Effectiveness of Self-management eHealth Intervention for Psychological Adjustment for Health-Related Quality of Life in Cancer Survivors: A Systematic Review

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Abstract: eHealth interventions support psychological adjustment to life-threatening crises such as cancer survival and improving health-related quality of life. This review synthesizes existing knowledge on the effectiveness of self-management eHealth interventions and summarizes the best evidence on psychological adjustment for health-related quality of life among cancer survivors. Five electronic databases were searched for articles reporting self-management eHealth interventions for the psychological adjustment of cancer survivors from February 2011 to March 2022. Articles were included if they were published in English or Thai journals; peer-reviewed; evaluated self-management through technology to support psychological adjustment for quality of life; and concerned adult cancer survivors. Data were extracted from all included articles using online data imported into the Joanna Briggs Institute SUMARI program to increase the consistency of data extraction, with a quantitative summary and analysis by two reviewers.

Eight articles met the inclusion criteria, integrating self-management eHealth interventions and demonstrating a statistically significant improvement of psychological adjustment for the participants' health-related quality of life. This review identified that self-management eHealth interventions might assist with the development of mechanisms/strategies which may effectively support cancer survivors' psychological adjustment for their health-related quality of life. However, supportive cancer care via eHealth interventions may subordinate additional behavioral change techniques and information resources to assist and develop an individual's coping mechanisms. The information gained may help healthcare providers with the development and enhancement of practice-related clinical guidelines that assist with implementing self-management eHealth interventions for cancer survivors.

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Introduction

Self-management eHealth interventions (SMeHIs) for psychological adjustment have been shown to improve health-related quality of life (HRQoL)[1,2] and provide appropriate strategies to assist cancer survivors (CSs) in identifying ways to deal with associated disease problems and concerns.[1,3] eHealth information support

care has been shown clinically to help CSs in numerous dimensions,[4,5] including reducing cancer-related physiological and psychological burdens associated with tension, anger, vigor, fatigue, confusion, and depression among some individuals.[6] This systematic review focused on the physiological burdens faced by many CSs, in terms of physical activities, fatigue, and mobility, and by exploring the effectiveness of SMeHIs. Such interventions entail delivery methods that require individuals to follow the suggested clinical care, and which help CSs maintain life continuity to the greatest extent possible.

Regular participation in identifying solutions and strategies regarding psychological defense mechanism(s) has been reported to improve CSs' overall health and increase their quality of life (QoL).[7,8] Research highlights that CSs who receive detailed strategies in eHealth interventions related to HRQoL are more likely to meet psychological guideline practices,[5,10] but the scope and delivery methods of such interventions relative to patients' capabilities determine their optimum effectiveness. Some studies recommend that CSs need a multidisciplinary team approach to provide relevant information,[2,9] with dedicated time to discuss concerns, provide reassurance, and integrate psychosocial services into their care.[10,11,12] However, it has been reported that such experiences do not meet the needs of some CSs, due to shallow engagement among multidisciplinary professionals (among other factors), compared to normative nurse-led holistic care.[13,14]

It is recommended that psychological adjustment strategies to promote CSs' HRQoL be incorporated into the promotion of self-management for patients' regular care, delivered and mediated by a nurse practitioner between consultation visits.[15] Nurse practitioners are well-positioned to assist with organizing lifestyle support strategies within eHealth interventions (e.g., procedural information, sensory information, and psychosocial support) for CSs, due to their increased time spent with service users and their inherent role as patient advocates and holistic healthcare professionals.[6,16] CSs typically develop a high level of trust in their nurse practitioners, who provide appropriate details of interventions available.[17,18]

It has been reported that some oncology nurses experience barriers supporting the self-management of their patients' eHealth physiological and psychological needs, including among CSs.[19] Self-management may include information support, coping with physical and psychological issues,[20] dealing with social and spiritual problems,[21] and mechanisms to deal and cope with families of CSs.[22] In addition, some oncology nurses believe that using self-management eHealth to promote psychological adjustment during consultations may not change CSs' psychological defense mechanism behaviors;[11,23] indeed, such an approach may cause them to be unwilling to implement psychological adjustment strategies.[24,25] However, studies have identified that following psychological adjustment strategies with SMeHIs promote and assist psychological adjustment for HRQoL among CSs, when designed and implemented effectively.[6,26,27]

With the continuing increase in the diffusion and application of online digital technology in healthcare services, SMeHI among CSs has been explored in relation to numerous key outcomes; however, the use of different outcomes to measure intervention success creates methodological problems for those seeking to compare and collate such research outcomes with a view to formulating evidenced-based practice for CSs.[1] Nevertheless, the effects of eHealth interventions on various components of CSs' QoL have been explored, indicating that such interventions can help CSs improve their psychological adjustment and HRQoL. To date, few studies have focused on the effectiveness of specific technological solutions in SMeHIs.

This systematic review identified studies' interventions and summarized the effectiveness of self-management eHealth intervention for cancer survivors,[28,29] and the findings can be useful for oncology nurses in promoting such interventions.[4]

The reviewed literature indicates particular study designs that can generate evidence with a varying degree of quality and importance to determine the efficacy of oncology nurses' interventions on CSs' psychological adjustment for HRQoL.[20] This is important since it is necessary to move towards standardized indices to determine intervention effectiveness.[30] Upon initial examination of this topic, it was found that there have been no recently published systematic reviews focused on psychological adjustments, as opposed to the physical needs of patients. So, this review was undertaken to determine if SMeHIs are effective in supporting psychological adjustment for HRQoL enhancement among CSs.

