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REVIEW ARTICLE

# A systematic review of psychological interventions for patients with head and neck cancer

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## Abstract

**Aim** The purpose of this systematic review is to identify psychological interventions that have been effective at improving quality of life and reducing psychological distress (depression and anxiety) in patients with head and neck cancer.

**Methods** All relevant peer-reviewed articles published between March 1980 and March 2017 were identified through an electronic search of five databases: Medline, Embase, PsycINFO, Scopus, and Academic Search Complete. Risk of bias was independently assessed by two reviewers using the Crowe Critical Appraisal Tool (CCAT). Following this, a narrative synthesis of the findings was completed.

**Results** Twenty-one unique intervention studies were identified. Interventions tested included cognitive behavioural therapy (CBT), psychoeducation, meditation/mindfulness, group therapy, and telehealth initiatives. Ten studies utilised a randomised controlled design. Five of these investigated CBT and three examined psychoeducation, with the greatest empirical support found for these intervention types. However, the majority of studies were underpowered to detect significant effects and did not examine whether improvements in quality of life and psychological well-being were sustained over time.

**Conclusions** Further research is needed to investigate the effects of psychological interventions among patients with head and neck cancer, using randomised controlled designs, adequately powered samples, and long-term follow-up. This would allow evidence-based recommendations to be made regarding the most appropriate interventions to implement in clinical practice.

**Trial registration** CRD42017069851

**Keywords** Anxiety · Depression · Head and neck cancer (HNC) · Health-related quality of life (HRQL) · Psychological intervention · Systematic review

## Introduction

Head and neck cancer (HNC) is a physically and psychologically demanding disease, associated with negative changes in basic functions (such as breathing, speaking, and eating) and facial appearance [1]. These changes are typically the result of treatment, which may include any combination of surgery, radiotherapy, and chemotherapy. Effects of treatment are long-lasting [2] and have a notable impact on patient health-related quality of life (HRQL). This outcome reflects a broad range of attributes thought to index a person's capacity to function and derive satisfaction from such function [3], including physical/functional, social, emotional, and general well-being [4]. Patients with HNC generally report low levels of HRQL during and immediately following treatment [5] but must also often contend with swallowing and dental difficulties, persistent pain, and reduced life satisfaction for many years [1, 6]. Rates of psychological distress are also high among patients with HNC [7], with significant depression and anxiety symptoms evident across the entire disease trajectory [8].

Screening for psychological distress among all cancer patients is advocated in order to identify those who might benefit from psychological intervention [9]. While a clear definition of 'psychological intervention' is yet to be established, such

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interventions typically aim to bring about a positive change in psychological well-being by modifying an individual's knowledge, thoughts, or behaviours in response to a challenging situation [10]. Psychological interventions for patients with cancer have been grouped into four main types: education, cognitive behavioural therapy, individual psychotherapy, and group interventions [11]. Education interventions (also known as psychoeducation interventions) are used to improve knowledge and reduce uncertainty by providing information about cancer and its treatment. Cognitive behavioural therapy (CBT) involves identifying and correcting thoughts, feelings, and behaviours that may be contributing to psychological distress [12]. Individual psychotherapy is a less structured form of intervention [11], where the focus is on helping a patient by providing support, compassion, and empathy to manage the distress and disruption caused by cancer. Finally, group interventions typically involve weekly meetings with other individuals affected by cancer. These meetings are guided by a psychologist or other mental health professionals and allow for the sharing of personal experiences and information exchange.

Cognitive behavioural approaches to the management of distress have been modified over time, resulting in a number of new ('third wave') interventions that are separate from the categories identified above. Examples include acceptance and commitment therapy (ACT) and mindfulness-based stress reduction (MBSR), which promote the development of sustained non-judgemental awareness in the present moment, including continuous attention to sensations, perceptions, affective states, thoughts, and imagery [13]. Engaging in mindfulness is designed to promote increased flexibility in coping with both positive and negative life experiences, and to enhance perceptions of control as a result.

Several systematic reviews and meta-analyses have concluded that psychological interventions reduce psychological distress and improve HRQL in patients with cancer [14–16]. However, most meta-analyses have found heterogeneous effect sizes across trials. This suggests that while some interventions have reported robust positive effects, others have not shown any improvement in patient outcomes [17]. The majority of studies demonstrating benefit from psychological interventions have involved patients with breast cancer [18]. It is important to consider potential variation in intervention effectiveness across different cancer types, where the symptoms, treatment, and quality of life impact for patients can vary dramatically.

Despite patients with HNC facing unique physical, social, and emotional challenges, few studies have investigated the efficacy of psychological interventions for this group [19]. Furthermore, a Cochrane systematic review found limited evidence for interventions examined to date, because of difficulties comparing intervention types, the extensive range of outcomes assessed, and methodological shortcomings associated with study designs [20]. That systematic review was restricted to randomised controlled trials (RCTs). However, difficulties associated with recruitment and implementation of interventions among patients with HNC suggest that a number of studies may have used alternative methods. These studies are worthy of consideration, as they may highlight promising interventions for further research. The most recent systematic review that considered studies using a range of designs to examine interventions for patients with HNC was published in 2011 and included studies conducted in 2009 and earlier [21]. Results found a small number of studies and limited high-quality evidence, although there was some support for psychoeducation in reducing patient distress.

In recent years, a number of interventions for patients with HNC have been reported, including mindfulness approaches that have not been included in prior systematic reviews [22, 23]. Therefore, the aim of this study is to conduct an updated systematic review of psychological interventions designed to improve HRQL and reduce the high rates of distress evident among patients with HNC.

## Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to conduct this systematic review. Details of the review were successfully registered and published within the PROSPERO database (registration number CRD42017069851).

