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The effect of group cohesion on rehabilitation outcome in cancer survivors

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Abstract

Objective: Group-based physical training interventions have been shown to be effective in increasing quality of life in cancer survivors. Until now, however, the impact of cohesion within the group on intervention outcome has not been investigated.

Methods: We examined self-reported individual group cohesion ratings collected in the first half of a 12-week rehabilitation programme for cancer survivors ($N = 132$). Four dimensions of group cohesion were measured, i.e. the bond with the group as whole, the bond with other members, cooperation within the group and the instrumental value. Quality of life, physical functioning and fatigue were assessed before and after the intervention using the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30. Linear multiple multivariate regression analysis was conducted to explore the relationship between group cohesion and intervention outcome.

Results: The relationship between group cohesion and outcome was significantly modified by gender. Higher ratings of cooperation within the group predicted better post-intervention quality of life and physical functioning and less fatigue in men, and better quality of life and physical functioning in women. Additionally, women who reported a stronger bond with other members showed a lower quality of life after the intervention. No relationship was found between the instrumental value and the outcome variables.

Conclusion: Some dimensions of group cohesion seem to be associated with intervention outcome. The underlying mechanisms need to be unravelled.

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Keywords: cancer; oncology; exercise; group cohesion; survivors; quality of life

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Introduction

Recent reviews and meta-analyses have revealed the physical and psychological benefits of exercise programs in cancer patients [1,2]. Several of these programs were offered to individuals in group format and these reported improvement in quality of life, physical functioning and fatigue in cancer patients during primary treatment [3–10] and after completion of initial treatment [11–14]. Recently, interest has been growing in patients' experience with training within groups. Several authors explored the relevance of group processes by means of in-depth interviews and focus groups [8,15–17]. Cancer patients and survivors emphasized the importance of exercising in groups. Participants felt motivated by others to

overcome their physical limitations and they experienced reciprocal upwards comparison [8,17]. By exercising in groups, patients were encouraged and challenged to attain physical peak performance [8]. It is suggested that these group processes may have a positive effect on intervention outcome, that is an improvement in the quality of life of cancer patients [4]. In group therapy, one supposed mechanism of change is that of group cohesion [18]. Two components of cohesion were described, namely social cohesion and task cohesion [19]. Group cohesion as defined by Yalom [18] primarily refers to social-emotional cohesion since group cohesion is conceptualised as the intimacy, reciprocity and emotional disclosure that is felt among the group members. In sport psychology, the definition was expanded by

integrating the component of task cohesion: Group cohesion is defined as 'a dynamic process that is reflected in the tendency of a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs' [20]. Cohesiveness is a multidimensional concept that refers to cooperation within the group to achieve a common therapeutic aim [21]. Group cohesion has been described as a bonding force consisting of four factors, namely attraction to the group as a whole and to individual members of the group, risk taking and instrumental value of the group [22]. It is presumed that when cohesion is high, the group is motivated to perform well and is more able to coordinate activities for successful performance [23]. The role of cohesion within a group has been extensively investigated in psychotherapy and it has been shown that higher group cohesion predicted better treatment outcome [24–26]. In the case of sedentary adults involved in exercise classes, it has been demonstrated that groups that reported high cohesiveness were characterized by mutual support for exercise activities, which then facilitated the development of self-efficacy beliefs and improved mastery expectation with regard to exercise [27]. This is supposed to have a positive effect on physical activity behaviour [10]. Hence, the implication is that cohesion is a putative mechanism of change during group interventions and is therefore expected to be related to intervention outcome.

Research in cancer self-help groups revealed differences in the needs of men and women within groups [28,29]. Men emphasised the importance of giving and seeking information, whereas women emphasised the importance of intimacy, mutual support and emotional disclosure. It may therefore be conceivable that men and women would experience the cohesion within the group differently.

To date, the impact of group cohesion on the effectiveness of group-based physical exercise interventions for cancer survivors has not been explored [30]. The present study is part of a randomised controlled trial that evaluates the effect of group-based rehabilitation among cancer survivors. Our aim was to explore the relationship between group cohesion and intervention outcome. We expected the perception of higher group cohesion to be significantly related to better quality of life, physical functioning and less fatigue. We also explored the differences between men and women as regards their perception of group cohesion and the relationship between group cohesion and intervention outcome.

