. Knowles SR, Mikocka-Walus A. Utilization and efficacy of internet-based eHealth technology in gastroenterology: a systematic review. *Scand J Gastroenterol.* Apr 2014;49(4):387-408. [doi: [10.3109/00365521.2013.865259](https://doi.org/10.3109/00365521.2013.865259)] [Medline: [24494974](https://pubmed.ncbi.nlm.nih.gov/24494974/)]
29. Hammersley ML, Jones RA, Okely AD. Parent-focused childhood and adolescent overweight and obesity eHealth interventions: a systematic review and meta-analysis. *J Med Internet Res.* Jul 21, 2016;18(7):e203. [FREE Full text] [doi: [10.2196/jmir.5893](https://doi.org/10.2196/jmir.5893)] [Medline: [27443862](https://pubmed.ncbi.nlm.nih.gov/27443862/)]
30. Robinson A, Oksuz U, Slight R, Slight S, Husband A. Digital and mobile technologies to promote physical health behavior change and provide psychological support for patients undergoing elective surgery: meta-ethnography and systematic review. *JMIR Mhealth Uhealth.* Dec 01, 2020;8(12):e19237. [FREE Full text] [doi: [10.2196/19237](https://doi.org/10.2196/19237)] [Medline: [33258787](https://pubmed.ncbi.nlm.nih.gov/33258787/)]
31. Darley A, Coughlan B, Furlong E. People with cancer and their family caregivers' personal experience of using supportive eHealth technology: a narrative review. *Eur J Oncol Nurs.* Oct 2021;54:102030. [FREE Full text] [doi: [10.1016/j.ejon.2021.102030](https://doi.org/10.1016/j.ejon.2021.102030)] [Medline: [34531122](https://pubmed.ncbi.nlm.nih.gov/34531122/)]
32. Cox A, Lucas G, Marcu A, Piano M, Grosvenor W, Mold F, et al. Cancer survivors' experience with telehealth: a systematic review and thematic synthesis. *J Med Internet Res.* Jan 09, 2017;19(1):e11. [FREE Full text] [doi: [10.2196/jmir.6575](https://doi.org/10.2196/jmir.6575)] [Medline: [28069561](https://pubmed.ncbi.nlm.nih.gov/28069561/)]
33. Lally RM, Kupzyk K, Gallo S, Berry D. Use of an unguided, web-based distress self-management program after breast cancer diagnosis: sub-analysis of CaringGuidance pilot study. *J Med Internet Res.* Jul 06, 2020;22(7):e19734. [FREE Full text] [doi: [10.2196/19734](https://doi.org/10.2196/19734)] [Medline: [32628117](https://pubmed.ncbi.nlm.nih.gov/32628117/)]
34. Schover LR, Canada AL, Yuan Y, Sui D, Neese L, Jenkins R, et al. A randomized trial of internet-based versus traditional sexual counseling for couples after localized prostate cancer treatment. *Cancer.* Jan 15, 2012;118(2):500-509. [FREE Full text] [doi: [10.1002/cncr.26308](https://doi.org/10.1002/cncr.26308)] [Medline: [21953578](https://pubmed.ncbi.nlm.nih.gov/21953578/)]
35. Psihogios AM, King-Dowling S, O'Hagan B, Darabos K, Maurer L, Young J, et al. Contextual predictors of engagement in a tailored mHealth intervention for adolescent and young adult cancer survivors. *Ann Behav Med.* Nov 18, 2021;55(12):1220-1230. [FREE Full text] [doi: [10.1093/abm/kaab008](https://doi.org/10.1093/abm/kaab008)] [Medline: [33674863](https://pubmed.ncbi.nlm.nih.gov/33674863/)]
36. van den Berg SW, Peters EJ, Kraaijeveld JF, Gielissen MF, Prins JB. Usage of a generic web-based self-management intervention for breast cancer survivors: substudy analysis of the BREATH trial. *J Med Internet Res.* Aug 19, 2013;15(8):e170. [FREE Full text] [doi: [10.2196/jmir.2566](https://doi.org/10.2196/jmir.2566)] [Medline: [23958584](https://pubmed.ncbi.nlm.nih.gov/23958584/)]
37. King-Dowling S, Psihogios AM, Hill-Kayser C, Szalda D, O'Hagan B, Darabos K, et al. Acceptability and feasibility of survivorship care plans and an accompanying mobile health intervention for adolescent and young adult survivors of childhood cancer. *Pediatr Blood Cancer.* Mar 2021;68(3):e28884. [FREE Full text] [doi: [10.1002/pbc.28884](https://doi.org/10.1002/pbc.28884)] [Medline: [33416214](https://pubmed.ncbi.nlm.nih.gov/33416214/)]
38. Crafoord MT, Fjell M, Sundberg K, Nilsson M, Langius-Eklöf A. Engagement in an interactive app for symptom self-management during treatment in patients with breast or prostate cancer: mixed methods study. *J Med Internet Res.* Aug 10, 2020;22(8):e17058. [FREE Full text] [doi: [10.2196/17058](https://doi.org/10.2196/17058)] [Medline: [32663140](https://pubmed.ncbi.nlm.nih.gov/32663140/)]

