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Instrument translation and initial psychometric evaluation of the Danish Body Image Quality
of Life Inventory

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ABSTRACT

Rationale and objectives: Negative body perception has been reported in a number of patient populations. No instrument in Danish for measuring body image related concerns has been available. Without such an instrument, understanding of the phenomenon in Danish speaking populations is limited. The purpose of the study was thus to translate and validate a Danish version of the Body Image Quality of Life Inventory (BIQLI), in order to obtain a valid instrument applicable for health care research.

Methods: The study consisted of two phases: i) Instrument adaptation, including forward and back translation, expert committee comparisons and cognitive interviewing, and ii) empirical testing of the Danish version (BIQLI-DA) with subsequent psychometric evaluation.

Hypothesized correlations to other measures, including Body Mass Index (BMI), Medical Outcome Short Form 8 (SF-8), Patient Health Questionnaire-9 (PHQ-9), General Anxiety Disorder-7 and Symptom Check List-90-Revised (SCL-90-R[®]) were tested. In addition exploratory factor structure analysis (EFA) and internal consistency on item and scale level were performed.

Results and study limitations: The adapted instrument was found to be semantically sound, yet concerns about face validity did arise through cognitive interviews. Danish college students (n=189, 65 men, $M_{\text{age}} = 21.1$ years) participated in the piloting of the BIQLI-DA. Convergent construct validity was demonstrated through associations to related constructs. Exploratory factor analysis revealed a potential subscale structure. Finally, results showed a high internal consistency (Cronbach's alpha = 0.92). Support for the validity of the BIQLI-DA might have been strengthened by repeating cognitive interviews after lay-out alterations, by piloting the instrument on a larger sample.

Conclusions: This study demonstrated tentative support for the validity of the Danish Body Image Quality of Life (BIQLI-DA), and found the measure to be reliable in terms of internal consistency. Further exploration of response processes and construct validity is needed.

INTRODUCTION

Body image (BI) can be defined as a subjective picture of one's own physical appearance established both by self-observation and by noting the reactions of others (1). Poor BI has been found to be associated with greater body dissatisfaction, more strongly internalized cultural beauty standards and greater adiposity, particularly in women (2-4). Strong relationships between BI and different psycho-emotional traits, such as self-esteem (3-5), perceived social support (3), perceived stress and psychological symptoms (4,5), as well as numerous eating disorder and body image related traits (3,4) have also been identified.

Different tools measuring dissatisfaction with body image can be used. Many of these focus predominantly on appearance, and has been developed and used for persons with an eating disorder and/or body dysphoria, such as the Body Image Ideals Questionnaire (BIQ)(6), Situational Inventory of Body Image Dysphoria (SIBID)(7), Appearance Schemas Inventory (ASI)(8), Multidimensional body-self Relations Questionnaire (MBSRQ)(9), Sociocultural Attitudes towards Appearance Questionnaire (SATAQ)(10) and the Objectified Body Consciousness Scale (OBCS)(11).

Most diseases cause bodily changes, whether they are temporary, recurrent or chronic. The changes may be visible or invisible, physical or psychological and body image concerns occur independently of medical diagnosis (12). Negative body perception has been reported in a number of patient populations, such as those affected by cardiac diseases (13,14) and cancer (15,16). Investigating the phenomenon in Danish patient populations is relevant in order to ascertain knowledge about how BI may change during illness, possible associations to adverse outcomes and identify interventions to improve these. The Body Image Quality of Life Inventory (BIQLI) is a measure intended to quantify the influence of one's body image experiences on multiple relevant facets of psychosocial functioning and well-being in

everyday life (3). Therefore, this instrument was considered relevant for patient populations, as it focuses not only upon appearance, but also the functioning and wellbeing related to a possibly altered body. The instrument was assumed to also be useful for future studies in relation to clinical nursing, as it is considered to be generic and, thus, measurements across a lifespan, different illnesses and during a specific illness trajectory can be compared. The BIQLI was developed in a preliminary version in 1997 by the American psychologist Thomas F. Cash, who has worked extensively with the concept of body image. In 2002, a revised inventory was empirically evaluated on female college students. Subsequently the instrument was validated further for utilization on both genders,(3) and on a wider range of age groups (17). Furthermore, the BIQLI has been used in various patient populations (5,18-23), indicating its applicability in health care research.

Until now, no instrument in Danish for measuring body image related concerns has been available. Since health care research in Denmark is ever-growing, the need for validated questionnaires in Danish is increasing. Therefore, the objectives of this study were to (i) translate the Body Image Quality of Life Inventory into Danish and (ii) assess the validity and reliability of the Danish version.

METHODS

The study consisted of three phases (Figure 1). The first phase was the translation and adaptation process, which consisted of five steps: (1) forward translation; (2) expert committee consensus, (3) back translation, (4) research group consensus and (5) cognitive interviewing. The second phase was the empirical testing and psychometric evaluation of the adapted Danish version (BIQLI-DA) on a Danish sample population. The third phase was testing instrument performance on a patient population sample. The present paper reports

solely on the two first phases. A separate paper reports the findings of the testing of the BIQLI-DA on a sample of patients treated for infective endocarditis (Figure 1).

