

The Body Image Drawing Analysis in Women with Breast Disease and Breast Cancer: Anxiety, Colour and Depression Categories

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Abstract. *Background:* Wirsching *et al.* introduced a psychosocial risk scale (PRS) for psychological identification of breast cancer patients before biopsy and found that women with cancer had a tendency to draw bigger drawings than the women with a benign tumour. To our knowledge, the associations between the body image drawing analysis and the risk of breast cancer are rarely considered together in a prospective study. *Patients and Methods:* This study is an extension of the Kuopio Breast Cancer Study. Women with breast symptoms were referred by physicians to the Kuopio University Hospital (Finland) and were asked to participate in this study. These women (n=115) were interviewed, and all study variables were obtained before any diagnostic procedures were carried out, so neither the investigator nor the participants knew the final diagnosis of breast symptoms at the time of the interview. The research method used was the semistructured in-depth interview method. The investigator used the Montgomery-Åsberg depression rating scale (MADRS) to evaluate the depression of the study participants. All participants were also asked to complete standardized questionnaires (Beck depression inventory and Spielberger trait inventory). The overall content of the Body Image Drawing was estimated using a 3-point scale: symbolic, partly symbolic, or humanlike. Two raters scored the body image drawings independently and the final scores were formed by comparing the separate scores of the two raters. The raters evaluated the difficulty of giving a score in a 5-point scale during scoring. *Results:* The clinical examination and biopsy showed breast cancer (BC) in 34 patients, benign breast disease (BBD) in 53 patients, and 28

individuals were shown to be healthy (HSS). The results indicated that the breast cancer patients tended to use the colours with blue and the tones of brown and black in the body image drawings than the BBD and HSS groups. The HSS group used the colours with yellow more often than did the other groups. *Conclusion:* The results of this study support a weak association between the colour category of the body image drawing and breast cancer risk. However, the biological explanation for such an association is unclear and the exact effects of psychological factors on the various hormones relevant to development of breast cancer are, at present, poorly defined.

Hormonal factors such as early age at menarche, later age at menopause, later age at first full-term pregnancy and hormone replacement therapy are known to be the main risk factors for sporadic breast cancer (1). In addition, life-style factors, such as obesity, smoking, alcohol consumption and lack of physical activity, appear to contribute to the increased risk for this malignancy, although the results concerning these life-style factors are inconsistent (1-7). Psychological factors, such as stressful and adverse life events, are widely thought to play a role in the etiology of breast cancer (8-13). Many case control studies have also investigated the relationship between anxiety, depression, the history of psychiatric symptoms and the risk of breast cancer in relation to suppression of emotions and anger in particular (14-21). We have prospectively investigated breast cancer risk in relation to anxiety, coping and defending, depression, idealization, the history of psychiatric symptoms and stressful and adverse life experiences among patients with breast disease in the Kuopio Breast Cancer Study (22-26). The results of our study support an overall association between stressful life events, coping and defending, and breast cancer risk.

Wirsching *et al.* introduced psychosocial risk scale (PRS) for psychological identification of breast cancer patients before biopsy and noticed that the women with breast cancer had a tendency to draw bigger drawings than the women with a benign tumour (15, 27). To our knowledge, the

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Table I. Characteristics of the study participants. Results are shown for the patients with breast cancer (BC), for those with benign breast disease (BBD) and for the healthy study participants (HSS).

Variable	BC (n=34)	BBD (n=53)	HSS (n=28)	p-Value
Age (mean, years)	51.6	47.6	45.7	0.12
Height (mean, cm)	164.4	162.3	160.8	0.75
Body weight (mean, kg)	72.5	67.8	68.3	0.25
Age at menarche (mean, years)	13.4	13.4	13.4	0.99
Age at birth of first child (mean, years)	25.2	25.0	25.0	0.92
Age at menopause (mean, years)	47.9	48.9	50.0	0.53
No. of children (mean)	2.6	2.4	2.5	0.27
Parity	31 (91%)	44 (83%)	23 (82%)	0.50
Breast feeding (mean, months)	3.6	3.4	3.9	0.77
Using of oral contraceptives	13 (38%)	25 (47%)	18 (64%)	0.12
HRT	27 (79%)	36 (68%)	14 (50%)	0.44
Premenopausal	13 (38%)	28 (53%)	18 (64%)	0.10
Postmenopausal	21 (62%)	25 (47%)	10 (36%)	0.12
History of previous BBD	18 (53%)	22 (42%)	10 (36%)	0.37
Family history of BC	1 (3%)	5 (9%)	5 (18%)	0.21
Use of alcohol	21 (62%)	31 (58%)	13 (46%)	0.44
Smoking	15 (44%)	21 (40%)	10 (36%)	0.80

