Body attitude, body satisfaction and body awareness in a clinical group of depressed patients: An observational study on the associations with depression severity and the influence of treatment

Submitted

M. Scheffers\textsuperscript{a}
M. A. J. van Duijn\textsuperscript{b}
M. Beldman\textsuperscript{c}
R. J. Bosscher\textsuperscript{e}
J. T. van Busschbach\textsuperscript{a,d}
R. A. Schoevers\textsuperscript{e}

\textsuperscript{a} Windesheim University of Applied Sciences, School of Human Movement and Education, Zwolle, the Netherlands
\textsuperscript{b} University of Groningen, Department of Sociology, Groningen, the Netherlands
\textsuperscript{c} University of Groningen, University Medical Center Groningen, University Center of Psychiatry, the Netherlands
\textsuperscript{d} University of Groningen, University Medical Center Groningen, University Center of Psychiatry, Rob Giel Research center (RGOc), Groningen, the Netherlands
\textsuperscript{e} University of Groningen, University Medical Center Groningen, University Center of Psychiatry, Research School of Behavioural and Cognitive Neurosciences (BCN), Interdisciplinary Center for Psychopathology and Emotion regulation (ICPE), Groningen, the Netherlands
ABSTRACT

**Background:** Apart from changes in mood and cognition, depressive disorders are also characterized by changes in body experience, changes that largely influence daily functioning and aggravate distress. In order to gain more insight into this important issue, three domains of body experience - body attitude, body satisfaction and body awareness - and their associations with symptom severity of depression were studied pre- and post-treatment in a sample of depressed patients in a multidisciplinary setting.

**Methods:** Body attitude (Dresden Body Image Questionnaire), body satisfaction (Body Cathexis Scale), body awareness (Somatic Awareness Questionnaire) and severity of depressive symptoms (Inventory of Depressive Symptomatology) were measured in a clinical sample of depressed patients at the start and at the end of treatment. Differences between pre-treatment and post-treatment scores were studied with paired t-tests. Associations between body experience and depression were analysed with Pearson correlations and partial correlations.

**Results:** At the start of treatment, patients scored significantly lower than a healthy comparison sample on body attitude and body satisfaction, but not on body awareness. After treatment, depression scores decreased with large effect sizes, scores for body attitude and body satisfaction increased with medium effect sizes and body awareness scores increased slightly. Medium pre-treatment and strong post-treatment associations were found between depression severity and body attitude and between depression severity and body satisfaction. Body awareness showed low correlations with depression severity at both measurements.

**Conclusions:** The study provides evidence for a solid association in clinically depressed patients between body attitude, body satisfaction and depression. The findings merit further studies in order to elucidate the exact role of each aspect of body experience in depressed patients.
INTRODUCTION

Apart from changes in mood and cognition, depressive disorders are characterized by changes in body experience. Depressed patients commonly report various symptoms related to changes in the subjective experience of their own body [1], changes that largely influence daily functioning and aggravate distress. This aspect of depression, however, has received only little scientific attention. In order to gain more insight into the issue of body experience in depression, the present study reports outcomes in three domains of body experience: body attitude, body satisfaction and body awareness, and their associations with symptom severity of depression in a group of clinically depressed patients.

As described by Bhugra and Mastrogianni [2], body-related symptoms are common features of depression throughout the world. According to Röhrich et al. [3] and Papadopoulos and Röhrich [4], body-related symptoms might even be dominant in depression and patients may experience depression mainly through the lived body. However, theoretical models for processes underlying depression do not explicitly or systematically refer to the body-mind nature of depressive syndromes. Depressed patients, nonetheless, frequently report a broad range of body-related symptoms and phenomena such as decreased feelings of vitality; negative appraisal of the body, loss of sexual interest; and physical complaints like chronic joint pain, limb pain, back pain and gastrointestinal problems [5]. Furthermore, studies have shown a positive association between depression and psychomotor retardation [6, 7] as expressed in, among others, decreased gait, restricted sensorimotor space [8, 9] and increased standing phases and slumped posture with reduced vertical movement of the upper body [10]. Moreover, body awareness, the perception of bodily states, processes and actions [11], is reported to be diminished in depressed patients [3, 12].

Despite clinical observations and some theoretical notions that the way depressed people experience their body is a core feature of depression, which is used as a frame of reference in body-oriented psychological interventions for depression [3], empirical evidence for the association between depressive symptoms and negative body experience is scarce. Studies have typically been conducted in non-clinical samples, revealing consistent results: respondents scoring in the clinical range of depression display significantly higher body dissatisfaction than non-depressed controls.