Phase I: Translation, cognitive interviewing and adaptation.

The aim of the translation process was to produce a measure which was semantically equivalent to the original instrument and which was comprehensible to respondents.

Forward translation, expert committee comparisons, back translation and research group comparisons.

Forward and back translation and expert committee comparisons were conducted as recommended in the literature (24,25). First four translators, proficient in both Danish and English (two native English speakers, with a nursing background, one native Danish speaker, and a professional translator) independently translated the instrument from the source language English into the target language Danish (1st Danish Versions). Secondly an expert committee, consisting of one Ph.D. student, one external professional translator, three senior health care researchers and three college students, met to systematically compare the four Danish BIQLI versions with the original English version. Differences were discussed and consensus reached on a 2nd Danish version, which was used for the back translation. Thirdly, two native Danish speaking professional translators independently performed the back translation into English. Finally, the research group compared the original English version, the 2nd Danish version, and the two back translated English versions and consensus was reached maintaining the 2nd Danish version with no additional alterations for further testing in cognitive interviews.

Cognitive interviewing

Face validity refers to whether an instrument *appears* to measure the intended construct (26).

We explored face validity by cognitive interviewing (27,28). The aim was to investigate how

translated questions were understood by respondents, and whether the questions seemed to capture the intended scientific construct. These cognitive interviews served the purpose of pre-testing the questionnaire.

As recommended, a sample analogous to the population of initial validation studies, being college students, was sought (27). Participants were four women and two men with a mean age of 23 (range 21-28), all enrolled in a nursing college in Copenhagen. Participants were informed about study purpose, as well as voluntary participation and anonymity. Individual interviews were conducted in November 2012 by two researchers from the research team, who both have prior experience interviewing. The main interviewing techniques used were thinking aloud and probing (27). Each question on the BIQLI-DA was read out loud by the interviewer. The participant was then asked to explain in his/her own words what he/she thought he/she was being asked (thinking aloud), by rephrasing the question, and explaining the thought process behind the answer. Probes were used to facilitate elaboration, for example asking “What do you think this question means?” or “How did you decide upon your answer?” Lastly the participant was asked about his/her general opinion on questions related to the instrument and the issue of body image in general. Analysis included a summarizing of respondents’ interpretation of items, identification of types of problems, analysis of item summaries and decision making about items (29) prior to the adaptation of the final Danish version.

Phase II: Empirical testing and psychometric evaluation.

The quality of a measure is typically assessed by the psychometric properties relating to validity and reliability (27,30). Validity refers to the extent to which the items of an instrument and/or its subscales reflect the intended construct or phenomenon (30). We assessed the validity of the adapted BIQLI-DA by examining hypothesized correlations to

other measures and exploratory factor structure analysis (EFA). Reliability refers to the consistency, stability and dependability with which an instrument measures the intended construct or phenomenon (26). We assessed the reliability of the BIQLI-DA by examining the internal consistency of the scale.

Participants for hypotheses-testing and assessment of validity and reliability

Data were collected in February 2013. A total of 192 students from nursing and technical colleges in the Copenhagen area in Denmark completed the questionnaire package anonymously. Participants were approached by researchers in their classrooms and were informed of study purpose and procedure as well as voluntary participation and anonymity. Students had the option to submit their name in a separate box after returning the questionnaire and 20 participants were randomly selected to receive a gift certificate of 50 USD (275 DKK.). Three participants aged 30 or older were excluded from data analysis, as their age deviated too far from the original target population. Hence, the sample consisted of 189 participants, 65 of which were men (34%) and 124 women (66%). Age ranged from 16 to 29 years ($M = 21.1$, $SD = 3.5$). The average body mass index ($BMI = k/m^2$) was 21.8 ($SD = 2.7$, range 17.3-32.7) for women and 22.7 ($SD = 2.5$, range 16.8-27.2) for men.

Data collection

Paper and pencil versions of the questionnaires were distributed to students at their respective colleges, and filled out after a brief introduction and collected by two investigators from the research group. The package included the BIQLI-DA and four other standardized measures as well as questions about age, gender, height and weight.

Hypotheses for testing convergent construct validity

In previous studies, various measures have been applied in identifying associations between the BIQLI and traits such as self-esteem (3-5), perceived social support (3), perceived stress

and psychological symptoms (4,5), as well as eating disorder and body image (3,4). Ideally, the same measures for assessing the Danish BIQLI would be applied, however, of the measures included in the studies, only an instrument measuring psychological symptoms (the SCL-90), was available in Danish and could be administered to Danish participants.

Therefore, we hypothesised associations to other psycho-emotional traits including mental health, anxiety and depression of which validated measures in Danish were available. Based on findings of prior research, the following hypotheses were formulated and tested in order to obtain evidence supporting convergent construct validity:

Hypothesis 1: Body image quality of life is negatively associated with body mass index (BMI) in women. This relationship has been shown in prior studies and correlations were found to be strong ($r = - 0.52$) (2) and weak ($r = - 0.20$) (3), ($r = - 0.22$) (4).