Methods

Procedure

The sample of the current study is a subset of the sample in a prospective, randomised multicentre

trial conducted at four Dutch centres, namely at the rehabilitation units of two university medical centres and one general hospital and at one rehabilitation centre [31]. The study was approved by the medical ethics committee of the University Medical Center Utrecht and the local research ethics committees.

Cancer survivors were informed about the study by their treating physician, information in the local newspapers or via the Internet. After written consent, eligible subjects were scheduled for baseline measurements and allocated randomly to either physical training (PT) based on principles of self-management or PT plus cognitive-behavioural training (PT + CBT). In each centre consecutive groups of 8–12 eligible subjects were assigned to PT or PT + CBT to ascertain adequate numbers of participants in each group. Randomisation at group level was applied; prior to enrolment of participants in the study, the sequence of PT and PT + CBT groups at each centre was determined by an independent researcher using a randomisation list. Until the first session, participants were blinded to the rehabilitation group they were allocated to. Following the intervention, participants in both intervention groups showed significant improvements in global quality of life, physical functioning and fatigue compared with control [32,33]. No differences in any outcome variable were found between PT and PT + CBT groups from pre-intervention to post-intervention. Also, group cohesion ratings were not different between PT and PT + CBT (data not shown). The two intervention groups were therefore combined into one group in the present study.

Participants

Inclusion criteria were: age ≥ 18 years; last cancer treatment completed at least three months before study entry; estimated life expectancy at least one year (i.e. based on medical evaluation of each individual by the referring physician); and referred for rehabilitation by medical specialist or general practitioner on the basis of at least three out of the following six criteria: physical complaints, reduced physical capacity, psychological problems, increased levels of fatigue, sleep disturbances, and problems coping with reduced physical and psychosocial functioning. Cancer survivors were excluded if they had cognitive disturbances (e.g. cancer survivors who were unable to be instructed, to think in three dimensions, to complete questionnaires), serious psychopathology or emotional instability that might impede participation in the rehabilitation program (e.g. being in the process of a divorce at the moment or a recent death of a loved one), or if they needed intensive medical treatment or rehabilitation (i.e. having a low level of activity, e.g. less than 50% of their daytime

ambulant, rapid fatigue appearance on performance of low physical activity and activity of daily living dependency).

Recruitment and assessments of cancer survivors occurred between February 2004 and April 2006. One hundred and seventy-six cancer survivors were referred to the research centres. Twenty-nine subjects were excluded before randomisation due to not meeting the inclusion criteria ($n = 14$), refusing to participate in the rehabilitation ($n = 5$), refusing to be randomly assigned ($n = 7$), and feeling no need for rehabilitation anymore ($n = 3$). There were no significant differences between subjects who were randomised and those who were excluded before randomisation with regard to age, gender, educational level, marital status, type of cancer, type of treatment and time post-treatment.

Because the focus of the present study was the relationship between group cohesion and intervention effects, we limited the analyses to 132 of 147 participants who completed the intervention. Reasons for discontinuing the intervention were medical ($n = 11$) and personal ($n = 4$). There were no significant differences in demographic variables and pre-intervention scores on the outcome variables between those who completed the intervention and those who dropped out.

Intervention

The intervention took place in mixed-gender groups of 8–12 participants and approximately 80% of each group were women. Participants in PT ($n = 62$ from eight groups) followed 24 sessions of PT and participants in PT + CBT ($n = 70$ from eight groups) followed 24 sessions of PT combined with 12 CBT sessions. Both components, PT and the CBT, were based on principles of self-management: i.e. goal selection, information collection, information processing and evaluation, decision-making, action and self-reaction [34].

