Development and Psychometric Evaluation of the Ostomy Adjustment Inventory-23 (OAI-23)

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Abstract

Purpose: This article describes the development of the Ostomy Adjustment Inventory-23 (OAI-23), a self-report, multidimensional scale designed to assess psychosocial adjustment in patients with a stoma.

Subjects and Setting: Five hundred and seventy persons with a colostomy, an ileostomy or urostomy, randomly selected from three national databases, provided assessable data.

Results: The results indicate that the scale is reliable (Cronbach's alpha = .93, split-half = .91 and test – retest (r) = .83) and valid, correlating positively with Felton's Acceptance of Illness Scale (r = .72) and confirming expected improvements in adjustment consistent with increasing time since surgery *(F (5,531) = 5.22, p <.001).* Four factors (eigenvalue ≥ 1) which accounted for 55.4% of the total variance emerged from factor analysis.

Conclusion: The Ostomy Adjustment Inventory-23 (OAI-23) is a valid and reliable measure of psychosocial adjustment which would be of interest both to researchers investigating life after stoma surgery, and clinicians making objective assessments of their patients' progress.

Introduction

Recent reports suggest a steady increase in the number of people surviving colorectal cancer at least five years following diagnosis [1, 2]. A similar trend is reported for cancer of the bladder, with a 5-year relative survival rate of 82% [1] . This would suggest that increasingly more patients with cancer-related colorectal and urinary ostomies are living longer. In the majority of cases, stoma surgery is performed as a life-saving procedure, but there can be little doubt about the accompanying social and psychological consequences. Sprangers and colleagues [3], following a systematic review of past studies of colorectal cancer patients with and without a stoma, reported significantly higher rates of depression, suicidal thoughts, feelings of loneliness, low self-esteem and sexual impotence in those with a stoma. In a later review, Brown [4] also reported higher prevalence of sexual concerns and negative beliefs about body image. The increasing survival rates and acknowledgement of the difficulties experienced by those patients have led to calls for more emphasis on addressing social and psychological concerns [5, 6].

Addressing psychosocial needs of ostomy patients necessarily involves identifying and monitoring those having difficulty adjusting to their illness, and isolating their unique problems. However, in countries such as the UK where there is universal access to a stoma care nurse [7], anecdotal evidence suggests that very little time is invested in addressing social and psychological concerns. The most plausible explanations for this are perhaps pressure on nurses' time and competence in the skills necessary to address the varied experience of patients. However, the absence of a stoma-specific, valid and reliable assessment aid, which could help stoma nurses identify patients in most need of support, could also contribute to the dearth in psychosocial care.

Regarding assessment aids, researchers have used a number of scales, which invariably measure different concepts. For example, Bekkers and colleagues [8, 9] used an altered form of the Psychosocial Adjustment to Illness Scale [10] to measure adjustment following stoma surgery. The PAIS was designed to assess, among others, vocational impairment and the domestic environment. Wade [11] used the Present State Examination [12] which is limited to detecting symptoms associated with mental disorders. Neither of those scales addresses concerns specific to the stoma patient. The tendency to use QOL scales to assess psychosocial adjustment, albeit stoma-related [see 13, 14], is also questionable because quality of life and adjustment to illness are different constructs [15]. Those scales, therefore, are of little use to the nurse in clinical practice.

Acknowledging the limitations of generic instruments, Olbrisch [16] developed the Ostomy Adjustment Scale specifically to measure psychological and social adjustment in patients with a stoma. According to independent studies [17, 18] the scale is reliable when all 34 items are used. However, Burckhardt [18] could not confirm the reliability estimates for the two subscales reported by Olbrisch, and also disagreed that the scale detects changes in adjustment over time. The OAS is designed to assess patients with a colostomy, ileostomy, or urostomy; but these procedures require adaptation to different life-style habits. Thus, it is probable that adjustment may vary according to ostomy type. However, no evaluation of the data by Olbrisch was undertaken to exclude this possibility.

