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# Reliability of the Body Awareness Scale-Health

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## Reliability of the Body Awareness Scale-Health

In physical therapy the clinical assessment Body Awareness Scale-Health (BAS-H) focusing on the quality of movements and movement behaviour has previously been studied for validity. The aim of this study was to address the inter-rater reliability and test–retest reliability in three groups. The groups assessed were: patients in psychiatric care with eating disorders (n = 26), patients in rehabilitation of prolonged musculoskeletal pain (n = 22) and healthy individuals (n = 22). Results revealed inter-rater reliability (n = 70) of the BAS-H total to be 79.9 % with acceptable agreement (accepting one scale-step of difference) and 48.7% with perfect agreement. Weighted Kappa ranged

between 0.34 and 0.92. Test–retest reliability (n = 54) as a mean for both raters were found to be 90.5% for the BAS-H total with acceptable agreement and 60.4% with perfect agreement. Weighted Kappa ranged between 0.65 and 0.92. The BAS-H seems to be a reliable assessment in the rehabilitation of patient with prolonged pain, psychiatric disorders and healthy controls when used according to the manual. The authors, however, suggest some revisions.

**Keywords:** physical therapy, assessment, quality of movements, Body Awareness Scale-Health, reliability, prolonged pain, psychiatric disorders.

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## Background

Physical therapy in psychiatry has expanded during the last decades in the Nordic countries (1, 2). Beside the more traditional approaches like physical training, relaxation therapies and traditional physiotherapy one of the most important treatment facilities is the basic body awareness therapy (Basic BAT) (2–4). Treatment with Basic BAT is also used in the rehabilitation of patients with problems in the musculoskeletal system as a means to change the total movement pattern and the movement behaviour (5, 6). In order to assess the motor disturbances that usually are associated with mental and prolonged musculoskeletal disorders and to evaluate interventions in physical therapy and Basic BAT. The Body Awareness Scale-Health (BAS-H) was developed by Roxendal in 1992 (7). The BAS-H is a variation of the Body Awareness Scale (BAS) constructed by Roxendal in 1985 and tested in schizophrenia rehabilitation (3).

The BAS-H assesses the quality of movements, the functional ability and movement behaviour in patients with pathological conditions in their motor pattern. The scale can be used regardless of diagnosis if you have a motor problem or problems with muscular tensions or body awareness. The scale will give a broad picture of the quality of the functional ability both the resources and the problems. It can be used as a tool both to plan and evaluate a rehabilitation or treatment intervention. The BAS-H was according to Roxendal intended for use in primary health care, psychiatric outpatient care, and for patients with pain conditions in the musculoskeletal system as well as for healthy individuals (7, 8). The body awareness can be impaired in conditions where there is pain or trauma in the aetiology (2), but also because a lack in the development of the ego mostly because of emotional distress (2, 3). In psychiatric patients there often is a problem with body awareness making this an interesting target for both intervention and assessment (3, 4). In patients with schizophrenia you often find that they have great difficulties in their movement pattern and behaviour. There may also be a discrepancy between the observed difficulties and the reported experiences of the body (3). In outpatient treatment of patients suffering from anxiety, depression or eating disorders the movement function and behaviour often is rigid or tense, lacking in vitality, spontaneity and

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freedom (4). The full theories of the body ego according to Roxendal addresses both the conscious and the subconscious aspects, as well as the aspects related to experiences and the visible expressions of the person, i.e. the movement pattern and/or the movement behaviour. Parts of theories of Basic BAT and the body ego, defined by Roxendal (2, 7, 8) are used to analyse the movement function and behaviour with regard to the relation to the ground and the centre line, centring of movements through the movement centre in the solar plexus area, freedom of the breathing and the flow of movements throughout the body by the use of the BAS-H. Body awareness measured by the BAS-H scale has been found to correlate to self-efficacy and health-related quality of life (9).