PT (twice weekly, 2 h per session): Each session consisted of individual training performed within the group (aerobic bicycle training (30 min) and muscle strength training (30 min)) followed by group sports (60 min). The training sessions were supervised by two physical therapists and were performed according to a standardised protocol taking cancer survivor's baseline physical fitness into account. Group sports included badminton, soccer, swimming, balancing games, and aimed, firstly at promoting enjoyment in sports and improving self-efficacy in order to incorporate sporting activities into daily life and to adopt a physically healthy lifestyle, and at the same time to enhance cohesiveness by stimulating interaction. Self-management skills [34] were trained to stimulate exercise motivation and execution.

CBT (once a week, 2 h per session): The intervention was based on a cognitive-behavioural

problem-solving protocol for individual cancer patients [35] and a group problem-solving protocol for low back pain patients [36]. During the intervention, self-management skills [34] were developed to enable participants to solve present and future problems associated with the physical and psychosocial consequences of cancer. A psychologist and a social worker supervised the intervention.

Measures

Outcome measures

Global quality of life, physical functioning and fatigue were assessed using subscales of the *European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30* (EORTC-QLQ-C30) [37]. Two, five and three items measured global quality of life, physical functioning and fatigue, respectively. Raw scores of the EORTC-QLQ-C30 were transformed linearly into scores ranging from 0 to 100. A higher score represents a higher quality of life and physical functioning, and a higher level of fatigue. In our sample, the Cronbach's α of the used subscales ranged from 0.64 to 0.81 at baseline, and from 0.60 to 0.80 post-intervention.

The EORTC-QLQ-C30 was administered pre-intervention and directly after the 12-week intervention at the study site.

Predictive measures

Socio-demographic and medical data were obtained at baseline using a self-report questionnaire. The referring physician confirmed medical data.

Group cohesion was assessed using the *Group Cohesion Questionnaire* (GCQ-22) [38], which is based on the Group Attitude Scale [39] and the Three Factor Group Questionnaire [40]. The GCQ-22 comprises 22 items across four scales: Bond-Group—the bond with the group as total (seven items, e.g. 'I feel involved about what happens in the group'); Bond-Member—the bond with other members of the group (four items, e.g. 'After the last session I would like to stay in contact'); Cooperation (four items, e.g. 'Generally, everybody is actively involved'); and Instrumental Value (seven items, e.g. 'I feel supported by the group as regards achieving my goals'). Each item is rated from 1 (totally disagree) to 6 (totally agree). The lowest score is 1, meaning an absence of group cohesion, and the highest score is 6, meaning very high group cohesion. The internal consistency of all scales was reported to range from adequate to good (0.66–0.88) [38]. We discarded one item from the cooperation subscale resulting in an increase of the Cronbach's α from 0.57 to 0.62. For the assessment of early group cohesion, the GCQ-22 was completed at the centre at the end of sessions 4 (s-4), 8 (s-8) and 12 (s-12) of the PT program. The

Cronbach's α of the subscales ranged from 0.62 to 0.80 at s-4, from 0.67 to 0.82 at s-8 and from 0.65 to 0.83 at s-12.

Data analysis

If not stated otherwise, analyses were performed using the R software (version 2.4.1, <http://www.r-project.org>).

Socio-demographic and medical data of the participants who dropped out and who stayed in the study, and data on men and women were compared using independent Student's *t*-tests for continuous data and chi-squared tests for categorical data.

Spearman rank correlation coefficients for continuous data and chi-squared tests for categorical data were calculated in order to investigate the relationship between group cohesion scores and socio-demographic data and medical data. Group cohesion ratings of men and women and changes over time were analysed using linear mixed-effects models. Effect sizes (ES) were calculated according to Cohen as indices measuring the magnitude of change [41]. Changes in outcome variables among and between men and women were compared using multilevel (i.e. centre, group and individual) linear mixed-effects models taking the baseline values as covariates into account.