In 2000, Maekawa published the Ostomates' Self-Adjustment Scale [19], a 30-item measure which was validated in a large national sample (N= 509) of persons living with a colostomy, ileostomy or urostomy registered with the Japanese Ostomy Association. Measured on a 5-point Likert scale, analysis showed that the OSAS is internally consistent (alpha =.81). A factor analysis, using varimax rotation, yielded six factors which accounted for 50.9% of the variance, and which the developers interpreted as 1) body image, 2) enjoyable life, 3) self care, 4) positive view of life, 5) deny reality of life and 6) disease and disabled. However, the scale lacks some psychometric evaluations. Specifically, there was no test to determine whether it is stable; neither was there any assessment of content or criterion validity. Therefore, it is not clear whether the Ostomates' Self-Adjustment Scale has *diagnostic* or *predictive utility*. Given that the key components of the construct of psychosocial adjustment to chronic illness are acceptance of the illness and adapting life to accommodate it [15], the inclusion of items measuring information given about the disease, treatment and appliances (Factors 3 and 6), raises questions about the underlying construct the scale measures. In addition, the scale has attracted very little use in published research articles since its publication in the Ochanomizu Medical Journal. A search of CINAHL, PsycINFO and PubMed databases covering the period between 2000 and 2007 found no references to the instrument.

Patients having difficulty adjusting to their stoma need to be identified and offered support, including, when appropriate, referral to psychological and psychiatric services. As in any other area of health care, selection of stoma patients for specialist services should be based on clinical needs following a thorough assessment, using established guidelines or procedures. Potential limitations in the scales in current use, however, suggest that, as yet, there is no instrument to ensure unbiased and consistent identification of such patients. The purpose of this study was to develop a scale to measure social and psychological adjustment to stoma surgery.

Methods

A major strength of the OSAS was the process used to generate and test items via a large sample of persons with a colostomy, urostomy, or ileostomy. Therefore, we decided to adopt the items from the OSAS as the initial pool. These items were translated from Japanese to English by two independent translators, then reviewed by clinical experts in ostomy care at a district hospital in the UK and members of the research team based at the University of Hertfordshire. This process was undertaken to ensure that each of the items taps an aspect of the adjustment construct, defined as acceptance of the illness (in this case the ostomy) and behaviors associated with coping with the ostomy [15]. The review team agreed that five of the items were not related to any aspect of the construct. Instead they relate to knowledge and information given about the disease, treatment and appliances (e.g. “I received adequate information about my disease and treatment”). Therefore, they were eliminated. None of the items pertain to sexual concerns, concerns which are widely reported in previous studies [20]. Therefore one item *(I feel I am less sexually attractive because of my stoma)* was included to address those concerns. The resulting 26 items were introduced to a group of British ostomy patients attending their monthly support group meeting. In a focus group setting, they were asked to comment on their understanding of the items and whether each item reflected their experiences living with an ostomy. Based on feedback from this pilot testing, the wording of some items was changed. A Flesch readability test which provides an estimate of the comprehensibility of written material and the proportion of the population likely to have no difficulty understanding it [21], subsequently suggested that over 91% of the British general public would easily comprehend the questionnaire (Flesch =8.5).

Eleven hundred stoma patients were selected at random from databases of the British Colostomy Association, the British Ileostomy Association and the British Urostomy Association. These national charities maintain addresses of approximately one-third (32,000) of all patients with bowel and bladder stomas in the UK. Potential respondents were sent a package containing 1) the revised 26-item questionnaire, 2) Felton's [22] Acceptance of Illness Scale (alpha =.81) which assesses the extent to which patients with a chronic disease accept the limitation of their illness without experiencing negative feelings; 3) a form designed specially to record clinical and demographic data; 4) a covering letter explaining the study, a consent form and a self-address envelope for the return of the questionnaires. The Ethics Committee of the University of Hertfordshire approved the study.

The Instrument

To ensure a homogeneous scale, Streiner and Norman [23] recommend that only items with an item-to-total correlation coefficient greater than .2 should be included. Three of the 26 items failed to meet that criterion (Table 1). Therefore, the new instrument, the *Ostomy Adjustment Inventory -23 (OAI-23)* consists of 23 items, each measured on a 5-point Likert scale (0 – 4) with higher scores indicating better adjustment. Twelve of the items *(items 2, 5, 7, 8, 10, 11, 12, 13, 16, 17, 18, 21)* are negatively phrased and therefore, reverse scored (Appendix 1).

Results

Sample

Five hundred and eighty seven out of 1100 surveys were returned, yielding a response rate of 53.4%. Seventeen returns were excluded from further analysis. They included those of respondents who had reversal surgery, those who returned incomplete questionnaires, and because of the reported relationship between stoma care self-efficacy and adjustment [6, 9], they also included those ostomists who depended on others to take care of their stoma. No respondent was receiving post-surgical chemotherapy or radiotherapy at entry to the study. The first 100 respondents with assessable data were retested on the revised 26-item questionnaire two weeks later, an interval we estimated to be short enough to avoid large changes in adjustment and long enough for patients not to remember their previous responses. Of those, eighty four returned completed questionnaires.