The literature reports on six relevant studies in non-clinical samples. Four of these studies [13 - 16] used the Center for Epidemiologic Studies-Depression scale [17] to measure depression. Using data from the Body Appreciation Scale [18], Gillen [13] found a positive body image to be negatively correlated with depression ($r = -.38$) in a group of undergraduate students. Kim and Kang [14] reported positive body image in a group of middle-aged adults, measured with the Body Self-image Questionnaire [19], to be negatively correlated with depression ($r = -.45$). Jackson et al. [15] used the
Stunkard Adult Female Figure Rating Scale [20] to measure body image dissatisfaction in a group of mid-life women. Dissatisfied women were nearly twice as likely to report clinically significant levels of depressive symptoms (OR = 1.91) than women satisfied with their body image. Using the Body Parts Satisfaction Scale [21], Noles et al. [16] found a significant difference in body satisfaction between depressed ($M = 3.93, SD = 0.53$) and non-depressed ($M = 4.63, SD = 0.59$) subjects.

The fifth study [22] reporting on data from non-clinical samples used the Zung Self-Report Depression Scale [23] and a self-composed scale consisting of 17 different body parts in a cross-sectional study in a group of undergraduate students. The depressed group showed significantly higher levels of body dissatisfaction than the non-depressed respondents ($M = 3.27$ and $M = 2.61$ respectively, $SD$ not reported). Finally, Rosentröm et al. [24] used data from the population-based longitudinal Young Finns study and found that the appearance-related item from the Beck Depression Inventory [25] ‘I fear that I look ugly and displeasing’ was a strong predictor for chronic depression characterized by dysphoria.

To our knowledge, only one study has been conducted in a clinical sample of depressed patients. Röhricht et al. [26] measured body dissatisfaction using a visual analogue scale in 40 depressed patients. At the start of treatment, body dissatisfaction correlated .56 with depression severity as measured with the Hamilton Depression Scale [27]. The authors report that body satisfaction improved as depressive symptoms decreased, but did not report exact data for post-treatment.

In the studies presented thus far, assessment of body experience has been mainly restricted to appearance-related and weight-related body dissatisfaction. Considering the diverse aspects of body experience that are affected in depression, a conceptually broader representation of body experience is warranted. This is in line with the concept of body experience as capturing a variety of body-related phenomena [28]. Consequently, it is important to not only measure body dissatisfaction, but also the overall attitude towards the body [29].

In addition to body dissatisfaction and body attitude, the role of body awareness in depression should also be addressed. Body awareness is described by Mehling et al. [11, p. 4] as “the perception of bodily states, processes and actions that is presumed to originate from sensory proprioceptive and interoceptive afferents and that an individual has the capacity to be aware of”. Body awareness has received more attention in recent depression research. Danielsson and Rosberg [12], for example, emphasized the importance of addressing and enhancing body awareness in treating persons with major depression. Based on emerging evidence for abnormalities of interoception and dysfunction in the neural substrates for interoception (e.g., vagus, insula, anterior cingulate cortex) in depression, Harshaw [30] hypothesised that the reduced perception and interpretation of bodily signals is a key symptom of depressive disorder.
The present study investigates the relation between body experience and depression severity at the start and end of treatment in a group of depressed patients. The multidisciplinary treatment programme consisted of pharmaceutical, psychotherapeutic, and body- and movement-oriented interventions. We included the following domains of body experience: *body attitude*, referring to cognitive, affective and behavioural aspects [29]; *body satisfaction*, indicating the degree of contentment with appearance or functionality of the body [31]; and *body awareness*, as defined above [11].

In a sequence of analyses, we investigated the pattern of associations between body experience and depression before and after treatment and evaluated the change between both time points. In all analyses we expected a negative association between body experience and depression. At post treatment, we also distinguished between patients who were in remission at the end of treatment and those who were not. We also evaluated gender differences, because of the difference in prevalence of depression between women and men [32, 33] and because of the gender-specific role body experience, especially body satisfaction, may play in depression [34, 35].

The central aim of the present study is to further our understanding of the relation between body experience and clinical depression and to fill the gap in research on body experience in clinical samples. More insight into the link between depressive symptoms and body experience may also validate the role of body- and movement-oriented interventions targeting body experience in depression treatment.