### Research question and relevant criteria

The research question is: what is the evidence for the effectiveness of psychological interventions designed to improve the psychological outcomes of patients with HNC?

#### Population of interest

The population of interest included patients with a diagnosis of head and neck cancer. Studies that also included patients with other types of cancer were excluded unless analyses were performed separately for each cancer type or unless patients with HNC comprised > 80% of the sample. Patients with any stage of HNC (stages I–IV) were considered eligible for inclusion.

#### Interventions

Psychological interventions were included, that is, interventions aiming to produce positive changes in psychological well-being by modifying patient knowledge, thoughts, or behaviours in response to HNC. All variations of these interventions were included, regardless of dosage/intensity, mode of

delivery, personnel involved in delivery, frequency of delivery, duration, and timing. However, studies of the effects of medical interventions (such as a particular treatment regimen) on psychological outcomes were excluded.

#### Outcomes

The primary outcomes of this review included patient HRQL, depression, and anxiety. However, a number of secondary outcomes known to indicate HNC patient distress were considered, including body image, fear of cancer recurrence, illness cognitions, perceptions of social support, post-traumatic stress, and coping [19]. Specific domains of HRQL were also included as secondary outcomes, i.e. social, functional, physical, emotional, and head- and neck-specific quality of life. These outcomes needed to be measured using validated multi-dimensional self-report questionnaires or structured clinical interviews in order to be included in the review.

#### Study design

Given that previous reviews of interventions for patients with HNC have identified very few studies utilising randomised controlled designs, this review included both randomised and non-randomised studies. Specifically, randomised controlled trials, quasi-experimental studies, and observational studies were included. No limits were placed on the study sample size, follow-up period, or statistical analyses employed in order to gain a comprehensive picture of the interventions that have been tested in patients with HNC to date.

### Search strategy

Five electronic databases were searched in order to identify relevant studies: Medline, Embase, PsycINFO, Scopus, and Academic Search Complete. Searches were performed using key words or free text words depending on the database. The terms 'head and neck cancer' or 'oral cancer' were entered in the first step, followed by intervention terms in the second step ('intervention', 'programme', 'program', 'cognitive', 'behavioural', 'behavioral', 'psychoeducation', 'educational', 'coping', 'telemedicine', 'support', 'self-regulatory', 'mindfulness'), psychological outcomes in the third step ('psychological', 'distress', 'depression', 'anxiety', 'recurrence', 'post-traumatic', 'quality of life'), and an instruction to combine these terms in the fourth step. Each search was limited to studies published between January 1980 and May 2017. In addition to the electronic search, reference lists of potentially eligible studies were scanned for relevant citations.

All records retrieved from the searches were exported to endnote. Following this, duplicate records were removed and the number of unique records identified. The title and abstract of each unique record was examined in order to identify studies that might be eligible for inclusion. The full text of these articles was then obtained and assessed for eligibility. Studies published in peer-reviewed academic journal articles were considered for inclusion. However, masters and doctoral theses describing interventions were excluded from the review as it was expected that key findings would be published in the scientific peer-reviewed literature. Studies described in conference abstracts were also excluded due to the incompleteness of information regarding study design, analysis, and results. Only studies published in English were included.

### Data extraction

A data extraction form was completed for each study to be included in the review. Data were extracted using the Crowe Critical Appraisal Tool (CCAT) [24]. This requires each paper to be read in full before recording the citation, research design, variables and analysis (including the intervention(s), outcome(s), and data analysis method(s) used), sampling, and data collection processes.

### Quality assessment

The CCAT was also used to complete a quality assessment for each included study. The CCAT includes 22 items across eight different categories. Each category is given a score on a six-point scale from 0 to 5, with scores added to calculate a total score. This can be expressed as a percentage by dividing the score by 40. The quality of each paper is appraised by considering its total score alongside the score obtained in each category. Categories include preliminaries, introduction, design, sampling, data collection, ethical matters, results, and discussion. The CCAT has been identified as a reliable and valid tool for the assessment of study quality [25, 26]. Quality assessments were performed independently by two reviewers (AR and RM). Inter-rater agreement was calculated and discrepancies in scores were resolved in a consensus meeting, resulting in an agreement for each category of 100%.

Following completion of data extraction and quality assessment, study characteristics and outcomes were summarised in evidence tables and described in a narrative synthesis of the results.

## Results

### Study selection

A total of 6301 records were retrieved when combining the results of each database search (Medline = 2030; Embase = 1990; PsycINFO = 133; Scopus = 1382; Academic Search Complete = 762) and those identified from reference lists of included articles and the grey literature (see Fig. 1). Following