Hypothesis 2: Body image quality of life is negatively associated with the presence of psychological symptoms in both sexes, measured by the symptom dimension Interpersonal Sensitivity (I-S) and the global indices Global Severity Index (GSI) and Positive Symptom Total (PST) score of the SCL-90-R. Associations to the above mentioned dimensions/indices have been shown to be weakly correlated for the I-S dimension ($r = - 0.13$ for women), the GSI ($r = - 0.17$ for women) and the PST ($r = - 0.22$ for men and $r = - 0.19$ for women) (4).

Hypothesis 3: Body image quality of life is negatively associated with indicators of anxiety in both sexes, measured by the symptom dimensions Anxiety (ANX) and Phobic Anxiety (PHOB) of the SCL-90-R and the General Anxiety Disorder (GAD-7). To our knowledge this relationship has not previously been explored. Quality of life research, however, has consistently shown strong associations with anxiety (31). We thus find an association plausible.

Hypothesis 4: Body image quality of life is negatively associated with indicators of depression in both sexes, measured by the symptom dimension Depression (DEP) of the

SCL-90-R and the Patient Health Questionnaire (PHQ-9). This association has not, to our knowledge, previously been shown, but depression and quality of life has been found to be strongly correlated (32).

Hypothesis 5: Body image quality of life is negatively associated with self-rated mental health in both sexes, measured by the Mental Component Score of the SF-8. This hypothesis is also exploratory in relation to the BIQLI, but associations between body image and health related quality of life have been demonstrated in prior research (33).

We expected weak to moderate correlations based on prior study findings for the first two hypotheses and weak to moderate correlations based on the exploratory nature of the last three. We used Cohen's proposition for cut-offs for correlation coefficients: >0.1 = weak; >0.3 = moderate; >0.5 = strong (34).

Measures applied for hypotheses-testing

Data from other measures were collected to test hypothesized correlations between the traits reflected in these measures and body image concerns as measured by the BIQLI-DA. The choice of measures was constricted by their availability in Danish. No alternative measures of body image are available in Danish.

The Body Image Quality of Life Inventory is a self-report measure of the influence of one's body image on one's quality of life. It has a seven point response format ranging from very negative effect (-3) to very positive effect (+3) of body image on 19 life domains (2) (see appendix 1). A composite negative score thus may indicate a negative influence of an individual's body image on their quality of life, while a positive score may indicate a positive influence. Internal consistency (Cronbach's $\alpha = 0.95$), good item-total correlations (0.45 - 0.86) and stability over a 2-3 week period (test-retest reliability = 0.79) has been demonstrated (2). Furthermore, convergent construct validity has been shown by

relationships with different standardized measures of body image (2). The BIQLI has been translated and validated in to Spanish (4) and Brazilian Portuguese (5).

Body Mass Index (BMI) (35) is a person's weight in kilograms divided by the square of height in meters (kg/m^2). A high BMI can be an indicator of high body fatness. It is most commonly used to assess how much an individual's body weight departs from what is recommended for his or her height.

The Medical Outcome Short Form 8 (SF-8) (36) measures self-rated health and is a simpler version of SF-36(37). The eight items in the questionnaire each measure a dimension of health: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional and mental health. The dimensions are summarized into a physical component score (the first four dimensions) and a mental component score (the latter four dimensions). Scores range from 0 to 100; higher scores indicate better perceived health. In our study, we used a four weeks recall version of SF-8. As the eight items each measure a different domain, using internal consistency reliability as a quality criterion is not warranted. The SF-36 health survey has been validated in Danish . To our knowledge validation studies on the eight item version in Danish have not been published.

Patient Health Questionnaire-9 (PHQ-9) (38) developed for assessing and monitoring depression severity. This is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of: not at all, several days, more than half the days, and nearly every day, respectively. The PHQ-9 total score for the nine items ranges from 0 to 27. Scores of 5, 10, 15, and 20 represent cut off points for mild, moderate, moderately severe and severe depression, respectively. The PHQ-9 has been shown to be valid and reliable, with a Cronbach's alpha of 0.89 (38). To our knowledge validation studies on the PHQ-9 in Danish have not been published.

General Anxiety Disorder-7 (GAD-7) (39) was initially developed to screen for generalized anxiety disorder. It is calculated by assigning scores of 0, 1, 2, and 3, to the response categories of: not at all, several days, more than half the days and nearly every day, respectively. GAD-7 total score ranges from 0 to 21. Scores of 5, 10, and 15 represent cut off points for mild, moderate, and severe anxiety, respectively. The GAD-7 has been demonstrated to be valid and internally consistent, with a Cronbach's alpha of 0.92 (39). To our knowledge validation studies on the GAD-7 in Danish have not been published.

