Body image and depressive symptoms in patients with head and neck cancer: an important relationship

Bethany A. Rhoten · Jie Deng · Mary S. Dietrich ·
Barbara Murphy · Sheila H. Ridner

Received: 13 November 2013 / Accepted: 1 June 2014
© Springer-Verlag Berlin Heidelberg 2014

Abstract

Purpose The purpose of this study is to examine the relationship between body image and depressive symptoms in patients who have been treated for head and neck cancer.

Methods This is a prospective, longitudinal analysis. Body image and depressive symptoms were measured in patients diagnosed with head and neck cancer at baseline, end of treatment, 6 weeks post-treatment, and 12 weeks post-treatment. Body image was measured using the Body Image Quality of Life Inventory, and depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale.

Results Forty-three individuals diagnosed with head and neck cancer participated in this study. The majority of participants were male, Caucasian, and married or living with a partner. Participants ranged from age 32 to 78 years ($M=57.8$ years, $SD=10.5$ years). At 12 weeks post-treatment, body image scores were statistically significantly higher than they were at the end of treatment ($p=0.016$) and 6 weeks post-treatment ($p=0.032$). Statistically significant increases in levels of depressive symptoms were observed at the end of treatment ($p<0.001$) and 6 weeks post-treatment ($p=0.036$) with a return to baseline by the 12-week post-treatment assessment ($p=0.115$). Body image and depressive symptoms were statistically significantly associated at the end of treatment, 6 weeks post-treatment, and 12 weeks post-treatment (r_s -0.32 to -0.56 , $p<0.05$).

Conclusions This study supports early assessment of body image in patients with head and neck cancer. Additionally, the association between poorer body image and increased depressive symptoms is key in understanding the symptom clusters that patients with head and neck cancer experience.

Keywords Body image · Head and neck cancer · Depressive symptoms · Quality of life · Disfigurement

Introduction

Background

Patients with head and neck cancer (HNC) have a high potential for body image disturbance, given the highly visible location of the disease and targeted treatments, both of which can cause significant disfigurement. Body image can be described as the subjective picture of one's own physical appearance established by both self-observation and by noting the reactions of others [1]. Changes in body image can occur for a variety of reasons. In order to understand body image in patients with HNC, body image must be discussed with an appreciation of associated factors [2]. Body image disturbance, specifically in head and neck cancer patients, is a multidimensional concept that may include disfigurement, psychological distress, and a loss of function [2]. Disfigurement is often considered in the context of body image disturbance experienced by patients with HNC. For example, individuals with HNC-related disfigurement have a visibly changed appearance and shape related to the disease or its treatment. Disfigurement, however, is distinguishable from body image disturbance as it refers to something that spoils the appearance or completeness of a person and is not necessarily an individual's subjective picture of themselves [3]. Disfigurement in patients with HNC may be caused by

B. A. Rhoten (✉) · J. Deng · M. S. Dietrich · S. H. Ridner
Vanderbilt University School of Nursing, 600A Godchaux Hall, 461
21st Avenue South, Nashville, TN 37240, USA
e-mail: bethany.rhoten@vanderbilt.edu

M. S. Dietrich
Vanderbilt University School of Medicine, Nashville, TN, USA

M. S. Dietrich · B. Murphy
Vanderbilt-Ingram Cancer Center, Nashville, TN, USA

surgery or radiation therapy. Surgical excision of a tumor may involve removal of nerves, vasculature, soft tissue, and bone [4]. Extensive resections may result in highly visible surgical incisions, changes in facial shape, and alterations in the ability to elicit facial expressions critical to normal non-verbal communication [4]. Patients may require bone grafting, skin grafting, free or pedicle flaps, and metal hardware for reconstruction [4]. Although these techniques may lessen the disfigurement, they are potentially disturbing to patients. Surgical procedures that are particularly psychologically intrusive include total laryngectomy, orbital exenteration, and midface resection that extirpates the nose [4].