**METHOD**

**Participants**
This study included 74 patients (mean age 43.2, *SD* 12.1) from a group of 98 patients in treatment at the Department of Mood and Anxiety Disorders, University Center for Psychiatry (UCP), University Medical Center Groningen (UMCG), a tertiary academic centre. The treatment centre uses a multidisciplinary approach combining pharmaceutical, psychotherapeutic, and body and movement oriented interventions (psychomotor therapy) [36].

The sample consisted of 44 women (mean age 41.9, *SD* 12.0, range 21-61) and 30 men (mean age 45.2, *SD* 12.2, range 23-60). Experienced psychiatrists or clinical psychologists established clinical diagnoses by conducting extensive clinical interviews and by critically evaluating biography and treatment history.
Measures

Inventory of Depressive Symptomatology (IDS)
The IDS [37, 38] is a self-report instrument designed to measure overall depressive symptom severity. The IDS score, which ranges from 0 to 84, was obtained from 28 equally weighed items, rated on a 4-point Likert scale (range 0-3).

Dresden Body Image Questionnaire (DBIQ)
The DBIQ [39, 40] is a 35-item questionnaire with positively and negatively worded statements across five subscales: body acceptance (e.g., “I wish I had a different body”), vitality (e.g., “I am physically fit”), physical contact (e.g., “Physical contact is important for me to express closeness”), sexual fulfilment (e.g., “I am very satisfied with my sexual experiences”) and self-aggrandizement (e.g., “I use my body to attract attention”). Level of agreement with items was scored on a 5-point Likert scale ranging from 1 = not at all to 5 = fully. A higher score indicates a more positive body attitude. Psychometric evaluation of the Dutch version of the DBIQ resulted in a slight adaptation of the original scale, by moving one item to a different subscale. The resulting scales and subscales showed good reliability and validity [41].

Body cathexis scale (BCS)
The BCS is a 40-item self-report measure that focuses on body satisfaction [42] and is based on the original 53-item BCS [43]. The items relate to satisfaction with the body or to bodily functions, for instance: hands, vitality, eyes, coordination, health and weight. Responses were scored on a 5-point Likert scale, ranging from 1 = very dissatisfied to 5 = very satisfied. In a study on the BCS in a non-clinical sample, validity and reliability were found to be sufficient [42].

Somatic awareness questionnaire (SAQ)
The SAQ [44] is a Dutch 25-item self-report questionnaire that assesses sensitivity to and awareness of internal bodily signals and states, like energy level and awareness of tiredness. All items were posed as statements addressing awareness of internal bodily processes. Items were scored on a 5-point Likert scale (1 = not at all, 2 = barely, 3 = more or less, 4 = somewhat, 5 = much). A higher score indicates more awareness of bodily signals. In a non-clinical sample, validity and reliability were found to be sufficient [45].

Procedure
Patients were asked to fill out the DBIQ-35, BCS and SAQ at the start and end of treatment. They received an envelope containing the questionnaires addressing body experience to be filled out paper and pencil on-site.

As part of the computer-administered Routine Outcome Monitoring, IDS was
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monitored every two weeks during treatment. IDS measurements closest to those of the body experience scales measurements were used.

Of the 98 patients under treatment at the time of data collection (59 women, 39 men), 10 were not included in the study because they did not fulfill the criteria for depression (n = 10). These criteria were based on the cut-off scores provided by Schulte-van Maaren et al. [46]: 22 for women aged 18-40, 24 for women aged 41-65, 17 for men aged 18-40 and 19 for men aged 41-65. Fourteen patients were not included because they did not fill out the IDS (n = 12) or the DBIQ (n = 2) at the start of treatment. For 25 respondents no post-treatment IDS scores were available and from one other patient no information on the DBIQ was available at the end of treatment. Thus, 48 patients (29 women, 19 men) were included in the pre-post analyses.

**Data analyses**

All data analyses were conducted using IBM SPSS Statistics software version 20. Differences between body experience and depression scores between patients with complete and incomplete data were investigated with \( t \)-tests. Differences between pre-treatment and post-treatment scores were studied using a paired \( t \)-test and were expressed in Cohen’s \( d \), which is considered large if \( d > 0.80 \), moderate if \( d \) is between 0.50 and 0.79 and small when \( d \) is between 0.20 and 0.49 [47].

Associations between domains of body experience and depression at the start and end of treatment were analysed by Pearson correlations with separate analyses for men and women. Moreover, in order to obtain an estimate of the remaining association between body experience measures and depression after treatment, partial Pearson correlations were computed for the post-treatment scores on body experience measures and depression, controlling for pre-treatment measures.