HRT, use of hormonal replacement therapy.

association between the colour category in body image drawing analysis and risk of breast cancer is rarely considered together, and therefore we carried out a prospective study to examine the role of body image drawing analysis in women with breast symptoms referred by physicians to the Kuopio University Hospital (Finland).

Patients and Methods

The Kuopio Breast Cancer Study is a multidisciplinary cooperative project conducted by different departments of the University of Kuopio and Kuopio University Hospital. The participants of the project included all women who were referred to Kuopio University Hospital (North-Savo Health Care District) for breast examination between April 1990 and December 1995. The Kuopio Breast Cancer Study follows the protocol of the International Collaborative Study of Breast and Colorectal Cancer coordinated by the European Institute of Oncology in Milan, and was initiated as a SEARCH program of the International Agency for Research on Cancer. The collaborative study is based on the assumption that breast cancer and colorectal cancer may have common risk factors. Study centers for the breast cancer study are situated in Canada, Finland, Greece, Ireland, Italy, Russia, Slovakia, Spain and Switzerland (28). The participants of the Kuopio Breast Cancer Study consisted of individuals showing breast cancer symptoms (a lump in the breast or in the axilla, pain in the breast, bleeding from the nipple, nipple discharge and skin dimpling), or an abnormality of the breast detected during outpatient consultations for women referred to the Surgical Outpatient Department at the Kuopio University Hospital, Finland. There had been no pre-selection of the study participants and the indications for referral in this study are in line with our previous results in a Breast Cancer Diagnostic Unit in Finland (29). We maintain that our study sample can be considered clinically representative of this type of prospective case-control study design.

This case control study is an extension of Kuopio Breast Cancer Study (30-31). The study was approved by the Joint Committee of the University of Kuopio and Kuopio University Hospital. Participation was based on written consent. Women with breast symptoms or a suspect breast lump had been referred by physicians to the Kuopio University Hospital (Finland) during the study period from April 1990 to December 1992. Women were asked to participate in the study and were interviewed by a psychiatrist (P.O.) before any diagnostic procedures (clinical examination and biopsy), so neither the interviewer nor the patient knew the diagnosis at the time of the interview. The interviews were tape recorded (P.O.), and the ratings were completed before the final diagnosis. The clinical examination, mammography and biopsy showed breast cancer in (BC) 34 (29.6%) patients, benign breast disease (BBD) in 53 (46.1%) patients and 28 (23.4) patients with healthy breasts (HSS) (Table I).

Assessment of life events and stress. The research method was a semistructured in-depth interview. At the beginning of the interview, the patients drew their 'life lines' and a line describing being a woman, which supported the interview. In 'the draw a line of your life' the patient was asked to draw positive life experiences ('good times') with lines pointing upwards and negative life experiences ('hard times') with lines pointing downwards. Adverse and stressful life events were evaluated over the whole lifespan, with particular reference to the previous 10 years before admission. The adverse or stressful life events and the context surrounding them was marked on the 'life line paper' during the interview. After the interview were rated (by P.O) the life events according to the degree of threat or stress they were likely to pose, and each adverse or stressful life event was graded on a 5-point scale, grade I (one point) indicating non-threatening event and grade V (5 points) a severely threatening event. The used defences were also assessed on a 5-point scale: grade I (one point) indicating very defensive, in denial and grade V (5 points) non-defensive. The 'Working through and actively

confronting the stressful event' variable was also rated on a 5-point scale: grade I (one point) indicating not resolved and grade V (5 points) fully resolved. These measurements were put together in the final statement, 1 to 2 points on the scale means little or mild loss or stress, and 5 means very hard loss or stress.

The rated case record includes the loss events from childhood (under three years of age and 4-12 years of age), adolescence (13-23 years of age), adulthood and especially the last 10 years prior to the investigation.