Although less well studied, radiation therapy also may affect physical appearance. Radiation therapy may result in tissue swelling (lymphedema) and fibrosis [4]. These processes affect normal tissue contours causing changes in facial features, pigmentation, and facial asymmetry. Lymphedema, and the potential for facial disfigurement, is more prevalent than previously thought. For example, 75.3 % of 81 HNC patients had some form of late-effect lymphedema [5]. Radiation may result in alteration of skin texture, color, and elasticity [4]. This is prominent in African-Americans where radiation may dramatically contribute to discoloration within the radiation port. Radiation also may result in salivary gland hypofunction and subsequent development of dental caries [4]. A high percentage of patients with radiation-induced dental caries will require dental extraction [4]. Loss of teeth may lead to marked alterations in appearance and asymmetry. Although the use of dentures may ameliorate this problem, hyposalivation leads to decreased use of dentures because of discomfort and poor retention [4]. Thus, standard treatment modalities for HNC place patients at high risk for facial disfigurement and resultant disturbed body image.

Although disturbed body image has been associated with depression prior to treatment in a cross-sectional study of patients with HNC [6], it is important to examine body image and depressive symptoms in this population after treatment has been completed. In addition, several studies have shown that psychosocial distress occurs for some patients treated for HNC after treatment [7–9]. One of the more common symptoms of psychosocial distress is depression. Depressed affect, lack of positive affect, somatic activity, and interpersonal aspects of depression are four categories of depressive symptoms. The presence of these symptoms does not necessarily indicate that an individual has clinical depression. The presence of multiple symptoms, however, indicates further evaluation of an individual for depression may be warranted. Although not studied in this population, one possible explanation for the depression experienced by patients is the feelings of loss associated with a changed appearance.

Few studies are available that examine the potential relationship between body image and depressive symptoms in patients who had been treated for HNC. Studying the potential

relationship between these variables could provide evidence for timely assessment of body image and depressive symptoms as well as prompt early intervention when needed. It is also important to examine the differences in body image in patients who have varying levels of baseline depressive symptoms. Information regarding the relationship between body image and depressive symptoms is needed to better inform the clinical practice of health care professionals working with patients with HNC.

Purpose

The purpose of this study is to examine the relationship between body image and depressive symptoms in patients who have been treated for HNC. The conceptual framework utilized for this study has been previously described [2] and is shown in Fig. 1 [2]. Although not examined in this paper, this hypothesized conceptual framework shows the possible influence of patient characteristics such as age, gender, previous body image experiences, social factors such as marital status and other support systems, and environmental factors such as culture and community on body image. It also proposes that various social outcomes, psychological outcomes, and overall quality of life will be influenced by body image. Based on this framework, it is hypothesized that individuals with greater depressive symptoms will also have poorer body image.

Materials and methods

This is a secondary analysis of data obtained during the conduct of a larger primary study designed to examine the development, nature, progression, and prevalence of late-

Fig. 1 Conceptual framework for understanding body image in patients with head and neck cancer [2]

effect fibrosis and/or lymphedema as well as biological correlates and psychological stressors in patients with HNC. For this secondary analysis, the authors examined the relationship between body image and depressive symptoms in patients with HNC prior to treatment, at the end of treatment, as well as 6 and 12 weeks post-treatment.

Sample

For the primary study, 100 participants were recruited over 25 months from newly diagnosed patients with HNC undergoing treatment at Vanderbilt-Ingram Cancer Center (VICC). Of the 100 subjects enrolled in the parent study, a convenience subsample of 50 participants was followed prospectively in this substudy. Enrolled participants had to meet the following eligibility criteria: (1) newly diagnosed, histologically proven carcinoma involving the head and neck; (2) stage II tumor or greater; (3) age 21 or older; (4) willing and able to undergo baseline and follow-up assessment at the VICC; and (5) able to speak English. Exclusion criteria for continuation in the study included the following: (1) documented cognitive impairment that would preclude the ability to provide informed consent; (2) unwilling to undergo routine follow-up at the VICC; and (3) recurrent cancer. No restriction was placed on the type of treatment participants received for inclusion in the study.

Procedure

All study protocols were approved by the Vanderbilt Institutional Review Board and the VICC Scientific Review Committee. For the primary study, participants provided informed consent prior to beginning treatment for HNC. After providing informed consent, participants completed study measures at specified intervals, baseline (prior to radiation and/or chemotherapy), end of HNC treatment, 6 weeks post-treatment, and 12 weeks post-treatment. Demographic and medical history information as well as disease and treatment characteristics were also collected with permission from the participant's medical record.

Measures

Demographic and clinical information included age, gender, race, highest grade of education, marital status, employment status, residence, smoking history, alcohol history, insurance, medical problems, and household income. Disease and treatment information included diagnosis date, type of tumor, stage, surgery characteristics, radiation therapy details, and chemotherapy details.

