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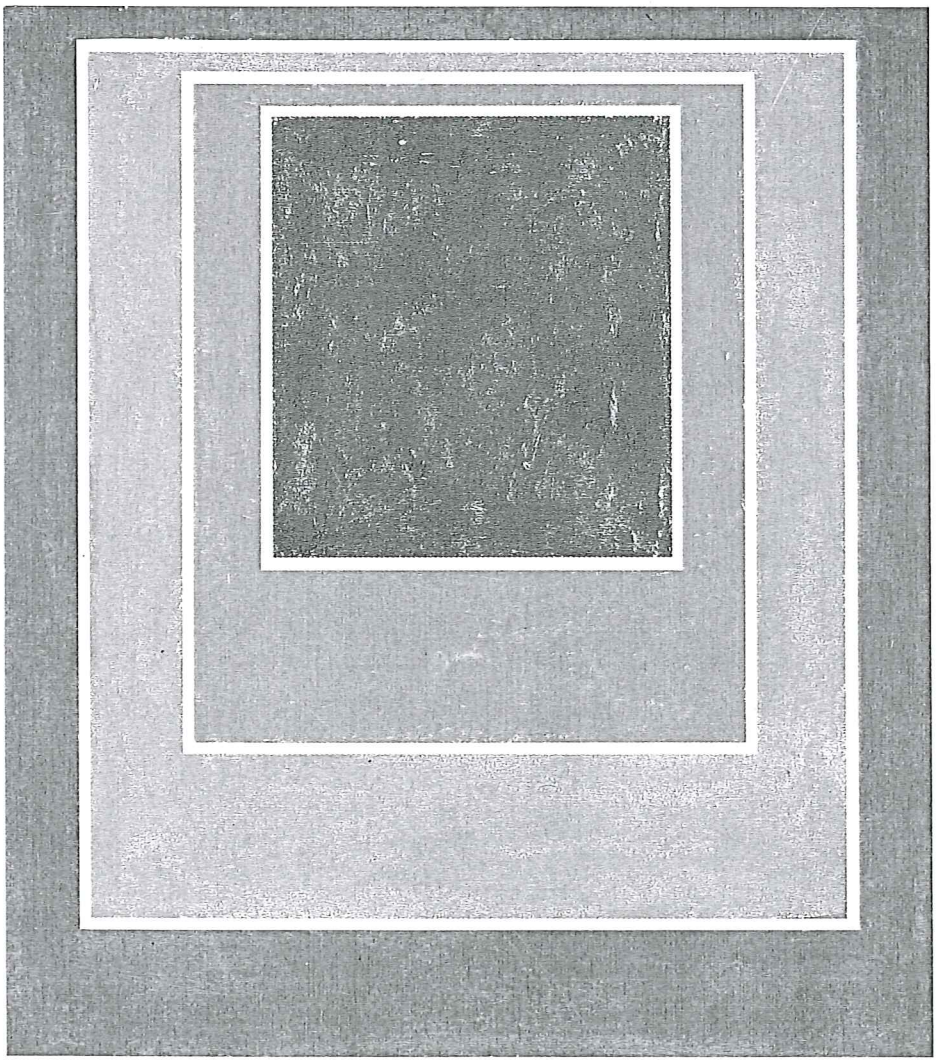

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Movement Behaviour of Patients with Eating Disorders and Inflammatory Bowel Disease: A Controlled Study

Key Words
Eating disorders
Anorexia nervosa
Bulimia
Inflammatory bowel disease
Movement behaviour
Dance therapy

Abstract
Background: This study assessed the movement behaviour of patients with eating disorders and inflammatory bowel disease. **Methods:** Ninety female patients with anorexia nervosa (n = 30), bulimia nervosa (n = 30), inflammatory bowel disease (n = 30) and a healthy control group (n = 30) were videotaped during a 10-min standardised movement sequence. A movement analysis instrument was developed for the evaluation. **Results:** The patient groups had a significantly smaller area of movement, less weight shift, more isolated use of their body parts, less integration of the lower body, more peripheral initiation of movement, less strength. No significant differences could be found among the patient groups with eating disorders and inflammatory bowel disease. **Conclusions:** The findings are discussed in relation to body scheme disturbances and inhibition of nonverbal expression.

Introduction

It has long been known that mental illness is associated with altered movement behaviour. In this respect, movement behaviour has been investigated empirically in different fields with a broad variety of methodological approaches such as psychiatry, neurology, psychomotor research, expression psychology, nonverbal communication and dance therapy.

Research in movement behaviour has focused primarily on psychiatric patients with severe psychopathology. Depending on the method, abnormal voluntary and involuntary movements [1–4], psychomotor deficits, such as found in dexterity or rhythm tasks [5–9], qualitative changes in movement behaviour [10–12], and altered nonverbal behaviour [13–16] were demonstrated.

The literature offers some indications that movement behaviour also reflects psychosomatic disturbances. In anorectics, quantitative abnormalities of movement behaviour such as hyperactivity [17–19] have been documented. Qualitative movement characteristics in patients with anorexia nervosa have been the issue of two empirical studies. Compared with the healthy control group, patients had less free movement flow, less flow from upper to lower body, more peripheral movement initiation, and more sustained movement [20] as well as a preference for quickness and moving the upper part of their body [21].