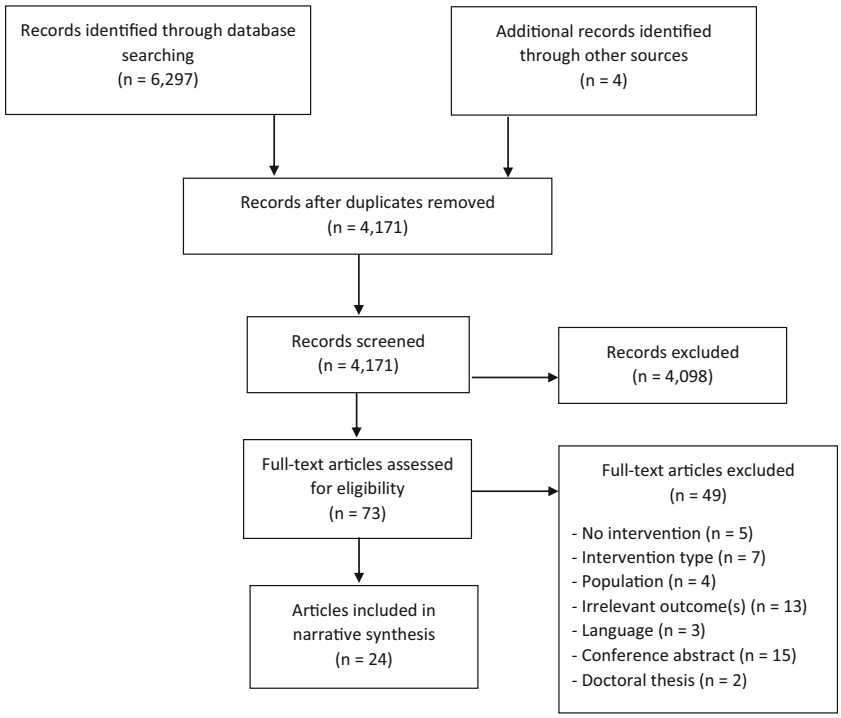


**Fig. 1** PRISMA flow diagram

the removal of duplicate records ($n = 2130$), 4171 unique records were identified. Of these, 4098 were removed on the basis of title and abstract, leaving 73 potentially relevant articles for full review. After review, 49 records were excluded. Exclusions occurred because no intervention was being tested, the intervention tested was not psychological, the outcome(s) assessed were not relevant, the participant population was not predominately HNC patients, the article was written in a language other than English, or the record was a conference abstract. This resulted in 24 articles eligible for review, representing 21 unique intervention studies.

## Study quality

The quality assessment score of each study is presented in Table 1. Ten studies employed a randomised controlled design to examine the effectiveness of an intervention. Remaining studies allowed patients to self-select into experimental condition or made use of pre-test post-test (or post-test only) designs. Studies utilising these designs received lower quality assessment scores due to the potential for pre-existing differences between groups at baseline. Other factors that resulted in lower quality assessment scores included small sample sizes (with the majority of studies reviewed underpowered to detect statistically significant effects), difficulties with participant adherence to the intervention and retention over time, and inadequate information regarding methods of group allocation, allocation concealment, and blinding of participants, researchers, and outcome assessors. Many studies failed to control for potentially confounding variables and this contributed to a lower quality assessment score. Methods for managing missing data were rarely identified in the studies reviewed. Furthermore, only two studies [23, 36] compared a specific intervention with an active control group, although neither of these studies also compared the interventions with standard care alone.

## Interventions and study characteristics

The characteristics of each intervention study are presented in Table 2. Psychological interventions for patients with HNC investigated to date include CBT, psychoeducation, meditation/mindfulness, group interventions, and telehealth interventions.

### Cognitive behavioural therapy

Ten studies have described cognitive behavioural therapy (CBT) interventions designed to improve psychological outcomes in patients with HNC. Five of these studies were RCTs [31, 35, 36, 41, 46, 47]. van der Meulen et al. [46, 47] found support for CBT in their RCT involving 205 patients treated for HNC. Patients who received six sessions of nurse-led CBT had significantly fewer depressive symptoms at 12 and 18 months post-treatment compared to those who received standard care. Patients in the intervention group also showed a greater improvement in emotional and physical functioning, pain, swallowing, social contact, and mouth opening at 12 months; better global quality of life, role and emotional functioning, pain, swallowing, and mouth opening at

**Table 1** Quality of studies assessed using the Crowe Critical Appraisal Tool (CCAT)

| | Preliminaries [/5] | Introduction [/5] | Design [/5] | Sampling [/5] | Data collection [/5] | Ethical matters [/5] | Results [/5] | Discussion [/5] | Total [/40] |
|---|---|---|---|---|---|---|---|---|---|
| Allison et al. (2004) [27, 28] | 4 | 5 | 2 | 3 | 3 | 5 | 4 | 4 | 30/40 (75%) |
| Boxleitner et al. (2017) [23] | 4 | 5 | 3 | 3 | 4 | 4 | 4 | 2 | 29/40 (73%) |
| Chen et al. (2016) [29] | 5 | 5 | 4 | 4 | 3 | 5 | 5 | 4 | 35/40 (88%) |
| D'Souza et al. (2013) [30] | 4 | 5 | 3 | 5 | 3 | 4 | 4 | 4 | 32/40 (80%) |
| Duffy et al. (2006) [31] | 4 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 34/40 (85%) |
| Fiegenbaum (1981) [32] | 4 | 4 | 3 | 2 | 3 | 1 | 2 | 3 | 22/40 (55%) |
| Hammerlid et al. (1999) [33] | 2 | 4 | 2 | 2 | 3 | 2 | 2 | 2 | 19/40 (48%) |
| Hammerlid et al. (1999) [33] | 2 | 4 | 1 | 2 | 3 | 3 | 2 | 2 | 19/40 (48%) |
| Hansson et al. (2017) [34] | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 38/40 (95%) |
| Humphris and Rogers (2012) [35] | 4 | 5 | 4 | 2 | 5 | 5 | 4 | 4 | 33/40 (83%) |
| Kangas et al. (2013) [36] | 5 | 5 | 4 | 4 | 4 | 5 | 4 | 5 | 36/40 (90%) |
| Katz et al. (2004) [37] | 4 | 5 | 2 | 3 | 5 | 4 | 4 | 4 | 31/40 (78%) |
| Kilbourn et al. (2013) [38] | 4 | 4 | 2 | 2 | 2 | 4 | 4 | 2 | 24/40 (60%) |
| Petruson et al. (2003) [39] | 3 | 4 | 3 | 4 | 3 | 4 | 4 | 3 | 28/40 (70%) |
| Pfeifer et al. (2015) [40] | 4 | 5 | 5 | 4 | 3 | 4 | 4 | 4 | 33/40 (83%) |
| Pollard et al. (2017) [22] | 4 | 5 | 2 | 2 | 3 | 5 | 4 | 3 | 28/40 (70%) |
| Richardson et al. (2017) [41] | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 36/40 (90%) |
| Semple et al. (2009) [42] | 5 | 5 | 3 | 3 | 4 | 5 | 5 | 4 | 34/40 (85%) |
| Vakharia et al. (2007) [43] | 3 | 4 | 2 | 3 | 3 | 4 | 3 | 2 | 24/40 (60%) |
| van den Brink et al. (2007) [44] | 5 | 3 | 3 | 2 | 3 | 2 | 4 | 4 | 26/40 (65%) |
| van der Meulen et al. (2013) [45] | 3 | 5 | 2 | 3 | 4 | 4 | 4 | 3 | 28/40 (70%) |
| van der Meulen et al. (2013, 2014) [46, 47] | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 38/40 (95%) |
| Vilela et al. (2006) [48] | 5 | 4 | 2 | 4 | 3 | 5 | 4 | 5 | 32/40 (78%) |

