



Picturing disturbed body experience: A comparison of body drawings in persons with somatoform disorder and a general population sample

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ABSTRACT

People with somatic symptom disorder or somatoform disorder are considered to have a troubled relationship to their body that is hard to assess with self-report questionnaires alone. To examine the potential value of own-body drawings as an assessment tool, objective features of drawings from 179 patients referred to treatment for somatoform disorder, were compared to those of 173 age-and-sex matched persons from the general population. While two factors had been found in the somatoform disorder sample, in the general population only the factor that reflected 'details' in own-body drawings was replicated. The two samples did not score differently on this factor. The general population sample showed a less strong association between objective body drawings scores on this 'details' factor and self-reported scores of body experience than the somatoform disorder sample. Moreover, the phenomenological contents of the drawings were more oriented towards health or appearance than the mostly mixed or unclear orientation of persons with somatoform disorder. Because the objective scoring of body drawings did not differ between groups while the contents of body drawings appeared to differ, the results suggest that this objective scoring of body drawings is not appropriate to distinguish people with and without somatoform disorder.

1. Introduction

Patients with somatoform disorder (DSM-IV, APA, 2000) or somatic symptom disorder (DSM-5, APA, 2013) experience chronic, distressing somatic symptoms. A common characteristic of this condition is the patients' troubled relationship to their body: they experience their body as dysfunctional (Röhricht, 2011) and have difficulty acknowledging and understanding body signals (Henningens et al., 2018; Kalisvaart et al., 2012; Nijs et al., 2008; Sertoz et al., 2009). This disturbed body experience can be a focus in the treatment of somatoform disorder (Baptista et al., 2012; Houtveen et al., 2015), and its assessment is helpful in the process of indication for treatment and effect-evaluations (van Dessel et al., 2014; Scheffers et al., 2018). Body experience is a multilayered concept that is used to describe the different ways people relate to their body (Cash, 2015; Röhricht et al., 2005; Scheffers et al., 2017a). It encompasses the evaluation of appearance and functioning of

the body (body cathexis or body satisfaction; Neumark-Sztainer, 2006), the cognitive, affective and behavioral aspects of the relation to one's body (body attitude; Pöhlmann and Joraschky, 2006; Scheffers et al., 2019), and the sensitivity to and capacity to recognize and regulate bodily states (body awareness, Gyllensten, 2010; Landsman-Dijkstra et al., 2004; Mehling et al., 2009).

The use of self-report questionnaires alone, which address conscious aspects in a verbal way, may not be sufficient to assess the full scope of body experience. The less conscious ways in which body experience is expressed, for instance in posture, movement patterns, embodied identity (Pass Erickson, 2020) and automatic behavior, can also be assessed using nonverbal tools such as physical tests, behavioral observations (Emck et al., 2012; Lausberg, 2009) or artistic expression (Assmann et al., 2010). In order not to rely only on conscious, verbalized reflections of body experiences, we examined own-body drawings as a form of self-expression of body experience (Kalisvaart et al., 2018).

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These are non-intrusive, personal, and quick and easy to administer (Betts, 2006). Self-report and body drawings are assumed to address different aspects (e.g., conscious, verbal or explicit versus unconscious, nonverbal, or implicit) that combine into body experience (Petty and Fazio, 2008).

In many contexts, scientists have tried to quantify the subjective expression of a drawn person, an assignment used in clinical practice to deepen experience through verbal exchange with a therapist (Penzes et al., 2018). Assessment of illness experience through drawings has been examined, for instance, in people with cardiovascular disease (Broadbent et al., 2006; Reynolds et al., 2007), brain injury (Jones et al., 2016), eating disorders (Guez et al., 2010), Cushing's syndrome (Tiemensma et al., 2012), and chronic pain disorders including headache (Broadbent et al., 2009), whiplash-associated disorders (Bernhoff et al., 2017), and fibromyalgia (Bojner Horwitz et al., 2006). These studies in patients with somatic problems indicated that drawings reveal clinical severity, illness perception and distress (Broadbent et al., 2018). Overall, however, the scientific evidence of projective assessment techniques, such as drawing-a-person or a figure-of-self, as a measure of psychological characteristics, is weak and difficult to interpret (e.g., Betts, 2006; Gigi, 2016; Lilienfeld et al., 2000). One reason may be that the interpretation of body drawings is unreliable when it relies on subjective impressions instead of objective characteristics of drawings.