Body image was measured using the Body Image Quality of Life Inventory (BIQLI). The BIQLI was developed to quantify the effects of one's own body image on various

self-experiences and life contexts [10]. The BIQLI is a 19-item instrument whose items reflect domains or contexts in which body image has been found to be consequential [10]. Participants rate the impact of their own body image on each of the 19 areas, using a 7-point bipolar scale from -3 to +3, thereby permitting reports of negative, positive, or no impact [10]. Overall impact of body image can be determined by averaging the scores of all items. Initial validation of this instrument in healthy individuals revealed a Cronbach's alpha of 0.95 [10]. The Cronbach's alpha of the scores in this study was 0.97.

Depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D). The CES-D is a 20-item instrument that was designed to measure current level of depressive symptomatology, with emphasis on the affective component, depressed mood [11]. The symptoms are among those on which a diagnosis of clinical depression is based but which may also accompany other diagnoses to some degree [11]. Each item is scored 0 "less than 1 day," 1 "some or a little of the time (1–2 days)," 2 "occasionally or a moderate amount of time (3–4 days)," or 3 "most or all of the time (5–7 days)" [11]. Four items are reverse scored [11]. Subsequently, the individual item scores are summed to arrive at a total score ranging from 0 to 60, with higher scores indicating more depressive symptoms. For the purposes of this study, participants who scored a total of ≥ 19 met criteria for further evaluation, and a referral was made to the participant's medical oncologist.

Data analysis

Analyses were conducted using SPSS version 22. Frequency distributions were used to summarize the nominal- and ordinal-level demographic and clinical variables, as well as the proportion of individuals above or below the clinically significant level of depressive symptoms on the CES-D. Means and standard deviations summarized the normally distributed age and Body Image Quality of Life Inventory (BIQLI) scores. The CES-D distributions were positively skewed and thus summarized using medians, as well as 25th to 75th interquartile ranges (IQR). Group-level patterns of change in BIQLI and CES-D from baseline to 12 weeks post-treatment were investigated using mixed level general linear models (GLM) incorporating generalized estimating equations (GEE). Spearman Rho correlations were used to generate the associations between the BIQLI and CES-D raw scores. Furthermore, BIQLI and CES-D score trajectories were generated for each individual. The linear and quadratic (change in linear slope) values of each individual's set of BIQLI and CES-D trajectories were then correlated using Spearman Rho coefficients. Spearman Rho correlations were also used to correlate the linear and quadratic descriptors of

individual BIQLI and CES-D with baseline CES-D scores. Tests of statistical significance maintained a maximum alpha of 0.05 ($p < 0.05$).

Results

Fifty participants were recruited from the primary study for completion of the additional body image measures. For inclusion in the analysis sample for this study, the participant needed to have completed the BIQLI and CES-D measures at baseline and at least two of the possible three subsequent assessments between end of treatment and 12 weeks post-treatment. Of those 50 enrolled participants, 43 met those analysis requirements and are reported on below. There were no clinically significant and only one statistically significant difference in the characteristics or the baseline CES-D/BIQLI scores of those included in the analysis sample and those not ($N=7$). None of the seven (100 %) had any type of neck dissection, while 61 % ($N=26$ of 43) did have a dissection surgery ($p=0.041$).

Sample characteristics

Demographic characteristics of the sample ($N=43$) are shown in Table 1. Participants ranged from age 32 to 78 years ($M=57.8$ years, $SD=10.5$ years). The majority of participants were male ($n=31$, 72 %), Caucasian ($n=39$, 91 %), and married or living with a partner ($n=36$, 84 %). Most participants had at least a high school education ($n=38$, 88 %), and 42 % ($n=18$) were employed full time at the beginning of the study. The majority of participants had a history of tobacco use ($n=29$, 58 %) and alcohol use ($n=25$, 58 %). Approximately one third of participants had an annual household of less than or equal to \$30,000 ($n=14$, 32 %).