39. Ferrante JM, Lulla A, Williamson JD, Devine KA, Ohman-Strickland P, Bandera EV. Patterns of Fitbit use and activity levels among African American breast cancer survivors during an eHealth weight loss randomized controlled trial. *Am J Health Promot*. Jan 2022;36(1):94-105. [FREE Full text] [doi: [10.1177/08901171211036700](https://doi.org/10.1177/08901171211036700)] [Medline: [34344171](https://pubmed.ncbi.nlm.nih.gov/34344171/)]
40. Schrijvers J, Vanderhaegen J, Van Poppel H, Haustermans K, Van Audenhove C. How do patients between the age of 65 and 75 use a web-based decision aid for treatment choice in localized prostate cancer? *J Evid Based Med*. Aug 2013;6(3):167-172. [doi: [10.1111/jebm.12051](https://doi.org/10.1111/jebm.12051)] [Medline: [24325373](https://pubmed.ncbi.nlm.nih.gov/24325373/)]
41. Zhu H, Chen X, Yang J, Wu Q, Zhu J, Chan SW. Mobile breast cancer e-support program for Chinese women with breast cancer undergoing chemotherapy (part 3): secondary data analysis. *JMIR Mhealth Uhealth*. Sep 16, 2020;8(9):e18896. [FREE Full text] [doi: [10.2196/18896](https://doi.org/10.2196/18896)] [Medline: [32936087](https://pubmed.ncbi.nlm.nih.gov/32936087/)]
42. Cuypers M, Lamers RE, Kil PJ, van de Poll-Franse LV, de Vries M. Impact of a web-based prostate cancer treatment decision aid on patient-reported decision process parameters: results from the Prostate Cancer Patient Centered Care trial. *Support Care Cancer*. Nov 2018;26(11):3739-3748. [FREE Full text] [doi: [10.1007/s00520-018-4236-8](https://doi.org/10.1007/s00520-018-4236-8)] [Medline: [29752528](https://pubmed.ncbi.nlm.nih.gov/29752528/)]
43. Høybye MT, Dalton SO, Deltour I, Bidstrup PE, Frederiksen K, Johansen C. Effect of internet peer-support groups on psychosocial adjustment to cancer: a randomised study. *Br J Cancer*. Apr 27, 2010;102(9):1348-1354. [FREE Full text] [doi: [10.1038/sj.bjc.6605646](https://doi.org/10.1038/sj.bjc.6605646)] [Medline: [20424614](https://pubmed.ncbi.nlm.nih.gov/20424614/)]
44. Han JY, Wise M, Kim E, Pingree R, Hawkins RP, Pingree S, et al. Factors associated with use of interactive cancer communication system: an application of the comprehensive model of information seeking. *J Comput Mediat Commun*. Apr 2010;15(3):367-388. [FREE Full text] [doi: [10.1111/j.1083-6101.2010.01508.x](https://doi.org/10.1111/j.1083-6101.2010.01508.x)] [Medline: [21760702](https://pubmed.ncbi.nlm.nih.gov/21760702/)]
45. Golsteijn RH, Bolman C, Peels DA, Volders E, de Vries H, Lechner L. A web-based and print-based computer-tailored physical activity intervention for prostate and colorectal cancer survivors: a comparison of user characteristics and intervention use. *J Med Internet Res*. Aug 23, 2017;19(8):e298. [FREE Full text] [doi: [10.2196/jmir.7838](https://doi.org/10.2196/jmir.7838)] [Medline: [28835353](https://pubmed.ncbi.nlm.nih.gov/28835353/)]
46. Lozano-Lozano M, Melguizo-Rodríguez L, Fernández-Lao C, Galiano-Castillo N, Cantarero-Villanueva I, Martín-Martín L, et al. Association between the use of a mobile health strategy app and biological changes in breast cancer survivors: prospective pre-post study. *J Med Internet Res*. Aug 14, 2019;21(8):e15062. [FREE Full text] [doi: [10.2196/15062](https://doi.org/10.2196/15062)] [Medline: [31414667](https://pubmed.ncbi.nlm.nih.gov/31414667/)]
47. Fang CY, Galloway TJ, Egleston BL, Bauman JR, Ebersole B, Chwistek M, et al. Development of a web-based supportive care program for patients with head and neck cancer. *Front Oncol*. 2020;10:602202. [FREE Full text] [doi: [10.3389/fonc.2020.602202](https://doi.org/10.3389/fonc.2020.602202)] [Medline: [33384959](https://pubmed.ncbi.nlm.nih.gov/33384959/)]