In our previous study, a rating instrument was developed to assess objective characteristics of body drawings made by persons referred to treatment for somatoform disorder (Kalisvaart et al., 2018). Inter-rater reliability tests indicated accurate scoring of several features of body drawings by untrained observers. Two factors with adequate internal consistency and low inter-correlation best summarized the scores of assessors: 'details' (eyes, other senses, gender characteristics and the angle of perception) and 'basic elements' (limbs, feet, hands and the drawing fitting within the page). Objective ratings of these patients' drawings (showing a lack of 'details' and 'basic elements') correlated with subjective scoring by art therapy experts, reflecting a disturbed body experience. After therapy, more 'details' and 'basic elements' were seen in objective ratings of the body drawings: this may reflect a positive change.

However, these ratings were not correlated with self-reported body experience as assessed by a questionnaire. To clarify the validity and utility of this tool, drawings by people from the general population should be compared with the previously collected drawings from the people with somatoform disorder.

Before this comparison can be made, it is necessary to test the assumption that objective characteristics of own-body drawings from people with a somatoform disorder and from the general population reflect more or less the same constructs. To that aim, we will examine whether the original two-factor model in the clinical sample reflecting 'details' and 'basic elements' is replicated in the general population.

If the factor structure is the same, then a second research question – whether ratings of body drawings from the two groups differ – can be addressed. Self-report questionnaires quite consistently indicate a more positive body experience in the general population than in a population with mental or physical symptoms (Scheffers et al., 2017a, 2018). Furthermore, the finding in our previous study that post-treatment body drawings of patients with somatoform disorder showed more 'details' and 'basic elements' than those made before treatment started, may tentatively suggest that improved body experience is reflected in more comprehensive body drawings. Therefore, we expect people from the general population to obtain higher scores on both factors, 'details' and 'basic elements', than people with somatoform disorder.

Besides the objective scores of the drawings, a difference between groups can also occur in the phenomenological contents of the drawings. In Western society, when referring to one's body, people will be primarily oriented toward aspects of appearance (Harriger et al., 2018), as long as they are healthy. Persons with somatoform disorder, who are confronted with a dysfunctional body on a daily basis, possibly have a

more health-focused orientation (Riebel et al., 2014). This focus on health, including function and symptoms, might reflect their disproportionate and persistent thoughts about the seriousness of their symptoms (DSM-5, APA, 2013). This difference may be reflected in drawings of the body, for example through visible symptoms and omitted body parts, as opposed to detailed clothing and body shape. Such a difference in orientation of the drawing could influence the interpretation of objective features of drawings; and this raises the third research question: whether differences in orientation of the two groups emerge in body drawings. We expect that healthy persons, especially those who report few somatic symptoms, draw their own-body mainly from an appearance orientation, with detailed clothing and body shape, while persons with somatoform disorder are likely to highlight health-related aspects.

A fourth and last research question addresses the association between ratings of body drawings and self-report scores of body experience. Although assessments of body drawings may correlate to a certain extent with self-reports, a leading assumption underlying this study is that the two measures reflect different aspects of body experience. In our previous study with a homogeneous somatoform disorder sample, no significant univariate correlations were found between body drawing and self-report scores. Whereas this can partly be explained by the different modes of assessment (Ganellen, 2007), it might also reflect a real difference, i.e., that body drawings and questionnaire scores reflect different components of body experience (Petty et al., 2008). Moreover, in the group with somatoform disorder, such discordance between nonverbal and verbal assessments may also reflect somatoform dissociation, the tendency to disconnect from the body, which has been described in these patients (Lind et al., 2014; Linting et al., 2007; Kienle et al. 2017; Nijenhuis, 2000). Based on this notion, we expect the correlation between body drawing and self-report scores to be more pronounced in people from the general population than in those with somatoform disorder.