Review Aim and Research Question

The aim was to summarize the effectiveness of SMeHI compared to the usual care model (comparator) on psychological adjustments for HRQoL (outcome) in CSs (population), by answering the following question: "What is the effectiveness of SMeHIs compared with usual care focusing on psychological adjustment for HRQoL in CSs?"

Method

The protocol for this systemic review was registered in the Prospective Register of Systematic Reviews (PROSPERO 2022 CRD42022316178).

Study inclusion: Articles included in this review had to meet the following inclusion criteria: (1) primary, peer-reviewed studies published in English or Thai language in freely accessible full-text format via the search databases; (2) focused only on adult CSs; (3) exploring or evaluating the effectiveness of SMeHI; (4) measuring participants' psychological adjustment for HRQoL, and physical activity experienced by CSs (including tension, anger, vigor, fatigue, confusion, and depression); and (5) using a waiting list or usual care as a comparator. Articles were excluded if they identified multicomponent interventions and where participants received intervention targeting, including multiple physiological and psychological support (e.g., randomized in 1:1:1 and psychological adjustment with physiological), as it is challenging to attribute reliability to psychological adjustment interventions.[31] Although the primary purpose of this review was to include controlled clinical trials and randomized controlled trials (RCTs), all experimental design variations, including pre- and post-research studies, non-RCTs, and quasi-experimental designs, were searched. However, only eight controlled clinical trials and RCTs were identified during a primary search, of which only the RCTs were included. The second reviewer (PB) searched three times to obtain the required information when articles were incomplete, missing, or unclear.

Data sources and search strategy: Five electronic databases were searched for articles from February 2011 to March 2022: the Cumulative Index to Nursing and Allied Health Literature (CINAHL), ProQuest Nursing & Allied Health Database (ProQuest), PubMed Central (PMC), the largest abstract and citation Scopus database of peer-reviewed studies, and the Thai Journal Citation Index Center (TCI). The search strategy was developed, tested, and elaborated for PMC and is suitable for other databases. This technique was achieved in cooperation with a professional medical-health librarian at Chiang Mai University. The first and second reviewers (AK and PB) utilized the information synthesis group at the Faculty of Nursing of the same university, and the Peer Review of Electronic Search Strategies Evidence-based Checklist (PRESS) to guide the search process. However, to detect articles that may have been lost among databases, a citation list of identified material was also examined for potential inclusion (e.g., systematic reviews, commentary, and Thai Research Institute resources), with these articles being subsequently hand-searched.

Study selection: The search process led to an initial corpus of 95 articles, of which eight were subsequently systematically reviewed after removing

duplicates, studies with missing outcomes, those inaccessible in full-text versions, and those concerning multicomponent interventions (**Figure 1**). This process is explained in more detail in the review findings.