**RESULTS**

Due to computer-assisted assessment, scores on IDS showed no missing values. In calculating means for body experience measures, administered paper-and-pencil, we limited missing values to two for total mean scores. This led to no loss of data for SAQ and BCS. However, DBIQ data showed more than two missing values in ten respondents, mainly as a result of missing values in the subscale sexual fulfilment. Therefore, we decided not to include the subscale sexual fulfilment in our analysis. DBIQ mean item scores showed no significant differences with and without this subscale (Mean = 2.60, \( SD = 0.49 \) and Mean = 2.58, \( SD = 0.48 \), respectively).

Pre-treatment scores on IDS for respondents without post-treatment scores did not differ significantly from those of respondents with both pre-treatment and post-
treatment scores: Mean = 39.2, SD = 9.6 and Mean = 39.2, SD = 9.3, respectively; $t(72) = 0.02, p = 0.99$. Differences in body experience measures between respondents without post-treatment IDS scores and those with both pre-treatment and post-treatment IDS scores were significant for BCS: $t(72) = 2.00, p = 0.05, d = 0.49$, with respectively Mean = 2.84, SD = 0.38 and Mean = 3.04, SD = 0.43; and for SAQ: $t(72) = 2.08, p = 0.04, d = 0.51$ with respectively Mean = 3.26, SD = 0.53 and Mean = 2.98, SD = 0.56. Differences were non-significant for DBIQ: $t(72) = 0.85, p = 0.40$.

Table 1 shows means, standard deviations and gender differences for IDS and the three body experience measures at pre-treatment. The effect size for gender differences in depression severity was moderate, with women presenting higher depression scores than men. Effect sizes for gender differences on DBIQ and BCS were large (> 0.80), with women scoring lower than men. Women did, however, score higher than men on body awareness, with a moderate effect size.

Table 1. Means, standard deviations and gender differences for depression and body experience at pre-treatment ($n = 74; n_m = 30; n_f = 44$).

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>Mean_m</th>
<th>SD_m</th>
<th>Mean_f</th>
<th>SD_f</th>
<th>t</th>
<th>d</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDS</td>
<td>39.2</td>
<td>9.3</td>
<td>36.1</td>
<td>9.2</td>
<td>41.3</td>
<td>8.9</td>
<td>2.45*</td>
<td>0.57</td>
</tr>
<tr>
<td>DBIQ</td>
<td>2.60</td>
<td>0.49</td>
<td>2.84</td>
<td>0.46</td>
<td>2.44</td>
<td>0.45</td>
<td>3.67**</td>
<td>0.88</td>
</tr>
<tr>
<td>BCS</td>
<td>2.98</td>
<td>0.42</td>
<td>3.17</td>
<td>0.31</td>
<td>2.84</td>
<td>0.44</td>
<td>3.54**</td>
<td>0.87</td>
</tr>
<tr>
<td>SAQ</td>
<td>3.08</td>
<td>0.56</td>
<td>2.91</td>
<td>0.45</td>
<td>3.19</td>
<td>0.60</td>
<td>2.18*</td>
<td>0.53</td>
</tr>
</tbody>
</table>

* $p < .05$ ** $p < .001$

m = male; f = female; $d$ = Cohen’s $d$; IDS = Inventory of Depressive Symptomatology; DBIQ = Dresdner Body Image Questionnaire; BCS = Body Cathexis Scale; SAQ = Somatic Awareness Questionnaire.

Table 2 presents correlations between the three dimensions of body experience and depression severity at pre-treatment for the whole group and for men and women separately. The correlations of DBIQ and BCS with IDS are weak to moderate, and the correlations of SAQ with IDS as well as with the other body experience measures are very weak. The correlations are represented graphically in the left panel of Figure 1 and in Figures S2 and S3 in the supplementary materials. Table S1 in the supplementary materials presents correlations for the sample of respondents with complete data at both pre- and post-treatment ($n = 48$) in order to facilitate valid comparison with the post-treatment correlations. Except for a stronger negative correlation between IDS and BCS for women in the sample with complete data, there are no substantial differences between Table 2 and Table S1.
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Table 2. Correlations at pre-treatment for total group and men and women separately (n = 74; n_m = 30; n_f = 44).