To summarize, in order to further examine the validity and utility of a body-drawing tool for assessing body experience in somatoform disorder, drawings from a matched general population group were compared to those from the original study of people with somatoform disorder. We examined whether: (1) the two-factor structure of body drawing ratings, found in the somatoform group, was replicated in the general population sample; (2) body drawing ratings differed between the two groups; (3) the orientation of the drawings differed between groups; and (4) drawings and self-report scores had a stronger correlation in the general population than in the somatoform sample.

2. Methods

2.1. Participants

In our previous study, 180 own-body drawings were collected in the diagnostic phase at a tertiary mental health centre specialised in psychosomatic medicine (Kalisvaart et al., 2018). Persons admitted for treatment in this centre generally had had somatic symptoms for on average 10 years; had received about 5 previous treatments for somatoform disorder in primary or secondary care; and, in about half of the cases, had a comorbid mood, anxiety, or personality disorder (van der Boom and Houtveen, 2014). The data from this group were collected in the period of DSM-IV classifications, and therefore the group is described as 'somatoform disorder sample'. A detailed description of this group is provided in our previous publication (Kalisvaart et al., 2018).

For the current study, to acquire a comparison sample from the general population, three research assistants collected data in several settings, such as work, sports clubs, scout groups, school and family, matching their group of participants as much as possible with the patient group on gender and age (18-65 years). Excluding seven persons older than 65 produced an adequately age-and-sex-matched group of 173 persons. In the somatoform disorder group, one person older than 65

was also excluded from the comparative analyses. The study was conducted in accordance with the principles of the Declaration of Helsinki (World Medical Association, 2013), was approved by the Institutional Review Board of the mental health centre (2013-30/oz1317/ck) for the somatoform group, and was granted a waiver by the Medical Ethical committee of the University Medical Centre Groningen for the general population group. Additional approval for the anonymous publication of drawings has been obtained (2022-23/oz1317). All participants provided written informed consent for participation in the study and the participants whose drawing was published provided written informed consent for the publication of their drawings.

2.2. Instruments

Body drawings. Similarly to data collection in the somatoform group, small groups with a maximum of five participants were instructed to pay attention consecutively to the different parts of their body. After this exercise they were asked individually to draw how they experienced their body. They used a pencil on an A3 sized (420 × 297 mm) sheet of paper. Participants were free to choose the orientation of the sheet (landscape or portrait). Instructions were provided by research assistants, while in our previous study art therapists gave the instructions to people with somatoform disorder (Kalisvaart et al., 2018).

The drawings were rated by research assistants on ten objective characteristics that had shown good inter-rater reliability in the previous study, in which principal components analysis had shown a two-factor solution (Kalisvaart et al., 2018). Four items loaded on the factor 'details': presence of eyes, number of other senses, angle of perception and gender clarity. Another four items loaded on the factor 'basic elements': limbs, feet, hands and the drawing fitting within the page. Both factors had adequate internal consistency (Cronbach's $\alpha = .76$ and $.73$). The two items that did not load on any factor, surroundings and position on the sheet (factor loadings $\leq .18$ in categorical factor analysis), were not included in the rotated solution and analyses in the previous study.

The rating of the content 'orientation' of the own-body drawings was done collaboratively by the first author and a research assistant. Orientation was graded in one of four categories: 1) no body drawn: this mostly involved a symbolic drawing without a body that could be classified; 2) health-oriented: body function and symptoms; 3) mixed or unclear: mixture of health and appearance or unclear orientation; and 4) appearance-oriented: clothing, stature and exterior.