48. Webb J, Peel J, Fife-Schaw C, Ogden J. A mixed methods process evaluation of a print-based intervention supported by internet tools to improve physical activity in UK cancer survivors. *Public Health*. Oct 2019;175:19-27. [FREE Full text] [doi: [10.1016/j.puhe.2019.06.013](https://doi.org/10.1016/j.puhe.2019.06.013)] [Medline: [31374452](https://pubmed.ncbi.nlm.nih.gov/31374452/)]
49. Low CA, Danko M, Durica KC, Kunta AR, Mulukutla R, Ren Y, et al. A real-time mobile intervention to reduce sedentary behavior before and after cancer surgery: usability and feasibility study. *JMIR Perioper Med*. Mar 23, 2020;3(1):e17292. [FREE Full text] [doi: [10.2196/17292](https://doi.org/10.2196/17292)] [Medline: [33393915](https://pubmed.ncbi.nlm.nih.gov/33393915/)]
50. Bruggeman Everts FZ, van der Lee ML, de Jager Meezenbroek E. Web-based individual mindfulness-based cognitive therapy for cancer-related fatigue — a pilot study. *Internet Interv*. May 2015;2(2):200-213. [doi: [10.1016/j.invent.2015.03.004](https://doi.org/10.1016/j.invent.2015.03.004)]
51. Finlay A, Evans H, Vincent A, Wittert G, Vandelanotte C, Short CE. Optimising web-based computer-tailored physical activity interventions for prostate cancer survivors: a randomised controlled trial examining the impact of website architecture on user engagement. *Int J Environ Res Public Health*. Oct 28, 2020;17(21):7920. [FREE Full text] [doi: [10.3390/ijerph17217920](https://doi.org/10.3390/ijerph17217920)] [Medline: [33126692](https://pubmed.ncbi.nlm.nih.gov/33126692/)]
52. Ferrante JM, Devine KA, Bator A, Rodgers A, Ohman-Strickland PA, Bandera EV, et al. Feasibility and potential efficacy of commercial mHealth/eHealth tools for weight loss in African American breast cancer survivors: pilot randomized controlled trial. *Transl Behav Med*. Oct 08, 2020;10(4):938-948. [FREE Full text] [doi: [10.1093/tbm/iby124](https://doi.org/10.1093/tbm/iby124)] [Medline: [30535101](https://pubmed.ncbi.nlm.nih.gov/30535101/)]
53. Berry DL, Blonquist TM, Patel RA, Halpenny B, McReynolds J. Exposure to a patient-centered, web-based intervention for managing cancer symptom and quality of life issues: impact on symptom distress. *J Med Internet Res*. Jun 03, 2015;17(6):e136. [FREE Full text] [doi: [10.2196/jmir.4190](https://doi.org/10.2196/jmir.4190)] [Medline: [26041682](https://pubmed.ncbi.nlm.nih.gov/26041682/)]
54. Casillas JN, Schwartz LF, Crespi CM, Ganz PA, Kahn KL, Stuber ML, et al. The use of mobile technology and peer navigation to promote adolescent and young adult (AYA) cancer survivorship care: results of a randomized controlled trial. *J Cancer Surviv*. Aug 2019;13(4):580-592. [FREE Full text] [doi: [10.1007/s11764-019-00777-7](https://doi.org/10.1007/s11764-019-00777-7)] [Medline: [31350681](https://pubmed.ncbi.nlm.nih.gov/31350681/)]
55. Dozeman E, Verdonck-de Leeuw IM, Savard J, van Straten A. Guided web-based intervention for insomnia targeting breast cancer patients: feasibility and effect. *Internet Interv*. Sep 2017;9:1-6. [FREE Full text] [doi: [10.1016/j.invent.2017.03.005](https://doi.org/10.1016/j.invent.2017.03.005)] [Medline: [30135831](https://pubmed.ncbi.nlm.nih.gov/30135831/)]
56. Baik SH, Oswald LB, Buscemi J, Buitrago D, Iacobelli F, Perez-Tamayo A, et al. Patterns of use of smartphone-based interventions among Latina breast cancer survivors: secondary analysis of a pilot randomized controlled trial. *JMIR Cancer*. Dec 08, 2020;6(2):e17538. [FREE Full text] [doi: [10.2196/17538](https://doi.org/10.2196/17538)] [Medline: [33289669](https://pubmed.ncbi.nlm.nih.gov/33289669/)]
57. Chambers SK, Ritterband LM, Thorndike F, Nielsen L, Aitken JF, Clutton S, et al. Web-delivered cognitive behavioral therapy for distressed cancer patients: randomized controlled trial. *J Med Internet Res*. Jan 31, 2018;20(1):e42. [FREE Full text] [doi: [10.2196/jmir.8850](https://doi.org/10.2196/jmir.8850)] [Medline: [29386173](https://pubmed.ncbi.nlm.nih.gov/29386173/)]