The construct validity of the BAS-H has previously been studied for psychiatric patients, chronic pain patients and healthy normals (9). Results conveyed that the construct of the BAS-H correlated in a significant way with instruments measuring health related quality of life, the Nottingham Health profile,  $r = 0.71$ , and self efficacy, Arthritis Self Efficacy Scale,  $r = 0.64$ , Sense of Coherence,  $r = 0.47$  and Global Severity Index from the Symptom Checklist 90R,  $r = 0.57$ . A multiple regression analyses with the BAS-H as the dependent variable revealed that Nottingham Health Profile and Arthritis Self Efficacy Scale accounted for 55% of the variance of the BAS-H total index. Group membership (healthy normals, psychiatric or chronic pain patients) added another 5% to the BAS-H variance. No support for a sufficient criterion validity of the BAS-H was found in a study of chronic pain patients (10). The authors concluded, however, that the BAS-H reflects aspects of impairment, disability and health levels in patients with whiplash problems and has the potential to become a sensitive outcome measurement for rehabilitation (10).

The reliability of BAS-H has been tested in healthy women (11). The results from the study presents the reliability in two ways; exact reliability being between 50 and 100% and the reliability accepting one step difference in ratings between raters, as being between 75 and 100%. In another study of eight healthy individuals in primary health care Ryding et al. found the reliability to be identical in 78% of the scorings and in 98% of the scorings accepting one-step difference on the scale. The total score of the healthy group ranged between 15 and 46 (theoretical range 0–114), indicating that the scores were very low, using only the lowest third of the possible scale steps (12).

The BAS-H has also been found to be responsive to treatment with Basic BAT (4). In a randomized, prospective outcome study in psychiatric outpatient care, two groups of patients were studied. One group of 39 patients received psychiatric treatment as usual and the other group of 38 patients received treatment as usual and 12 times of Basic BAT in addition. After a 3-month period, group comparisons revealed that the group that had

received Basic BAT in addition to treatment as usual, had significant improvements in the BAS-H total and subgroups. In another study Winberg focused on the sensitivity of the BAS-H, after 6 months of treatment with Basic BAT in a group of 15 healthy women. A significant improvement across 12 of the 22 items of the BAS-H was found after treatment (13). Although the reliability of the BAS-H has been studied in a number of small studies of healthy individuals, the reliability of BAS-H, for different groups of patients, and groups of healthy individuals, has not been sufficiently investigated.

The aim of the present study was to examine the inter-rater reliability and test-retest of the BAS-H for relevant groups of patients, where the BAS-H is in clinical use and healthy individuals.

## Subjects and methods

### *Body Awareness Scale-Health*

The BAS-H assesses the quality of movements, functional abilities and movement behaviour using a structured movement test. The test procedure is given by the creator of the scale (7). A physiotherapist leads the patient in different movements and observes how the movements are performed.

The BAS-H consists of items that are used in everyday living, like running, jumping, stepping up on a stool or laying down. The movement behaviour is analysed in accordance with the theories from Basic BAT and has to do with the stable relation to the ground, the stability of the postural line (centre line), centring of movements and co-ordination and how the breathing and movements flows throughout the body. They are observed in a number of bodily positions, like standing, walking, jumping, running, sitting on a chair and laying on the floor. The scoring is based on the quality of the performance and the way the subject uses the body as a whole in movements. Every item is defined in a manual (7). There are a few additional items related to the use of the body in movements, like increased or decreased flow of speech, eye contact with the assessor and the room, and relation to mirror image of self. These items more reflect the inner psychological state and are rated as additional items.

The BAS-H instrument has 24 items with scores given on a 7-step scale ranging from 0 to 6. A score of '0' indicates that the subject perform the movement in a harmonious, relaxed and vital way, while a score of '6' indicates a pattern of malfunction in movements. In the item 'jumping and running' the score of '0' indicates the ability to leave the floor with ease and vitality and the score of '6' means that the subject has noticeable difficulties to leave the floor. The items are summarized into four different sub-indices. Grounding/centre line (10 items), centring of movements/breathing (4 items), flow index (8 items) and

additional items (4 items). In calculating the score for the sub-indices of BAS-H, the scores in the sub-index are summed and then divided by the amount of items in respective sub-index. To obtain the BAS-H total index the total sum is divided by 24, which gives a score between 0 and 6. It can be noticed that two items have double representation (lowered/inhibited motor activity and flow through the centre line), see Table 1.

According to the manual the inter-rater reliability with equal scale-step and ratings with one scale-step difference should be considered to be satisfactory (7).