2.3. Questionnaires

The *Dresden Body Image Questionnaire* (DBIQ-35, Pöhlmann et al., 2014; Scheffers et al., 2017a) is a 35-item questionnaire with positively and negatively worded items comprising 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 is scored on a 5-point Likert scale ranging from 1 = "not at all" to 5 = "fully". Higher subscale scores indicate a more positive body experience. Internal consistency (Cronbach's α) of the subscales (Dutch version) was good, varying from .74 to .91 in a non-clinical sample (Scheffers et al., 2017b) and from .78 to .92 in people with somatoform disorder (Scheffers et al., 2018). People with somatoform disorder scored substantially lower on all subscales than a random non-clinical sample (Scheffers et al., 2018).

In our first study, adequate (paper-and-pencil) DBIQ data completed within a period of three months before or after completion of the drawing from 65 persons were available. Data from the DBIQ of the other participants in this sample were not available or not used because the interval between the body drawing and questionnaire scores was too long. In this second study, participants were invited to complete an

online questionnaire only after they had done their drawing, and 145 persons responded.

In order to assess severity of somatic symptoms, the participants from the general population also completed the *Patient Health Questionnaire* (PHQ-15; Kroenke et al., 2002). The PHQ-15 is a fifteen-item instrument to assess the severity of somatic symptoms. It comprises somatic symptoms, such as headache, dyspnea, indigestion and nausea, each scored from 0 = "not bothered at all" to 2 = "bothered a lot". Sum scores of 5, 10 and 15 represent cutoff points for mild, moderate, and high somatic symptom severity, respectively. The questionnaire was shown to be reliable and valid in various health care settings and in the general population (Kocalevent et al., 2013).

2.4. Analysis

SPSS Version 22 was used for all statistical analyses. In the original study, categorical principal components analysis had yielded two factors: 'details' and 'basic elements'. In order to estimate goodness of fit of this factor solution in the general population group, confirmatory factor analysis would have been the preferred analysis. However, this could not be done due to a ceiling effect and limited variance in the data of the general population sample. Therefore, to answer the first research question, an explorative categorical principal components analysis, using the same procedure as in the somatoform sample, was executed in the general population sample, using all items that had sufficient inter-rater reliability. After transformation of the nominal and ordinal scores of the drawings into continuous, normal distributed scores using categorical principal components analysis, the transformed variables were rotated, using principal components analysis with oblique (oblimin) rotation (Linting et al., 2007). Criteria for excluding items for factor analysis were a factor loading $< .40$ or a loading $> .32$ on two or more factors (Costello and Osborne, 2005). For the determination of the number of factors, the scree plot of Eigenvalues and interpretability of factor solutions were used. Internal consistency of the subscales was examined with Cronbach's α .

Chi-square tests were used to compare gender and orientation of both groups, and analyses of variance to compare age and DBIQ-35 scores, as well as body drawing ratings between orientation categories and groups. To further explore the anticipated difference in orientation of the drawings, analysis of variance was used to compare symptom severity (PHQ-15, in the general population sample) among orientation categories.

To examine the hypothesis that the associations between the ratings of body drawings and self-report scores of body drawings were stronger in the general population than in the group with somatoform disorder, a linear regression analysis was performed, predicting DBIQ-35 total scores from ratings of body drawings and group (general population vs. somatoform disorder). In Block 1, group and z -scores of body drawings were entered and in block 2, the body drawings \times group interaction. To interpret a significant interaction, regression lines for the two groups were plotted for people scoring low (-1 SD) and high ($+1$ SD) on body drawings (Aiken and West, 1991).

3. Results

3.1. Descriptives

Table 1 shows age, gender and DBIQ-35 scores of the two groups. No differences in mean age ($p = .90$) or gender distribution ($p = .30$) were found. Mean DBIQ-35 scores on the total scale and all subscales differed significantly ($p < .001$, Cohen's $d = .84$ for physical contact to $d = 2.24$ for vitality) with patients obtaining lower scores on all aspects of body experience.

In 82.1% of the general population group, somatic symptom severity as measured with the PHQ-15 was low, in 15.1% medium symptom severity was reported, and 2.8% of the population scored high. The sum

Table 1

Characteristics of the participants from the general population and somatoform disorder samples: age, gender and scores on the scales of the Dresden body image questionnaire (DBIQ-35).