Symptom Check List-90-Revised (SCL-90-R®) (40) assesses a broad range of psychological problems and symptoms of psychopathology. It includes 90 items rated on a 5-point scale, ranging from 0 = not at all, to 4 = extremely. SCL-90-R measures nine primary symptom dimensions, including Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX) and Phobic Anxiety (PHOB). It provides three global indices including the Global Severity Index (GSI) designed to measure overall psychological distress and the Positive Symptom Total (PST), which reports the number of self-reported symptoms. Higher scores indicate a higher prevalence of the phenomenon on all symptom and global scales. The SCL-90-R has been validated in Danish and has been demonstrated to be valid and reliable, with a Cronbach's of between 0.73 and 0.91 for the symptom scales and 0.97 for the Global Severity Index on a large Danish sample (41).

Statistical analysis

Statistical analyses were performed using the IBM SPSS® 20.0 software package. Prior to analysis, data were examined to ascertain that variables' distribution and relationships did not violate the statistical assumptions of the analyses. Missing data did not exceed 5% on any measure. All multi-item measures possessed an acceptable internal consistency in this sample, with Cronbach's alphas ranging from 0.75 - 0.98. Descriptive statistics were

performed to quantify demographic characteristics. The study had 189 participants, which is approximately 10 participants per item, as is recommended in the literature when doing exploratory factor analysis (27,42). The KMO measure of sampling adequacy was 0.89 and the Bartlett's test was highly significant, supporting the appropriateness of factor analysis for this data (42). Principal component factor analysis with extraction based on Eigenvalue greater than 1 using Varimax rotation was performed to examine the factor structure. This model is consistent with prior studies on the BIQLI (3-5). However we chose a low cut-off point (.20), in order to better visualize loadings and cross-loadings. Convergent construct validity was assessed by exploratory analyses investigating hypothesized correlations between the BIQLI-DA and the above mentioned measures in this sample using Spearman's rank order correlations, as data were not normally distributed. Internal consistency of measures on this sample, as well as item total correlations, was determined using Cronbach's alpha.

RESULTS

Results of phase I, the translation, cognitive interviewing and adaptation.

Translation process

As a result of committee comparisons and discussions, four adjustments were made to the 2nd BIQLI-DA version, two in the instructions and two in the items. Back translation and subsequent research group discussions resulted in no further adjustments.

Cognitive interviews

The linguistic comprehensiveness of instrument instructions and items presented no difficulties to the participants. However, a major issue concerning the wording and the layout of the instrument became apparent during the interviews and gave cause to concerns about face validity.

In the original English language version, instructions and response range are presented once in the heading (see Appendix 1). As respondents progressed through the items, they lost track of the link between the influence of their body image and the particular life domain described in an item. For example when asked about the item “*my feelings of being adequate as a man or woman?*” a respondent rephrased her understanding of the question as “*whether I am content being a woman?*”. It often took several prompts to link questions to the influence of body image. Respondents also expressed confusion about the connotation of the items. To the question of whether one respondent was willing to do things that called attention to her appearance, she replied, “*I do that a lot, is that positive or negative?*” Furthermore, the respondents expressed confusion regarding whether *usually* referred to most of the time, in every-day life circumstances or today.

Based on these findings, the instrument was adjusted by highlighting the sentence, “*For each item, circle how and how much your feelings about your appearance affect that aspect of your life*” in the instruction in bold, underlined letters and repeating the sentence at the top of each page, as well as repeating the response range for each item. This completed the translation and adaptation process and resulted in the third and final version of the BIQLI-DA (see Appendix 2).

Results of phase II, the empirical testing and psychometric evaluation.

Validity

In the factor analysis, based on the criterion of Eigenvalue greater than 1, four factors were rotated. Additionally, the factor solution with three factors was inspected. This revealed no clearer item loadings or additional clarity to the conceptual frame. Table 1 shows the result of the four factor solution. We found that the 19 items did not load to a single factor and that factors 3 and 4 were particularly distinct. Cronbach’s alpha was 0.91, 0.85, 0.78 and 0.64

respectively, with only the fourth item factor (with just two items) below the acceptable 0.70 alpha (43). The finding of this four factor solution suggests the possibility of subscales. Items loading on the first factor mainly related to feelings about life in general and romantic/sexual relations. Items loading on the second factor mainly related to interpersonal non-romantic/non-sexual relations. Items loading on the third factor related to influencing lifestyle factors. Finally, items loading on the fourth factor were the two items related to physical appearance.

The results of the convergent construct validity analysis based on correlations are shown in Table 2. All our hypotheses of weak to moderate correlations between body image quality of life and related traits were confirmed. Apart from BMI and Interpersonal Sensitivity (I-S), correlations were stronger in men compared to women in this sample, particularly for Phobic Anxiety (PHOB) and the Mental Component Score (MCS).

Reliability

The internal consistency determined by the Cronbach's alpha of the BIQLI-DA was 0.92 for this sample, demonstrating excellent internal consistency of the items in the inventory, exceeding the recommended minimum of 0.70 for a "respectable" alpha (43) (p.109). Corrected item total correlations and Cronbach's alpha if deleted are shown in Table 3. Items 13, 14, 15, 16 and 17 demonstrated the lowest correlations, and in this sample alphas would increase if item 15 was deleted.