### Design

The patients and the healthy individuals were all assessed twice in the same week, with a 2-day span between the test opportunities. The same rater always made the BAS-H test, while the other rater was always observing. The test took about 30 min to perform and after the test was finished the patient or healthy individual left the room. The raters filled in the test form separately. At the

first test occasion the patients were asked to participate at a second re-test opportunity. The re-tests were performed with 2 days in between, to minimize actual change in the patient's movement abilities, but with enough time for the raters to forget the scores. To calculate test-retest reliability the scorings of both the raters were used. The scoring forms were kept separate until they were computerized.

The patients were informed about the study both in writing and orally, before giving consent to participation. The Research Ethics Committee of the Medical faculty of Lund University approved of the study. The participants were given feedback of the results of the test from one of the PTs after the second test and scoring occasion. If the patients declined participation at a second time, the information was given at the first occasion. For the patients with prolonged musculoskeletal pain the results were presented to the patient by yet another PT observer, present at the first BAS-H test occasion, with none of the raters from the reliability study present.

The psychiatric patients were assessed in relation to being inpatients for an assessment week at a clinic with an intensive rehabilitation programme for patients with eating disorders. The purpose for the patients was to meet the staff and be assessed by specialist within different fields like psychiatrist, psychologist, social worker and physiotherapists. At the end of the week, the patients and the staff, decided if the patient was to become a regular patient at the clinic. The patients with prolonged musculoskeletal disorders, were participating in a 6-week interdisciplinary rehabilitation programme. The BAS-H assessment was made at the beginning and the end of the programme as a part of the regular routine. The assessment used in this study was made the last week of rehabilitation. The healthy individuals in the study consisted of physiotherapists, other health care staff or interested persons who volunteered to participate.

### Patients

Three groups were included in the study. One group of 26 patients with eating disorders in psychiatric care, one group of 22 patients with prolonged musculoskeletal disorders and one group with 22 healthy normals. The mean age of the psychiatric patients was 22 years (median 22 years, range 16–34). The mean age of the patients with prolonged musculoskeletal disorders was 42 years (median 42 years, range 23–59). The mean age of the healthy individuals was 46 years (median 45 years, range 18–61). There were two males among the psychiatric patients, and the healthy individuals. In the group with patients with prolonged musculoskeletal disorders there were five males.

In the calculation of the inter-rater reliability, 70 ratings from the first opportunity, assessing 70 persons, were included. For the calculation of test-retest (intra-rater)

**Table 1** The Body Awareness Scale-Health (BAS-H) sub-indices

Grounding/centre line index
Stability in the centre line
Flow through the centre line <sup>a</sup>
Ability to relate your body weight to the ground
Ability to put weight on and balance on both feet
Ability to sit on the floor
Ability to lie on the floor
Contact area between body and ground
Stamping on the floor
Ability to leave the floor in running and jumping
Ability to step up on a stool
Centring/breathing index
Lowered/inhibited motor activity <sup>a</sup>
Centring of movements
Stretching throughout the body
Flow of breathing in the body
Flow index
Vegetative reactions
Lowered/inhibited motor activity <sup>a</sup>
Muscular tension
Flow through the centre line <sup>a</sup>
Open/closed posture
Rotation of body and arm movements in gait
Area of comfort
Isolated movements
Additional items index
Increased flow of speech
Decreased flow of speech
Eye contact with the assessor and the room
Relation to the mirror image of self

<sup>a</sup>Double representation of items is taken in account in forming of the BAS-H total index.

reliability, 54 of the 70 patients participated the second time. From this material only 105 of the 108 ratings were used, because of the absence of a rater on three occasions.

### Raters

Two experienced physiotherapist performed the BAS-H assessments in the study. They had about 20 years of clinical experience mainly from the field of psychiatric physiotherapy but also some experience from patients in rehabilitation of prolonged pain. They were both well acquainted with the BAS-H, trained by the creator of the scale and using it regularly in their work. They had no specific training to increase reliability, before the study began.

### Statistics

Inter-rater reliability was calculated using the proportion of perfect agreement between the raters and proportion of acceptable agreement, meaning accepting one scale-step of difference between the raters. For the intra-rater agreements, the same procedure was used in calculation for the raters separately and as a mean for both the raters. Weighted kappa was calculated according to Altman (14). The statistical software product used was SPSS 10 (15).

### Financial aid

Financial aid was obtained from Vårdalstiftelsen, Sweden and the Medical Faculty Lund University.