Two reviewers (AR and RM) used the CCAT to score the quality of each study. Discrepancies were resolved and a consensus reached to provide the final ratings presented in this table

**Table 2** Study characteristics and interventions tested

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| Allison et al. (2004) [27, 28] | Pre/post study with no control group | 66 patients 1–36 months post-treatment for a first primary HNC; 50 patients with complete outcomes data | Nurse-led psychoeducation delivered in 1 of 3 formats (individual, small group, and home) | 2 or 3 2-h sessions delivered over a 4-week period | HRQL (EORTC QLQ-C30) and anxiety/depression (HADS) collected at baseline, 2 weeks, and 3 months post-intervention | Significant improvement in global quality of life and reduced fatigue, sleep disturbance, and depressive symptoms from pre- to post-intervention |
| Boxleitner et al. (2017) [23] | Randomised controlled trial comparing 2 interventions | 28 HNC patients scheduled for radiotherapy treatment (13 in intervention group 1 and 15 in intervention group 2); 10 patients with complete outcomes data | Intervention 1: coach-led meditation; intervention 2: self-meditation with CD | Intervention 1: 20-min session once a week after radiotherapy treatment over 6 weeks; intervention 2: 20-min CD session to be used before or after radiotherapy treatment over 6 weeks | Anxiety/depression (HADS) and emotional distress (Emotional Distress Thermometer) collected at baseline, and 6 and 12 weeks later | No significant differences between the 2 interventions with respect to reducing anxiety, depression, and emotional distress; patients in both groups reported a reduction in anxiety from pre- to post-intervention |
| Chen et al. (2016) [29] | Randomised controlled trial comparing intervention with standard care | 66 female HNC patients with facial disfigurement more than 3 months post-treatment (32 in intervention group and 34 in control group) | Nurse and cosmetologist led psychoeducation (skin camouflage programme) | 2 face-to-face individual sessions and 1 group session over a 3-week period and biweekly telephone follow-up 4–8 weeks after the first session | Disfigurement (observer-rated disfigurement scale), self-esteem (RSES), body image (the body image scale), social anxiety (LSAS), and anxiety/depression (HADS) collected at baseline, and 1, 2, and 3 months post-intervention | Patients in the intervention group had significantly less facial disfigurement, depression, and anxiety of social interaction than those in the standard care group at 3 months post-intervention |
| D'Souza et al. (2013) [30] | Pre/post study with control group (standard care) | 96 newly diagnosed patients with stage III or IV primary or recurrent HNC (47 in intervention group and 49 in control group) | Nurse-led psychoeducation | One 1.5–2 h face-to-face individual session | Anxiety/depression (HADS) collected at baseline (post-intervention), and 3 and 6 months later | Patients in the intervention group had a significantly greater reduction in anxiety (but not depression) over time compared to those in the standard care group |
| Duffy et al. (2006) [31] | Randomised controlled trial comparing intervention with standard care | 184 patients with HNC who screened positive for 1 or more of: smoking, alcohol, and depression (91 in intervention group and 93 in control group); 77 patients in each group with complete outcomes data | Nurse-led CBT and pharmacologic management as needed | 9–11 telephone sessions | Self-reported smoking status, alcohol consumption (AUDIT), and depression (GDS-SF) collected at baseline and 6 months | Significantly lower 6-month smoking cessation rate for patients in the intervention group compared to those in the standard care group; no significant differences in 6-month depression and alcohol outcomes |