	General population (n=173)	Somatoform disorder (n=179)
Age (years) mean (SD)	40.9 (13.9)	40.7 (12.1)
inter-quartile range	27-53	30-52
range	18-65	17-65
Gender (% female)	75.3	70.3
DBIQ, mean (SD)	3.41 (.40)	2.46 (.65)
total score		
acceptance	3.72 (.67)	2.88 (1.01)
vitality	3.51 (.55)	2.12 (.75)
physical contact	3.70 (.62)	3.06 (1.06)
Sexual fulfilment	3.70 (.73)	2.31 (1.14)
Self-aggrandizement	2.74 (.53)	2.11 (.66)

Note. Age was registered for 146 persons from the general population and 138 patients with somatoform disorder. DBIQ-35 scores were obtained from 145 persons from the general population and 65 patients with somatoform disorder.

of these latter percentages is higher than the 8.1% for men and 10.3% for women with medium or high PHQ-15 scores observed in a study of the German general population (Kocalevent et al., 2013).

Fig. 1 gives an impression of the body drawings from both groups with varying amounts of ‘details’ and ‘basic elements’, and different orientations.

3.2. Factor structure of ratings of drawings

Table 2 shows the results of the exploratory factor analyses in the two groups. Categorical principal components analysis in the general population group indicated a 3-factor structure, based on Eigenvalues >1.0

and interpretability of the factors (explained variance 61,8%). Factor 1 (explained variance 30.4%) was identical to factor 1 (‘details’) of the somatoform disorder sample and comprised items referring to details of the body presented in the drawing: eyes, other senses, gender characteristics and the angle of perception. Factor 2 (explained variance 20.3%) comprised three ‘basic elements’ of the original somatoform model: limbs, feet and hands, in combination with surroundings. Factor 3, (explained variance 11.1%) comprised position on the sheet and fit to the page. Internal consistency of the three factors was adequate for ‘details’ (Cronbach’s $\alpha = .81$) and low for factor 2, ‘basic elements’ ($\alpha = .35$) and factor 3, ‘page’ ($\alpha = .20$). Because of the low reliability of the second and third factors and their divergence with the original model, further analyses were done with the ‘details’ factor only.

3.3. Differences between groups

Table 3 shows the mean scores on the ‘details’ factor for the general population and somatoform disorder groups divided over the orientation subgroups. The ‘details’ score of body drawings did not differ ($F = .48, df = 1, p = .49$) between the general population (mean = 5.91, $SD = .17$) and somatoform disorder group (mean = 6.08, $SD = .16$).

The orientation scores were significantly different with more mixed or unclear drawings in the somatoform disorder group, and more pronounced health or appearance orientation in the general population group (Chi-square = 22.83, $df = 3, p < .001$). The ‘details’ score differed between the orientation groups ($F = 39.41, df = 2, p < .001$), with the most details in appearance-oriented drawings. PHQ-15 scores of symptom severity did not differ significantly between orientation categories in the general population sample ($F = 2.02, df = 2, p = .14$).