The disease and treatment characteristics are summarized in Table 2. The most frequent tumor location for participants was the oropharynx ($n=18$, 42 %). The majority of participants had tumor stage of stage III or above ($n=41$, 95 %). Although individuals with stage I tumors were excluded from this study because of significant differences in the standard course of treatment, one individual's initial pathology was graded as stage II and later reversed to stage I after participation in the study had begun. Most participants had a squamous cell carcinoma type of tumor ($n=34$, 79 %), and 40 % ($n=17$) had an HPV-related tumor. All participants had undergone some type of radiation treatment, and the majority had concurrent chemotherapy ($n=42$, 98 %). Forty-nine percent of participants ($n=21$) had surgery as part of their treatment, and of those, the most common surgical procedure was a radical neck dissection ($n=17$, 81 %). Almost half of the participants had a PEG tube at some point after the end of treatment ($n=20$, 47 %).

Table 1 Demographic characteristics

Characteristic	N (%), N=43
Sex	
Male	31 (72.1)
Female	12 (27.9)
Race	
White	39 (90.7)
Black	2 (4.7)
Asian	2 (4.7)
Education level	
<12th grade	5 (11.6)
≥12th grade	38 (88.4)
Marital status	
Single/widowed/other	7 (16.3)
Married/live with partner	36 (83.7)
Employment status	
Employed full time	18 (41.9)
Employed part time	2 (4.7)
Retired	12 (27.9)
Unemployed	9 (20.9)
Other	2 (4.7)
Insurance status	
Medicare	9 (20.9)
Medicaid	2 (4.7)
Private insurance	24 (55.8)
None	5 (11.6)
Other	3 (7.0)
Household income	
≤30,000	14 (32.6)
>30,000	24 (55.8)
Do not care to respond	5 (11.6)
Smoking (any current or past use)	
Yes	29 (67.4)
No	14 (32.6)
Alcohol (any current or past use)	
Yes	25 (58.1)
No	18 (41.9)
Mean (SD)	
Age (years)	57.8 (10.5)
Min, max	31.8, 78.2

Body image and depressive symptoms

BIQLI scores at each respective time of assessment are summarized in Table 3. Median body image for the sample was positive at each assessment point; however, there were participants with negative body image scores at each assessment point. There was a statistically significant quadratic pattern of change between baseline and 6–12 weeks post-treatment (Wald $\chi^2_{(df=3)}=8.22$, $p=0.042$). At 12 weeks post-treatment,

Table 2 Clinical and treatment characteristics

Characteristic	N (%), N=43
Tumor location	
Nasal cavity	1 (2.3)
Paranasal sinuses	1 (2.3)
Oral cavity	9 (20.9)
Nasopharynx	3 (7.0)
Oropharynx	18 (41.9)
Larynx	5 (11.6)
Salivary gland	5 (11.6)
Other	1 (2.3)
Tumor TNM stage	
Stage I	1 (2.3)
Stage II	1 (2.3)
Stage III	9 (20.9)
Stage IVa	28 (65.1)
Stage IVb	4 (9.3)
Type of tumor	
Squamous cell carcinoma	34 (79.1)
Other	9 (20.9)
HPV-related tumor	
Yes	17 (39.5)
No	26 (60.5)
Surgery	
Yes	21 (48.8)
Neck dissection	17 (81.0)
Any other surgery	21 (100.0)
No	22 (51.2)
Tracheotomy	
Yes	9 (20.9)
No	34 (79.1)
PEG	
Yes	20 (46.5)
No	23 (53.5)

body image scores were statistically significantly higher than they were at the end of treatment ($p=0.016$) and 6 weeks post-treatment ($p=0.032$), as well as within the range of those observed at baseline ($p=0.085$) (see Fig. 2).

CES-D scores at baseline and each time of assessment up to 12 weeks post-treatment are also summarized in Table 3. As a whole, depressive symptoms were relatively low at baseline (median=10.0), almost doubling by the end of treatment (median=17.0) with a gradual subsequent decrease. While this overall pattern over the course of treatment was not statistically significant, there was a statistically significant interaction effect of time of assessment with the level of depressive symptoms at baseline (Wald $X^2_{(df=7)}=17.80$, $p=0.013$, see Fig. 2). Within the set of participants who had baseline CES-D scores above the clinically significant level of 19 ($N=11$, 25.6 %), there was a statistically