Linear multiple multivariate regression analysis (Mplus version 4.1 [42]) was conducted with quality of life, physical functioning and fatigue at post-intervention as dependent variables and the four GCQ-subcales as predictor variables. Owing to the fact that results were not different for GCQ measurements at s-4, s-8 and s-12, the mean of these three measurements for each subscale was used in the model. The model was adjusted for pre-intervention levels of the outcome variables, intervention modality (i.e. PT + CBT or PT), attendance rate and age. Model fit was assessed using the chi-square test for model fit ($p > 0.05$) and the standardized root mean square residual (< 0.05). Between-group intra-class correlations ($ICCs_{\text{group}}$) for the GCQ-subcales were estimated in order to examine the interdependence of data due to nesting within groups. These $ICCs_{\text{group}}$ appeared to be low (0.001–0.058). The non-standardised regression coefficients (raw importance of predictor variables) and the standardised regression coefficients (relative importance of predictor variables) were presented as a measure of the performance of the individual predictive variables. In order to determine whether the relationship between group cohesion and outcomes was modified by gender, statistical testing was performed to establish whether the regression coefficients were different ($p < 0.05$).

In these analyses, the models accounted for missing data (EORTC-Q-30 $n = 1$; GQC s-4 $n = 6$, s-8 $n = 8$, s-12 $n = 4$) based on the observed

data. Only two-sided significance tests were used ($\alpha < 0.05$).

Results

Study participants

Table 1 shows the baseline characteristics of the study participants. There was no statistical difference between men and women as regards socio-demographic variables and time post-intervention. The prevalence of type of cancer was distributed differently because breast and gynaecological cancers are predominantly diagnosed in women. Surgery was reported more often in women and this may be due to the types of cancer (breast and gynaecological) for which surgery is needed. PT + CBT subjects completed 89% of 24 PT sessions and 87% of 12 CBT sessions. PT subjects completed 91% of 24 PT sessions. There was no significant difference in the attendance rate of men and women. Table 2 provides characteristics of the 16 intervention groups. Each group consisted of 8–12 participants except for four groups in which subjects cancelled participation at short notice.

Outcome measures

Pre-intervention outcome measures did not differ between men and women. Quality of life and

Table 1. Baseline characteristics^a

Variable	Overall (n = 132)	Men (n = 21)	Women (n = 111)	P- value ^b
Age (years)	48.6 ± 10.8	45.9 ± 11.8	49.2 ± 10.6	0.31
Educational level				0.60
Low	17 (12.9)	4 (19.0)	13 (11.7)	
Middle	62 (47.0)	10 (47.6)	52 (46.8)	
High	53 (40.2)	7 (33.3)	46 (41.4)	
Marital status				0.11
Married/living together	94 (71.2)	18 (85.7)	76 (68.5)	
Single	38 (28.8)	3 (14.3)	35 (31.5)	
Type of cancer				<0.0001
Breast	77 (58.3)	1 (4.8)	76 (68.5)	
Haematological	20 (15.2)	7 (33.3)	13 (11.7)	
Gynaecological	14 (10.6)	1 (4.8)	13 (11.7)	
Colon	3 (2.3)	3 (14.3)	—	
Urogenital	8 (6.1)	6 (28.6)	2 (1.8)	
Other	10 (7.6)	3 (14.3)	7 (6.3)	
Type of treatment				
Surgery	115 (87.1)	13 (61.9)	103 (91.9)	<0.0001
Chemotherapy	76 (57.6)	12 (57.1)	64 (57.7)	0.97
Radiotherapy	93 (70.5)	13 (61.9)	80 (72.1)	0.35
Time post-treatment (years)	1.3 ± 1.8	1.2 ± 0.9	1.4 ± 1.9	0.60

^a Data are presented as mean ± standard deviation for continuous variables and frequency (percentage) for categorical variables.

^b P-value for differences between men and women.