Assessment of idealization. The characteristics of the idealization of childhood and adolescence, of womanhood and motherhood, of own children, spouse and parity, and the idealization of present life-situation and of life in general in the BC, BBD and HSS groups were estimated using the 3-point scale: grade I, no idealization; grade II, mild/moderate idealization; grade III, severe idealization.

Coping and defence strategies. A modified Haan coping and defence inventory (32) was used. This inventory is divided into ten scales, and each scale has subscales from grade 0 to grade 3: with 0 meaning no definition, 1=coping, 2=defending and 3=fragmentation. In addition, the researchers estimated the patients' ability to cope (scale 1 to 5), the amount of defensiveness (scale 1 to 5), and fragmentation (scale 1 to 5).

Beck depression inventory (BDI). The women completed the BDI (33, 34) with 21 variables. The investigator used the modified inventory divided into three grades: grade I (score 0-13), no depression; grade II (score 14-24), moderate depression; grade III (score over 24), severe depression.

Spielberger trait inventory. All study participants completed the Spielberger trait inventory (35). Trait anxiety was assessed using the subscale from the Inventory, and the 10 items defer to how a person generally feels, with a higher total score reflecting a higher anxiety trait (20-80 range). The investigator rated the test as follows: grade I (score 20-29), seldom anxious; grade II (score 30-49), sometimes anxious; grade III (score 50-69), often anxious; grade IV (score 70-80), always anxious.

Montgomery Åsberg Depression Rating Scale (MADRS). The MADRS with 10 variables (scores from 0 to 6) was used to evaluate the depression of the study participants (36), and the test was rated as follows: grade I (scores 0-6), no depression; grade II (score 7-19), mild depression; grade III (score 20-34), moderate depression; and grade IV (score 35-60), severe depression.

Assessment of psychosocial risk using Wirsching's PRS. The Wirsching classification introduces 12 variables and the variables measure personality and psychosocial stress. We used a modified Wirsching PRS for psychosocial risk assessment (15, 27) with 12 scales, each scale has subscales from grade 1 to grade 5. The researchers estimated the patients' psychosocial risk and the test was rated as follows: grade I (subscale grade 3), low psychosocial risk; grade II (subscale grade 2 and subscale grade 4), moderate psychosocial risk; grade III (subscale grade 1 and subscale grade 5), high psychosocial risk for breast cancer.

Body image drawing analysis. The instruction for the drawing test was "Draw the image of your own body. Use only one colour and

take the time you need." The materials consisted of Caran Dàche-colour crayons with 30 colours and 8,5 × 11 sheet of white paper. The study participants were not allowed to use an eraser.

The rating scales of the body image drawings were partly based on previous studies on human figure and body image drawings. They were adapted to the drawings in this study by examining 20% of randomly chosen drawings. The first 10% were used to create the rating scales and the second 10% of the drawings were used to test the created rating scales. The analysed aspects of the drawings were divided into four categories: body image, depression, anxiety and colour.

Two raters scored the body image drawings independently and the final scores were formed by comparing the separate scores of the two raters (37). If the raters agreed, the score in question was accepted as the final score. A score disagreed on was taken under consideration for making a common decision on it. The raters did not meet the women and were not aware of their diagnosis and the grouping of the drawings.

The size of the body image drawing was measured by centimetres from the highest and the widest part of the drawing. The overall content of the body image drawing was scored in 3-point scale: symbolic, partly symbolic, or humanlike. Symbolic drawings were excluded from the body image rating analysis.

The body image category. Human likeness of the drawing was evaluated by comparing it to the human body, so that the more realistic the drawing, the higher it scored in this category.

Integration of the body parts was evaluated from the synthesis of the body parts and the wholeness of the human figure. Integrative parts of the body as the throat, the shoulders, the waist, the hips and the joints were taken into consideration here.

Differentiation of the human figure was evaluated from the point of view of how clearly what was portrayed in every part of the drawing could be seen. It was essential how clearly and realistic the parts and the outline of the body and the clothes were drawn.

Boundary line referred to the outline of the human figure. Its features were evaluated by two variables: penetrability and impenetrability.

Nudity and clothing category was evaluated as indefinite when it was impossible to describe the human figure as nude or clothed.