The sample of 570 patients (mean age = 67.1 years; age range = 17 - 91) consisted of 291 (51%) men who were significantly older than the women ($t = 4.84, p < .001$). One hundred and ninety eight (34.7%) had a colostomy, 110 (19.3%) had an ileostomy, 238 (41.8%) had a urostomy and 18 had two stomas. Six patients did not indicate their type of surgery. Patients with an ileostomy were significantly younger than the others ($F (3, 485) = 13.2, p < .01$) and lived with their stoma the longest ($F (3, 552) = 8.8, p< .001$). Time since surgery varied between 1 and 59 years (mean = 7.2).

The adjustment scores showed a negatively skewed distribution, with a mean of 63.81 (range, 10 – 92; SD = 15.5). There was no significant difference in scores between men and women *(65.16 Vs 62.4; p (U) =.198)*, no significant correlation with age *(Spearman's Rho = .057, p = .20)* and very little variation between participants with different types of stoma ($F (3, 560) = 1.74, p = .16$). Adjustment improved significantly as time since surgery elapsed ($F (5,531) = 5.22, p <.001$), steeply up to the second year after surgery and more gradually thereafter.

Reliability assessment

Three tests were conducted to establish reliability estimates. The two sets of scores for the 84 participants who completed the inventory on two separate occasions were correlated (test-retest procedure). This yielded a reliability estimate of .83, indicating good temporal stability (Figure 1). The data for the whole sample were then examined for estimates of internal consistency using both Cronbach's alpha (α) and Spearman-Brown Split-half formula. As shown in Table 2, the resulting estimates are, respectively, .93 and .91. Therefore, the OAI-23 is shown to be highly reliable based on the results of Cronbach's α and the Spearman-Brown split-half formula.

Validity assessment

The Acceptance of Illness Scale [22], which was completed by respondents at the same time as the OAI-23, is a reliable measure of patients' acceptance of their illness. We argue that patients who accept their ostomy would be the more likely to adjust. Therefore, concurrent validity was assessed by correlating the scores on the AIS with those on the OAI-23. The result showed a significant and positive association between the two *(Spearman's rho = .723, p <. 001)*. A Principal Component Factor analysis was carried out to establish construct validity. Items with factor loading <.4 were suppressed [24] and both orthogonal (varimax) and oblique (oblimin) rotations were conducted. Four factors (eigenvalue ≥ 1) emerged (Table 3). Three of them (*Factors 1*, *2 and 3*) are inter-related to some degree, suggesting that they are not independent of each other. Therefore, only the results of the oblique rotation (Table 3) are reported here. In matrices resulting from oblique rotations, no loading is shown for items which load on two or more inter-related factors[25]. As a result no loadings are shown for items

16, 18 and 22. Therefore, when using the factors as independent subscales, these items should not be included. Together the factors explained 55.4 % of the total variance. Factor 1 (items 9, 3, 19, 15, 4, 1, 14, 23, 6) explained the largest amount (39.6%) and relates to patients coming to terms with their ostomy (*Acceptance*). The items on Factor 2 (items 13, 17, 21, 12, 20) relate to constant worry about the stoma (*Anxious Preoccupation*); and those on Factor 3 (items 5. 11, 8, 7) and Factor 4 (items 2, 10) relate, respectively, to the extent to which patients engage socially (*Social Engagement*) and to the degree of anger they express (*Anger*). Cronbach alpha and split-half estimates for each of the factors are shown in Table 2. Given the small number of items in each of the factors, caution should be exercised when interpreting the split-half estimates. Test of sampling adequacy (KMO = .946) suggests that the sample was sufficiently large to produce distinct and stable factors. Therefore, these results are most likely to be repeated elsewhere.

As further evidence of its validity, the OAI-23 detected a significant trend *(F (5,531) = 5.22, p <.001)* which suggests a pattern of adjustment that would normally be expected in the periods after surgery: quickening between the first and second year (16.1% increase), followed by gradual increases amounting to 6.3% over the next 10years.