58. Mikolasek M, Witt CM, Barth J. Adherence to a mindfulness and relaxation self-care app for cancer patients: mixed-methods feasibility study. *JMIR Mhealth Uhealth*. Dec 06, 2018;6(12):e11271. [FREE Full text] [doi: [10.2196/11271](https://doi.org/10.2196/11271)] [Medline: [30522990](https://pubmed.ncbi.nlm.nih.gov/30522990/)]
59. Kanera IM, Willems RA, Bolman CA, Mesters I, Zambon V, Gijzen BC, et al. Use and appreciation of a tailored self-management eHealth intervention for early cancer survivors: process evaluation of a randomized controlled trial. *J Med Internet Res*. Aug 23, 2016;18(8):e229. [FREE Full text] [doi: [10.2196/jmir.5975](https://doi.org/10.2196/jmir.5975)] [Medline: [27554525](https://pubmed.ncbi.nlm.nih.gov/27554525/)]
60. Børøsund 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*. Mar 01, 2013;15(3):e34. [FREE Full text] [doi: [10.2196/jmir.2285](https://doi.org/10.2196/jmir.2285)] [Medline: [23454601](https://pubmed.ncbi.nlm.nih.gov/23454601/)]
61. Harris LN, Cleary EH, Stanton AL. Project connect online: user and visitor experiences of an internet-based intervention for women with breast cancer. *Psychooncology*. Sep 2015;24(9):1145-1151. [FREE Full text] [doi: [10.1002/pon.3734](https://doi.org/10.1002/pon.3734)] [Medline: [25521661](https://pubmed.ncbi.nlm.nih.gov/25521661/)]
62. Ruland CM, Maffei RM, Børøsund E, Krahn A, Andersen T, Grimsbø GH. Evaluation of different features of an eHealth application for personalized illness management support: cancer patients' use and appraisal of usefulness. *Int J Med Inform*. Jul 2013;82(7):593-603. [doi: [10.1016/j.ijmedinf.2013.02.007](https://doi.org/10.1016/j.ijmedinf.2013.02.007)] [Medline: [23507561](https://pubmed.ncbi.nlm.nih.gov/23507561/)]
63. Short CE, Rebar A, James EL, Duncan MJ, Courneya KS, Plotnikoff RC, et al. How do different delivery schedules of tailored web-based physical activity advice for breast cancer survivors influence intervention use and efficacy? *J Cancer Surviv*. Feb 2017;11(1):80-91. [doi: [10.1007/s11764-016-0565-0](https://doi.org/10.1007/s11764-016-0565-0)] [Medline: [27498099](https://pubmed.ncbi.nlm.nih.gov/27498099/)]
64. 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*. Nov 2013;11(11):1389-1397. [FREE Full text] [doi: [10.6004/jnccn.2013.0162](https://doi.org/10.6004/jnccn.2013.0162)] [Medline: [24225972](https://pubmed.ncbi.nlm.nih.gov/24225972/)]
65. Zhu J, Ebert L, Liu X, Wei D, Chan SW-C. Mobile breast cancer e-support program for Chinese women with breast cancer undergoing chemotherapy (part 2): multicenter randomized controlled trial. *JMIR Mhealth Uhealth*. Apr 30, 2018;6(4):e104. [FREE Full text] [doi: [10.2196/mhealth.9438](https://doi.org/10.2196/mhealth.9438)] [Medline: [29712622](https://pubmed.ncbi.nlm.nih.gov/29712622/)]
66. Cox M, Basen-Engquist K, Carmack CL, Blalock J, Li Y, Murray J, et al. Comparison of internet and telephone interventions for weight loss among cancer survivors: randomized controlled trial and feasibility study. *JMIR Cancer*. Sep 27, 2017;3(2):e16. [FREE Full text] [doi: [10.2196/cancer.7166](https://doi.org/10.2196/cancer.7166)] [Medline: [28954716](https://pubmed.ncbi.nlm.nih.gov/28954716/)]
67. Zhou ES, Recklitis CJ. Internet-delivered insomnia intervention improves sleep and quality of life for adolescent and young adult cancer survivors. *Pediatr Blood Cancer*. Sep 2020;67(9):e28506. [doi: [10.1002/pbc.28506](https://doi.org/10.1002/pbc.28506)] [Medline: [32568460](https://pubmed.ncbi.nlm.nih.gov/32568460/)]