DISCUSSION

This study described the translation and adaptation process into Danish of the Body Image Quality of Life Inventory and examined its psychometric properties through piloting of the final Danish version, the BIQLI-DA.

The concept of body image has achieved wider clinical attention within health care in recent years. Bodily changes, and related body image concerns, has been shown to occur independently of medical diagnosis (12,14,16), and body image has been found to be strongly associated with quality of life (33,44). As no measure in Danish has been available to assess BI related concerns in patient population, health care providers may be uninformed about the magnitude and severity of the phenomena, and may fail to provide adequate care. We undertook the translation and initial psychometric evaluation of the BIQLI, which we found to be a relevant instrument for this purpose. The subsequent testing of the adapted BIQLI-DA will be reported in a separate paper. Researchers, working with Danish speaking subjects or other populations with a language not widely spoken, often have very few high quality instruments to choose from in designing their studies. Inconsistency in translation methodology can undermine the value of the research conducted applying the translated instrument. Therefore, taking on the enterprise of systematic translation and subsequent empirical testing is important within health care research.

Translation, cognitive interviewing and adaptation.

We conducted a rigorous translation process with multiple independent translators and competent expert committee members. Subsequently, we performed cognitive interviewing to explore the comprehensibility of the Danish version. This step is rarely undertaken in translation studies and has not previously been done in validation studies on the BIQLI. We found that cognitive interviewing was a valuable methodological step, which provided information about instrument performance that could not have been otherwise obtained. The cognitive interviewing led to some validity concerns, as it became clear that respondents did not reply in accordance with the construct the instrument is intended to capture, “*the impact of one’s body image experiences on various psychosocial domains of life*” (3)(p. 280). This issue has been detected in a prior Brazilian study, in which alterations were also made to

enhance participants' understanding of the link between appearance and the particular life domain (5).

Empirical testing and psychometric evaluation

The factor analysis indicated that the inventory may benefit from development of a subscale structure, although this seems to contrast with the high internal consistency of the items. The original author and a Spanish validation study have found the BIQLI to be unidimensional (3,4), but one other validation study of the inventory, support our findings of possible subscales (5). Our intention was to produce a semantically equivalent version of the BIQLI, and not to alter or further develop the inventory. Also factors 3 and 4 cannot be considered full subscales as they contain merely 3 and 2 items respectively. Additionally, several items cross-loaded to more than one factor, particularly indicating an overlap between the first two factors. Therefore, if the suggested hypothesis of subscales is to be pursued, further investigation on larger samples and possibly the development of sound subscales with additional items and a strong conceptual framework would be necessary.

Validity based on relationships with other variables was tested with five hypotheses and our results provided evidence for them all, with weak to moderate correlations as hypothesized. The association between higher body mass indices and a negative body image quality of life in women was demonstrated, as it has been in numerous prior studies (2-4). The association between body image quality of life and selected psychological symptoms measured by the SCL-90 has been shown by Jauregui-Lobera, however correlations in the Spanish sample were generally weaker and gender differences reversed, with generally stronger correlations found in women compared to men (4). Although anxiety, depression and mental health seem plausible as traits related to body image concerns measured by the BIQLI, no other studies have examined these associations. We detected associations between these variables in our

study, supporting the validity of the BIQLI-DA. By doing so we provided first time evidence of the negative relationship between body image quality of life and anxiety, depression and mental health.

The Danish version of the instrument shows excellent internal consistency, similar to previous reports (2-5). Item total correlations indicate the possibility of redundant items in this sample, in which case a short form may be adequate to capture the construct of body image impacted quality of life.

LIMITATIONS AND RESEARCH DIRECTIONS

In light of the validity concerns that arose, it might have been advantageous to perform additional cognitive interviews after making alterations in the lay-out to see whether comprehensiveness had in fact improved as intended. The constraints on choice of instruments for examining convergent construct validity presented limitations. We were limited to measures of potentially related traits, and, even so, several of the instruments used did not have validation data for the Danish language version. Had we been able to test correlations to body image specific instruments, validity evidence might have been strengthened. Further refinement of the BIQLI-DA based on the potential subscales structure that emerged from the EFA, might also have provided additional support of instrument validity. However this enterprise was beyond the scope of our study. In order to strengthen the evidence for reliability of the BIQLI-DA, we could have explored stability. We found that testing the short term stability of the measure through test-retest was not relevant, as we consider body image to be a situational variable state and the BIQLI is intended to be sensitive to change. An alternative could have been to assess the stability of the construct as opposed to the measure, using the technique described by Heise (45). This, however, would

have necessitated a specific research design with more measurement points and was beyond the scope of this study.

Further exploration of responder processes is warranted as a result of the cognitive interviewing, in order to ensure comprehension of the full questions of the BIQLI. Further studies on larger samples, representative of the general Danish population may be warranted in order to explore the appropriateness of a short-form version or a multidimensional scale version, and to evaluate instrument performance on average and low literacy groups.

Additionally, testing on different patient populations is needed in order to establish whether the BIQLI-DA is applicable in health care research, as a measure in descriptive studies and as to whether the instrument is sensitive to change due to health care interventions and can be used in randomized clinical trials.