Table 2. Characteristics of the intervention groups

	N	Gender		Age (years \pm SD)	N _{Drop out during the intervention} (N women/men)
		Women	Men		
Group 1	11	10	1	43.0 \pm 8.9	—
Group 2	10	8	2	43.6 \pm 11.5	4 (3/1)
Group 3	11	9	2	49.6 \pm 10.5	—
Group 4	9	8	1	49.8 \pm 7.4	1 (1/0)
Group 5	12	11	1	52.7 \pm 10.6	2 (2/0)
Group 6	9	8	1	44.3 \pm 11.5	1 (1/0)
Group 7	8	7	1	51.0 \pm 9.9	—
Group 8	7	5	2	45.2 \pm 18.0	—
Group 9	11	10	1	51.0 \pm 11.5	—
Group 10	12	9	3	44.2 \pm 9.1	1 (1/0)
Group 11	12	10	2	56.1 \pm 10.0	4 (3/1)
Group 12	8	5	3	54.5 \pm 4.8	—
Group 13	8	7	1	47.3 \pm 14.3	—
Group 14	6	5	1	53.0 \pm 9.7	—
Group 15	6	5	1	40.0 \pm 9.2	—
Group 16	7	6	1	55.0 \pm 3.8	2 (1/1)

Table 3. Outcome variables at baseline and post-intervention, and changes from baseline to post-intervention assessed using the European Organization for Research and Treatment of Cancer QLQ-C30 (range 0–100)

	Baseline (mean \pm SD)	Post-intervention (mean \pm SD)	Change score (95% CI)	P-value ^a
<i>Quality of life</i>				
Overall	58.2 \pm 16.4	73.4 \pm 15.0	15.2 (11.5 to 18.9)	0.0002
Men	63.9 \pm 15.7	79.0 \pm 12.2	15.2 (7.4 to 22.9)	<0.0001
Women	57.1 \pm 16.3	72.3 \pm 15.3	15.2 (11.3 to 19.1)	<0.0001
<i>Physical functioning</i>				
Overall	73.4 \pm 13.2	85.4 \pm 10.7	12.0 (10.2 to 13.7)	<0.0001
Men	75.2 \pm 14.2	87.0 \pm 15.0	11.7 (7.3 to 16.2)	<0.0001
Women	73.1 \pm 13.1	85.1 \pm 9.8	12.0 (10.0 to 14.0)	<0.0001
<i>Fatigue</i>				
Overall	50.0 \pm 22.6	31.8 \pm 17.2	-18.3 (-22.5 to -14.1)	<0.0001
Men	43.9 \pm 22.6	29.6 \pm 19.0	-14.3 (-23.7 to -4.9)	0.003
Women	51.2 \pm 22.5	32.2 \pm 16.9	-19.0 (-23.5 to -14.6)	<0.0001

SD, standard deviation; CI, confidence interval.

^aP-value for change from baseline to post-intervention using linear mixed-effects model.

physical functioning increased significantly and fatigue decreased significantly from baseline to post-intervention in both men and women (Table 3). Changes were not different between men and women ($p > 0.05$).

Group cohesion ratings

Group cohesion scores were unrelated to socio-demographic and medical data, i.e. age, education, marital status, type of cancer, primary cancer treatment, time post-treatment. Cohesion scores were also unrelated to intervention group (PT or PT + CBT) and the number of sessions attended.

Table 4 shows the group cohesion scores. Scores were not significantly different between men and women with the exception of higher scores for women on Bond-Member at the three measurement times ($p = 0.0001$).

Bond-Group and Cooperation within the group did not change significantly over time between s-4, s-8 and s-12. Instrumental value increased significantly from s-4 to s-8 ($p = 0.02$, ES = 0.18), but not from s-8 to s-12. A significant interaction effect of gender and time was found in Bond-Member. In women, Bond-Member at s-8 and s-12 was higher than at s-4 ($p = 0.01$, ES = 0.19 and 0.0001, ES = 0.25, respectively). In men, Bond-Member decreased from s-4 to s-8 ($p = 0.03$, ES = 0.28) and then increased from s-8 to s-12 (0.04, ES = 0.26) to a level comparable to s-4.