<table>
<thead>
<tr>
<th></th>
<th>IDS</th>
<th>DBIQ</th>
<th>BCS</th>
<th>SAQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDS</td>
<td></td>
<td>-.41**</td>
<td>-.24*</td>
<td>.05</td>
</tr>
<tr>
<td>DBIQ</td>
<td>-.38*/-30’</td>
<td></td>
<td>.47**</td>
<td>-.14</td>
</tr>
<tr>
<td>BCS</td>
<td>-.28/-.09</td>
<td>.33/.41**</td>
<td></td>
<td>-.14</td>
</tr>
<tr>
<td>SAQ</td>
<td>.03/.05</td>
<td>-.23/06</td>
<td>03/-08</td>
<td></td>
</tr>
</tbody>
</table>

* p < .05 ** p < .01

m = male, f = female;
Correlations within whole group above and of m/f separately below diagonal;
IDS = Inventory of Depressive Symptomatology; DBIQ = Dresdner Body Image Questionnaire;
BCS = Body Cathexis Scale; SAQ = Somatic Awareness Questionnaire.

Table 3 shows differences before and after treatment. Note that the pre-treatment means refer to the 48 participants with post-treatment scores. The differences with the pre-treatment means for all patients reported in Table 1 are small.
The effect size for change in IDS scores is high and somewhat higher for men than for women. The effect sizes for body attitude (DBIQ) and body satisfaction (BCS) are moderate for the complete group and for women, but high for men. Effect sizes for differences in scores on body awareness (SAQ) before and after treatment are low for both women and men. Patients who score below the cut off values on the IDS after treatment, indicating remission, show high effect sizes for DBIQ and BCS, whereas these effect sizes are low for those not in remission. The boxplots in Figure S1 in the supplementary materials illustrate the differences between pre-treatment and post-treatment for men and women, and for patients in remission and not in remission.

Table 4 shows correlations at post-treatment for IDS and for the three body experience measures as well as the partial correlations controlled for pre-treatment. Figure 1 facilitates interpretation for DBIQ, and Figures S2 and S3 facilitate interpretation for BCS and SAQ. These Figures all present scatterplots with a regression line of the pre- and post-treatment measurements and a scatter plot showing the partial correlations for the complete sample. The partial correlation plots are based on the residuals for the post-treatment depression score after regression on the pre-treatment score for depression and the body experience measure.

In the pre-treatment scatterplot in Figure 1, the regression line of IDS score on DBIQ score is less steep than in the post-treatment scatterplot. This reflects a lower association pre-treatment, which is at least partly due to the smaller range in both IDS and DBIQ scores compared to the post-treatment scatterplot. After controlling for the pre-treatment scores, the association post-treatment becomes even somewhat stronger, which is reflected by the variability around the regression line in the partial correlation plot.
Table 3. Means and standard deviations on depression and body experience before and after treatment, paired $t$-test and Cohen’s $d$ and correlation pre-post ($n = 48$; $n_f = 29$, $n_m = 19$).