Discussion

The need to monitor how well patients adjust to stoma surgery is not in doubt because, as Bekkers [8] showed in a four year follow-up of stoma and non-stoma patients who underwent bowel surgery, poor adjustment has an adverse effect on terminal status and survival time. Therefore, monitoring social and psychological adjustment should form a central part of the ostomy nurse’s role. However, current practice pays little heed to this, principally because the instruments now available to measure adjustment are not stoma-specific or they suffer from methodological weaknesses, thus raising serious concerns about their use. In contrast to the generic scales such as the PAIS [10] and the AIS [22], the latter measuring only the concept of Acceptance, the Ostomy Adjustment Inventory-23 reliably assesses the range of adjustment behaviours specific to stoma patients. This is despite the very high alpha coefficient, suggesting therefore, that construct validity has not been sacrificed for internal consistency, a common problem in questionnaire design [23].

Participants with a urostomy were disproportionately represented in the sample we investigated. However, their scores on the inventory did not differ significantly from those of the other two patient groups. There was no relationship with age *(Spearman's Rho = .057, p = .2)* and no significant difference between male and female respondents *(Mann Whitney U) p =.198).* Therefore, the scale would be valid for patients with an ileostomy, a urostomy and a colostomy, regardless of age and gender.

The OAI-23 would be useful for both researchers and clinicians, not only to provide them with an estimate of how well patients adjust to stoma surgery, but, by using the factors as independent sub-scales, they can also identify the areas of adjustment causing patients the most concern. Clinicians must be mindful, however, that patients with very poor educational attainment (< grade 5) could experience some difficulty in understanding the questionnaire items. In such circumstances they should be wary about using the inventory as a self-report scale. As a research instrument, it is also worth noting that Factors *1, 2 and 3* are interrelated. Nonetheless, given that the correlation coefficients between them vary between .27 and .53 there is unlikely to be problems with multicollinearity if they are used as independent predictors in studies employing multiple regression analyses [25].

Limitations

We did not test whether subjects in our sample responded in ways which are socially desirable, although, based on the criteria proposed by Studman and Bradburn [26] , having a stoma may well qualify as a disability prone to such biased responses. However, given that the questionnaire was administered anonymously and that respondents were no longer under the direct care of health professionals, we believe it unlikely they would minimize or overstate their adjustment difficulties. Respondents were drawn from patients who chose to register with one of the national charities. Therefore, we cannot be certain that the data-bases are truly representative of the experiences of those who choose not to register. Finally, we cannot discount a bias in those who choose to participate in the study, because although our sample size was more than adequate to produce stable results, only 53.4% of the patients surveyed responded.

More research is necessary to improve the clinical use of the scale. For example, cut-off scores which could distinguish between “adjusted” and “non-adjusted” patients or which could identify levels of adjustment requiring a specialist (e.g. psychiatric) referral would be useful clinically. In future studies researchers could a) clarify whether some items or subscales are more predictive of adjustment than others and b) measure adjustment at shorter intervals (e.g. 3-4 months) to evaluate improvements in the first year following surgery, the period when patients might find it most difficult to cope with associated life-styles changes.

Conclusion

Despite the above limitations, the OAI-23 is a valid and reliable self-report measure of social and psychological adjustment in adult patients whose surgery ended with a colostomy,

an ileostomy or a urostomy. The inventory is multidimensional, consisting of four subscales, each with a reasonably high reliability coefficient. It is anticipated to benefit both researchers and clinicians. For clinicians the OAI-23 provides a simple, objective and easy-to-use instrument that allows them to monitor how well their patients adjust to having an ostomy, to identify patients with ongoing adjustment difficulties, and to isolate major concerns. Therefore, use of the OAI-23 should help to tailor care to better meet the needs of individual patients.