Relationship between group cohesion rating and outcome measures

The relationship between group cohesion and outcome was significantly modified by gender ($p = 0.0005$). Table 5 shows that higher cooperation within the group predicted higher

Table 4. Group cohesion ratings assessed using the Group Cohesion Questionnaire-22 (range 1–6)

	Session 4 (mean ± SD)	Session 8 (mean ± SD)	Session 12 (mean ± SD)	Mean of all sessions ^a (mean ± SD)
<i>Bond-Group</i>				
Overall	4.90 ± 0.56	4.94 ± 0.50	4.95 ± 0.47	4.92 ± 0.47
Men	5.02 ± 0.40	5.05 ± 0.48	4.92 ± 0.38	4.99 ± 0.38
Women	4.88 ± 0.59	4.92 ± 0.50	4.95 ± 0.49	4.91 ± 0.48
<i>Bond-Member</i>				
Overall	4.00 ± 0.80	4.07 ± 0.85	4.15 ± 0.83	4.06 ± 0.76
Men	3.61 ± 0.94 ^b	3.34 ± 0.97 ^{b,c}	3.58 ± 0.93 ^{b,d}	3.50 ± 0.90
Women	4.07 ± 0.75	4.21 ± 0.75 ^c	4.26 ± 0.76 ^c	4.17 ± 0.69
<i>Cooperation</i>				
Overall	4.60 ± 0.83	4.56 ± 0.83	4.50 ± 0.86	4.54 ± 0.66
Men	4.72 ± 0.87	4.76 ± 0.70	4.44 ± 0.88	4.64 ± 0.57
Women	4.57 ± 0.82	4.52 ± 0.85	4.52 ± 0.85	4.53 ± 0.68
<i>Instrumental value</i>				
Overall	4.59 ± 0.68	4.71 ± 0.64 ^c	4.65 ± 0.65	4.64 ± 0.58
Men	4.69 ± 0.68	4.76 ± 0.64	4.66 ± 0.49	4.69 ± 0.52
Women	4.57 ± 0.68	4.70 ± 0.64	4.65 ± 0.68	4.64 ± 0.59

^a Ratings are the mean of group cohesion scores assessed after 4, 8, 12 of in all 24 sessions.

^b Indicating a significant difference between men and women.

^c Indicating a significant change compared with session 4.

^d Indicating a significant change compared with session 8.

Table 5. Regression coefficients for group cohesion score predicting outcome variables for men and women^a

	Quality of life			Physical functioning			Fatigue		
	B	CI	β	B	CI	β	B	CI	β
<i>Male participants</i>									
GCQ subscales									
Bond-Group	2.9	(-11.1 to 17.0)	0.01	-4.6	(-16.1 to 7.0)	-0.13	12.2	(-3.5 to 34.1)	0.26
Bond-Member	-1.0	(-6.2 to 4.2)	-0.07	-0.8	(-5.0 to 3.4)	-0.006	1.8	(-6.8 to 11.0)	0.09
Cooperation	13.2	(4.4 to 21.9)	0.64	8.6	(1.4 to 15.8)	0.37	-18.7	(-38.6 to -2.7)	-0.60
Instrumental Value	0.5	(-9.5 to 10.6)	0.02	-2.0	(-10.3 to 6.2)	-0.08	-8.0	(-21.1 to 6.1)	-0.23
<i>Female participants</i>									
GCQ subscales									
Bond-Group	6.1	(-2.2 to 14.4)	0.19	2.8	(-1.8 to 7.4)	0.15	-3.1	(-12.6 to 5.5)	-0.09
Bond-Member	-6.5	(-11.3 to -1.7)	-0.30	-0.6	(-3.3 to 2.1)	-0.05	4.4	(-0.9 to 10.0)	0.18
Cooperation	4.0	(-0.1 to 8.1)	0.18	2.5	(0.2 to 4.8)	0.17	0.6	(-3.6 to 7.3)	0.02
Instrumental Value	0.2	(-6.4 to 6.8)	0.01	-2.5	(-6.1 to 1.2)	-0.16	-2.4	(-10.6 to 3.8)	-0.08

B, unstandardised regression coefficient; β, standardised regression coefficient; GCQ, Group Cohesion Questionnaire; Bond-Group, bond within the group as a whole; Bond-Member, bond with the other members of the group.^a Linear multiple multivariate regression model adjusted for pre-intervention levels of outcome variables, intervention group (physical training; physical training plus cognitive-behavioural training), age and attendance rate.

post-intervention quality of life, physical functioning and lower fatigue in men, and higher quality of life and physical functioning in women. Women who reported a stronger bond with other members showed lower post-intervention quality of life. There was no relationship between instrumental value and any outcome variable.