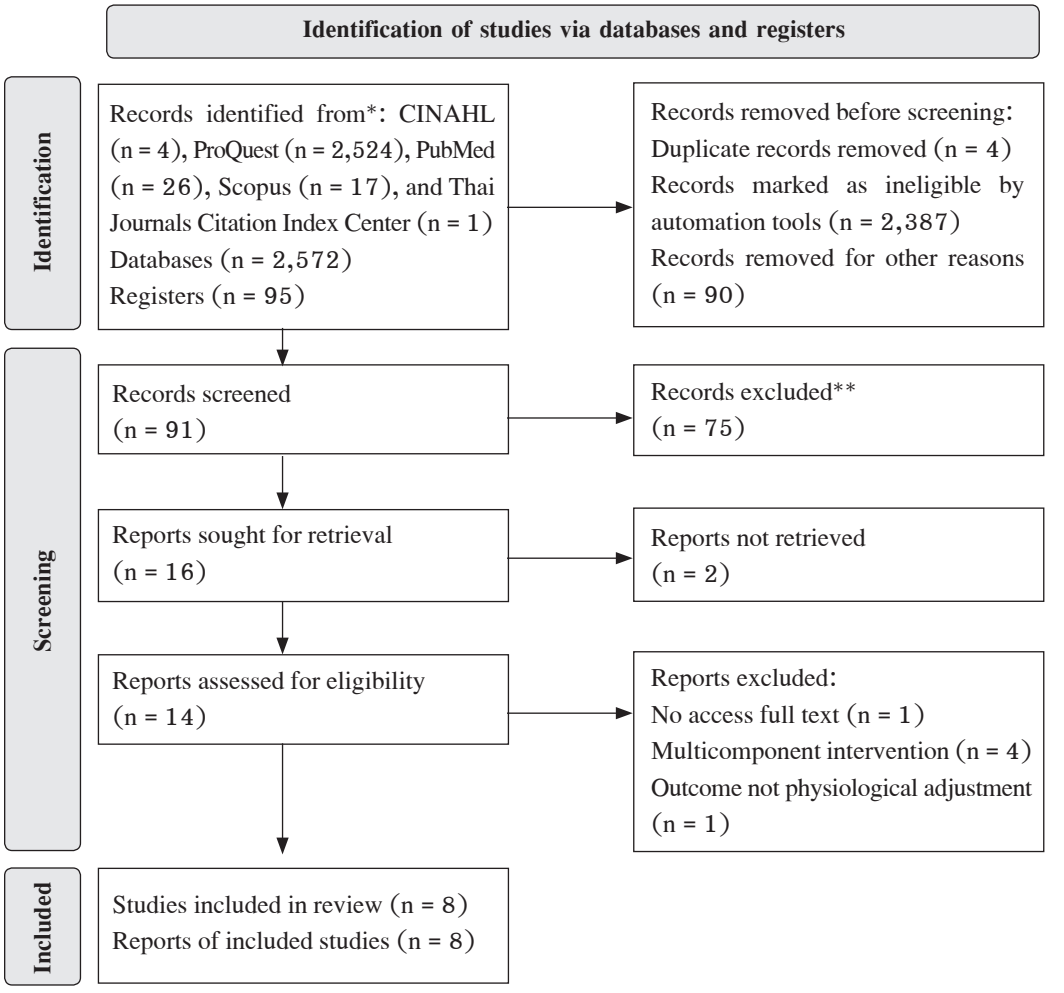

Figure 1. PRISMA flow diagram of search results

Instruments and article analysis: The Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA)[32] was used to report the review, and the Joanna Briggs Institute (JBI) effectiveness reviews were used to search for and assess studies for inclusion, as described in the 2020 JBI Reviewer's Manual.[17,18] JBI screening instrument contains a checklist that ensures complete and transparent reporting is undertaken in this article's preparation and helps ensure comprehensive information is included and clarity in the review process.

The JBI SUMARI online tool for Screening the Risk of Bias[33] was used to assess the included articles. Two reviewers (AK and PB) appraised each article utilizing the questions in **Figure 2**.

Citation	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13
Børøsund E, et al. (2021)[27]	Y	N	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y
Kanera IM, et al. (2017)[15]	Y	Y	Y	N	N	N	Y	Y	Y	Y	Y	Y	Y
Kanera I, et al. (2016)[3]	Y	N/A	N	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y	Y
Murphy MJ, et al. (2020)[14]	Y	N	Y	N/A	N/A	N/A	Y	Y	Y	Y	Y	Y	Y
van de Wiel HJ, et al. (2018)[37]	Y	N	U	N	N	N	N	Y	Y	Y	Y	Y	Y
Blair CK, et al. (2021)[8]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Golsteijn RHJ, et al. (2018)[35]	Y	Y	N	N	N	N	N	Y	Y	Y	Y	Y	Y
van de Wiel HJ, et al. (2021)[38]	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Y: low risk of bias, N: risk of bias, U: unclear risk of bias, N/A: not applicable (study did not include objective assessments)

Q1: Was true randomization used for assignment of participants to treatment groups?
Q2: Was allocation to treatment groups concealed?
Q3: Were treatment groups similar at the baseline?
Q4: Were participants blind to treatment assignment?
Q5: Were those delivering treatment blind to treatment assignment?
Q6: Were outcomes assessors blind to treatment assignment?
Q7: Were treatment groups treated identically other than the intervention of interest?
Q8: Was follow-up complete and if not, were differences between groups in terms of their follow-up adequately described and analyzed?
Q9: Were participants analyzed in the groups to which they were randomized?
Q10: Were outcomes measured in the same way for treatment groups?
Q11: Were outcomes measured in a reliable way?
Q12: Was appropriate statistical analysis used?
Q13: Was the trial design appropriate, and were any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?

Figure 2. Risk of bias of included studies

In the appraisal process, two reviewers (AK and PB) reviewed independently, using "Yes" to refer to an information report, "No" to refer to no information report, "Unclear" to direct an unclear or unknown information report, and "N/A" to refer to non-applicability. The reviewers compared assessments and solved inconsistencies through judgment. A third reviewer (LC) helped resolve inconsistencies when the two reviewers disagreed after the discussion.

The SUMARI online data extraction protocol guidelines in the Joanna Briggs Institute (JBI) systematic review interventions[33] were used by two reviewers (AK and PB) to extract data freely from the included full-text articles. Data extracted were general data (including the name of the authors, year of publication, country, and study design; participants' mean age in years and sample size; intervention characteristics (including cancer type, time frame,

and intervention group); outcome measurements (including measures of the timing of assessment Time 1, 2, 3, and instruments); and outcomes.

Data synthesis: This was done by preparing a summary of findings and collating this information into a table. Following this quantitative synthesis process, details were summarized textually. An explanatory synthesis followed the protocol published in the guidance on the conduct of quantitative evidence in systematic reviews.[34]

Review Findings

Search results

Electronic database and hand searches initially yielded 2,572 results. After screening these initial results, 95 articles were deemed related to the study topic. After removing duplicates and reviewing citations, 91 articles were identified for review, and eight met the eligibility criteria.[6,8,14,15,27,34-37] Results and explanations were based on extrapolating solutions details from the studies instead of the subject to avoid duplicates of similar studies. A high level of agreement was achieved between the two reviewers (AK and PB) during the screening, data extraction, and risk of bias assessments.