Key Words

Ostomy adjustment, instrument development

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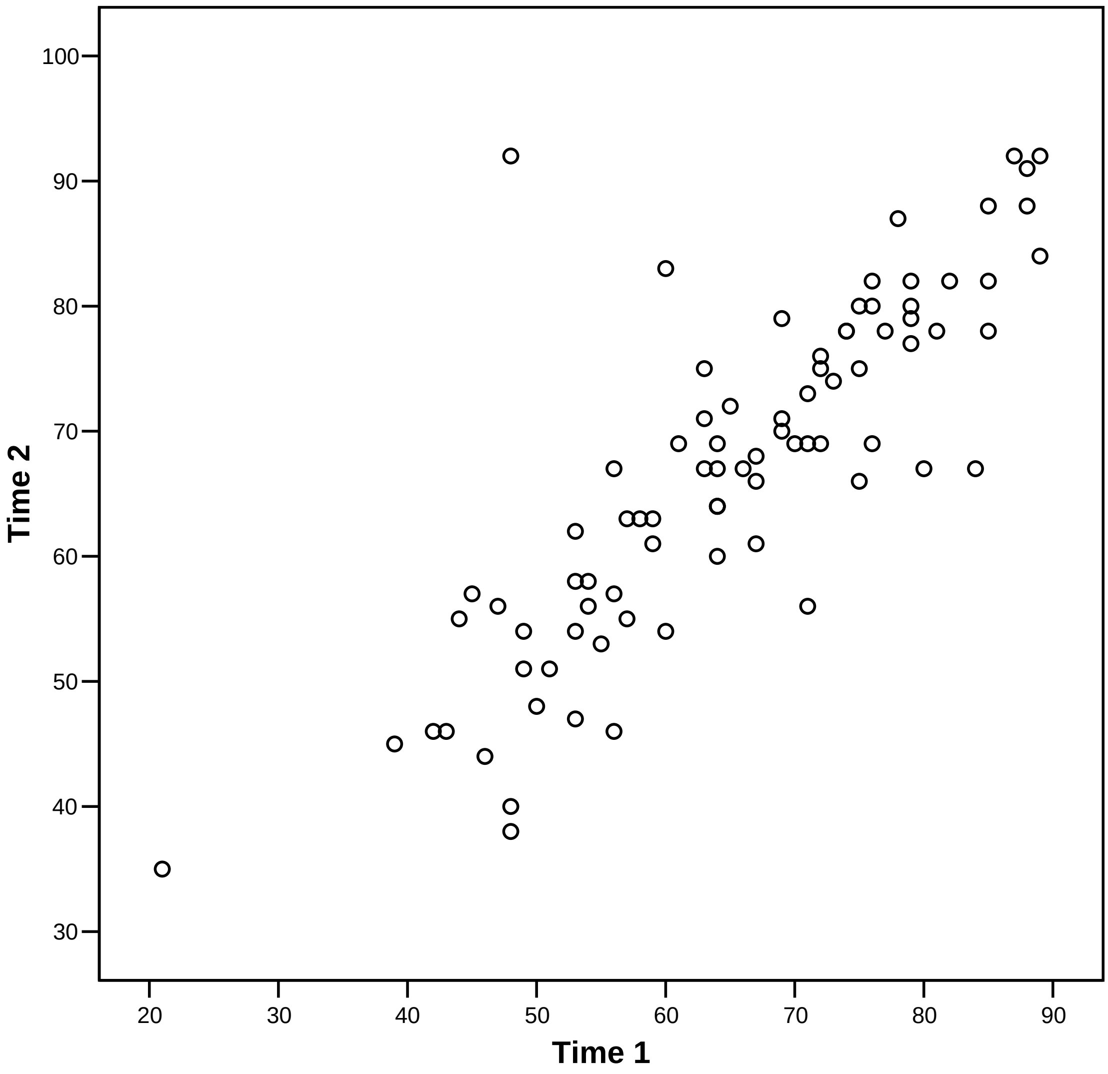
Table 1: Means, standard deviations and item-to-total correlations of the 26 items

Item	mean	SD	Item-to-total
1. I feel that I have recovered from my stoma operation	3.35	.785	.647
2. I don't like to touch my stoma	2.96	1.030	.436
3. I have a meaningful life even with my stoma	3.20	.962	.590
4. I enjoy food and drinks as much as I did before my stoma	3.10	1.041	.553
5. My stoma inhibits me from having a proper bath or shower	3.01	1.149	.482
6. I sleep well without worrying about my stoma	2.74	1.221	.602
7. Because of my stoma I feel I am no longer in control of my life	2.87	1.176	.699
8. I am reluctant to mix socially since having my stoma	2.99	1.178	.612
9. I have now accepted my stoma as part of my body	3.22	.885	.632
10. I cannot get over the shock of having a stoma	3.11	1.020	.672
11. Because of my stoma I limit my range of activities	2.32	1.314	.628
12. Because of my stoma I feel that I will always be a patient	2.29	1.282	.571
13. I am always conscious that the stoma pouch may leak, smell and be noisy	1.61	1.317	.520
14. I have accepted the changes in my appearance caused by my stoma	2.80	1.022	.469
15. I would like to have my body without a stoma***	.68	.968	.193
16. I am grateful that the stoma has given me a new lease of life	3.48	.746	.468
17. Caring for my stoma is difficult	2.94	.954	.603
18. I feel that I am less sexually attractive because of my stoma	1.63	1.276	.453
19. I feel angry about having a stoma	2.70	1.165	.623
20. I feel I need the support of my family and friends***	2.21	1.237	-.198
21. I am willing to share my experience with other patients with a stoma***	3.20	.838	.185
22. Despite my stoma I have a rewarding life	3.27	.762	.659
23. I will be able to manage my stoma in the future	2.55	1.015	.474
24.I am always anxious about my stoma	2.18	1.237	.637
25. With my stoma I feel that my life-threatening experience has passed	2.97	.944	.395