Table 3 Summaries of BIQLI and CES-D scores

Scale	Baseline	EOT	6 weeks post	12 weeks post
BIQLI				
Mean	0.60	0.43	0.52	0.92
SD	1.13	1.14	1.36	1.21
Min, max	-2.0, +3.0	-2.0, +3.0	-2.0, +3.0	-1.0, +3.0
N	43	41	40	40
CES-D				
Median	10.0	17.0	14.7	13.0
25th to 75th IQR	8.0–19.0	11.0–24.5	5.0–24.5	6.3–21.8
Min, max	0, 43	2, 42	0, 52	0, 44
N (%)>=19 ^a	11 (25.6)	18 (43.9)	17 (41.5)	13 (35.8)
N	43	41	41	40

Every case had to have a baseline score and either a 6 weeks or 12 weeks post-treatment score for inclusion in the analysis ($N=43$). As can be seen, most cases had both assessments

EOT end of treatment

^a Criteria for further evaluation

significant quadratic effect of treatment (Wald $X^2_{(df=3)}=25.28$, $p<0.001$). Statistically significant increases in levels of depressive symptoms were observed at the end of treatment ($p<0.001$) and 6 weeks post-treatment ($p=0.036$) with a return to baseline by the 12-week post-treatment assessment ($p=0.115$). Mirroring the pattern observed with the BIQLI scores, statistically significant increases in levels of depressive symptoms were observed at the end of treatment ($p<0.001$) and 6 weeks post-treatment ($p=0.036$) with a return to baseline by the 12-week post-treatment assessment ($p=0.115$). Within the group without clinically significant depressive symptoms at baseline (CES-D<19, $N=32$, 74.4 %), there was no statistically significant change in those symptom levels throughout the study time period (Wald $X^2_{(df=3)}=3.27$, $p=0.352$).

Overall associations between body image and depressive symptoms at each time of assessment are shown in Table 4. Other than at baseline, the associations were inverse and statistically significant (r_s -0.32 to -0.56, $p<0.05$). As shown in Fig. 2, it appears that particularly in those participants with initially low levels of baseline depressive symptoms, the trajectory patterns of BIQLI and CES-D were mirror images of each other. To test this hypothesis, each participant's trajectory was modeled to arrive at the best fit linear and quadratic component for that particular trajectory. If a person's trajectory was best modeled as a straight line (e.g., high at the beginning and decreasing at each time of assessment), then the equation for that line would contain a large linear value but a very small quadratic value. On the other hand, if a person's trajectory was "U" or "inverse U" shaped, then the linear value for their line might be rather small but the quadratic component would be rather large. Subsequently, the linear and

Fig. 2 Patterns by baseline CES-D group

quadratic values for the BIQLI trajectories were correlated with the respective linear and quadratic values for the CES-D trajectories. We expected that a linearly decreasing trajectory of depressive symptoms would be associated with a linearly increasing trajectory for body image (and vice versa). This hypothesis was confirmed. A statistically significant inverse correlation was observed between the linear components of each trajectory ($r_s -0.45$, $p=0.002$). Furthermore, evidence for the “lock step” quadratic patterns of the two variables, particularly observed in the participants with low baseline CES-D scores, the correlation between the quadratic components of those trajectories was also statistically significant ($r_s -0.39$, $p=0.010$).

Discussion

This paper examined the relationship between body image and depressive symptoms in patients who have been treated for HNC. Body image and depressive symptoms were significantly inversely associated at the end of treatment, 6 weeks post-treatment, and 12 weeks post-treatment.

Table 4 Associations between BIQLI and CES-D

Baseline	EOT	6 weeks post	12 weeks post
-0.13 (0.425)	-0.34 (0.031)	-0.49 (0.001)	-0.56 (<0.001)
43	41	40	40

Values in the cells are Spearman's Rho correlations (p value)

Sample

Demographic characteristics in this study were similar to that of other studies reported in the literature as well as that of the population [4, 6, 12–16].

Body image and depressive symptoms

A previous cross-sectional study of pretreatment body image in patients with HNC showed low body image concerns [6]. Similarly, median body image for the sample in this study was positive at baseline. Although median body image for the sample was positive at each assessment point, there were participants with negative body image scores at each assessment point indicating that body image is problematic for some patients with HNC. No known studies have assessed body image in patients with HNC longitudinally utilizing a body image-specific measure [2]. However, one retrospective post-treatment study indicated that patients treated for HNC are less satisfied with their appearance after treatment [17]. This finding is similar to our study findings that end-of-treatment body image scores were statistically significantly poorer than those at 6 and 12 weeks post-treatment. Our unique longitudinal study showed the change in body image over time in patients recovering from HNC treatment. Body image scores were statistically significantly higher at 12 weeks post-treatment than they were at the end of treatment as well as 6 weeks post-treatment, indicating that the time between the end of treatment and 12 weeks post-treatment is a critical time for body image improvement. The exact reasons for the timing of this improvement are unknown, but it could be that as patients with HNC complete treatment, their body image improves as a result of their reintegration into a