3.4. Association between self-report and drawings

In the multivariate regression analyses, self-report (DBIQ-35) scores

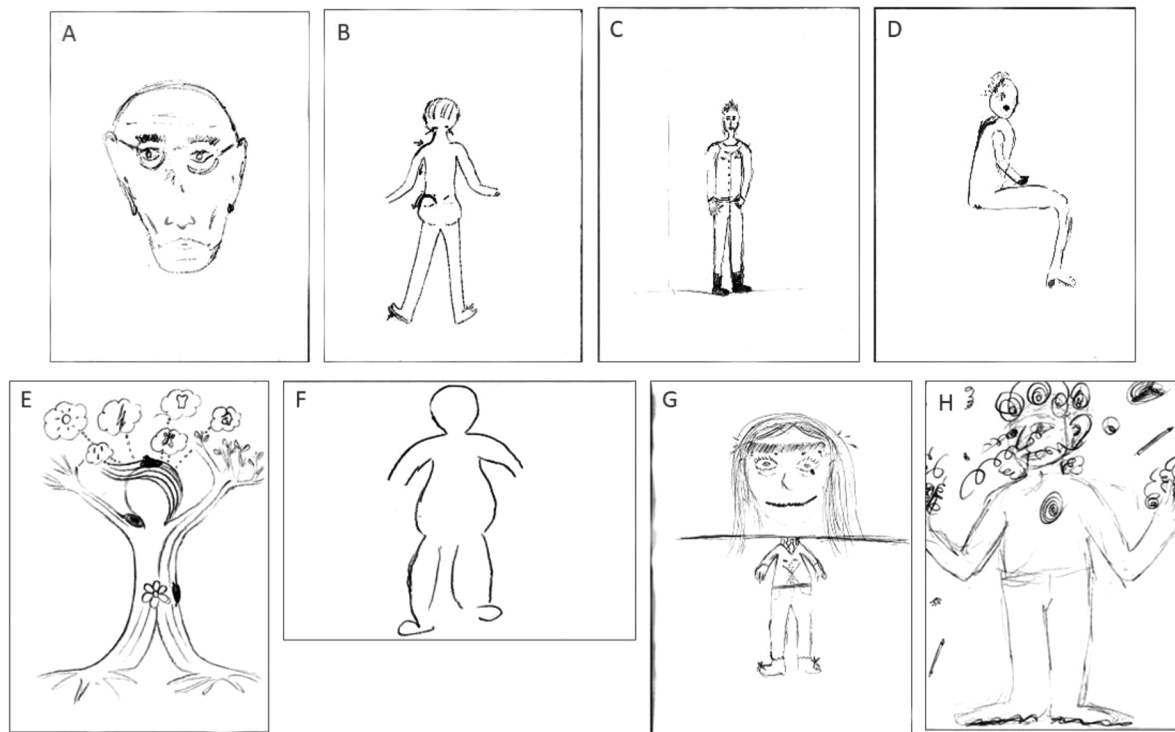


Fig. 1. Body drawings from persons from the general population (A to D) and patients with somatoform disorder (E to H) showing (orientation in italics): A. no basic elements, all details, *appearance*; B. most basic elements, no details, *health*; C. all basic elements and details, *appearance*; D. all basic elements and most details, *mixed*; E. a symbolic drawing with no score due to no visible body, *no body drawn*; F. some basic elements and no details, *unclear*; G. all basic elements and details, *mixed* and H. most basic elements and all details, *mixed*.

Table 2

Pattern Matrix with factor loadings* of the physical features of body drawings of the general population group (n=173) and the somatoform disorder group (n=167) and category scores based on transformed scores after categorical principal components analysis.

Item	Factor loadings General population			Somatoform disorder		Category scores
	Details1	BasicElements2	Page3	Details1	BasicElements2	
Presence of eyes	.92	.03	.15	.91	.01	0 No eyes 1 Eyes without pupils 2 Eyes with pupils
Number of other senses	.92	.01	.14	.91	-.02	0 Zero 1 One 2 Two or three
Angle of perception	.84	.19	.07	.69	-.26	0 Back or unclear 2 Front, side or several sides
Gender clarity	.63	-.12	-.22	.53	.13	0 No 2 Yes
Presence of feet	.16	.64	.06	-.08	.85	0 No feet 2 Feet present
Number of limbs (with elbow or knee)	-.04	.77	-.16	.18	.80	0 Zero or one limb 1 Two limbs 2 Three or four limbs
Presence of the hands	-.04	.61	.16	-.02	.70	0 Nowhere 1 Hidden or behind the body 2 Visible
Surroundings	-.11	.64	.16	**	**	2 Natural surroundings 1 No surroundings 0 Symbolic and negative surroundings
Fit to the page	.00	.10	.83	-.13	.72	0 Too big 2 Small or fitting
Position on the sheet	.12	-.29	.67	**	**	0 In the middle 1 Left 2 Right or several positions

*Extraction Method: Principal Components Analysis. Rotation Method: Oblimin with Kaiser Normalisation.