CONCLUSION

The BIQLI-DA was found to be semantically sound in its wording, but validity concerns arose through cognitive interviewing. A change in wording and layout may solve this issue and further exploration of response processes to elucidate this would be beneficial.

Convergent construct validity through associations to related constructs was demonstrated through five confirmed hypotheses. These were based on available measures in Danish of related constructs and thus the evidence provided might be less than optimal. Although the original BIQLI is considered unidimensional, our exploratory factor analysis revealed a potential subscale structure. Future studies are warranted to scrutinize this issue. Finally, we found the BIQLI-DA to be reliable in terms of internal consistency.

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AUTHOR CONTRIBUTIONS

TBR, HK, and SKB designed the study and conducted data collection. TBR and JD conducted the data analysis. TBR in collaboration with JD, HK, PM, ADZ and SKB drafted the manuscript. All authors revised the manuscript critically and have given their final approval of the version to be published.

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ETHICAL APPROVAL

The study followed the recommendations of the Declaration of Helsinki II 2008. Approval was obtained from the Danish Data Protection Agency (j.nr.: 2007-58-0015).

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Figure 1. Process of translation, adaptation and validation

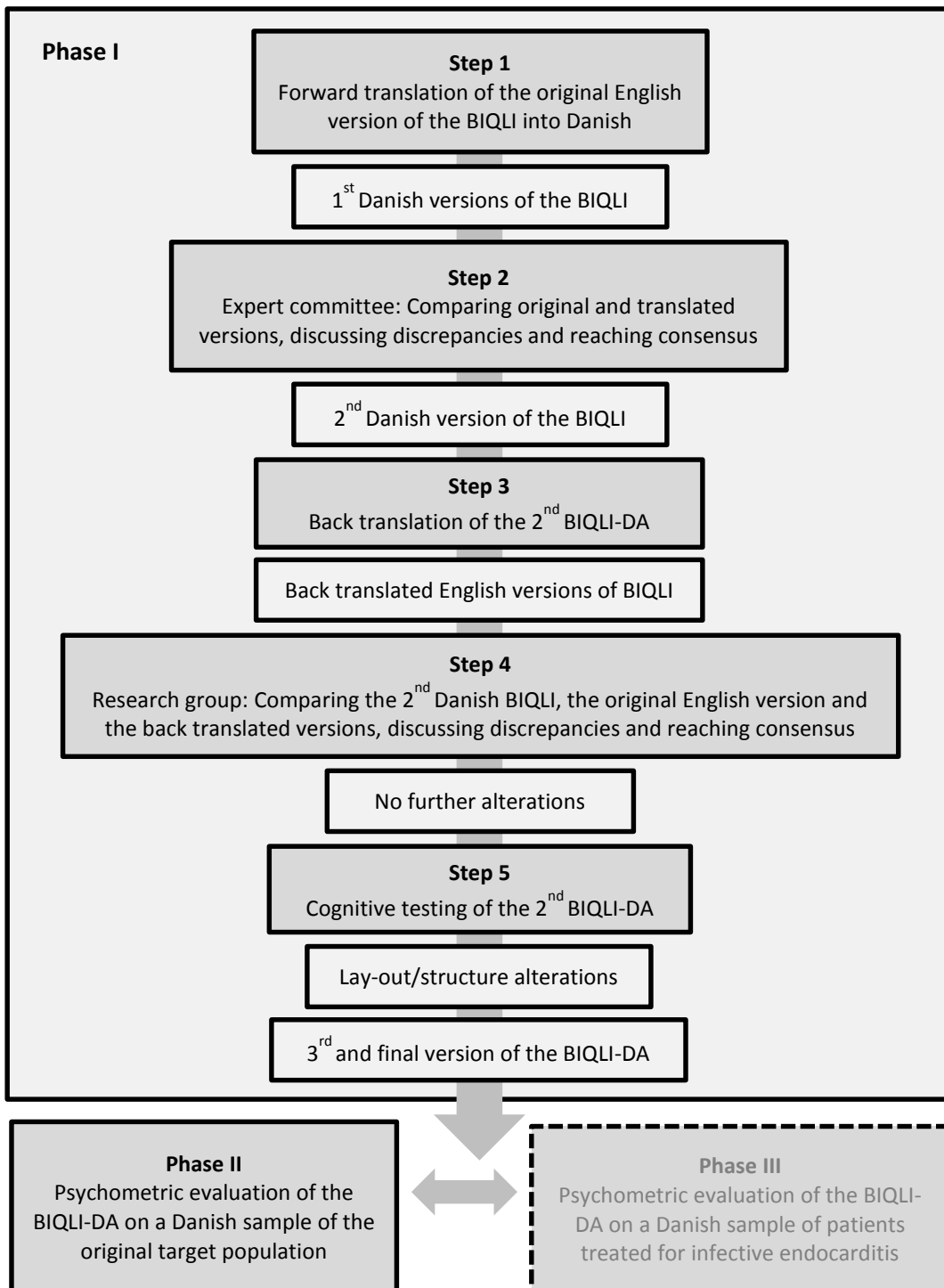


Table 1. Factor Analysis – Rotated Component Matrix ¹

Item	Component				Communalities	Concept
	1	2	3	4		
11. My feelings of acceptability as a sexual partner.	0.81	0.24			0.68	
18. How confident I feel in my everyday life.	0.74	0.25	0.24	0.25	0.60	
1. My basic feelings about myself – feelings of personal adequacy and self-worth.	0.72		0.33	0.23	0.49	
10. My satisfaction with my life in general.	0.71	0.40			0.67	Feelings about life in general and romantic/sexual relations
12. My enjoyment of my sex life.	0.70	0.20			0.62	
2. My feelings about my adequacy as a man or woman - feelings of masculinity or femininity.	0.67			0.36	0.58	
4. My interactions with people of the other sex.	0.61	0.43		0.23	0.84	
5. My experiences when I meet new people.	0.52	0.51		0.29	0.76	
9. My day-to-day emotions.	0.44	0.39		0.39	0.54	
7. My relationships with friends.	0.24	0.88			0.75	
8. My relationships with family members.		0.84			0.73	Interpersonal relations (non-romantic/non-sexual)
6. My experiences at work or at school.	0.29	0.67			0.54	
19. How happy I feel in my everyday life.	0.52	0.52	0.21		0.76	
3. My interactions with people of my own sex.	0.50	0.50			0.83	
14. My ability to control my weight.			0.90		0.46	Lifestyle factors
13. My ability to control what and how much I eat.			0.84		0.66	
15. My activities for physical exercise.			0.65		0.74	
17. My daily “grooming” activities (i.e., getting dressed and physically ready for the day).			0.22	0.80	0.73	Physical appearance
16. My willingness to do things that might call attention to my appearance.	0.26			0.75	0.59	
Cumulative % of total variance explained	44	54	61	66		