more “normal” or an adaptation to a “new normal” life. This reintegration is thought to be moderated by a number of factors and is broadly depicted in the conceptual framework used for this study. Identification of specific factors that affect body image in the recovery period for patients with HNC is needed to further refine this framework.

There is limited longitudinal data on depressive symptoms in patients with HNC. An Australian study that assessed patients at baseline, end of treatment, and 18 months post-treatment found that the number of depressed patients increased from baseline to the end of treatment and decreased at 18 months post-treatment [8]. Similarly, a Chinese study that assessed patients with HNC at baseline, during treatment, and 3 months and 6 months post-treatment also showed a decrease in mood disturbance as patients progressed through those assessment points [18]. Our study had similar findings in that depressive symptoms were the greatest at the end of treatment with a subsequent decrease at 6 and 12 weeks post-treatment. This is the only known longitudinal study conducted in the USA to examine depressive symptoms in patients with HNC using the CES-D.

Our findings reflect the intensity of HNC treatment experienced by many participants. It is not surprising that depressive symptoms are the greatest and body image is poorest at a time when participants have just completed concurrent chemoradiation, given the unrelenting physical and emotional burden of this treatment. Although a few studies have examined the relationship between body image and psychological distress or well-being, no known studies have evaluated the relationship between body image and depressive symptoms in patients with HNC. Thus, our study identified that an increase in depressive symptoms was consistently associated with poorer body image (Table 4). These findings are similar to Fingeret et al.’s [6] study where poorer body image was associated with psychological distress (BSI-18) and Fingeret et al.’s [12] study where poorer body image was associated decreased well-being. Additionally, supporting the association of body image and depressive symptoms, the trajectory patterns of body image and depressive symptoms in this study were mirror images of each other. The association of these variables also supports the conceptual framework by describing the nature of the relationship between body image and depressive symptoms. The identification of this relationship indicates that body image and depressive symptoms are linked, even months after treatment.

Strengths

The demographics of the sample used for this study suggest that participants are representative of patients with HNC with respect to the characteristics mentioned above. This study is the first known study to examine the relationship between body image and depressive symptoms longitudinally in the

HNC disease/treatment/recovery trajectory. Additionally, body image and depressive symptoms have been described for participants at similar time points in the HNC disease/treatment/recovery trajectory, thus yielding important clinical information about patients with HNC, particularly in the 12 weeks following the end of treatment.

Limitations

The small sample size of this study and variation in treatment modalities are notable limitations. Although the sample was demographically similar to that of other studies, the changing demographics of patients with HNC make it important to include younger patients and females in research studies, particularly those assessing supportive care issues in future studies. Another limitation of this study is that causality is not established. It is unclear at this time whether poorer body image influences depressive symptoms or whether an increased number of depressive symptoms contribute to poorer body image. It is also unclear if depressive symptoms are an outcome of poorer body image or if poorer body image is an outcome of an increase in depressive symptoms. It is, however, clear that body image and depressive symptoms are associated in patients with HNC. Additionally, clarifying the directionality of this relationship and identifying specific moderating variables will also enhance the conceptual framework.

Clinical implications

The new findings from this study further support early assessment of body image in patients with HNC. Because patients with poorer baseline body image also have higher levels of depressive symptoms, it is important that these patients be identified early and monitored for changes throughout the recovery period. Additionally, the association between poorer body image and depressive symptoms is key in understanding the symptom clusters that patients with HNC experience. Identifying poor body image and the presence of depressive symptoms early increases the likelihood of effective intervention.

Future research

Future research is needed to clarify the directionality of the relationship between body image and depressive symptoms. In addition, clarifying the impact of patient characteristics, social factors, and environmental factors on an individual’s body image will assist researchers in predicting which patients might have poorer body image. Future research is also needed to examine other concepts or factors associated with body image in this population. A better understanding of body image and the associated factors in patients with HNC will inform the development of targeted interventions that have the potential to increase overall well-being in this patient population.