Completion of drawing in the pelvic and pubic areas evaluates the degree of specification and finishing in these areas. Detailedness, symmetry and completion of breast areas were evaluated in separate rating scales. Ways to express femininity were evaluated by two separate rating scales: i) general appearance, clothes, hair, jewellery; ii) the shape of the female body. Obviousness of sex was evaluated according to how clearly the figure represented a male or a female. The human figure was feminine when the drawing displayed roundness, sensitivity and maturity. In the evaluation of sexuality, the same aspects were considered, emphasizing sensuality. The human figure was evaluated as motherly when the clothing was stereotypically womanly and there was a general feeling of tenderness and empathy. The impression of masculinity arose from strength, angularity and plainness. Realistic, cheerful and brightly coloured drawings were considered positive, while bizarre, cheerless and darkly coloured drawings were considered negative. Impression of the age of the drawn human figure and the drawer were evaluated in separate rating scales.

The depression category. The drawing was evaluated to be depressive if it had features such as dark and faded colours, disintegration, emptiness, lack of motivation and details,

incompletion and undifferentiation. Emptiness of the body image drawing was evaluated so that the other pole was the impression of vitality. Impression of sorrow rose from withdrawn expressions and gestures, faintness of lines and colours. The quantities of details and omissions were scored separately concerning the arms, the face, the hands, the heads and the legs. Motivation was evaluated from the amount of doing and the completion of the drawing.

The anxiety category. The drawing was rated as expressing anxiety if the lines were heavily pressed and slowly drawn, and if there was a lot of redrawing and shading. Impression of aggression rose from hostile expressions and gestures and violent lines. The evaluated line characteristics were pressure and the continuity of the line and, evaluated on a 3-point scale, variation of the line pressure. Also the pressure of the line in the breast area was evaluated separately. Liveliness of the line rose from the motion of the pencil, so that the line was rated as lively if it got thinner towards the end. Redrawing was evaluated on a 3-point scale on the basis of sketching and drawing again in order to improve or change. Redrawing was also scored separately in different body areas. The darkened, coloured parts of the drawing were evaluated as shading on a 2-point scale. Shading was also scored separately in different body areas.

The colour category. The colours in the body image drawing analysis were divided into three categories. The division of the colours was made according to the primary colours, yellow and blue and which the colour in question consisted more of. The third category included colours which cannot be categorized according to this principle, for example brown and black.

The assessment of the difficulty of scoring and the evaluation of the interrater agreement. The body image drawings were scored independently by two raters (37), who were not aware of the diagnosis and the grouping of the body image drawings. The scoring of body image drawings is a difficult task and this fact was studied in two ways. Firstly, the raters evaluated the difficulty of giving a score on a 5-point scale during scoring. The rating varied from 1 (very difficult) to 5 (very easy). Secondly, the body image drawing scores of the two raters were compared with each other and the interrater agreements of the scores, as the difference between the scores, were calculated. Finally, the means of the raters' difficulty values were compared with the interrater agreements.

Statistical analysis. Significance of the results was calculated with the SPSS/PC statistical package (SPSS Inc., Chicago, IL, USA). Correlations and differences between the study groups (BC, BBD and HSS groups) were measured with the 2-sided Chi-square test and non-parametric Kruskal-Wallis variance analyses. Results were considered statistically significant at a p -value <0.05 . Associations between the major study variables and breast cancer risk were analysed by unconditional logistic regression to estimate risk ratios (RRs) and 95% confidence intervals (CI).

Results

The mean age of the breast cancer (BC) patients was 51.5 years. The corresponding figures for the patients with benign breast disease (BBD) were 47.5 years and for the HSS group 45.7 years. Although the patients in the BC group were older than those in the BBD or HSS groups, the

age difference was not statistically significant ($p=0.12$). The majority of the patients (85/115, 74%) were married or living in a steady relationship. Almost half of the women (41.7%) had graduated from primary school, and 25% had a college education. By profession, the patients represented industrial and service employees (25.2%), office employees (10.4%), health care employees (8.7%), and farmers (8.7%), and almost 23.5% were retired. The combined mean gross income of both spouses in the patients with BC was 36,100 € per year. The corresponding figures for the patients with BBD were 27,714 € per year. The patients with BC were significantly ($p=0.03$) wealthier than the patients with BBD and HSS, as estimated by the combined gross income of both spouses. The groups differed only slightly from each other as to the factors of the reproductive life of the women (Table I).