## Results

Results revealed that the inter-rater reliability with perfect agreement (identical scale points) ranged between 28.6% (stability in the centre line) and 87.1% (increased flow of speech). The inter-rater reliability for the BAS-H total with perfect agreement was 48.7%.

The inter-rater reliability with acceptable agreement (accepting one scale point of difference) ranged between 51.5% (stability in the centre line) and 92.8% (increases flow of speech). The inter-rater reliability for BAS-H total with acceptable agreement was 79.9%. The full results concerning the percentage of agreement between the two raters are shown in Table 2. Kappa statistics, using weighted Kappa, revealed the lowest value for inter-rater reliability to be 0.34 (decreased flow of speech) and the highest value to be 0.92 (ability to leave the floor jumping/running). The full results concerning Kappa statistics for intra-rater reliability are shown in Table 2.

Test-retest (inter-rater) reliability was assessed 2 days after the first test opportunity. Fifty-four participants accepted to participate in the test-retest procedure. Results

are presented for the raters separately and as a mean between the two raters, see Table 3.

Results revealed test-retest reliability with perfect agreement to range between 39.2 % ('flow of breathing', rater 2) and 100% (area of comfort, rater 1). The mean test-retest reliability for the raters concerning the BAS-H total was 60.4% with perfect agreement and 90.5% with acceptable agreement. The range for test-retest reliability with acceptable agreement was 76.6% ('centring', rater 1) to 100% ('area of comfort', rater 1 and ability to sit on the floor, rater 2). Weighted Kappa for the test-retest reliability ranged between 0.65 (stability in the centre line) and 0.92 (lowered/inhibited motor activity).

## Discussion

The statistics used in this study are chosen in order for the results to be comparable with earlier research in the area of BAS-H. Other ways of assessing inter-rater reliability and test-retest reliability could of course have been employed.

Accepting one scale step of difference, as recommended by the constructor of the scale, the inter-rater reliability generally was satisfactory. In this study the inter-rater reliability of the BAS-H total was 79.9%. According to Kazdin (16) an inter-rater reliability of 70–80% is considered to be satisfactory. In the study reported by Nordwall (11), inter-rater reliability was 73.9% for the total part of movement observations accepting one scale step of difference and 98% in the study by Ryding et al. (12). Their samples were however small and they were all healthy individuals and with a generally healthy quality of movement. According to clinical experience it is easier to rate the end steps of the scale (like a '0' or a '6'), than the scale steps in between. In this study items like increased and decreased flow of speech had an inter-rater reliability of over 90% accepting one step of difference. The reason for this was probably because of the fact that 57 of the 70 patients scored '0' on the item 'increased flow of speech'.

The inter-rater reliability with identical scale steps was generally not satisfactory. This could be due to several factors. One factor could be that the raters were not sufficiently trained together and needed some more training. Another factor could be that the BAS-H is a clinical rating scale of movement observations, where it is difficult to accomplish total agreement on a level of seven different scale steps. The constructor of the scale recommends that one should be satisfied with one step of difference (7, 8). Yet another reason could be that some of the items are unclear and difficult to rate because they contain too much information. The items where inter-rater reliability revealed the lowest reliability were the items that contained a lot of different information. An example is the item 'stability in the centre line' (BAS-H 66), which incorporate postural deviations, asymmetries