68. Mihuta ME, Green HJ. The implementation of web-based cognitive rehabilitation in adult cancer survivors: examining participant engagement, attrition and treatment fidelity. *Support Care Cancer*. Feb 2018;26(2):499-506. [doi: [10.1007/s00520-017-3855-9](https://doi.org/10.1007/s00520-017-3855-9)] [Medline: [28866765](https://pubmed.ncbi.nlm.nih.gov/28866765/)]
69. Lally RM, Bellavia G, Gallo S, Kupzyk K, Helgeson V, Brooks C, et al. Feasibility and acceptance of the CaringGuidance web-based, distress self-management, psychoeducational program initiated within 12 weeks of breast cancer diagnosis. *Psychooncology*. Apr 2019;28(4):888-895. [doi: [10.1002/pon.5038](https://doi.org/10.1002/pon.5038)] [Medline: [30803084](https://pubmed.ncbi.nlm.nih.gov/30803084/)]
70. Lally RM, Kupzyk K, Mills A, Gallo S, Meneses K. Effects of social constraints and web-based psychoeducation on cancer-related psychological adjustment early-after breast cancer diagnosis. *J Psychosoc Oncol*. 2019;37(6):677-698. [doi: [10.1080/07347332.2018.1546787](https://doi.org/10.1080/07347332.2018.1546787)] [Medline: [31631813](https://pubmed.ncbi.nlm.nih.gov/31631813/)]
71. Børøsund E, Varsi C, Clark MM, Ehlers SL, Andrykowski MA, Sleveland HR, et al. Pilot testing an app-based stress management intervention for cancer survivors. *Transl Behav Med*. Aug 07, 2020;10(3):770-780. [FREE Full text] [doi: [10.1093/tbm/ibz062](https://doi.org/10.1093/tbm/ibz062)] [Medline: [31330023](https://pubmed.ncbi.nlm.nih.gov/31330023/)]
72. Beatty L, Koczwara B, Wade T. Evaluating the efficacy of a self-guided web-based CBT intervention for reducing cancer-distress: a randomised controlled trial. *Support Care Cancer*. Mar 2016;24(3):1043-1051. [doi: [10.1007/s00520-015-2867-6](https://doi.org/10.1007/s00520-015-2867-6)] [Medline: [26248651](https://pubmed.ncbi.nlm.nih.gov/26248651/)]
73. Head BA, Keeney C, Studts JL, Khayat M, Bumpous J, Pfeifer M. Feasibility and acceptance of a telehealth intervention to promote symptom management during treatment for head and neck cancer. *J Support Oncol*. Jan 01, 2011;9(1):e1-11. [FREE Full text] [doi: [10.1016/j.suponc.2010.12.006](https://doi.org/10.1016/j.suponc.2010.12.006)] [Medline: [21499540](https://pubmed.ncbi.nlm.nih.gov/21499540/)]
74. Benedict C, Lazard AJ, Smith SM, Agrawal A, Collins MK, Love B. User experiences, usability, and social presence of a peer-to-peer support app: survey of young adults affected by cancer. *J Appl Commun Res*. Sep 06, 2021;49(5):497-514. [doi: [10.1080/00909882.2021.1971737](https://doi.org/10.1080/00909882.2021.1971737)]
75. Petrocchi S, Filippini C, Montagna G, Bonollo M, Pagani O, Meani F. A breast cancer smartphone app to navigate the breast cancer journey: mixed methods study. *JMIR Form Res*. May 10, 2021;5(5):e28668. [FREE Full text] [doi: [10.2196/28668](https://doi.org/10.2196/28668)] [Medline: [33970120](https://pubmed.ncbi.nlm.nih.gov/33970120/)]
76. Sivell S, Edwards A, Manstead AS, Reed MW, Caldon L, Collins K, et al. Increasing readiness to decide and strengthening behavioral intentions: evaluating the impact of a web-based patient decision aid for breast cancer treatment options (BresDex: www.bresdex.com). *Patient Educ Couns*. Aug 2012;88(2):209-217. [doi: [10.1016/j.pec.2012.03.012](https://doi.org/10.1016/j.pec.2012.03.012)] [Medline: [22541508](https://pubmed.ncbi.nlm.nih.gov/22541508/)]
77. Zachariae R, Amidi A, Damholdt MF, Clausen CD, Dahlggaard J, Lord H, et al. Internet-delivered cognitive-behavioral therapy for insomnia in breast cancer survivors: a randomized controlled trial. *J Natl Cancer Inst*. Aug 01, 2018;110(8):880-887. [FREE Full text] [doi: [10.1093/jnci/djx293](https://doi.org/10.1093/jnci/djx293)] [Medline: [29471478](https://pubmed.ncbi.nlm.nih.gov/29471478/)]