Study characteristics

Table 1. summarizes the reviewed articles and their characteristics. The review included characteristics of the mean age in a year of participants' characteristics obtained in the intervention and control groups of studies.

All studies were published between 2016 to 2021, with the majority (n = 5) being conducted in the Netherlands.[3,15,34,36,37] The remaining three were conducted in the US,[8] Australia,[14] and Norway.[27] All eight studies were RCTs comparing the control group with usual care or waiting list.

Participants' characteristics

Table 1 provides details of the study participants' characteristics, including sample sizes at baseline, which varied from 84 to 478. Participants' ages ranged from 52 to 69.6 years (SD = 4.8-14.1). In addition, five studies[3,8,14,15,27] included participants who had been diagnosed with other cancers, while three included participants diagnosed with prostate or breast cancer. Regarding the time frame of treatment in one study,[8] participants reported that they had completed their preliminary program of cancer treatment within the previous seven years. In two studies,[14,27] participants completed their primary cancer treatment program in a year, and another study[14] provided details of a patient who had completed their preliminary cancer treatment program within 1.5 years. The remaining two studies[36,37] highlighted that the participants had completed their initial cancer treatment program within three months of the study. Overall, the pursuit rates for the intervention were high, and it was reported that 100% of participants had provided informed consent.

Table 1. Summary of the reviewed articles and characteristics

Author and year of publication	Country	Study design	Sample size	Mean age in a year (mean, SD)	Cancer type	Time frame of cancer treatment
Blair CK, et al. (2021)[8]	United States of America	RCT	54 (control n = 18, intervention n = 36)	69.6 (SD = 4.8)	Variety of cancer types	Completed primary treatment within previous 7 years
Børøsund E, et al. (2021)[27]	Norway	RCT	172 (control n = 88, intervention n = 84)	52 (SD = 11.3)	Variety of cancer types	Completed primary treatment within previous year

Table 1. Summary of the reviewed articles and characteristics (Cont.)

Author and year of publication	Country	Study design	Sample size	Mean age in a year (mean, SD)	Cancer type	Time frame of cancer treatment
Golsteijn RHJ, et al. (2018)[34]	Netherlands	RCT	478 (control n = 229, Intervention n = 249)	66.55 (SD = 7.07)	Prostate and colorectal cancer	Completed primary treatment within the previous year or at least 6 weeks post-surgery
Kanera I, et al. (2016)[3]	Netherlands	RCT	462 (control n = 231, intervention n = 231)	55.6 (SD = 11.5)	Variety of cancer types	Completed primary treatment previous month
Kanera IM, et al. (2017)[15]	Netherlands	RCT	376 (control n = 210, intervention n = 166)	55.6 (SD = 11.5)	Variety of cancer types	Completed primary treatment previous month
Murphy MJ, et al. (2020)[14]	Australia	RCT	114 (control n = 61, intervention n = 53)	53.29 (SD = 9.65)	Variety of cancer types	Completed primary treatment within previous 1.5 months
van de Wiel HJ, et al. (2018)[37]	Netherlands	RCT	246 (control n = 82, intervention n = 164)	Not mentioned	Breast and prostate cancer	Completed primary treatment within previous 3 months
van de Wiel HJ, et al. (2021)[38]	Netherlands	RCT	291 (control n = 154, intervention n = 137)	60.1 (SD = 14.1)	Breast and prostate cancer	Completed primary treatment within previous 3 months

Note. Mean age in a year of participants' characteristics was obtained in the intervention and control groups of studies.

Intervention characteristics

Table 2 provides details regarding interventions focusing on the self-management theory, monitoring physical activity,[8,37] stress management, cognitive behavior,[14,27,36] and behavioral changes.[3,15,34] Most studies provided details of web-based and Internet-delivered programs.[1,3,14,15,34,36] Only two studies presented details of self-management interventions utilizing an mHealth application.[8,27] The intervention duration lasted from 13-144 weeks. Interventions were implemented according to regular weekly or monthly schedules.

In all studies, the control group comprised a waiting list or usual care group, with participants treated as an intervention group after completing the trial. The outcome was measured at baseline and post-baseline at three intervals and was measured using a variety of instruments, shown in **Table 2.**

Outcomes

All eight trials relating to the SMeHI studies reported outcomes. Studies outcomes vary of HRQoL across studies, including depression,[14,27,34] physical activity and fatigue.[3,8,15,36,37] All eight studies report improvement in self-management eHealth intervention outcome, the feasibility of use and acceptability of report on results. This result indicated that SMeHIs are effective when appropriately implemented for psychological adjustment among CSs.