**Table 2** The inter-rater agreement with perfect and acceptable agreement between two raters, n = 70

	Proportion of perfect agreement	Proportion of acceptable <sup>a</sup> agreement	Weighted Kappa
Grounding/centre line index	45.6%	80.4%	
Stability in the centre line	28.6% (20/70)	51.5% (39/70)	0.57
Flow through the centre line <sup>b</sup>	42.8% (30/70)	77.1% (54/70)	0.76
Ability to relate your weight to the ground	41.4% (29/70)	82.8% (57/70)	0.84
Ability to put weight on/ balance on both feet	60.0% (42/70)	91.3% (64/70)	0.87
Ability to sit on the floor	42.9% (30/70)	80.2% (56/70)	0.75
Ability to lie on the floor	35.7% (25/70)	72.9% (51/70)	0.77
Contact area between body and ground	39.9% (28/70)	77.0% (54/70)	0.67
Stamping on the floor	45.8% (32/70)	88.7% (60/70)	0.88
Ability to leave the floor jumping/running	52.9% (37/70)	91.5% (64/70)	0.92
Ability to step up on a stool	65.7% (46/70)	91.3% (64/70)	0.90
Centring/breathing index	40.0%	79.0%	
Lowered/inhibited motor activity <sup>b</sup>	58.6% (41/70)	87.2% (62/70)	0.91
Centring of movements	31.4% (22/70)	77.2% (54/70)	0.72
Stretching throughout the body	41.5% (29/70)	80.2% (56/70)	0.79
Flow of breathing in the body	28.6% (20/70)	71.6% (50/70)	0.69
Flow index	47.7%	77.3%	
Vegetative reactions	44.4% (31/70)	74.5% (62/70)	0.59
Lowered/inhibited motor activity <sup>b</sup>	58.6% (41/70)	87.2% (62/70)	0.91
Muscular tension	44.2% (31/70)	75.8% (53/70)	0.76
Flow through the centre line <sup>b</sup>	42.8% (30/70)	77.1% (54/70)	0.76
Open/closed posture	38.6% (27/70)	64.4% (45/70)	0.70
Rotation of body and arm movements in gait	35.7% (25/70)	72.8% (50/70)	0.69
Area of comfort	78.6% (55/70)	84.3% (59/70)	-
Isolated movements	38.5% (27/70)	82.8% (58/70)	0.76
Additional index	68.3%	85.9%	
Increased flow of speech	87.1% (62/70)	92.8% (66/70)	0.75
Decreased flow of speech	77.1% (54/70)	82.8% (58/70)	0.34
Eye contact with assessor and room	50.0% (35/70)	77.1% (54/70)	0.61
Relation to mirror image of self	60.1% (42/70)	84.4% (59/70)	0.79
BAS-H total index	48.7%	79.9%	

<sup>a</sup>Acceptable  $\pm 1$  point of difference.<sup>b</sup>Items have double representation.

BAS-H, Body Awareness Scale-Health.

as to range of movements in legs and arms or other asymmetries of the movement pattern e.g. the way the arms naturally move throughout the whole test. This item also had the highest mean-score of all items. The validity of this item can be questioned. Maybe this item would profit from being divided into one item related to stability of posture and another item related to asymmetry in movements, if it should at all be included.

The test-retest reliability with identical scale points was not satisfactory either. The reliability between the test-retest assessments accepting one scale step of difference, however, demonstrated a good reliability. The mean intra-rater reliability was 90.5% for the BAS-H total index. This supports the discussion from the inter-rater reliability section, where the difficulty to evaluate the quality of function and movement behaviour on a seventh grade scale is debated. The authors of this article suggest that the BAS-H scale comprises too many scale steps. Only the

ratings of the 0, 2, 4 and 6 are defined in the manual. The ratings of 1, 3 and 5 are thought to cover the in-betweens and are in that way more vague and difficult to rate. The goal must be to construct a scale where inter-rater agreement can be more precise.

In the test-retest part of the study, the patients with fibromyalgia (patients with prolonged pain) sometimes differed between test 1 and test 2, because they actually had some daily variations of the movement ability. The variations were however marginal, however clearly noticeable in the BAS-H assessment ratings. This leads to the conclusion that the BAS-H scale generally seems to be stable enough to show the general pattern of quality of movement function and movement behaviour within a time period of 3 days.

In their study Ryding et al. based on their findings suggested a collapsing of the BAS-H scale to a more short and condensed version. They found 7 items as being the

**Table 3** The intra-rater agreement (test–retest) agreement with perfect and acceptable agreement, for the raters separately and as a mean of both the raters,  $n = 51$  for rater 1 and  $n = 54$  for rater 2