Psychological self-report questionnaires (BDI and STI) and MADRS. The mean BDI score (SD) of the BC group was 8.4 (6.9) and 8.8 (7.4) and 7.1 (7.3) ($p=0.5$) for the BBD and HSS groups, respectively. The mean MADRS score (SD) of the BC group was slightly higher at 11.4 (9.2) than that of the BBD group, at 10.7 (9.2) and the HSS group, at 8.4 (9.7) ($p=0.23$). The mean (SD) STI differed only slightly between the BC group, at 40.1 (8.6), the BBD group, at 41.5 (7.2) and the HSS group, at 39.1 (6.4) ($p=0.20$).

The characteristics of Wirsching's PRS. The characteristics of the PRS in the BC, BBD and HSS groups were categorized according Wirsching's classification. The mean sums of the scores of PRS functions were significantly higher in the BC group than in the BBD or HSS groups. However, the mean scores for the PRS for HSS, for BBD and for BC groups differed only slightly when the PRS functions were considered separately. The BC group used more suppression of feelings, optimism, self-sufficiency, rationalizing attitude, remoteness, harmonizing behaviour and altruism than the BBD and HSS groups according to Wirsching's classification.

The interrater disagreement of the body image drawing variables. The interrater disagreement of the body image drawing variables in the BC, BBD and HSS groups was defined as the difference between the scores given by the two raters. If there was no disagreement in scores given by the two raters, as both raters had given the same assessment, the amount of disagreement was score 0 and the amount of disagreement varied from score 0 (no disagreement) to score 4 (disagreement in all variables; maximum disagreement). The two raters fully agreed in 70.6% of variables; score 0 and the interrater disagreement of the body image drawing variables was score 0; 70.6%, in the score 1; 20.9%, score 2; 4.5%, score 3; 2.3% and score 4; 1.8%.

Table II. The interrater agreement and the assessment of difficulty for the body image drawing variables. The first column gives the percentages of the complete interrater agreement, and the second gives the sum of the interrater agreement and the one-point disagreement. Third column gives the mean value (M) of the raters' estimated difficulty of the assessment, and the fourth the standard deviation (SD). The fifth column gives the correlation (Rs) between the interrater agreement and the mean value of the difficulty of assessment.

Assessment variables of the BID	Interrater agreement		Difficulty of the assessment		Correlation	
	Total	1-point	M	SD	Rs	p-Value
Depression	52.3	90.8	4.0	0.9	-0.160	0.097
Emptiness	60.6	92.4	3.8	1.0	-0.252	0.010*
Sorrow	39.4	81.6	4.0	0.8	-0.062	0.523
Detailing, overall	64.2	94.5	4.3	0.7	-0.185	0.060
Head and face	76.1	97.3	4.5	0.7	-0.120	0.042*
Arms and hands	88.1	99.1	4.3	1.1	-0.251	0.010*
Legs	83.5	99.1	4.6	0.6	-0.359	0.000***
Motivation	72.4	96.3	4.3	0.8	-0.397	0.000***
Line pressure	70.6	96.4	4.3	0.8	-0.213	0.026*
Variation of pressure	72.5	100.0	4.4	0.6	-0.264	0.006**
Continuous	52.3	97.3	4.2	0.7	-0.092	0.343
Pressure on breast	89.0	97.0	4.5	0.7	-0.242	0.144
Liveliness of line	56.0	92.7	4.3	0.6	-0.074	0.446
Redrawing, overall	70.6	96.3	4.3	0.8	-0.202	0.035*
Shading, overall	90.8	100.0	4.7	0.6	-0.079	0.412
Anxiety	56.9	88.1	4.3	0.8	-0.326	0.000***
Aggression	57.8	91.7	4.0	0.9	-0.282	0.003**
Colour	97.2	100.0	4.9	0.3	-0.094	0.337

BID, Body image drawing.