<table>
<thead>
<tr>
<th>(sub) scale</th>
<th>Pre-treatment</th>
<th>Post-treatment</th>
<th>$t$</th>
<th>Cohen’s $d$</th>
<th>Correlation pre post</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDS total group</td>
<td>39.2 (9.4)</td>
<td>21.7 (15.3)</td>
<td>-9.16*</td>
<td>1.38</td>
<td>.51</td>
</tr>
<tr>
<td>$m$</td>
<td>37.6 (9.7)</td>
<td>17.5 (14.1)</td>
<td>-7.71*</td>
<td>1.66</td>
<td>.68</td>
</tr>
<tr>
<td>$f$</td>
<td>40.5 (9.1)</td>
<td>24.6 (15.0)</td>
<td>-5.98*</td>
<td>1.28</td>
<td>.36</td>
</tr>
<tr>
<td>IR</td>
<td>36.2 (9.1)</td>
<td>10.3 (5.4)</td>
<td>-12.90*</td>
<td>3.47</td>
<td>.02</td>
</tr>
<tr>
<td>NIR</td>
<td>43.1 (8.6)</td>
<td>36.3 (10.6)</td>
<td>-4.21*</td>
<td>.70</td>
<td>.73</td>
</tr>
<tr>
<td>DBIQ</td>
<td>2.64 (0.51)</td>
<td>2.96 (0.56)</td>
<td>5.46*</td>
<td>.60</td>
<td>.72</td>
</tr>
<tr>
<td>$m$</td>
<td>2.87 (0.48)</td>
<td>3.24 (0.45)</td>
<td>3.48*</td>
<td>.80</td>
<td>.51</td>
</tr>
<tr>
<td>$f$</td>
<td>2.49 (0.47)</td>
<td>2.78 (0.55)</td>
<td>4.18*</td>
<td>.57</td>
<td>.75</td>
</tr>
<tr>
<td>IR</td>
<td>2.70 (0.46)</td>
<td>3.22 (0.45)</td>
<td>7.67*</td>
<td>1.15</td>
<td>.70</td>
</tr>
<tr>
<td>NIR</td>
<td>2.57 (0.56)</td>
<td>2.62 (0.50)</td>
<td>0.79</td>
<td>0.09</td>
<td>.86</td>
</tr>
<tr>
<td>BCS</td>
<td>3.04 (0.44)</td>
<td>3.33 (0.55)</td>
<td>5.34*</td>
<td>.58</td>
<td>.72</td>
</tr>
<tr>
<td>$m$</td>
<td>3.24 (0.33)</td>
<td>3.55 (0.43)</td>
<td>3.21*</td>
<td>.81</td>
<td>.39</td>
</tr>
<tr>
<td>$f$</td>
<td>2.91 (0.45)</td>
<td>3.19 (0.57)</td>
<td>4.24*</td>
<td>.55</td>
<td>.78</td>
</tr>
<tr>
<td>IR</td>
<td>3.09 (0.48)</td>
<td>3.55 (0.47)</td>
<td>6.98*</td>
<td>.97</td>
<td>.74</td>
</tr>
<tr>
<td>NIR</td>
<td>2.97 (0.38)</td>
<td>3.06 (0.53)</td>
<td>1.19</td>
<td>0.20</td>
<td>.77</td>
</tr>
<tr>
<td>SAQ</td>
<td>2.98 (0.56)</td>
<td>3.10 (0.61)</td>
<td>1.93</td>
<td>0.20</td>
<td>.75</td>
</tr>
<tr>
<td>$m$</td>
<td>2.88 (0.52)</td>
<td>2.97 (0.47)</td>
<td>0.99</td>
<td>0.18</td>
<td>.71</td>
</tr>
<tr>
<td>$f$</td>
<td>3.04 (0.59)</td>
<td>3.18 (0.68)</td>
<td>1.64</td>
<td>0.22</td>
<td>.76</td>
</tr>
<tr>
<td>IR</td>
<td>2.93 (0.50)</td>
<td>3.16 (0.60)</td>
<td>2.74**</td>
<td>0.42</td>
<td>.70</td>
</tr>
<tr>
<td>NIR</td>
<td>3.04 (0.64)</td>
<td>3.01 (0.63)</td>
<td>-0.39</td>
<td>0.05</td>
<td>.85</td>
</tr>
</tbody>
</table>

* $p < .001$ ** $p < .05$

$m$ = male; $f$ = female; IR = in remission ($n = 27$); NIR = not in remission post-treatment ($n = 21$);

IDS = Inventory of Depressive Symptomatology; DBIQ = Dresdner Body Image Questionnaire;

BCS = Body Cathexis Scale; SAQ = Somatic Awareness Questionnaire.

In the post-treatment correlation plots, the separate groups of patients in remission and not in remission are visually clear. Because of the low IDS scores for patients in remission, the correlations with DBIQ, BCS and SAQ in this group are weak. As reflected by the weak partial correlations, correlations remain weak after correcting for the pre-treatment measures. Gender differences in correlations and partial correlations are modest. The higher negative partial correlation between IDS and BCS for women is likely due to the outlier in the lower right corner (third panel of Figure 1). Overall, the correlations and partial correlations are strongest for IDS and DBIQ, increasing from pre- to post-measurement, and similar, but not quite as strong, for BCS. The correlation between SAQ and IDS, on the other hand, is quite weak. These results are in line with the similar distributions of DBIQ and BCS at pre- and post-treatment and of their difference score.
Table 4. Correlations between depression severity and body experience measures (n = 48) at post-treatment and partial correlations at post-treatment controlling for pre-treatment measurements.