**Table 2** (continued)

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| Fiegenbaum (1981) [32] | Prospective case--controlled study comparing intervention with standard care | 17 HNC patients with visible disfigurement at least 4 years post-treatment | Therapist-led behaviour therapy (social training) | Ten 2-h group sessions over a 2.5-month period | Self-insecurity, contact anxiety, social anxiety, and self-discontent collected pre- and 1 week post-intervention, and again 2 years post-intervention | Patients in the intervention group had a significant improvement in self-confidence and a reduction in contact and social anxiety from pre- to post-intervention compared to those in the standard care group |
| Hammerlid et al. (1999) [33] - 1 | Pre/post study with control group (standard care) | 47 newly diagnosed HNC patients (13 in intervention group and 34 in control group); only 8 patients participated in more than 1 intervention session | Psychologist-led group intervention, CBT, and relaxation training | 1.5-h group sessions once a week for 2 months, every second week for the next 2 months, and then once a month for 6 months | HRQL (EORTC QLQ-C30 and EORTC QLQ-H&N35) and anxiety/depression (HADS) collected at time of diagnosis and 1, 2, 3, 6, and 12 months post-treatment | Patients in the intervention group had improved more than patients in the standard care group by 1 year follow-up with respect to anxiety/-depression, social functioning, emotional functioning, and global quality of life* |
| Hammerlid et al. (1999) [33] - 2 | Pre/post study with no control group | 14 patients with HNC between 12 and 22 months post-diagnosis | Healthcare provider-led psychoeducation | Week-long programme held at a comprehensive rehabilitation centre | HRQL (EORTC QLQ-C30, EORTC QLQ-H&N35) and anxiety/depression (HADS) collected before and 4 weeks post-intervention | Improvements observed in relation to some aspects of functioning and symptom burden from pre- to post-intervention* |
| Hansson et al. (2017) [34] | Randomised controlled trial comparing intervention with standard care | 96 patients with HNC to be treated with radiotherapy and/or chemotherapy (54 in intervention group and 42 in control group); 88 patients with complete outcomes data | Nurse-led psychoeducation and person-centred care | First meeting within 7 days of first visit to the oncologist and ongoing follow-up (weekly meetings during treatment followed by 3 monthly visits) | HRQL (EORTC QLQ-C30, EORTC QLQ-H&N35) collected at baseline and 4, 10, 18, and 52 weeks after the start of treatment | Patients in the intervention group had significantly less difficulty with HNC-specific problems (swallowing, social eating, and feeling ill) at 18 weeks compared to those in the standard care group; no significant differences in global quality of life scores |
| Humphris and Rogers (2012) [35] | Randomised controlled trial comparing intervention with standard care | 87 HNC patients approximately 3 months post initial treatment (53 in intervention group and 34 in control group); 77 patients with | Nurse-led CBT addressing illness perceptions | Up to six 60-min sessions | Anxiety/depression (HADS), cancer-related worry (WOC), HRQL (EORTC QLQ-C30), and mental adjustment to cancer (MACS) | Patients in the intervention group had a significantly greater reduction in fear of cancer recurrence and anxious preoccupation |

**Table 2** (continued)

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| | | complete outcomes data | | | collected 3, 7, 11, and 15 months post-treatment | between 7 and 11 months compared to those in the standard care group; however, these results were not sustained at final follow-up |
| Kangas et al. (2013) [36] | Randomised controlled trial comparing 2 interventions | 35 newly diagnosed HNC patients undergoing radiotherapy with elevated levels of PTSD, depression, or anxiety (21 in intervention group 1 and 14 in intervention group 2); 18 patients with complete outcomes data | Intervention 1: psychologist-led CBT; intervention 2: psychologist-led supportive counselling | Both interventions involved 6 consecutive weekly 90-min sessions conducted concurrently with patients' radiotherapy regime and a seventh (booster) session conducted 4 weeks after the last session | PTSD (Clinician Administered PTSD Scale), lifetime and current psychological problems (SCID-DSM-IV), cancer-related PTSD (Posttraumatic Checklist), depression (BDI-II), anxiety (STAI), posttraumatic cognitions (PTCI), and HRQL (FACT-G) collected pre-intervention, and 1, 6, and 12 months post-intervention | No significant differences between the 2 interventions with respect to reducing PTSD, anxiety, and depression; patients in both groups reported a reduction in anxiety and depression from pre- to post-intervention |
| Katz et al. (2004) [37] | Randomised controlled trial comparing intervention with standard care | 19 newly diagnosed patients to be surgically treated for oral cavity cancer (10 in intervention group and 9 in control group) | Nurse-led psychoeducation | One 60–90-min pre-operative telephone session and one 60–90-min post-operative in-person session | Anxiety (STAI), depression (CES-D), well-being (Affect Balance Scale), body image, life satisfaction (Life Happiness Rating Scale), illness intrusiveness (IIRS), and HRQL (EORTC QLQ-C30) collected pre-operatively, post-operatively, and 3 months post-hospital discharge | Patients in the intervention group had a significant reduction in anxiety and higher knowledge and satisfaction with their appearance at 3-month follow-up relative to those in the standard care group |
| Kilbourn et al. (2013) [38] | Pre/post study with no control group | 21 recently diagnosed patients receiving treatment for HNC; 11 patients with complete outcomes data | Telephone-based CBT with a focus on easing and alleviating symptoms | Up to 8 telephone sessions delivered across the course of treatment by professional telephone interviewers, with the number of sessions determined by | Cancer-specific distress (IES), HRQL (FACT-H&N), pain (PDI), and social support (ISEL) collected at baseline and 1 month post-intervention | Decrease in cancer-specific distress, HNC-specific HRQL, and perceived social support from pre- to post-intervention* |