Discussion

The present study examined cancer survivors' cohesion in group-based rehabilitation and its

relationship to intervention outcomes, i.e. global quality of life, physical functioning and fatigue. We expected group cohesion to be related to better intervention outcomes. Indeed, higher cooperation within the group predicted better quality of life, physical functioning and less fatigue. This is in accordance with the findings of others who reported that mainly task commitment was positively related to performance [43]. Unexpectedly and in contrast to the findings of others [24], we found that a higher bond between individual members predicted lower post-intervention outcome in women. One explanation could be

altruism, that is a mechanism of support previously observed in cancer patients with metastatic disease during supportive group meetings [44]. Cancer survivors who felt that they were not making progress discovered that they could be useful to others and, therefore possibly rate the relationship with other members as high. Possibly, cancer survivors 'hid behind' the group. Being involved with other members of the group probably caused cancer survivors to avoid working on their own problems. A different mechanism might be downward social comparison [45,46], which means that participants who did not experience improvement compared themselves with others who performed worse in order to enhance their self-esteem. The reverse may also be the case, namely that these participants compared themselves with other participants who were making progress and bond to them because their progress was proof that improvement was possible. The latter implies that group cohesion might be influenced by the development of the outcome. The development of group cohesion and intervention outcome may be a reciprocal process during the course of the intervention [25]. By design we were able to answer the question of whether group cohesion predicted outcome, but not of whether the development of outcome influenced the development of group cohesion. The directionality of this relationship needs to be investigated in the future. By measuring group cohesion and the outcome variables at same time points over the course of the intervention, statistical analytical techniques are possible to examine the causal direction.

Interestingly, there was no relationship between instrumental value and intervention outcomes. We have no clear explanation for this finding. Instrumental value can be understood as being the extent to which the group mediates goals for its members. A possible explanation could be that our Instrumental Value-subscale did not specify which goals were mediated by the group. Questions concerning goals that are related specifically to physical training would probably reveal a relationship between instrumental value and outcome.

The present results illustrated that the perception of group cohesion did not differ between men and women, with the exception that Bond-Member scores were lower among men. Men seemed to be less interested in contact with individual members of the group during and after the intervention. Also we cannot rule out the possibility that lower Bond-Member rates in men were due to the fact that women were in the majority in each group. The role of cooperation within the group was related to better outcome for men as well as for women. However, it seemed to be more important for men. This might be explained by gender-specific coping styles. Men might prefer problem-focused coping strategies while women possibly prefer coping

through mutual support and emotional disclosure within the group [28,29]. However, one should again note that women were in the majority. Men might have experienced cohesion within a group differently if there had been more men in the group. Future research is needed in groups with more or only men attending.

For the purpose of the present study we chose to measure group cohesion during the first half of the intervention to reveal the effect of early aspects of group cohesion on intervention outcome. Identifying these aspects might be important because the sooner possible difficulties in a group are recognised, the more the time that is available for the therapists to address them. It might be important for clinicians to be sensitive to the different aspects of early group cohesion. Our results propose that cooperation within the group ought to be stimulated. Attention might be paid to participants who are engaged particularly with the other members and the reasons for their engagement should be clarified to ensure profit from the intervention. However, it would be premature to conclude that bonding between group members impedes individual profit since the directionality of the relationship is not yet investigated.

Our results suggest that group cohesion developed early during the intervention. Bond-Group and Cooperation within the group did not change in time between session 4, 8 and 12. Bond-Member and Instrumental Value changed significantly over time. However, ES of these changes ranged from 0.10 to 0.28, indicating either no effect or a small effect [41]. This early development might be due to the fact that cancer survivors felt connected by being in the same situation of having cancer and fighting against the consequences of cancer [16].

In conclusion, the present study was the first that investigated the relationship between group cohesion and rehabilitation outcome in cancer survivors. The results showed that cooperation within the group was related to better outcome, while a higher bond with individual members was negatively related. This suggests that it might be beneficial for therapists to pay attention to the different dimensions of cohesion within oncological rehabilitation groups.

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