<table>
<thead>
<tr>
<th></th>
<th>DBIQ</th>
<th>BCS</th>
<th>SAQ</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Correlations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDS</td>
<td>-.61**</td>
<td>-.61**</td>
<td>-.15</td>
</tr>
<tr>
<td>m/f</td>
<td>-.48*/-.65**</td>
<td>-.52*/-.62**</td>
<td>-.05/-2.7</td>
</tr>
<tr>
<td>IR/NIR</td>
<td>-.15/-50'</td>
<td>-.18/-70''</td>
<td>.14/.24</td>
</tr>
<tr>
<td><strong>Partial correlations</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IDS</td>
<td>-.70***</td>
<td>-.54***</td>
<td>-.10</td>
</tr>
<tr>
<td>m/f</td>
<td>-.56/-71***</td>
<td>-.37/-63***</td>
<td>.36/-32</td>
</tr>
<tr>
<td>IR/NIR</td>
<td>-.26/-56'</td>
<td>-.01/-27</td>
<td>.25/.37</td>
</tr>
</tbody>
</table>

* p < .05 ** p < .01 *** p < .001
m/f = male/female; IR/NIR = in remission/not in remission; IDS = Inventory of Depressive Symptomatology; DBIQ = Dresden Body Image Questionnaire; BCS = Body Cathexis Scale; SAQ = Somatic Awareness Questionnaire.

DISCUSSION

The aim of this study was to investigate associations between depression and different domains of body experience in a group of clinically depressed patients. The study shows a simultaneous improvement of depression, body attitude and body satisfaction. Furthermore, medium to strong associations between depression severity and body attitude and between depression severity and body satisfaction were found before and after treatment, and when controlling for covariates. Thus, the study provides evidence of a solid association in clinically depressed patients between body attitude, body satisfaction and depression.
Body awareness scores did not change significantly in the course of treatment and showed low correlations with depression severity at the start as well as at the end of treatment. These findings were contrary to our expectations. Therefore, we will address body awareness separately in our discussion.

**Depression severity, body attitude and body satisfaction**

Compared with respondents in a healthy comparison sample who filled out the same questionnaires on body experience [41], patients with depression scored significantly lower at the start of treatment. On a 5-point range, the difference was almost one point lower on body attitude and more than half a point lower on body satisfaction. Overall, depression scores decreased as a result of treatment with high effect sizes. Simultaneously, body attitude as well as body satisfaction scores increased with medium effect sizes. Furthermore, patients who achieved remission at the end of the treatment period also showed large changes in body attitude and body satisfaction, whereas patients not in remission only showed small changes on these domains. After treatment, mean scores on body attitude and body satisfaction were still below those reported for healthy controls [41], although only slightly so for patients in remission. Together with the finding of large post-treatment partial correlations (i.e. controlling for pre-treatment scores) between depression scores and body attitude as well as body satisfaction scores, the results point in the direction of an interesting connection between these aspects of body experience and depression severity.

**Gender differences**

In line with the sex-specific pattern in IDS reference values reported by van Schulte-van Maaren et al. [46], mean scores for women on IDS in our study were somewhat higher than those for men. At the start of treatment, mean scores on body attitude and body satisfaction were lower for women than for men. These results are similar to those in a healthy convenience sample in which the same body experience measures were used [41, 42], to studies on body attitude in a broad range of mental disorders [48], and to studies on body attitude and body satisfaction in a group with trauma-related disorders [29]. Although body attitude, body satisfaction and depressions scores improved for both women and men, the differences before and after treatment were larger for men than for women. Post-treatment women showed higher depression severity and more negative body attitude and body satisfaction scores than men.

**Depression and body awareness**

The results of our study do not support the hypothesis by Harshaw [30] that diminished interoceptive awareness or body awareness is central in depression. Compared with scores in the healthy sample [45], body awareness in depressed patients was hardly
lower at the start of treatment, although somewhat lower for men than for women, and changed only slightly after treatment.

The SAQ measures core aspects of interoceptive awareness and was therefore our instrument of choice. Mehling et al. [49], however, proposed to broaden the conceptualization of interoceptive awareness as commonly used in neuroscience to one that includes interpretational aspects of perception, such as appraisal and beliefs (e.g. catastrophizing) and attention regulation (e.g. ignoring, distraction). They stated that the concept of body awareness is too strict and should also include proprioceptive awareness, the conscious perception of joint angles and muscle tensions, of movement, posture and balance [50]. Therefore, they introduced the Multidimensional Assessment of Interoceptive Awareness (MAIA). This broader instrument might be more informative than the SAQ in assessing the association between body awareness and depression and might shed light on the possibility that not body awareness ‘as such’ is disturbed, but that ignoring and avoiding the awareness of bodily signals might be central in body awareness in depression.