Since previous investigations of anorectic individuals have shown encouraging results, the present study continued research with this group. Furthermore, as comparison a healthy control group, another group of patients with eating disorders, i.e. bulimia nervosa, and patients with inflammatory bowel diseases were examined. The last represent a diagnostic group in whose aetiology psychosocial factors play an important role [22].

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Table 1. Mean standardised movement tasks with significant differences between groups and interrater reliabilities

Movement task/ movement item	Rater 1					Rater 2					κ^1
	A	B	C	U	H	A	B	C	U	H	
Stamp/strength	2.2	2.3	2.4	2.3	3.2***	2.1	2.2	2.1	2.4	3.1***	0.75
Co/kinesphere	1.3	1.3	1.4	1.4	1.2	1.5	1.4	1.5	1.6	1.5	0.58
Ex/kinesphere	3.6	3.8	3.9	3.8	3.9	3.7	3.8	3.9	3.7	3.9	0.87
Co-ex/kinesphere	3.3	3.5	3.5	3.4	3.7	3.2	3.4	3.4	3.2	3.4	0.67
Toes/balance	2.9	3.1	2.5	2.9	2.9	2.9	3.0	2.7	2.9	2.9	0.53
Turn/flow	2.2	2.3	2.0	2.2	2.9**	2.0	2.2	1.8	2.2	2.7**	0.58
Turn/contin.	2.4	2.3	2.4	2.2	2.1	2.4	2.4	2.5	2.3	2.2	0.80
Fall/flow	2.0	2.4	2.4	2.2	3.3**	1.8	2.4	1.8	2.2	3.1**	0.66
Fall/endpos.	2.4	2.4	2.0	2.3	2.7	2.2	2.1	1.9	2.0	2.7**	0.70

A = Anorexia; B = bulimia; C = Crohn's disease; U = ulcerative colitis; H = healthy control group; Co = contraction; Ex = expansion.
** $p < 0.01$; *** $p < 0.001$ by Kruskal-Wallis H test.
1 Cohen's weighted kappa.

Method

The source of data were 10-min videotapes of 120 females aged 15–45 years, including 90 patients with anorexia nervosa (DSM-III-R:307.1; n = 30), bulimia nervosa (DSM-III-R:307.51; n = 30), Crohn's disease (n = 11), ulcerative colitis (n = 19), and 30 healthy control persons. The patients were recruited from the In-patient Department of Psychosomatic Medicine and Psychotherapy of Lübeck Medical University, which admits patients who are diagnosed as having anorexia nervosa, bulimia nervosa, or inflammatory bowel disease without psychosis or confinement to intensive care.

The control group was the female staff of the Department of Psychosomatic Medicine and Psychotherapy of Lübeck Medical University.

Criteria of exclusion were further psychic and somatic illness apart from the primary diagnosis, intellectual impairment, confinement to bed, parenteral or tube nourishment, anus praeter or other somatic complaints, e.g., fractures, that could influence movement behaviour. All female patients and all female staff members between the ages of 15 and 45 were asked to participate in order to avoid a selection of those who liked to dance and thus achieve a representative sample. In each group, 2–3 persons refused to take part in the study. The groups were matched for education and age. Mean age was 23.1 years in the anorexia nervosa group, 23.4 years in the bulimia nervosa group, 28.5 years in the Crohn's disease group, 26 years in the ulcerative colitis group and 27.2 years in the healthy control group.

While being videotaped, each subject performed a 10-min movement program according to verbal instruction, consisting of standardised movement tasks (walking, running, jumping, stamping, contraction-expansion, balancing on toes, swinging, turning and falling) and four improvisation tasks (interpreting in movement the themes of water, fire, air, and earth).

A movement analysis system was developed on the basis of the Laban effort/shape system [23, 24]. This movement observing instrument is used in dance/movement research and therapy. It comprises the movement categories use of the body (general body involvement, body part integration, body half preference, movement initiating body part, weight shift), space (movement area, contact with floor, floor patterns, movement level, personal space), efforts or dynamics [phrasing, efforts (flow, time, weight and space)]. The Laban system differs from other movement description instruments (psychiatric rating scales for abnormal involuntary movements such as AIMS or Rockland scale; nonverbal rating scales such as Freedman's body movement coding system; psychomotor test batteries etc.) by virtue of its broad and explicitly descriptive approach to analysis of whole body movement.

A preliminary movement-rating instrument was tested in a pilot study [21]. Forty selected movement items were operationalised as 21 ordinal scales with 4–5 gradations and 16 nominal scales.

The 2 raters, dance therapists with a knowledge of movement analysis, were blind to the diagnosis and hypothesis of the study. They were trained using 14 test videotapes. Coding units were identified by the duration of the movement tasks, which lasted from 10 to 60 s.

Interrater reliabilities for the movement items ranged from 0.53 to 0.87 with a mean value of .67 7 in Cohen's weighted kappa [25].