** Factor loadings ≤ .18 in categorical factor analysis and therefore not included in rotated solution.

Table 3

Orientation of body drawings in the general population group (n=173) and the somatoform disorder group (n=179) with scores of the 'details' factor for each subgroup.

	General population		Somatoform disorder	
	% of group	Details mean (SD)	% of group	Details mean (SD)
No body drawn	0%	-	5.1%	-
Health-oriented	45.7%	5.31 (.24)	35.6%	4.00 (.26)
Mixed or unclear	26.0%	5.76 (.31)	42.4%	6.52 (.24)
Appearance-oriented	28.3%	7.16 (.30)	16.9%	7.23 (.38)

of body experience were not significantly associated with scores on the 'details' factor, while total DBIQ-35 scores were higher for the general population group ($t=-12.80, p<.001; b=-.951$ [95%CI: -1.025;-.877]) and an interaction effect between group and 'details' was found: $t=2.39, p=.018; b=.171$ [95%CI: .099;.243]. Post-hoc analyses showed that a similar interaction effect was found for scores on the subscale 'acceptance' but not for other subscales; group effect: $t=-7.65, p<.001; b=-.891$ [95%CI: -1.007;-.775]; interaction: $t=3.05, p=.003; b=.345$ [95%CI: .232;.458]. Fig. 2 displays the interaction effects. The graphs show that for people from the general population, the association between the total DBIQ-35 score and 'details' in drawings was not stronger than for patients with somatoform disorder; hence, the hypothesis was rejected.

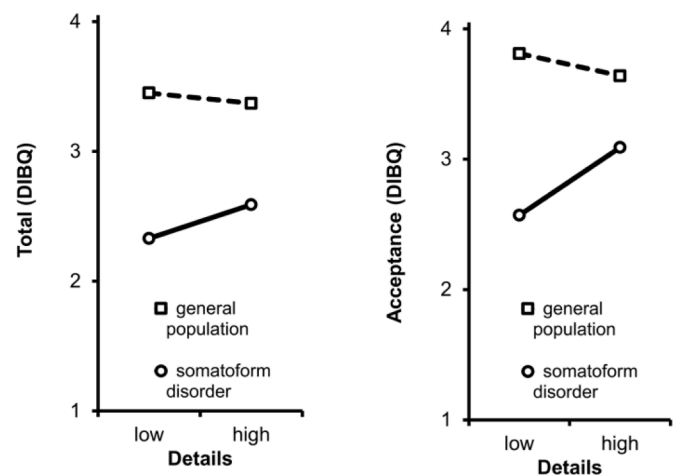


Fig. 2. Self-reported scores of body experience (total and acceptance scores on the DIBQ-35) for people from the general population and people with somatoform disorder scoring low and high on 'details' of body drawings.

4. Discussion

This validation study of a scoring model for body drawings in somatoform disorder, that was tested in a general population sample, showed several differences between the two groups, both factorial as well as in the associations with self-report of body experience, and in

orientation. Scores on the factor 'details' represented in the drawings of both groups were not different between groups. The other factor, 'basic elements', was not replicated in the drawings from the general population. Persons with somatoform disorder drew their body more often with mixed or unclear orientation, in contrast to the more pronounced health or appearance orientation in the general population group. Linear regression analysis showed that the correlations of self-reported body experiences (DBIQ-35 questionnaire) with the 'details' score of drawings were different in the two groups.

The observation that only the 'details' factor included similar items and adequate internal consistency in both groups was probably due to the restriction of the range of scores in the 'basic elements' factor in the general population, with virtually all participants scoring high. The current study suggests that drawing 'basic elements', such as limbs, hands and feet is non-problematic in the general population, while some persons with somatoform disorder omitted these elements. It is not clear to what extent this omission is specific for somatoform disorder, because neglect of body parts has also been observed in other patient populations such as psychotic disorder (Priebe and Röhrlich, 2001; Sakson-Obada et al., 2018) and traumatized children (Piperno et al., 2007). However, these studies used other methods than own-body drawings. In our study, as a consequence of the difference in factor structure, only the scores of 'details' in drawings were compared between groups and these were found to be not dissimilar. Contrary to our hypothesis, using a general population group for comparison, scores signifying the 'details' in body drawing were shown not to be an appropriate tool to distinguish between the two groups.