**General discussion**

Notwithstanding a modest sample of patients diagnosed with depression, our study showed modest to large improvement and clear associations between depression and body experience scores pre- and post-treatment. As no large differences due to attrition were found, the findings of the current study can be considered solid and generalisable to a broader population of clinically depressed patients.

The diverging outcomes of the current study for the different domains of body experience support our view that body experience needs to be measured from different angles [29]. Aspects of body experience appear to be affected differently in depression, and treatment may influence these aspects in different ways. The majority of studies that have investigated the association between body experience and depression, for the most part conducted in non-clinical samples, focused on body dissatisfaction and its association with depression. Our findings of reduced body satisfaction in a clinical sample of depressed patients are in line with the result of these studies.

Our study also clearly shows the association of depression with body attitude, which so far has not been a topic in depression research. It seems worthwhile to pay more attention to measures of body attitude capturing body-related emotional and behavioral aspects, which are important features in the subjective experience of depression.

Although our study provided more insight into the aspects of body experience that are disturbed in depressed patients and might be targeted in therapy, the integrated specialized multidisciplinary treatment programme does not make it possible to distinguish the specific benefits of the body- and movement-oriented intervention (psychomotor therapy) from the pharmacotherapeutic and psychotherapeutic treatment.
It is important to gain more data on the specific contribution of body- and movement-oriented interventions. To date, evidence is still scarce.

One of the few studies that investigated whether a body-oriented psychological therapy is specifically effective in improving depressive symptoms was conducted by Röhrich et al. [3] In an exploratory randomized control the authors found that, at the end of treatment, patients in the body psychotherapy group had significantly lower depressive symptom scores than the waiting group that served as comparison group. However, no measures of body experience were used.

Another relevant study evaluating the benefits of body- and movement oriented interventions was performed by van der Maas et al. [51]. In a cluster randomized trial evaluating the effect on quality of life, disability and depression of a multidisciplinary pain rehabilitation programme with and without added psychomotor therapy, the authors found a larger reduction in depression scores for patients treated with additional psychomotor therapy. This provides some evidence for the surplus value of psychomotor therapy with body experience, interaction and communication as central elements. The authors hypothesised that psychomotor therapy may act as a catalyst for other, more cognitively oriented parts of the treatment programme.

Finally, some additional support for the use of body- and movement-oriented approaches as an adjunctive treatment for depression comes from reviews indicating that the use of relaxation techniques and exercise can alleviate depression severity [52, 53]. These reviews do not specify the role and influence of body experience, but it may be suggested that part of the working mechanism lies in the self-empowering effect of experiential therapies such as psychomotor therapy [52].

Summarizing, the study findings indicate that in clinically depressed patients, body experience, especially body attitude and body satisfaction, improves after treatment, with strong associations between depressive symptoms and body attitude and body satisfaction. This result merits further controlled studies investigating both depression symptoms and body experience measures in order to evaluate and elucidate the specific role of body- and movement-oriented interventions in depressed patients. These studies may lead to the development of further specialized interventions.
REFERENCES


SUPPLEMENTARY MATERIALS

Table S1. Correlations at pre-treatment for total group and men and women separately (n = 74; n_m = 30; n_f = 44).

<table>
<thead>
<tr>
<th></th>
<th>IDS</th>
<th>DBIQ</th>
<th>BCS</th>
<th>SAQ</th>
</tr>
</thead>
<tbody>
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<td>IDS</td>
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<td>-.10</td>
<td></td>
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<tr>
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<tr>
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<td>.39/.49&quot;</td>
<td>.10</td>
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<tr>
<td>SAQ</td>
<td>-.16/-.11</td>
<td>-.31/.14</td>
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</table>

* p < .05 ** p < .01
m = male, f = female;
Correlations within whole group above and of m/f separately below diagonal;
IDS = Inventory of Depressive Symptomatology;
DBIQ = Dresdner Body Image Questionnaire;
BCS = Body Cathexis Scale; SAQ = Somatic Awareness Questionnaire.

Figure S1. Boxplots of the difference in depression measure and the three body experience measures before and after treatment (n = 48; n_male = 19; n_female = 29; n_in remission = 27; n_not in remission = 21)
Figure S2. Correlation scatterplots of the depression measure IDS and body experience measure BCS before and after treatment and partial correlation plot after treatment controlling for pre-treatment measures (n=48)

Figure S3. Correlation scatterplots of the depression measure IDS and body experience measure SAQ before and after treatment and partial correlation plot after treatment controlling for pre-treatment measures (n=48)