Table 2. Intervention characteristics of participants' inclusion articles (n = 8)

Author and year of publication	Country	Intervention group				Control group	Outcome				Instruments and outcomes
		Content	Theory or strategies	Delivery	Duration		Pre-test measure	Post-baseline T1	Post-baseline T2	Post-baseline T3	
Blair CK, et al. (2021)[8]	United States of America	A Jawbone UP2 activity monitor on a smartphone app	Self-management theory	mHealth apps	13 weeks	Waitlist	Baseline	Not measured	Not measured	13-week (18/47)	Instruments: Active PAL monitor, SF-36 QoL, FACIT-Fatigue, and PROMIS pain scales Outcomes: Fatigue and QoL were not different in participants
Børøsund E, et al. (2021)[27]	Norway	Stress management intervention program	Self-management theory	eHealth apps	48 weeks	Usual care	Baseline	13 weeks (72/84)	24 weeks (65/84)	48 weeks (61/84)	Instruments: Perceived stress scale, Hospital snxiety and depression scale, Self-Regulatory fatigue18, and 6-item short form health survey (RAND-36 version) Outcomes: A stress management program could relieve stress, anxiety, depression, self-regulation fatigue, and HRQoL
Golsteijn RHJ, et al. (2018)[34]	Netherlands	OncoActive intervention	Self-management theory, Behavioral change theory, Social cognitive theory, Transtheoretical model, Health belief model, Goal setting theories, Health action process approach, Theories of self-regulation, and Precaution adoption process model	Computer-tailored	32 weeks	Usual care	Baseline	12 weeks (226/249)	24 weeks (230/249)	32 weeks (223/249)	Instruments: Short Questionnaire to Assess Health Enhancing Physical Activity (SQUASH), ActiGraph GT3X-BT (ActiGraph, Pensacola, FL), Checklist Individual Strength, Hospital Anxiety and Depression Scale, and European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 Outcomes: This program could promote physical functioning related to fatigue and depression
Kanera I, et al. (2016)[3]	Netherlands	Kanker NaZorg Wijzer (KNW) intervention	Self-management theory, Systematically developed, Theory-grounded, and web-based intervention	Web-based	24 weeks	Usual care	Baseline	Allocation (252/265)	Follow-up (43/188)	24 weeks (225/231)	Instruments: Self-report Short Questionnaire, Dutch Standard Questionnaire on Food Consumption, and Dutch Measuring Instruments For Research on Smoking and Smoking Cessation Outcomes: This program could improve fatigue mood and good relationships for cancer survivors
Kanera IM, et al. (2017)[15]	Netherlands	Web-based self-management program	Theory of planned behavior, Self-regulation theory, Integrated model for change	Web-based	48 weeks	Usual care	Baseline	Allocation (231/376)	24 weeks (188/376)	48 weeks (166/376)	Instruments: Self-report Short Questionnaire, vegetable consumption number of days per week Outcomes: This program can increase physical activity related to fatigue

Table 2. Intervention characteristics of participants' inclusion articles (n = 8) (Cont.)

Author and year of publication	Country	Intervention group				Control group	Outcome				Instruments and outcomes
		Content	Theory or strategies	Delivery	Duration		Pre-test measure	Post-baseline T1	Post-baseline T2	Post-baseline T3	
Murphy MJ, et al. (2020)[14]	Australia	I can adapt early intervention program	Self-management theory and cognitive behaviour therapy	Internet-delivered	16 weeks	Usual care	Baseline	Not measured	Not measured	16 weeks (41/52)	Instruments: Kessler-10 Psychological Distress Scale, Hospital Anxiety and Depression Scale, Fear of Cancer Recurrence Inventory, Functional Assessment of Cancer Therapy-General (FACTG, version 4), Credibility and Expectancy/ Satisfaction Questionnaire, Beck Depression Inventory, Beck Depression Inventory, Patient Health Questionnaire 9-item scale, and Question-9 Outcomes: iCBT program can improve depression and anxiety disorder in cancer survivors
Wiel HJ, et al. (2018)[37]	Netherlands	Internet-based physical activity support intervention	Transtheoretical model, uses aspects from the theory of planned behavior, and Social cognitive theory	Internet-based	48 weeks	Usual care	Baseline	Allocation (65/82)	24 weeks (65/82)	48 weeks (65/82)	Instruments: Actigraph GT3X+ activity monitor (Actigraph, Pensacola, Florida, USA), BT-Q1000XT GPS-device (QStarz International Co), International PA Questionnaire, Motivational Readiness towards a Goal Behavior, Multidimensional Fatigue Inventory, Profile of Mood States, Medical Outcomes Study Short Form-36, Medical Consumption Questionnaire, and Productivity Cost Questionnaire. Outcomes: This program can reduce fatigue, mood, health-related quality of life, and the cost of cancer survivors.
Wiel HJ, et al. (2021)[38]	Netherlands	Web-based intervention	Self-management theory, self-efficacy theory, and behavioural and attitudinal variables toward physical activity	Web-based	144 weeks	Usual care	Baseline	Allocation (153/154)	Not measured	144 weeks (137/137)	Instruments: International Physical Activity Questionnaire, Multidimensional Fatigue Inventory Questionnaire, Profile of Mood States, 36-Item Short Form Health Survey, single item, on the basis of the transtheoretical model, and questions on the basis of the theory of planned behaviour Outcomes: this program can increase fatigue-related physical activity and improve cancer survivors' symptom burden

Quality of evidence

The quality of evidence of the included studies was assessed as ranging from moderate to high when analyzing usual care on psychological adjustments for HRQoL. The results identified the certainty assessment of the effect quality of evidence, with the trail of indirect comparisons with usual care or waiting list. This point was a concern with the studies, as their quality was diminished by all their results failing to specify whether participants were blinded to assessments and whether each study participant was different. However, all of the studies moderated the population for studies with < 400 participants,[38] so this quality of evidence was then downgraded to four results. **Table 3** provides details of the quality of evidence regarding SMeHIs about the effectiveness of psychosocial adjustment.