Eigenvalues	8.32	1.89	1.29	1.05		

¹ Principal component factor analysis extraction based on Eigenvalue greater than 1 using Varimax rotation and a cut of point of 0.20.

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Table 2. Correlation between the BIQLI-DA and other measures

Measures	Spearman's Correlation Coefficient ¹ (<i>r</i>)			
	Name (+ subscales)	Total sample (n=189)	Women (n=124)	Men (n=65)
Body Mass Index (BMI) #		- 0.14	- 0.30**	0.15
Symptom Check List - 90 - R (SCL-90-R)				
Interpersonal Sensitivity (I-S)		- 0.27**	- 0.28**	- 0.26**
Depression (DEP)		- 0.25**	- 0.21*	- 0.33**
Anxiety (ANX)		- 0.25**	- 0.26**	- 0.27*
Phobic Anxiety (PHOB)		- 0.18*	- 0.10	- 0.42**
Global Severity Index (GSI)		- 0.26**	- 0.25**	- 0.32**
Positive Symptom Total (PST)		- 0.30**	- 0.28**	- 0.36**
General Anxiety Disorder - 7 (GAD-7)		- 0.25**	- 0.25**	-0.25
Patient Health Questionnaire - 9 (PHQ-9)		- 0.28**	- 0.26**	- 0.30*
Medical Outcome Short Form - 8 (SF-8)				
Mental Component Score (MCS)		0.23**	0.17	0.32*

¹ Bivariate analyzes, * $p < 0.05$, ** $p < 0.01$.

Table 3. Reliability statistics

Item	Corrected item-total Correlation	Cronbach's Alpha if item Deleted
1. My basic feelings about myself – feelings of personal adequacy and self-worth.	0.68	0.917
2. My feelings about my adequacy as a man or woman - feelings of masculinity or femininity.	0.62	0.918
3. My interactions with people of my own sex.	0.59	0.919
4. My interactions with people of the other sex.	0.68	0.917
5. My experiences when I meet new people.	0.66	0.918
6. My experiences at work or at school.	0.62	0.919
7. My relationships with friends.	0.65	0.918
8. My relationships with family members.	0.59	0.919
9. My day-to-day emotions.	0.66	0.918
10. My satisfaction with my life in general.	0.80	0.914
11. My feelings of acceptability as a sexual partner.	0.69	0.917
12. My enjoyment of my sex life.	0.57	0.920
13. My ability to control what and how much I eat.	0.46	0.922
14. My ability to control my weight.	0.41	0.924
15. My activities for physical exercise.	0.34	0.925
16. My willingness to do things that might call attention to my appearance.	0.48	0.921
17. My daily “grooming” activities (i.e., getting dressed and physically ready for the day).	0.47	0.921
18. How confident I feel in my everyday life.	0.77	0.915
19. How happy I feel in my everyday life.	0.68	0.917

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The BIQLI Questionnaire

Instructions: Different people have different feelings about their physical appearance. These feelings are called “body image.” Some people are generally satisfied with their looks, while others are dissatisfied. At the same time, people differ in terms of how their body-image experiences affect other aspects of their lives. Body image may have positive effects, negative effects, or no effect at all. Listed below are various ways that your own body image may or may not influence your life. For each item, circle how and how much your feelings about your appearance affect that aspect of your life. Before answering each item, think carefully about the answer that most accurately reflects how your body image usually affects you.