Table II shows each of the body image drawing variables separately; the amount of the disagreement of the body image drawing variables in percentages, the mean and the standard deviation of the raters estimated difficulty of rating. When the agreement was high easiness experienced in the assessment, and no correlation between these, the variables were simple and thus the evaluation was experienced as easy. Variables of this kind were overall shading and colour. The high mutual agreement of rating of the body image drawing variables with easiness experienced in the assessment and a correlation between these, indicate the ability to recognize the body image drawings which were difficult to score. Variables of this kind were *e.g.* overall content, nudity and detailing of legs. Low mutual agreement of rating of the body image drawing variables with easiness experienced in the assessment, and a correlation between these, indicate raters systematically different scores. A variable of this kind was *e.g.* the shape of the body. The low mutual agreement with difficulty experienced in the assessment, and no correlation between these, indicates an insufficiently defined rating scale, *e.g.* in the case of the variable of sorrow in depression category.

The descriptive aspects of the body image drawings. The body image drawings were mostly placed in the middle of the paper and the human figure was mostly drawn from the

front. The general impression was that the drawings were quite primitive and the human figures drawn were characteristically undifferentiated and lacking in details and 69.2% of the women did not draw breasts or drew only a hint of breasts. Over half (57.7%) of the human figures drawn by the study participants gave the impression of being younger than adult.

The depression variables. The instructions for drawing "the image of your own body" permitted the drawing of an image of any kind, but most women drew the whole human figure. The HSS, BBD and BC groups did not differ in a statistically significant degree in respect to drawing or not drawing, nor in respect to the overall content of the drawing. Six women refused to draw, six women also drew a symbolic drawing, *e.g.* a circle, a rose, a tree, and nine women drew drawings involving a symbol, *e.g.* a bag, a flower, words.

The patients with breast cancer tended to make a body image drawing of bigger size ($p=0.083$), and to draw a less positive body image ($p=0.069$), than those of the BBD and HSS groups. The BC group made less completed body image drawings in the area of the breast ($p=0.073$) than did the BBD patients and HSS. The patients in the BC group also tended to depict the sex of the body image drawing less obviously than the BBD or HSS groups ($p=0.097$). In the clothing variable, the lowest score for clothing was given when it was not

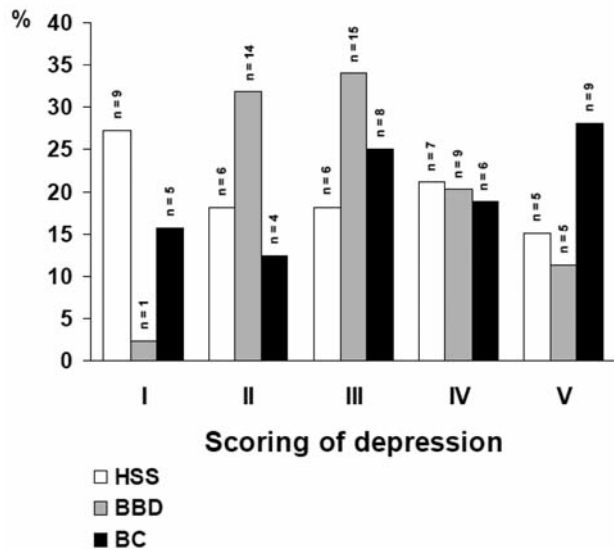


Figure 1. The impression of depression in the body image drawings scored in five categories: Grade I, no depression; Grade II, little depression; Grade III, some depression; Grade IV, clear depression; Grade V, very strong depression. The body image drawings available for this analysis were in 32 study participants in the BC group, in 44 study participants in the BBD group and in 33 study participants in the HSS group.

possible to determine whether there were clothes or not. There was a trend for the women with breast cancer to draw more depressive body image drawings ($p=0.029$) than the BBD and HSS groups (Figure 1).

The anxiety variables. The patients with benign breast disease tended to shade more often than the patients with breast cancer or healthy study subjects ($p=0.082$, Figure 2). The shading was also investigated closer in the different parts of the body comparing the shading of feet and the shading of irrelevant parts of the human body, which means inadequacy in this situation. The women with breast cancer tended to shade the feet area ($p=0.072$) and irrelevant parts of the human body ($p=0.070$) more often than the BBD or HSS groups.

The colour variable. The study participants were instructed to choose one colour for drawing. There were 30 colours available, of which 14 were used. The colours were categorised into three groups: Colours based on yellow: orange, red, yellow, yellow-green. Colours based on blue: blue-green, dark blue, light blue, plum, purple, violet. Other colours: black, dark brown, grey, light brown.