Table 3. Quality of evidence self-management eHealth interventions effectiveness to psychosocial adjustment

Certainty assessment			Number of patients		Effect		Certainty	Comments
Authors and year of publication	Study design	Risk of bias	Self-management eHealth intervention	Usual care	Relative (95% CI)	Absolute (95% CI)		
Blair CK, et al. (2021)[8]	RCT	Not shown to be serious	36/54 (66.7%)	18/54 (33.3%) 100.0%	OR 4.0 (1.8 to 8.9)	333 more per 1,000 (from 140 more to 483 more) 0 fewer per 1,000 (from 0 fewer to 0 fewer)	⊕⊕⊕⊕ High	OR (4.0)
Børøsund E, et al. (2021)[27]	RCT	Not shown to be serious	84/172 (48.8%)	88/172 (51.2%) 84.6%	OR 0.91 (0.60 to 1.39)	13 fewer per 1,000 (from 491 fewer to 469 more) 7 fewer per 1,000 (from 747 fewer to 150 more)	⊕⊕⊕⊕ High	OR (0.91)
Golsteijn RHJ, et al. (2018)[34]	RCT	Not shown to be serious	249/478 (52.1%)	229/478 (47.9%) 38.4%	OR 1.18 (0.92 to 1.52)	58 fewer per 1,000 (from 182 fewer to 78 more) 54 fewer per 1,000 (from 161 fewer to 77 more)	⊕⊕⊕◯ Moderate	OR (1.18)
Kanera I, et al. (2016)[3]	RCT	Not shown to be serious	231/462 (50.0%)	231/462 (50.0%) 38.5%	OR 1.00 (0.77 to 1.29)	106 fewer per 1,000 (from 230 fewer to 33 more) 96 fewer per 1,000 (from 197 fewer to 31 more)	⊕⊕⊕◯ Moderate	OR (1.00)
Kanera IM, et al. (2017)[15]	RCT	Not shown to be serious	166/376 (44.1%)	210/376 (55.9%) 76.9%	OR 0.62 (0.47 to 0.83)	311 fewer per 1,000 (from 399 fewer to 206 fewer) 305 fewer per 1,000 (from 436 fewer to 180 fewer)	⊕⊕⊕⊕ High	OR (0.62)
Murphy MJ, et al. (2020)[14]	RCT	Serious risk of bias [a]	53/114 (46.5%)	61/114 (53.5%) 69.3%	OR 0.75 (0.45 to 1.27)	35 fewer per 1,000 (from 513 fewer to 446 more) 30 fewer per 1,000 (from 650 fewer to 297 more)	⊕⊕⊕◯ Moderate	OR (0.75)

Table 3. Quality of evidence self-management eHealth interventions effectiveness to psychosocial adjustment (Cont.)

Certainty assessment			Number of patients		Effect		Certainty	Comments
Authors and year of publication	Study design	Risk of bias	Self-management eHealth intervention	Usual care	Relative (95% CI)	Absolute (95% CI)		
Wiel HJ, et al. (2018)[37]	RCT	Serious risk of bias[a]	164/246 (66.7%)	82/246 (33.3%)	OR 4.00 (2.75 to 5.82)	333 more per 1,000 (from 246 more to 411 more)	⊕⊕⊕◯ Moderate	OR (4.00)
				53.8%		285 more per 1,000 (from 224 more to 333 more)		
Wiel HJ, et al. (2021)[38]	RCT	Not shown to be serious	137/291 (47.1%)	154/291 (52.9%)	OR 0.79 (0.57 to 1.10)	32 fewer per 1,000 (from 92 fewer to 28 more)	⊕⊕⊕⊕ High	OR (0.79)
				100.0%		0 fewer per 1,000 (from 0 fewer to 0 fewer)		

[a] likely unclear

CI: confidence interval; OR: odds ratio

Risk of bias within studies

The risk of bias was classified as low in all domain questions (**Figure 2**), according to the JBI Critical Appraisal Checklist. Of the eight studies, four[6,14,27,36] failed to report an allocation to a treatment group. Of the remaining four, three[6,34,36] did not report details of participants blinded to a treatment assignment, with the remaining five studies[6,15,34,36] not reporting those delivering treatment blinded to treatment assignment. Five studies did not report outcomes of blinding to treatment assignment.[6,14,15,34,36] Interestingly, two studies[34,35,36] did not treat groups identically, other than the intervention of interest; Børøsund and Ehlers[27] did not report participants who were identified in the section to which they were RCTs.

Discussion

This systematic review aimed to identify and synthesize the findings from experimental and quasi-experimental studies which investigated the effectiveness of SMeHIs on the psychological adjustment for HRQoL among CSs. The results indicated that self-management eHealth had a statistically significant effect on HRQoL psychological adjustments. Psychological adjustment (tension, anger, vigor, fatigue, confusion, physical activity, and depression) was reported to be a mechanism to promote the need for HRQoL behavior. Nonetheless, the self-management components of the eHealth interventions were found to be sporadic and heterogeneous. It is believed that additional high-quality research is essential to identify optimum intervention features and inquire about intervention effectiveness as the crucial support for health care delivery for this patient cohort. Previous research studies have shown that interventions expect lower intenseness, thereby only an individual CS for psychological adjustment, primarily in-person with stress and depression during a common program assignment, which may help to increase HRQoL behavior.[14,27,39,40] There is extensive evidence indicating that CSs may be more prone to experience anxiety disorders.