78. Bisseling E, Cillessen L, Spinhoven P, Schellekens M, Compen F, van der Lee M, et al. Development of the therapeutic alliance and its association with internet-based mindfulness-based cognitive therapy for distressed cancer patients: secondary analysis of a multicenter randomized controlled trial. *J Med Internet Res*. Oct 18, 2019;21(10):e14065. [[FREE Full text](#)] [doi: [10.2196/14065](https://doi.org/10.2196/14065)] [Medline: [31628791](#)]
79. Kim HJ, Kim SM, Shin H, Jang JS, Kim YI, Han DH. A mobile game for patients with breast cancer for chemotherapy self-management and quality-of-life improvement: randomized controlled trial. *J Med Internet Res*. Oct 29, 2018;20(10):e273. [[FREE Full text](#)] [doi: [10.2196/jmir.9559](https://doi.org/10.2196/jmir.9559)] [Medline: [30578205](#)]
80. Manne SL, Topham N, D'Agostino TA, Myers Virtue S, Kirstein L, Brill K, et al. Acceptability and pilot efficacy trial of a web-based breast reconstruction decision support aid for women considering mastectomy. *Psychooncology*. Dec 2016;25(12):1424-1433. [[FREE Full text](#)] [doi: [10.1002/pon.3984](https://doi.org/10.1002/pon.3984)] [Medline: [26383833](#)]
81. Beatty L, Kemp E, Coll JR, Turner J, Butow P, Milne D, et al. Finding My Way: results of a multicentre RCT evaluating a web-based self-guided psychosocial intervention for newly diagnosed cancer survivors. *Support Care Cancer*. Jul 2019;27(7):2533-2544. [doi: [10.1007/s00520-018-4526-1](https://doi.org/10.1007/s00520-018-4526-1)] [Medline: [30411239](#)]
82. Bricker JB, Watson NL, Heffner JL, Sullivan B, Mull K, Kwon D, et al. A smartphone app designed to help cancer patients stop smoking: results from a pilot randomized trial on feasibility, acceptability, and effectiveness. *JMIR Form Res*. Jan 17, 2020;4(1):e16652. [[FREE Full text](#)] [doi: [10.2196/16652](https://doi.org/10.2196/16652)] [Medline: [31951215](#)]
83. Yanez B, Oswald LB, Baik SH, Buitrago D, Iacobelli F, Perez-Tamayo A, et al. Brief culturally informed smartphone interventions decrease breast cancer symptom burden among Latina breast cancer survivors. *Psychooncology*. Jan 2020;29(1):195-203. [[FREE Full text](#)] [doi: [10.1002/pon.5281](https://doi.org/10.1002/pon.5281)] [Medline: [31693265](#)]
84. Duffecy J, Sanford S, Wagner L, Begale M, Nawacki E, Mohr DC. Project onward: an innovative e-health intervention for cancer survivors. *Psychooncology*. Apr 2013;22(4):947-951. [[FREE Full text](#)] [doi: [10.1002/pon.3075](https://doi.org/10.1002/pon.3075)] [Medline: [22438297](#)]
85. Dirkse D, Hadjistavropoulos HD, Alberts NA, Karin E, Schneider LH, Titov N, et al. Making internet-delivered cognitive behaviour therapy scalable for cancer survivors: a randomized non-inferiority trial of self-guided and technician-guided therapy. *J Cancer Surviv*. Apr 2020;14(2):211-225. [doi: [10.1007/s11764-019-00810-9](https://doi.org/10.1007/s11764-019-00810-9)] [Medline: [31853727](#)]
86. Birkhoff SD, Cantrell MA, Moriarty H, Lustig R. The usability and acceptability of a patient-centered mobile health tracking app among a sample of adult radiation oncology patients. *ANS Adv Nurs Sci*. 2018;41(3):243-259. [doi: [10.1097/ANS.000000000000202](https://doi.org/10.1097/ANS.000000000000202)] [Medline: [29474226](#)]
87. Lynch SM, Stricker CT, Brown JC, Berardi JM, Vaughn D, Domchek S, et al. Evaluation of a web-based weight loss intervention in overweight cancer survivors aged 50 years and younger. *Obes Sci Pract*. Mar 2017;3(1):83-94. [[FREE Full text](#)] [doi: [10.1002/osp4.98](https://doi.org/10.1002/osp4.98)] [Medline: [28392934](#)]