26. I can engage in a variety of activities despite having a stoma	2.96	.978	.636

**** excluded from final questionnaire because of low (r < .2) item-to-total correlation*

Figure 1: Plot of scores at Time 1 and Time 2 (N = 84)



Pearson r = .832

Table 2: Corrected item-total correlations, Cronbach's alpha (α) and split-half (r) coefficients for the OAI-23 and subscales

	No. of Items	**item-total Correlation (range)**	**Alpha (α)**	**Split-half (r)**
OAI-23	23	.410 - .682	.93	.91
Factor 1 *(Acceptance)*	9	.503 - .662	.87	.86
Factor 2 *(Anxious Preoccupation)*	5	.371 - .605	.74	.71
Factor 3 *(social Engagement)*	4	.552 - .679	.80	.79
Factor 4 *(Anger)*	2	.466 - .466	.64	.64

Table 3: Factor structure (oblique rotation) of the OAI-23 Components

**** Values suppressed**

Appendix 1

Item		1	2	3	4
9	I have now accepted my stoma as part of my body	.776			
3	I have a meaningful life even with a stoma	.758			
19	Despite my stoma I feel I have a rewarding life	.726			
15	I am grateful that the stoma has given me a new lease of life	.691			
4	I enjoy food and drinks as much as I did before my stoma	.652			
1	I feel that I have recovered from my stoma operation	.650			
14	I have accepted the changes in my appearance which were caused by my stoma	.627			
23	I can engage in a variety of activities despite having a stoma	.570			
6	I sleep well without worrying about my stoma	.473			
16	Caring for my stoma is difficult**				
13	I am always conscious that my stoma may leak, smell or be noisy		.794		
17	I feel that I am less sexually attractive because of my stoma		.659		
21	I am always anxious about my stoma		.657		
12	Because of my stoma I feel I will always be a patient		.601		
20	I will be able to manage my stoma in the future		.508		
22	With my stoma I feel that my life-threatening experience has passed**				
5	My stoma inhibits me from having a proper bath or shower			-.678	
11	Because of my stoma I limit my range of activities			-.518	
8	I am reluctant to mix socially since having my stoma			-.483	
7	Because of my stoma I feel I am no longer in control of my life			-.447	
2	I don't like to touch or see my stoma				-.615
10	I cannot get over the shock of having a stoma				-.410
18	I feel angry about having a stoma**				

OSTOMATES' ADJUSTMENT INVENTORY-23 (OAI-23)

The statements below relate to how you feel about your stoma. For each statement please insert a ✓ in one of the boxes, “Strongly Agree” to “Strongly Disagree” to indicate your agreement with the statement. Please try to answer all of the questions.

	Strongly agree	Agree	Unsure	Disagree	Strongly Disagree
1. I feel that I have recovered from my stoma operation					
2. I don’t like to touch or see my stoma**					
3. I have a meaningful life even with a stoma					
4. I enjoy food and drinks as much as I did before my stoma					
5. My stoma inhibits me from having a proper bath or shower**					
6. I sleep well without worrying about my stoma					
7. Because of my stoma I feel I am no longer in control of my life**					
8. I am reluctant to mix socially since having my stoma**					
9. I have now accepted my stoma as part of my body					
10. I cannot get over the shock of having a stoma**					
11. Because of my stoma I limit my range of activities**					
12. Because of my stoma I feel that I will always be a patient**					
13. I am always conscious that my stoma may leak, smell or be noisy**					
14. I have accepted the changes in my appearance which were caused by the stoma.					
15. I am grateful that the stoma has given me a new lease of life					
16. Caring for my stoma is difficult**					
17. I feel that I am less sexually attractive because of my stoma**					
18. I feel angry about having a stoma**					
19. Despite my stoma I feel I have a rewarding life					
20. I will be able to manage my stoma in the future					
21. I am always anxious about my stoma**					
22. With my stoma I feel that my life-threatening experience has passed					
23. I can engage in a variety of activities despite having a stoma					

**** Reverse scored**