Moreover, SMeHIs are beneficial when supported by nurse-led HRQoL (physical activity) recommendations,

employing psychological adjustment strategies at follow-up appointments. These strategies had more positive outcomes than cases where such support was not offered to patients. This is likely related to holistic healthcare providers being more immersed in CSs' experiences and real-life needs, since participants stated that they relied on healthcare providers for entry to suitable medical treatment and supportive care.[41] This review highlighted the importance of CSs' need to develop trust in self-care information provided by their healthcare teams.[10] Healthcare providers need to serve as facilitators in giving support and guidance related to psychological adjustment behaviors and be able to endorse relevant resources as reliable and accurate sources of information.

Regarding self-management eHealth outcomes,[8,34] Bolman[34] identified that SMeHIs had significant impacts on CSs' physical activity, especially among those suffering from fatigue after receiving treatment.[6,20] eHealth information provides a broader platform for participants, including information for CSs who utilize guideline practices and strategies and accomplish successful health problem-solving in life experiences. This relates to the self-management theory of Creer,[42] who identified four primary goals of success in self-management: goal selection, information collection, processing and evaluation; decision-making and action; and self-reaction. As per this paradigm, CSs who are confident in self-care and comfortable with and willing to communicate and share their experiences, are able to achieve better QoL experiences, while also receiving encouragement from peers.[43]

Many CSs depend on healthcare teams to make psychological adjustments for HRQoL interventions. This systematic review highlights that there are educational opportunities regarding psychological adjustments. Considerable heterogeneity in past studies was observed regarding interventions delivered, making it challenging to compare intervention impacts with usual care. Differences among health-care providers may entail different roles and delivery of the content of various interventions and diverging levels of effects on consequent outcomes for patients.[11] Therefore, healthcare providers' ability to assist CSs and their educational skills focused on information regarding behavioral and emotional modification interventions. Educational skill strategies may be analyzed in future studies and be operationalized for future interventions. Similarly, understanding CSs routine care for healthcare teams should be considered when designing better interventions, so that more appropriate and worthwhile interventions are offered in the future for particular care delivery contexts.

All eight studies provided examples of theory-driven interventions, which researchers and practitioners may use to develop future interventions and strategies to assist CSs. Studies that did not compare different theoretical models within a single study were found to be challenged when attempting to ascertain effectiveness. In addition, the study's results discuss modification in psychological adjustment CSs behaviors in the future. Education background hinders the potentiality of defining the trajectories of improvement in psychological adjustment mechanisms along life living. Including such analyses would offer data that may be valuable to determine which interventions are ultimately more effective over the long term and be able to achieve sustainable change in psychological adjustment for HRQoL.

Suggestions for Future Research

Future research should explore the cost-effectiveness of self-management programs for CSs' HRQoL. eHealth interventions such as those studied in this review could be used as intervention platforms that are easily accessible to those in need. However, more comparative studies are needed to determine the effectiveness of self-management eHealth programs compared to standard care and other interventions. Such research studies' suggestions would greatly assist with the continuing development of programs to assist CSs in achieving

improved QoL. More importantly, to improve the value of educational interventions, researchers of educational institutes should promote educators' learning and development by developing tailored psychological interventions that positively affect CSs. Interventions should be designed in such a way as to ensure the use of an appropriate method(s) to obtain objective indexes for analysis. It is recommended that future research reviews are needed to analyze the most appropriate time to complement self-management intervention.

Limitations

This systematic review has some limitations. Firstly, its quality was limited for methodological reasons due to the relatively small number of participants and the lack of treatment blinding. Secondly, participant cohorts were found to have different characteristics, with various types of CSs involved in these studies. This may cause heterogeneity and influence pooled data analysis. The limited number of participants and the different types of eHealth interventions delivered, including being supported by various frequencies, contents, and information formats, also comprises a limitation for this review. However, in previous research conducted by sensitivity and analysis in the subgroup, results have shown that the outcome and non-significant clinical effects among CSs are their HRQoL.

Furthermore, only five databases were searched, which may have reduced the number of suitable studies to be examined. Hand-searching relevant journals, contacting researchers about the topic, and searching relevant grey literature sources could have resulted in additional studies being identified. Finally, despite the comprehensiveness of self-management, eHealth interventions have been found to have a strong need for standardization. Exploration of the effectiveness of mechanisms was encompassed by the study protocol we used but was limited by the variety of studies and the insufficient number of researchers for meta-regression. Therefore, SMeHIs and high-quality RCTs are needed to examine the exact mechanism of the effectiveness of eHealth interventions.