**Table 2** (continued)

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| | | | | patients' length of treatment | | |
| Petruson et al. (2003) [39] | Prospective case--controlled study comparing intervention with standard care | 142 newly diagnosed untreated HNC patients (52 in intervention group and 92 in control group) | Nurse- and dietician-led psychoeducation | Sessions were offered once a week during treatment, once a month during the first 6 months post-treatment, and once again 1 and 3 years post-diagnosis | HRQL (EORTC QLQ-C30, EORTC QLQ-H&N35) and anxiety/depression (HADS) collected at diagnosis and 3, 12, and 36 months after the start of treatment | Patients in the standard care group reported significantly better HRQL at 1 year and felt significantly less ill at 3 years relative to those in the intervention group |
| Pfeifer et al. (2015) [40] | Randomised controlled trial comparing intervention with standard care | 80 HNC patients receiving 1 or more treatments (45 in intervention group and 35 in control group) | Coordinator-monitored telehealth intervention | Daily responding to telehealth device throughout treatment | HRQL (FACT-H&N) and symptom burden (MSAS) collected pre-treatment (baseline), at least 3 weeks into treatment, and 3 weeks post-treatment | Patients in the intervention group had significantly better physical and head- and neck-specific HRQL and reduced symptom burden post-treatment compared to those in the standard care group |
| Pollard et al. (2016) [22] | Pre/post study with no control group | 19 patients with a first time diagnosis of HNC undergoing radiotherapy | Psychologist-led MBSR | Seven 90-min one-on-one sessions administered on a weekly to fortnightly basis | Mindfulness (FFMQ), psychological distress (POMS-SF), and HRQL (FACT-H&N) collected pre- and post-intervention | Greater length of time spent meditating daily was associated with higher post-intervention mindfulness; higher post-intervention mindfulness was associated with lower distress and better total, social, and emotional HRQL |
| Richardson et al. (2017) [41] | Randomised controlled trial comparing intervention with standard care | 62 patients with a recent diagnosis of HNC (31 in intervention group and 31 in control group); 54 patients with complete outcomes data | Psychologist-led CBT addressing illness perceptions | Three 60-min face-to-face sessions delivered: prior to treatment, toward the beginning of treatment, and toward the end of treatment | Illness perceptions (BIPQ), HRQL (FACT-H&N), and distress (GHQ-12) collected at baseline (diagnosis), and 3 and 6 months post-diagnosis | Patients in the intervention group had a significantly greater increase in treatment control perceptions from diagnosis to 3 months, and a significantly greater increase in social HRQL from diagnosis to 6 months compared to those in the standard care group |
| Semple et al. (2009) [42] | Pre/post study with control group | 54 post-treatment HNC patients with evidence of psychosocial | Nurse-led CBT | A minimum of 2 and a maximum of 6 90-min in-home sessions with a | Anxiety/depression (HADS), social impairment (WASA), and | Patients in the intervention group had a significant reduction in |

**Table 2** (continued)

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| | (standard care) | dysfunction (25 in intervention group and 29 in control group); 49 patients with complete outcomes data | | 2-week interval between sessions | HRQL (UWQOLv4) collected at baseline, 1 week post-intervention, and 3 months post-intervention | anxiety and depression and a significant improvement in social functioning and quality of life from baseline to follow-up; no significant improvements were observed for those in the standard care group |
| Vakharia et al. (2007) [43] | Post study only with control group (standard care) | 47 post-treatment patients with HNC (24 in intervention group and 23 in control group) | Healthcare provider-led support group | 1.5 h biweekly sessions | HRQL (HNQOL) collected post-intervention only | Patients in the intervention group had significantly better scores in relation to eating, emotion, pain, global bother, and treatment response compared to those in the standard care group |
| van den Brink et al. (2007) [44] | Pre/post study with control group (standard care) | 184 patients who had recently received surgical treatment for HNC (39 in intervention group and 145 in control group) | In-home electronic health information support system | Access to support system provided for a period of 6 weeks starting at discharge from hospital | HRQL collected at discharge, 6 weeks after discharge, and 3 months after discharge | Patients in the intervention group had significant improvements in 5 of 22 studied HRQL parameters from baseline to follow-up; however, only the improvement in physical self-efficacy remained significant at follow-up |
| van der Meulen et al. (2013) [45] | Post study only with control group (standard care) | 48 patients surgically treated for HNC (22 in intervention group and 26 in control group) | Nurse-led psychoeducation | One 30-min interview delivered at discharge from hospital | Informational needs (PINQ) and satisfaction with information (SCIP) collected 5 days post-discharge from hospital | No significant differences between groups were found with respect to informational needs or satisfaction with information |
| van der Meulen et al. (2013, 2014) [46, 47] | Randomised controlled trial comparing intervention with standard care | 205 patients to be treated for HNC (103 in intervention group and 102 in control group); 179 patients with complete outcomes data | Nurse-led psychoeducation/C-BT | Six 45–60-min sessions for 1 year following treatment completion (always combined with patients' 2-month medical check-ups) | Depressive symptoms (CES-D) and HRQL (EORTC QLQ-H&N35) collected prior to treatment and 3, 6, 9, 12, 18, and 24 months post-treatment completion | Patients in the intervention group had significantly lower levels of depressive symptoms at 12- and 18-month follow-up compared to those in the standard care group; patients in the |

**Table 2** (continued)

| Study | Design | Sample | Intervention | Duration | Outcomes | Results |
|---|---|---|---|---|---|---|
| | | | | | | intervention group also had greater improvements in a number of HRQL domains at 12, 18, and 24 months |
| Vilela et al. (2006) [48]—extension of Allison et al. (2004) [27, 28] | Prospective, non--randomised study | 138 patients 1–36 months post-treatment for a first primary HNC (66 in intervention group and 72 in control group); 101 patients with complete outcomes data | Nurse-led psychoeducation delivered in 1 of 3 formats (individual, small group, and home) | 2 or 3 2-h sessions delivered over a 4-week period | HRQL (EORTC QLQ-C30) and anxiety/depression (HADS) collected at baseline and 3–4 months post-intervention | Non-matched within group comparisons of baseline and follow-up scores showed statistically significant improvements in several HRQL domains and in the HADS depression scale for intervention participants; however, matched comparison of mean change scores between groups showed a significant difference in global HRQL only |