	-3	-2	-1	0	+1	+2	+3				
	Very Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Very Positive Effect				
1. My basic feelings about myself— feelings of personal adequacy and self-worth.	-3	-2	-1	0	+1	+2	+3				
2. My feelings about my adequacy as a man or woman—feelings of masculinity or femininity.					-3	-2	-1	0	+1	+2	+3
3. My interactions with people of my own sex.	-3	-2	-1	0	+1	+2	+3				
4. My interactions with people of the other sex.	-3	-2	-1	0	+1	+2	+3				
5. My experiences when I meet new people.	-3	-2	-1	0	+1	+2	+3				
6. My experiences at work or at school.	-3	-2	-1	0	+1	+2	+3				
7. My relationships with friends.	-3	-2	-1	0	+1	+2	+3				
8. My relationships with family members.	-3	-2	-1	0	+1	+2	+3				
9. My day-to-day emotions.	-3	-2	-1	0	+1	+2	+3				
10. My satisfaction with my life in general.	-3	-2	-1	0	+1	+2	+3				

	-3	-2	-1	0	+1	+2	+3				
	Very Negative Effect	Moderate Negative Effect	Slight Negative Effect	No Effect	Slight Positive Effect	Moderate Positive Effect	Very Positive Effect				
11. My feelings of acceptability as a sexual partner.					-3	-2	-1	0	+1	+2	+3
12. My enjoyment of my sex life.					-3	-2	-1	0	+1	+2	+3
13. My ability to control what and how much I eat.					-3	-2	-1	0	+1	+2	+3
14. My ability to control my weight.					-3	-2	-1	0	+1	+2	+3
15. My activities for physical exercise.					-3	-2	-1	0	+1	+2	+3
16. My willingness to do things that might call attention to my appearance.					-3	-2	-1	0	+1	+2	+3
17. My daily "grooming" activities (i.e., getting dressed and physically ready for the day).					-3	-2	-1	0	+1	+2	+3
18. How confident I feel in my everyday life.					-3	-2	-1	0	+1	+2	+3
19. How happy I feel in my everyday life.					-3	-2	-1	0	+1	+2	+3

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BIQLI-DA

Instruktion: Forskellige mennesker har forskellige følelser omkring deres fysiske udseende. Disse følelser kaldes kropsovfattelse. Nogle mennesker er generelt tilfredse med deres udseende, mens andre er utilfredse. Samtidig adskiller forskellige mennesker sig i måden hvorpå deres kropsovfattelse påvirker forskellige aspekter af deres liv. Kropsovfattelsen kan påvirke disse aspekter positivt, negativt eller slet ikke. I det følgende er opstillet en række forskellige måder, hvorpå din egen kropsovfattelse kan have indflydelse på dit liv. **Markér for hvert punkt, hvordan og hvor meget dine følelser omkring dit udseende påvirker det beskrevne aspekt af dit liv.** Tænk grundigt over, inden du besvarer hvert punkt, hvilket svar der mest nøjagtigt afspejler, hvordan din kropsovfattelse normalt påvirker dig.

Mine grundlæggende følelser om mig selv – følelse af personlig tilstrækkelighed og selvværd.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine følelser om min tilstrækkelighed som mand eller kvinde – følelse af at være maskulin eller feminin.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine interaktioner med mennesker af mit eget køn.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine interaktioner med mennesker af det modsatte køn.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Markér for hvert punkt, hvordan og hvor meget dine følelser omkring dit udseende påvirker det beskrevne aspekt af dit liv

Mine oplevelser når jeg møder nye mennesker.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine oplevelser på arbejde eller i skole.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine forhold til mine venner.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine forhold til mine familiemedlemmer.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine følelser fra dag til dag.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Markér for hvert punkt, hvordan og hvor meget dine følelser omkring dit udseende påvirker det beskrevne aspekt af dit liv

Min generelle tilfredshed med mit liv.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Min følelse af at være acceptabel som seksuel partner.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Min glæde ved mit sexliv.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Min evne til at styre hvad og hvor meget jeg spiser.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Min evne til at kontrollere min vægt.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Markér for hvert punkt, hvordan og hvor meget dine følelser omkring dit udseende påvirker det beskrevne aspekt af dit liv

Mine aktiviteter for at få motion.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Min villighed til at gøre ting, der kan henlede opmærksomheden på min udseende.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Mine daglige aktiviteter for at gøre mig i stand (f.eks. at tage tøj på og gøre mig fysisk klar til dagen).

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Hvor selvsikker jeg føler mig i min hverdag.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

Hvor glad jeg føler mig i min hverdag.

-3	-2	-1	0	+1	+2	+3
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Påvirker meget negativt	Påvirker moderat negativt	Påvirker lidt negativt	Påvirker ikke	Påvirker lidt positivt	Påvirker moderat positivt	Påvirker meget positivt

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