88. Graetz I, Anderson JN, McKillop CN, Stepanski EJ, Paladino AJ, Tillmanns TD. Use of a web-based app to improve postoperative outcomes for patients receiving gynecological oncology care: a randomized controlled feasibility trial. *Gynecol Oncol*. Aug 2018;150(2):311-317. [doi: [10.1016/j.ygyno.2018.06.007](https://doi.org/10.1016/j.ygyno.2018.06.007)] [Medline: [29903391](#)]
89. Graetz I, McKillop CN, Stepanski E, Vidal GA, Anderson JN, Schwartzberg LS. Use of a web-based app to improve breast cancer symptom management and adherence for aromatase inhibitors: a randomized controlled feasibility trial. *J Cancer Surviv*. Aug 2018;12(4):431-440. [[FREE Full text](#)] [doi: [10.1007/s11764-018-0682-z](https://doi.org/10.1007/s11764-018-0682-z)] [Medline: [29492753](#)]
90. Murphy KM, Burns J, Victorson D. Consider the source: examining attrition rates, response rates, and preliminary effects of ehHealth mindfulness messages and delivery framing in a randomized trial with young adult cancer survivors. *J Adolesc Young Adult Oncol*. Jun 2021;10(3):272-281. [[FREE Full text](#)] [doi: [10.1089/jayao.2020.0102](https://doi.org/10.1089/jayao.2020.0102)] [Medline: [33347390](#)]
91. Børøsund E, Cvancarova M, Moore SM, Ekstedt M, Ruland CM. Comparing effects in regular practice of e-communication and web-based self-management support among breast cancer patients: preliminary results from a randomized controlled trial. *J Med Internet Res*. Dec 18, 2014;16(12):e295. [[FREE Full text](#)] [doi: [10.2196/jmir.3348](https://doi.org/10.2196/jmir.3348)] [Medline: [25525672](#)]
92. Diefenbach MA, Mohamed NE, Butz BP, Bar-Chama N, Stock R, Cesaretti J, et al. Acceptability and preliminary feasibility of an internet/CD-ROM-based education and decision program for early-stage prostate cancer patients: randomized pilot study. *J Med Internet Res*. Jan 13, 2012;14(1):e6. [[FREE Full text](#)] [doi: [10.2196/jmir.1891](https://doi.org/10.2196/jmir.1891)] [Medline: [22246148](#)]
93. Bruggeman-Everts FZ, Wolvers MD, van de Schoot R, Vollenbroek-Hutten MM, Van der Lee ML. Effectiveness of two web-based interventions for chronic cancer-related fatigue compared to an active control condition: results of the "Fitter na kanker" randomized controlled trial. *J Med Internet Res*. Oct 19, 2017;19(10):e336. [[FREE Full text](#)] [doi: [10.2196/jmir.7180](https://doi.org/10.2196/jmir.7180)] [Medline: [29051138](#)]
94. Magnol M, Eleonore B, Claire R, Castagne B, Pugibet M, Lukas C, et al. Use of eHealth by patients with rheumatoid arthritis: observational, cross-sectional, multicenter study. *J Med Internet Res*. Jan 29, 2021;23(1):e19998. [[FREE Full text](#)] [doi: [10.2196/19998](https://doi.org/10.2196/19998)] [Medline: [33512320](#)]
95. Fang ML, Siden E, Korol A, Demestihias MA, Sixsmith J, Sixsmith A. A scoping review exploration of the intended and unintended consequences of eHealth on older people: a health equity impact assessment. *Human Technol*. Nov 30, 2018;14(3):297-323. [doi: [10.17011/ht/urn.201811224835](https://doi.org/10.17011/ht/urn.201811224835)]
96. Runz-Jørgensen SM, Schiøtz ML, Christensen U. Perceived value of eHealth among people living with multimorbidity: a qualitative study. *J Comorb*. 2017;7(1):96-111. [[FREE Full text](#)] [doi: [10.15256/joc.2017.7.98](https://doi.org/10.15256/joc.2017.7.98)] [Medline: [29359124](#)]