Conclusion

This systematic review has demonstrated that SMeHIs exert a statistically significant impact on CSs' psychological adjustment for HRQoL. The use of eHealth intervention information for self-management has identified that these interventions reported greater levels of effectiveness (ranging from moderate to high) compared to patients receiving usual care (or other control groups. The quality of evidence was evaluated by the JBI Critical Appraisal Checklist, which greatly assisted with the review of research into this topic. In conclusion, the results of this review should be considered cautiously for subsequent research, given its limitations. The review has also highlighted that RCTs are appropriate when investigating the effects of self-management interventions.

Implications for Practice

CSs may fail to comply with interventions requiring a high degree of self-efficacy for numerous reasons related to personal characteristics, circumstances, and healthcare service. Barriers may include a lack of access to necessary resources such as devices, Internet connectivity, and various forms of social support. This review has identified that SMeHIs do not significantly affect the CSs' QoL, but it is believed that such interventions could be beneficial for the continuing development of clinical guidelines for practice-related information to assist with the implementation of SMeHIs.

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ประสิทธิผลของการใช้เทคโนโลยีดิจิทัลในการจัดการตนเองต่อการปรับตัวทางจิตสังคมเพื่อคุณภาพชีวิตที่เกี่ยวข้องกับสุขภาพในผู้รอดชีวิตจากมะเร็ง: การทบทวนอย่างเป็นระบบ

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บทคัดย่อ: เทคโนโลยีสารสนเทศด้านสุขภาพสนับสนุนการปรับตัวทางจิตวิทยาของผู้รอดชีวิตจากมะเร็ง การปรับตัวทางจิตวิทยาสามารถช่วยให้ข้ามผ่านวิกฤตคุกคามชีวิตสู่คุณภาพชีวิตเกี่ยวกับสุขภาพ วัตถุประสงค์การทบทวนอย่างเป็นระบบนี้ เพื่อสังเคราะห์ความรู้เกี่ยวกับประสิทธิผลของเทคโนโลยีสารสนเทศด้านสุขภาพด้านการจัดการตนเอง พร้อมสรุปหลักฐานเกี่ยวกับการปรับตัวทางจิตวิทยาสำหรับคุณภาพชีวิตเกี่ยวกับสุขภาพของผู้รอดชีวิตจากมะเร็ง 5 ฐานข้อมูลอิเล็กทรอนิกส์สำหรับการค้นหา รายงานเทคโนโลยีสารสนเทศทางสุขภาพสำหรับการปรับตัวทางจิตวิทยาของผู้รอดชีวิตจากมะเร็ง ตั้งแต่เดือนกุมภาพันธ์ พ.ศ. 2554 ถึงมีนาคม พ.ศ. 2565 ตามเกณฑ์การคัดเลือก การตีพิมพ์ในวารสารภาษาอังกฤษหรือภาษาไทย มีการตรวจสอบโดยผู้เชี่ยวชาญ ผู้เข้าร่วมเป็นผู้รอดชีวิตจากมะเร็งในวัยผู้ใหญ่ ข้อมูลจะถูกดึงในระบบออนไลน์ไปยังโปรแกรม SUMARI ของสถาบัน Joanna Briggs เพื่อเพิ่มความสอดคล้องของการสังเคราะห์ข้อมูล และสรุปผลโดยผู้ตรวจทานสองคน

บทความ 8 ฉบับผ่านเกณฑ์การคัดเลือก ผลการศึกษาระบุว่าการใช้เทคโลโลยีสารสนเทศสำหรับการจัดการตนเองแสดงให้เห็นว่า การปรับตัวทางจิตวิทยามีนัยสำคัญทางสถิติต่อคุณภาพชีวิตเกี่ยวกับสุขภาพของผู้รอดชีวิตจากมะเร็ง การทบทวนวรรณกรรมอย่างเป็นระบบระบุว่าการใช้เทคโลโลยีสารสนเทศสำหรับการจัดการตนเองช่วยในการพัฒนากลไก/กลยุทธ์ที่อาจสนับสนุนการปรับตัวทางจิตวิทยาของผู้รอดชีวิตจากมะเร็งได้อย่างมีประสิทธิผล อย่างไรก็ตาม การดูแลผู้ป่วยมะเร็งแบบประคับประคองผ่านการใช้เทคโลโลยีสารสนเทศ อาจใช้เทคนิคการเปลี่ยนแปลงพฤติกรรมเพิ่มเติม และสนับสนุนแหล่งข้อมูลเพื่อช่วยและพัฒนากลไกการเผชิญปัญหาของแต่ละบุคคล ข้อมูลที่ได้รับอาจช่วยผู้ให้บริการด้านการดูแลสุขภาพ พัฒนาและเพิ่มประสิทธิภาพ พร้อมหาแนวทางปฏิบัติทางคลินิกที่เกี่ยวข้องกับการปฏิบัติ ซึ่งช่วยในการดำเนินการตามมาตรการใช้เทคโนโลยีสารสนเทศสำหรับการจัดการตนเองต่อผู้รอดชีวิตจากมะเร็ง

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คำสำคัญ: ภาวะสุขภาพของผู้ป่วยมะเร็ง การใช้เทคโลโลยีสารสนเทศ การปรับตัวทางด้านจิตวิทยา คุณภาพชีวิตด้านเนื้องอกวิทยา การจัดการตนเอง การทบทวนวรรณกรรมอย่างเป็นระบบ

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