Acknowledgments This research was supported by the National Institutes of Health 1R01CA149113-01A1, American Cancer Society DSCN-12-202-01-SCN, and National Center for Research Resources 1UL1RR024975. The authors thank Dr. Jill Gilbert for assisting with study recruitment. The authors also acknowledge Dr. Thomas Cash who created the Body Image Quality of Life Inventory.

Conflict of interest The authors have no conflicts of interest to declare.

References

- Merriam-Webster (2013) Body image. <http://www.merriam-webster.com/medical/bodyimage>. Accessed 4 Nov 2013
- Rhoten B, Murphy B, Ridner S (2013) Body image in patients with head and neck cancer: a review of the literature. *Oral Oncol* 49:753–760. doi:10.1016/j.oraloncology.2013.04.005
- Merriam-Webster (2013) Disfigure. <http://www.merriam-webster.com/dictionary/disfigurement>. Accessed 4 Nov 2013
- National Cancer Institute (2012) Head and neck cancer: treatment. <http://www.cancer.gov/cancertopics/treatment/head-and-neck>. Accessed 4 Nov 2013
- Deng J, Ridner S, Dietrich M, Wells N, Wallston K, Sinard R, Cmelak A, Murphy B (2012) Prevalence of secondary lymphedema in patients with head and neck cancer. *J Pain Symptom Manag* 42(2): 244–252. doi:10.1016/j.jpainsymman.2011.03.019
- Fingeret M, Vidrine D, Reece G, Gillenwater A, Gritz E (2010) Multidimensional analysis of body image concerns among newly diagnosed patients with oral cavity cancer. *Head Neck* 32:301–309. doi:10.1002/hed.21181
- Buchman L, Conlee J, Hunt J, Agarwal J, White S (2013) Psychosocial distress is prevalent in head and neck cancer patients. *Laryngoscope* 123(6):1424–1429. doi:10.1002/lary.23886
- Neilson K, Pollard A, Boonzaier A, Corry J, Castle D, Smith D, Trauer T, Couper J (2013) A longitudinal study of distress (depression and anxiety) up to 18 months after radiotherapy for head and neck cancer. *Psycho-Oncol* 22(8):1843–1848. doi:10.1002/pon.3228
- Gil F, Costa G, Hilker I, Benito L (2012) First anxiety, afterwards depression: psychological distress in cancer patients at diagnosis and after medical treatment. *Stress Health* 28(5):362–367. doi:10.1002/smi.2445
- Cash T, Fleming E (2002) The impact of body image experiences: development of the body image quality of life inventory. *Int J Eat Disord* 31:455–460. doi:10.1002/eat.10033
- Radloff L (1977) The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1(3):385–401. doi:10.1177/014662167700100306
- Fingeret M, Yuan Y, Urbauer D, Weston J, Mipomnick S, Weber R (2011) The nature and extent of body image concerns among surgically treated patients with head and neck cancer. *Psycho-Oncol* 21: 836–844. doi:10.1002/pon.1990
- Hagedoom M, Molleman E (2006) Facial disfigurement in patients with head and neck cancer: the role of social self-efficacy. *Health Psychol* 25(5):643–647. doi:10.1037/0278-6133.25.5.643
- American Cancer Society (2012) Cancer facts & figures 2012. American Cancer Society, Atlanta
- Katre C, Johnson I, Humphris G, Lowe D, Rogers S (2008) Assessment of problems with appearance following surgery for oral and oro-pharyngeal cancer using the University of Washington appearance domain and the Derriord appearance scale. *Oral Oncol* 44: 927–934. doi:10.1016/j.oraloncology.2007.12.006
- Katz M, Irish J, Devins G, Rodin G, Gullane P (2003) Psychosocial adjustment in head and neck cancer: the impact of disfigurement, gender, and social support. *Head Neck* 25:103–112. doi:10.1002/hed.10174
- Liu H (2008) Changes of satisfaction with appearance and working status for head and neck tumour patients. *J Clin Nurs* 17:1930–1938. doi:10.1111/j.1365-2702.2008.02291.x
- Yang H, Wang L, Chang J, Fang F (2013) The health-related quality of life and bio-psycho-social adaptation effects in patients with head and neck cancer: a longitudinal study. *Hu li za zhi J Nurs* 60(5):41–52. doi:10.6224/JN.60.5.41