97. Christensen H, Reynolds J, Griffiths KM. The use of e-health applications for anxiety and depression in young people: challenges and solutions. *Early Interv Psychiatry*. Feb 2011;5 Suppl 1:58-62. [doi: [10.1111/j.1751-7893.2010.00242.x](https://doi.org/10.1111/j.1751-7893.2010.00242.x)] [Medline: [21208393](https://pubmed.ncbi.nlm.nih.gov/21208393/)]
98. Christensen H, Griffiths KM, Farrer L. Adherence in internet interventions for anxiety and depression. *J Med Internet Res*. Apr 24, 2009;11(2):e13. [FREE Full text] [doi: [10.2196/jmir.1194](https://doi.org/10.2196/jmir.1194)] [Medline: [19403466](https://pubmed.ncbi.nlm.nih.gov/19403466/)]
99. Andrews G, Basu A, Cuijpers P, Craske MG, McEvoy P, English CL, et al. Computer therapy for the anxiety and depression disorders is effective, acceptable and practical health care: an updated meta-analysis. *J Anxiety Disord*. Apr 2018;55:70-78. [FREE Full text] [doi: [10.1016/j.janxdis.2018.01.001](https://doi.org/10.1016/j.janxdis.2018.01.001)] [Medline: [29422409](https://pubmed.ncbi.nlm.nih.gov/29422409/)]
100. Chan M, Jiang Y, Lee CY, Ramachandran HJ, Teo JY, Seah CW, et al. Effectiveness of eHealth-based cognitive behavioural therapy on depression: a systematic review and meta-analysis. *J Clin Nurs*. Nov 20, 2022;31(21-22):3021-3031. [doi: [10.1111/jocn.16212](https://doi.org/10.1111/jocn.16212)] [Medline: [35060252](https://pubmed.ncbi.nlm.nih.gov/35060252/)]
101. Kim SC, Shah DV, Namkoong K, McTavish FM, Gustafson DH. Predictors of online health information seeking among women with breast cancer: the role of social support perception and emotional well-being. *J Comput Mediat Commun*. Jan 2013;18(2):98-118. [FREE Full text] [doi: [10.1111/jcc4.12002](https://doi.org/10.1111/jcc4.12002)] [Medline: [24634575](https://pubmed.ncbi.nlm.nih.gov/24634575/)]
102. Bouma G, Admiraal JM, de Vries EG, Schröder CP, Walenkamp AM, Reyners AK. Internet-based support programs to alleviate psychosocial and physical symptoms in cancer patients: a literature analysis. *Crit Rev Oncol Hematol*. Jul 2015;95(1):26-37. [doi: [10.1016/j.critrevonc.2015.01.011](https://doi.org/10.1016/j.critrevonc.2015.01.011)] [Medline: [25701515](https://pubmed.ncbi.nlm.nih.gov/25701515/)]
103. Fulford H, McSwiggan L, Kroll T, MacGillivray S. Exploring the use of information and communication technology by people with mood disorder: a systematic review and metasynthesis. *JMIR Ment Health*. Jul 01, 2016;3(3):e30. [FREE Full text] [doi: [10.2196/mental.5966](https://doi.org/10.2196/mental.5966)] [Medline: [27370327](https://pubmed.ncbi.nlm.nih.gov/27370327/)]
104. Vo V, Auroy L, Sarradon-Eck A. Patients' perceptions of mHealth apps: meta-ethnographic review of qualitative studies. *JMIR Mhealth Uhealth*. Jul 10, 2019;7(7):e13817. [FREE Full text] [doi: [10.2196/13817](https://doi.org/10.2196/13817)] [Medline: [31293246](https://pubmed.ncbi.nlm.nih.gov/31293246/)]
105. Eom C, Shin DW, Kim SY, Yang HK, Jo HS, Kweon SS, et al. Impact of perceived social support on the mental health and health-related quality of life in cancer patients: results from a nationwide, multicenter survey in South Korea. *Psychooncology*. Jun 2013;22(6):1283-1290. [doi: [10.1002/pon.3133](https://doi.org/10.1002/pon.3133)] [Medline: [22833521](https://pubmed.ncbi.nlm.nih.gov/22833521/)]
106. Applebaum AJ, Stein EM, Lord-Bessen J, Pessin H, Rosenfeld B, Breitbart W. Optimism, social support, and mental health outcomes in patients with advanced cancer. *Psychooncology*. Mar 07, 2014;23(3):299-306. [FREE Full text] [doi: [10.1002/pon.3418](https://doi.org/10.1002/pon.3418)] [Medline: [24123339](https://pubmed.ncbi.nlm.nih.gov/24123339/)]
107. Gallant MP. The influence of social support on chronic illness self-management: a review and directions for research. *Health Educ Behav*. Apr 01, 2003;30(2):170-195. [doi: [10.1177/1090198102251030](https://doi.org/10.1177/1090198102251030)] [Medline: [12693522](https://pubmed.ncbi.nlm.nih.gov/12693522/)]
108. Gonzalez JM, Alegria M, Prihoda TJ. How do attitudes toward mental health treatment vary by age, gender, and ethnicity/race in young adults? *J Community Psychol*. Sep 2005;33(5):611-629. [doi: [10.1002/jcop.20071](https://doi.org/10.1002/jcop.20071)]
109. Kwon M, Lawn S, Kaine C. Understanding men's engagement and disengagement when seeking support for mental health. *Am J Mens Health*. Mar 07, 2023;17(2):15579883231157971. [FREE Full text] [doi: [10.1177/15579883231157971](https://doi.org/10.1177/15579883231157971)] [Medline: [36880329](https://pubmed.ncbi.nlm.nih.gov/36880329/)]
110. Ghidei L, Simone MJ, Salow MJ, Zimmerman KM, Paquin AM, Skarf LM, et al. Aging, antiretrovirals, and adherence: a meta analysis of adherence among older HIV-infected individuals. *Drugs Aging*. Oct 20, 2013;30(10):809-819. [FREE Full text] [doi: [10.1007/s40266-013-0107-7](https://doi.org/10.1007/s40266-013-0107-7)] [Medline: [23959913](https://pubmed.ncbi.nlm.nih.gov/23959913/)]

Abbreviations

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

Edited by T de Azevedo Cardoso; submitted 07.09.23; peer-reviewed by C Valle, M Svetlak; comments to author 30.11.23; revised version received 28.02.24; accepted 11.07.24; published 11.12.24

Please cite as:

Montalescot L, Baussard L, Charbonnier E

Factors Associated With Digital Intervention Engagement and Adherence in Patients With Cancer: Systematic Review

J Med Internet Res 2024;26:e52542

URL: <https://www.jmir.org/2024/1/e52542>

doi: [10.2196/52542](https://doi.org/10.2196/52542)

PMID:

©Lucile Montalescot, Louise Baussard, Elodie Charbonnier. Originally published in the Journal of Medical Internet Research (<https://www.jmir.org>), 11.12.2024. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any

medium, provided the original work, first published in the Journal of Medical Internet Research (ISSN 1438-8871), is properly cited. The complete bibliographic information, a link to the original publication on <https://www.jmir.org/>, as well as this copyright and license information must be included.