The patients with breast cancer tended to use the colours with blue and the tones of brown and black more often than the BBD patients and HSS. The HSS group used more often the colours with yellow than the BC and BBD groups (Figure 3, $p=0.042$).

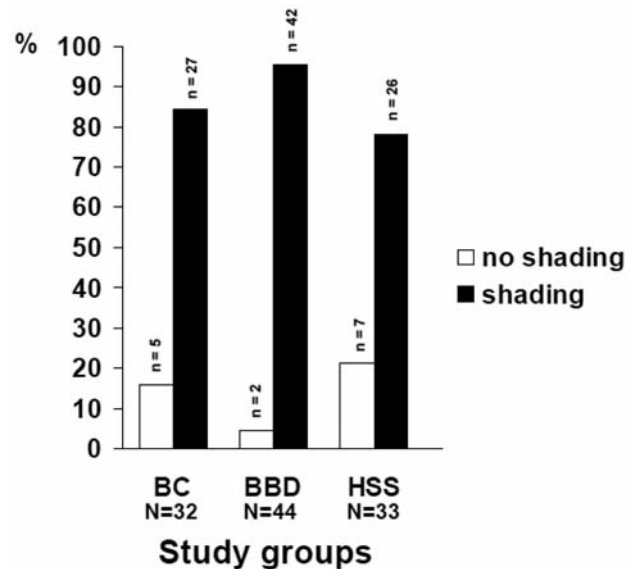


Figure 2. The shading variable in the body image drawings scored in two categories. The body image drawings available for this analysis were in 32 study participants in the BC group, in 44 study participants in the BBD group and in 33 study participants in the HSS group.

Discussion

The study groups did not differ from each other in the BDI, and most of the study participants were not depressive according to BDI. Our results in this study are in line with Todarello *et al.* (38), who also made the observation that women with breast cancer do not differ from healthy women and women with benign breast disease in a questionnaire about depression.

As expected, the patients with breast cancer projected their depression onto the body image drawings. The impression of depression included the following features; incompleteness, disintegration of body parts, lack of differentiation, dark and faded colours, lack of motivation and details, emptiness and loneliness. All these features have an effect on the impression of depression.

The study participants did not differ from each other in the STI, nor in the impression of anxiety in the drawings. However, trends appeared in the shading and redoing in body image drawings, which were considered as original indicators of anxiety according to Hammer (39). The women with breast cancer or benign breast disease tended to draw their body image drawing with more shading and redoing than the healthy study participants. This trend supports the previous studies by Wirsching *et al.* (15, 27).

As to location of shading in body image drawings, it is believed that shading indicates problems in the area in

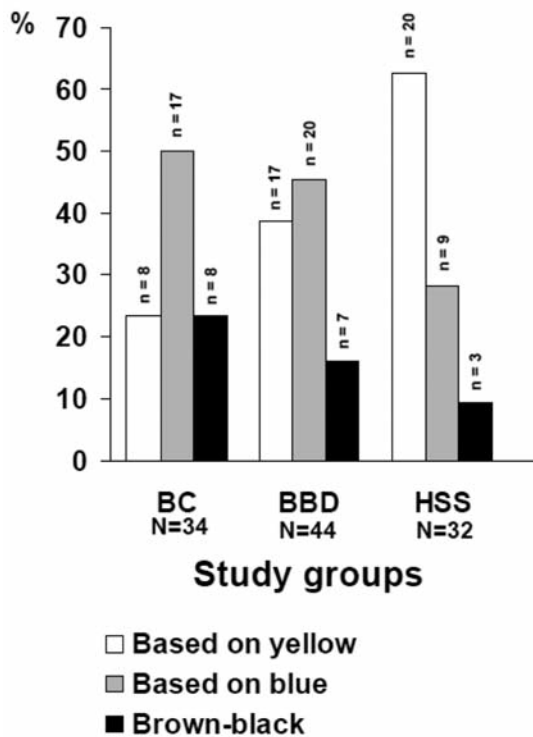


Figure 3. The colour used by the study participants in the body image drawings. The body image drawings available for this analysis were of 34 study participants in the BC group, 44 study participants in the BBD group and 32 study participants in the HSS group.

question. Sims *et al.* (40) noticed that qualitatively refined measures of shading, erasure and reinforcement in body image drawings may provide indicators of defensive style and they may give information about how the anxiety is handled, as in the Rorschach test. In our study, the shading in body image drawings, as well as redrawing, might be an indicator of ability to handle the anxiety associated with breast disease. The shaded areas in body image drawings far from the breasts and thus inadequate in this situation might indicate diffuse anxiety and incapable defense. On the other hand, the shading in the breast area could reflect the effort to deal with the anxiety associated with breast disease.