Differences, however, were found in the orientation of drawings. The finding that persons in the somatoform group drew their body less clearly or as a symbol, may reflect that they find it hard to accept their hampered body (Kalisvaart et al., 2018). According to art therapists in our institution, combining health and appearance orientation may be considered as a sign of acceptance of physical symptoms, because one does not neglect health concerns while depicting outer physical characteristics. Unfortunately, this 'mixed' orientation was not distinguished from unclear drawings in our definition of orientation. Persons in the general population mostly drew with health orientation, while we expected them to orient mostly on appearance. The selection of our research participants in settings like sports clubs, schools and families, with a broad age range and a higher proportion of people with somatic symptoms than expected, apparently represents a group oriented more toward health than expected on the basis of the appearance preoccupation on social media (Zimmer-Gembeck et al., 2021). Analyses reflected that on average, persons in the somatoform disorder and general population groups differed in the orientation of their drawings, which suggests that the meaning attached to the drawings differs and implies that comparison of the drawings is hampered.

The association between body-related self-report and objective drawing scores was less strong in the general population than in the somatoform disorder group. This rejects our hypothesis that somatoform dissociation in the somatoform disorder group might manifest itself in a lack of correlation between more and less conscious body experiences. Possibly, the negative body experience of people with more severe somatic symptoms is reflected in drawings as well as in self-reports, whereas persons who do not have severe somatic symptoms chose a broader orientation that does not reflect their self-report scores. This lack of association with questionnaires is recognized in draw-a-person tests (Lilienfeld et al., 2000) and other research using more implicit versus explicit measures (Petty and Fazio, 2008).

Strengths of this study are the large matched comparison sample from the general population and the use of objective characteristics of drawings with good inter-rater reliability. Limitations are the smaller amount of questionnaire data in the somatoform sample and the complicated definition of orientation, resulting in a mixed/unclear category that contained elementary as well as differentiated, expressive drawings. The relatively large subsample with medium to high somatic

symptom severity in the general population sample may suggest that the group is not fully representative of the general population. Although groups were matched and exposed to the same procedure in making drawings, other factors were not controlled. For instance, instructors, timing and the context of patients and control subjects differed, which may have influenced the results. Making a body drawing as part of a diagnostic phase may emphasize a focus on symptoms more than the everyday settings in the general population, to whom this procedure may be similar to a draw-a-person test. Also, the general population sample was given a digital version of the self-report questionnaires whereas the patients with somatoform disorder used paper and pencil. We cannot fully exclude that this yielded different results, although a previous study showed that internet findings are consistent with findings from traditional methods (Gosling et al., 2004).

Considering our previous findings, assessment and further validation of drawings using the scoring template may make sense in people with somatoform disorder. However, because the factor structure, the orientation on health or appearance, and the association with self-report measures differed between the somatoform disorder and general population groups, scorings of body drawings appear to have a different meaning for the two groups. Moreover, patients with somatoform disorder and people from the general population pictured a similar mean number of 'details' in drawings of their own body. These results indicate that scoring of objective features of drawings by assessors cannot be used to compare groups with and without body-related problems. This implies that the use and further validation of this scoring template for body drawings should be restricted to people with somatic symptom disorder and possibly also other groups with persistent physical symptoms.

Author statement

This study was conducted in accordance with the principles of the Declaration of Helsinki (World Medical Association, 2013), was approved by the Institutional Review Board of the mental health centre (2013-30/oz1317/ck) for the somatoform group, and was granted a waiver by the Medical Ethical committee of the University Medical Centre Groningen for the general population group. All participants provided written informed consent.

Declaration of Competing Interest

This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors. There are no conflicts of interest.

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