*AUDIT* Alcohol Use Disorders Identification Test; *BDI-II* Beck Depression Inventory II; *BIPQ* Brief Illness Perception Questionnaire; *CBT* cognitive behavioural therapy; *CES-D* Center for Epidemiologic Studies Depression Scale; *EORTC QLQ-C30, H&N35* The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core, Head and Neck Module; *FACT-G, H&N* Functional Assessment of Cancer Therapy – General, Head and Neck module; *FFMQ* Five Facet Mindfulness Questionnaire; *GDS-SF* Geriatric Depression Scale-Short Form; *GHQ-12* General Health Questionnaire-12; *HADS* Hospital Anxiety and Depression Scale; *HNC* head and neck cancer; *HNQOL* University of Michigan Head and Neck Quality of Life instrument; *HRQL* health-related quality of life; *IES* Impact of Event Scale; *IIRS* Illness Intrusiveness Rating Scale; *ISEL* Interpersonal Support Evaluation List; *LSAS* Liebowitz Social Anxiety Scale; *MACS* Mental Adjustment to Cancer Scale; *MSAS* Memorial Symptom Assessment Scale; *PDI* Pain Disability Index; *PINQ* Patient Information Need Questionnaire; *POMS-SF* Profile of Mood States-Short Form; *PTCI* Posttraumatic Cognitions Inventory; *PTSD* post-traumatic stress disorder; *RSES* Rosenberg Self-esteem Scale; *SCID-DSM-IV* Structured Clinical Interview for DSM-IV; *SCIP* Satisfaction with Cancer Information Profile; *STAI* State Trait Anxiety Inventory; *UWQOLv4* University of Washington Quality of Life Questionnaire version 4; *WASA* Work and Social Adjustment Scale; *WOC* Worry of Cancer Scale

*No significance testing performed

18 months; and better emotional functioning and less fatigue at 24 months.

However, a number of non-significant results have been reported in other trials. For example, Duffy et al. [31] found an improvement in smoking cessation but no effect of 9–11 CBT telephone sessions on alcohol use or depression, despite having an adequately powered sample of patients who had already screened positive for smoking, alcohol use, or depression ($n = 184$). Similarly, a pilot RCT comparing CBT with non-directive supportive counselling among 35 HNC patients who met criteria for clinical or subclinical cancer-related PTSD, depression, and/or anxiety at time of diagnosis found the two interventions to be equally effective at improving outcomes from baseline to 1-, 6-, and 12-month follow-ups [36].

Two RCTs tested interventions using cognitive behavioural strategies designed to modify illness perceptions [35, 41]. Humphris and Rogers [35] found that patients who had six sessions of the adjustment to the fear, threat, or expectation of recurrence (AFTER) intervention [49] had lower levels of recurrence fears and anxious preoccupation immediately after the completion of sessions. These results were no longer observed 15 months post-treatment, and no difference in general anxiety or depression was found in response to the intervention. In another pilot RCT [41], patients who received three psychologist-led sessions targeting illness perceptions and coping strategies across treatment reported better social HRQL 6 months post-diagnosis compared to those in a standard care control group. However, no differences in global quality of life or distress were found.

The five remaining CBT studies found improvements from pre- to post-intervention [27, 28, 32, 33, 38, 42]. However, two did not include a comparison group [27, 28, 38], and others have significant methodological limitations, including self-selection to participate [42] and inadequate statistical power [33]. Despite the problem of self-selection, Semple et al. [42] found that targeting CBT to patients experiencing high levels of distress was associated with a significant decrease in depression and anxiety, and improvements in social functioning and quality of life after the intervention and again 3 months later; these results were not observed among patients in the standard care comparison group. There has been substantial variation across studies regarding the time at which CBT is provided, with the majority investigating CBT post-treatment (or among heterogeneous samples of patients who are pre-, mid-, or post-treatment).

### Psychoeducation

Psychoeducation is another of the more frequently investigated interventions for patients with HNC, with seven studies identified. Three studies employed a randomised controlled design, and their results suggest that psychoeducation has the potential to improve HNC patient outcomes in the short term. Although the largest RCT examining psychoeducation for patients with HNC assessed outcomes across a yearlong period [34], the only significant differences in outcomes between those in the intervention and standard care groups were noted at 18 weeks; patients in the intervention group had significantly less difficulty with several HNC-specific problems, including swallowing, social eating, and feeling ill. The two other RCTs investigating psychoeducation for patients with HNC only investigated outcomes up to 3 months post-intervention, preventing conclusions regarding the long-term efficacy of this intervention type [29, 37]. Nevertheless, both documented positive effects on outcomes, including self-rated facial disfigurement, depression, and fear and anxiety related to social interaction [29], and knowledge, body image, and disturbance [37].

Of the remaining studies investigating psychoeducation, two found benefits of psychoeducation [27, 28, 30, 33, 48] while two found none [39, 45]. When considering those reporting positive findings, one study had a sample of 14 patients and did not employ formal statistical testing due to the small number of participants [33]. However, D'Souza et al. [30] found that a single session providing tailored information about HNC produced a significantly greater reduction in patient anxiety at 3- and 6-month follow-up relative to standard care.

### Meditation/mindfulness

Two studies have tested interventions incorporating meditation and mindfulness for patients with HNC undergoing radiotherapy [22, 23]. Boxleitner et al. [23] conducted a RCT in which patients were randomly assigned to receive coach-led meditation or self-meditation with a CD over the 6-week radiotherapy treatment period. No differences between the interventions were found with respect to reducing anxiety, depression, or emotional distress. However, only 64% of patients reported regular adherence to meditation, and only 10 patients provided data at final follow-up.

In a pre-post pilot study of a mindfulness intervention, no significant change in mean mindfulness was observed [22]. However, after accounting for participants' baseline mindfulness, higher post-intervention mindfulness was significantly correlated with lower post-intervention psychological distress, including depression and anxiety, higher total quality of life, and better social and emotional well-being. While these results are promising, compliance to the intervention was lower than anticipated and the study participation rate was low. Therefore, it is currently unclear whether patients with HNC have the capacity to engage in mindfulness while managing the severe side effects associated with radiotherapy.