The HSS in our study tended to use the colours based on yellow more often in the body image drawings than did those in the BBD and BC groups. Warm colours, *e.g.* red-orange, are seen to provoke active feelings, and cold colours, *e.g.* violet-blue, are considered less likely to cause extreme reactions (41, 42). Accordingly, it can be suggested that the healthy women are able to deal with active feelings, whereas the women with breast disease have difficulty in this respect. The tones of black and brown, which the women with breast cancer used more than the BBD and HSS groups, can be associated with refusal to use colours and repression of emotions. It has been found in many earlier studies,

conducted before diagnosis, that the avoidance of emotions and suppression of emotions is characteristic in women with breast cancer (14, 15, 43, 44). In addition, Wirsching *et al.* 1982 (15) noticed that women with breast cancer avoid conflicts and use harmonization as a defence mechanism.

Todarello *et al.* 1989 (38) noted that women with breast cancer have difficulty in verbalizing emotions and expressing emotions. This difficulty to recognize emotions and verbalize emotions is shown by the fact that the findings from the body image drawing test are not detectable by the BDI nor the STI in our study. The BDI and STI presuppose that the emotions are conscious and that there is an inclination to express them. Body image drawing is thought to be a way to express unconscious emotions by projection, *e.g.* women with breast disease are not necessarily conscious of their depression.

The important bias related to case-control studies is recall bias, which occurs, for example, if cases report their life experiences differently from controls. This may happen because they have often thought about their previous experiences in order to find causes for their breast cancer. To avoid recall bias, we conducted this case control study with a so called 'limited prospective study design': women were asked to participate in the study, were interviewed and reports on psychological factors and body image drawings were obtained before any diagnostic procedures, so neither the investigator nor the participants knew the diagnosis at the time of interview. However, the patients were encountered in an extremely stressful situation before the diagnosis. It can be assumed that on the basis of clinical impressions, some of the patients had already been given more or less clear hints by their doctors on their expected diagnosis. One potential bias comes from age being a confounding factor, and some studies have been criticized on such methodological grounds as limited controlling for age (45). In our study, the BC group was 4.0 years and 5.9 years older than the BBD group and the HSS group, respectively. However, no statistically significant age difference between these groups was found ($p=0.12$). The participants of our study consisted of individuals showing breast cancer symptoms (a lump in the breast or in the axilla, pain in the breast, bleeding from the nipple, nipple discharge and skin dimpling), or an abnormality of the breast detected during outpatient consultations referred to the Surgical Outpatient Department at the Kuopio University Hospital, Finland. There had been no pre-selection and the indications for referral in this study are in line with our previous results in a Breast Cancer Diagnostic Unit in Finland (29). We maintain that our study sample can be considered clinically representative for this type of prospective case control study design. It should be noted that the control group (healthy individuals) of our study is not representative of the whole population, since it consists of women who presented primarily with breast symptoms.

The study sample can be considered clinically representative of this type of prospective case-control study design if the variables characterized by the investigator and these characterized by the participants correlate. In our study, the variables reported by the investigator, the 'MADRS' and 'depression' variable correlated with high significance (p -value <0.001) with those variables reported by the study participants, BDI, A-trait, Forsen score 0-2 years and Forsen score 2.6 years. The 'anxiety' variable characterized by the investigator correlated with the A-trait and Forsen score 0-2 years variable reported by the study participants (p -value <0.05).

In summary, our findings of a weak relationship between the colour category and the big size of the body image drawing and breast cancer risk are in line with the findings Wirsching *et al.* (15, 27), who specifically investigated the defensive self-esteem of breast cancer patients before biopsy.

Conclusion

The results of this study support a weak association between the colour category of the body image drawing and breast cancer risk. However, the biological explanation for the association is unclear and it might be that psychological factors impact indirectly to breast cancer risk by affecting behaviours such as diet or sleep or, directly on neuroimmunological or hormonal systems.

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