Rater	Proportion of perfect agreement (%)			Proportion of perfect acceptable <sup>a</sup> agreement (%)		
	1	2	Mean	1	2	Mean
Grounding/centre line index	57.5	60.8	59.2	89.3	93.4	91.4
Stability in the centre line	58.9	41.5	50.9	87.5	93.5	89.8
Flow through the centre line <sup>b</sup>	47.1	61.3	54.2	81.0	94.9	90.7
Ability to relate your weight to the ground	47.1	52.0	49.6	85.4	98.6	97.5
Ability to put weight on/balance on both feet	68.9	55.7	62.3	87.2	91.0	91.7
Ability to sit on the floor	58.8	77.8	68.3	89.2	100	96.1
Ability to lie on the floor	55.0	68.6	61.8	76.9	92.8	88.7
Contact area between body and ground	53.0	42.7	47.9	87.3	83.5	86.9
Stamping on the floor	62.8	59.3	61.1	85.1	92.9	91.7
Ability to leave the floor jumping/ running	62.7	72.4	67.6	80.9	96.7	89.5
Ability to step up on a stool	60.8	76.9	68.9	93.8	90.3	91.4
Centring/breathing index	52.2	52.1	52.2	85.7	91.1	88.4
Lowered/inhibited motor activity <sup>b</sup>	65.6	66.7	66.2	91.2	98.6	94.9
centring of movements	51.0	50.7	50.9	76.6	91.2	83.9
Stretching throughout the body	49.1	51.9	50.5	92.3	92.9	92.6
Flow of breathing in the body	43.2	39.2	41.2	82.5	82.0	82.3
Flow index	58.7	57.1	57.9	87.7	91.8	89.8
Vegetative reactions	60.7	52.0	56.4	80.4	81.9	81.2
Lowered/inhibited motor activity <sup>b</sup>	65.6	66.7	66.2	91.2	98.6	94.9
Muscular tension	50.7	46.7	48.7	84.1	89.4	86.8
Flow through the centre line <sup>b</sup>	47.1	61.3	54.2	86.4	94.9	90.7
Open/closed posture	41.3	53.9	47.6	82.7	87.4	85.1
Rotation of body and arm movements in gait	53.0	44.7	48.9	86.4	93.1	89.8
Area of comfort	100	83.4	91.7	100	94.6	97.3
Isolated movements	50.9	48.2	49.6	90.1	94.7	92.4
Additional index	81.9	70.5	76.2	93.2	90.6	91.9
Increased flow of speech	96.1	83.5	89.8	96.1	91.1	93.6
Decreased flow of speech	94.2	77.8	86.0	96.2	96.4	96.3
Eye contact with assessor and room	58.9	48.2	53.6	88.4	78.1	83.3
Relation to mirror	78.4	72.3	75.4	92.1	96.6	94.4
BAS-H total index	61.2	59.5	60.4	88.8	92.1	90.5

<sup>a</sup>Acceptable  $\pm 1$  point of difference.<sup>b</sup>Items have double representation.

BAS-H, Body Awareness Scale-Health.

most discriminative; slowness of movements, relation to centre-line, flow, relation to ground, weight transfer, centring, isolated movements, stretching and stamping. The authors recommend that further studies in larger groups and in different context should be carried out (12). This is an interesting proposition, which needs still more research to be answered. As a step in that direction we, in this study, found some items that possessed reasonable good inter- and intra-rater reliability, as well as being of great clinical interest. In the sub index grounding/centre line, these items were: ability to relate your weight to the ground, ability to put weight on/balance on both feet, stamping on the floor, ability to leave the floor jumping/running, ability to step up on a stool. In the sub index of

centring/breathing these items were: centring of movements and stretching throughout the body. In the sub-index of flow these items were: lowered/inhibited motor activity, flow through the centre line and isolated movements.

We suggest that in a revision of the BAS-H scale, only the defined scale steps should be used, giving a four-point scale and that further research should focus on the development of a condensed scale. This would in our opinion make the BAS-H scale more easily accessible and precise to use both in the clinical setting and in research. We think that the BAS-H scale has many promising qualities for use in physiotherapy clinic and research of assessing the total movement pattern and movement



behaviour. However it needs some adjustments, to be the much-needed tool for clinical assessment and evaluation of patients with prolonged pain and pain behaviour as well as within the broad area of patients with psychosomatic, stress- related and psychiatric disturbances.

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## Author contribution

Amanda Gyllensten was responsible for the study conception and design, data collection, data analysis, drafting the manuscript, critical revision and obtaining funding. Maria N. Oveson and Inger Lindström were involved in the data collection and drafting of the manuscript. Lars Hansson was responsible for the data collection, drafting of the manuscript, critical revisions, statistical expertise, obtaining funding and supervision. Charlotte Ekdahl was involved in the study conception and design, drafting of the manuscript and supervision.

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Vårdalstiftelsen, Sweden and the Medical Faculty, Lund University, Sweden.

## Ethical approval

The Ethics Committee at Lund University approved the study. Reference number: LU 165-99.

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