### Group interventions

There is limited evidence to support the use of group therapy in patients with HNC, with only one study conducted to date [43]. This compared 24 patients who self-selected to participate in a HNC support group with 23 patients who did not participate. Patients who participated in the support group reported better HRQL regarding domains of eating, emotion, and pain, as well as lower global bother and a more positive response to treatment. However, no baseline assessment of HRQL occurred prior to the support group taking place. Therefore, pre-existing differences between the two groups may be responsible for the results found.

### Telehealth interventions

Two studies have tested telehealth interventions among patients with HNC [40, 44]. A telehealth messaging device that required patients to respond daily to symptom management algorithms across treatment produced significant improvements in physical and head- and neck-specific HRQL and reduced symptom burden at 3-week follow-up compared to standard care [40]. Similarly, 39 patients who received a comprehensive electronic health information support system following HNC surgery showed significantly improved HRQL in 5 of 22 parameters immediately after the intervention relative to a control group [44]. However, only one of these parameters remained significantly different 6 weeks later. In addition, 20 of the 59 patients eligible for the intervention refused to participate in the study, with more than half citing computer-related concerns as their reason for non-participation.

## Discussion

This systematic review identified 21 studies testing psychological interventions designed to improve adjustment among patients with HNC. A broad range of interventions was examined, including CBT, psychoeducation, meditation/mindfulness, group interventions, and telehealth interventions. The majority of studies investigated CBT and psychoeducation. While these interventions have the most empirical support for improving psychological outcomes in patients with HNC to date, preliminary evidence from pilot studies suggests that a number of additional interventions are worthy of further exploration in this patient group, namely, meditation/mindfulness and telehealth interventions.

Taken together, results of the two adequately powered RCTs investigating CBT suggest that this post-treatment intervention has potential to benefit HNC patients [31, 46, 47]. Future studies employing large samples are needed to confirm this. These studies could also examine whether CBT delivered to patients before or during treatment is beneficial. A review of meta-analyses has supported the efficacy of CBT for a number of problems across diverse populations [50]. Despite this, the evidence base for CBT in patients with cancer is less strong; reviews in this area are limited by threats to internal validity evident in individual studies [51, 52]. The greatest support for CBT is in patients with breast cancer, with a meta-analysis concluding that CBT can reduce distress and pain in this population, particularly when administered individually [53].

Although psychoeducation is one of the most frequently investigated psychological interventions for patients with HNC, only three RCTs were identified [29, 34, 37]. Further RCTs are needed to examine psychoeducation for patients with HNC, with extended follow-up periods in order to establish whether results can be maintained over time. Interventions that can produce long-term benefits for patients with HNC are particularly important in light of evidence that high rates of depression and poor quality of life can be detected in these patients many years after initial diagnosis [2, 8].

Only two studies examining mindfulness/meditation interventions were included in this review. Both studies were associated with significant limitations; they did not allow for comparisons with patients who had not been exposed to mindfulness and were inadequately powered [22, 23]. Small sample sizes associated with these studies were partly attributable to high rates of participant dropout. This suggests that future studies investigating mindfulness need to consider methods for promoting ongoing engagement. It may be that mindfulness is of greater benefit to patients when delivered prior to, or after, HNC treatment. The preliminary evidence suggests that RCTs examining mindfulness would be worthwhile, given positive associations between compliance with the intervention and well-being outcomes. Mindfulness-based interventions have already been identified as superior to standard care in decreasing depression and anxiety among women with breast cancer [54], although the clinical significance of findings is yet to be determined [54].

While only two studies testing telehealth interventions for patients with HNC were identified, results suggest that further research in this area is warranted. Telemedicine initiatives have proven cost-effective and clinically efficacious in a range of illness groups [55], suggesting that additional RCTs with longer follow-up periods should be conducted in patients with HNC.

The quality assessment tool utilised for this systematic review identified several methodological problems inherent in studies examining psychological interventions for patients with HNC. Insufficient reporting of study details, failure to control for confounding variables, and small sample sizes were identified as potential sources of bias. Many studies did not employ a randomised controlled design, instead making use of pre-test post-test (or post-test only) designs with no comparison group or, alternatively, allowing patients to self-select into experimental condition.

In order to improve the quality of future evidence, studies should test psychological interventions for patients with HNC using randomised controlled designs. Power calculations should be conducted prior to recruitment in order to ensure that adequate sample sizes are attained. Targeting interventions to patients experiencing distress is likely to be an effective method for increasing statistical power in this population [42]. It is also important that efforts be made to minimise participant dropout. This could be achieved by providing flexibility with respect to the timing and frequency of intervention sessions, in order to accommodate the severe treatment side effects experienced by HNC patients.

There are limitations associated with this review. First, although the literature search was comprehensive, published intervention studies may have been missed. Publication bias may also have influenced the studies identified, whereby positive findings have been more likely to be published. Three studies were excluded because they were not published in English, which may have led to additional effective interventions being missed. However, there is evidence to suggest that language restrictions do not bias conclusions in reviews of intervention studies [56]. A significant limitation of the CCAT is that there is a recognised element of subjectivity in this quality assessment; the two reviewers responsible for assessing included studies had different ratings prior to resolution of differences through a consensus meeting. Finally, it was not possible to quantify the results of interventions to date (using meta-analytic techniques) because of the broad range of study designs and methodological approaches used.

In conclusion, the evidence base for psychological interventions to promote adjustment and recovery following HNC diagnosis and treatment is growing. Interventions with the

greatest support to date include CBT and psychoeducation although few adequately powered RCTs have been conducted. Given that patients with HNC report an overwhelming need for psychological support [57], further research is needed to investigate the long-term effects of interventions for this population. In particular, mindfulness and telehealth approaches are worthy of exploration.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no competing interests.

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