As the comparisons between the study groups were related to ordinally scaled items non-parametric statistics, i.e. the Kruskal-Wallis one-way analysis of variance was applied. In case of significance, differences between the groups were additionally calculated with the Mann-Whitney U test.

Results

Significant differences in movement behaviour between the groups were found on 7 of the 16 ordinal movement scales. Table 1 shows the results of the standardised movement tasks. Significant differences between the

Table 2. Mean improvisation task 'fire' with significant differences between examination groups and interrater reliabilities

Movement item	Rater 1					Rater 2					κ^1
	A	B	C	U	H	A	B	C	U	H	
Floor contact	2.1	2.0	2.3	2.1	1.9*	2.0	1.9	2.0	1.8	1.5	0.62
Level	3.6	3.6	3.4	3.9	4.1	4.0	4.0	3.5	4.3	4.2	0.65
Movement area	1.7	2.0	1.8	1.8	2.8**	1.7	1.9	2.0	1.8	2.7**	0.82
Kinesphere	3.7	3.8	3.5	3.8	3.8	3.8	3.7	3.6	3.8	3.8	0.72
Weight shift	1.7	2.1	2.2	2.0	2.8***	1.8	2.4	2.4	2.0	2.8***	0.67
Body involvement	2.7	2.8	3.0	2.4	1.9***	3.0	3.0	2.9	2.9	2.5*	0.55
Body half	1.9	2.1	1.8	2.1	2.8**	1.8	2.2	1.9	1.9	2.6**	0.66

A = Anorexia; B = bulimia; C = Crohn's disease; U = ulcerative colitis; H = healthy control group.
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ by Kruskal-Wallis H test.
1 Cohen's weighted kappa.

groups examined were found on the tasks of stamping, turning, and falling.

The results of the improvisation tasks are given in table 2. As there were similar findings in all four improvisation tasks, only the results of the task 'fire' shall be demonstrated.

Table 2 shows that significant differences among the groups were found in the items movement area, weight shift, body involvement, and body half preference.

To localise the occurrence of significant differences between the groups, the U test was applied as an additional calculation. All significant differences occurred between the patient groups and the healthy control group, e.g., patients with anorexia nervosa, bulimia nervosa, or inflammatory bowel disease had a significantly smaller mean area of movement than the healthy individuals. No significant differences were found among the patient groups.

Discussion

Most of the movement rating scales showed good reliability and specificity. Some items require a more precise definition in order to improve interrater reliabilities. Reliability and diagnostic validity of the test instrument should be further examined in longitudinal studies and in studies with other diagnostic groups.

The present study is one of the first to describe qualitative movement characteristics of patients with eating disorders and inflammatory bowel disease, with significant differences observed between patient groups and the healthy control group. All patient groups used less strength when stamping and less free movement flow when turning and falling. During improvisation tasks, the patient groups showed a smaller movement area, less weight shift, less body involvement, and less integration of the lower body.

There are only a few studies of movement behaviour thus far which are thematically and methodologically similar to this study. While our findings are consistent with those of Burn [20], we also showed that these movement characteristics are not specific for anorexia nervosa but are also found in patients with bulimia and inflammatory bowel disease.

In a critical discussion of the results, the primary objection is that the movement characteristics observed in the patient groups might result from diminished vigour. However, the significant differences compared to the healthy control group occur in movement flow, body-half preference, and use of body parts, movement qualities that are not primarily determined by vigour. Factors such as agonist/antagonist innervation or motor patterns determinating the way the parts of the body are used play a more important role than vigour in these movement items.

Another point to discuss is the fact that the data on movement behaviour are gained from tasks. Hence, the influence of motivation in the performance of these movement tasks must be taken into consideration [26]. But again, since most of the significantly different movement items refer to the quality of movement, they are not primarily an expression of a high or low degree of motiva-

tion to fulfil a task compared to items such as quickness. Besides, especially anorectics are reported to have perfectionist tendencies [27] and tend to maximise energy expenditure in the performance of physical activities [19].

Two interpretations of the movement characteristics found in patients with eating disorders and inflammatory bowel disease as compared to healthy controls shall be outlined:

Bound movement flow, diminished activity of the lower body half, and isolated use of body parts (body involvement) correspond to a neglect of certain body parts in movement. This neglect might indicate an underlying body scheme distortion. Motor development and body scheme differentiation are interdependent, as are related disturbances [28–33]. The restricted use of the body in movement consecutively diminishes the capability of moving the body in space (weight shift, movement area).

Regarding the expressive aspect of movement, smaller movement area, less exertion of strength, less body involvement, and bound movement flow are a reduction of movement expression. This aspect concurs with findings in research on facial expression indicating that patients with different medical diseases (asthma, ulcerative colitis, functional vertebral complaints) show different patterns of reduction of facial expression [34–37]. To summarise, psychosomatic patients show a reduction of averbal expression, which can be the result of deficit or inhibition. In this respect the findings fit into psychosomatic concepts that underline the importance of deficit or inhibition of emotional expression in psychosomatic patients [38, 39].

In further studies, it might be of value to investigate movement behaviour in relation to body scheme disturbances and to deficits or inhibition of emotional expression.

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