PREPARING FOR CABG AND HEART VALVE REPLACEMENT SURGERY: A PILOT STUDY ON THE EFFECTIVENESS OF GUIDED IMAGERY AND PERIOPERATIVE PATIENT EDUCATION ON MENTAL HEALTH IN A SAMPLE OF DUTCH PATIENTS

Author:	Thibaut J. de Roos (Student number: 0110795)
Subject:	**Thesis**, Master program in Clinical and Health Psychology, University of Utrecht
Supervising associate professor:	drs. Sibe Doosje
Date:	July 16, 2008

Abstract

Aim: This pilot study examined the effects of a combined intervention consisting of guided imagery and perioperative patient education on levels of anxiety, depression and uses of humor (i.e., state variables) in a sample of Dutch patients referred for first CABG and/ or heart valve replacement surgery. Measurements of negative affect, social inhibition and aggression (i.e., trait variables) were used for analyses of covariance.
Background: Perioperative patient education and guided imagery as a method of relaxation have been related to improvement in mental health in terms of anxiety and depression. Beneficial effects on uses of humor for health have been suggested. Type D personality (composed of negative affect and social inhibition) and hostility (aggression) have been related to adverse effects on mental health in cardiac patients.
Design: A repeated measures between-subjects design was used for this research. Patients in the non-intervention and intervention group were given questionnaires upon referral (T1) and at two week intervals with a maximum of three subsequent pre-operative assessment times (T2, T3 and T4). Post-operative measurement occurred two weeks after surgery (T5). Anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS). Uses of humor was assessed with the recently developed Humor Check List (HCL). Negative affect and social inhibition were assessed using the Type D Scale (DS14) and aggression was assessed using the New-Buss Aggression Questionnaire (AQ).
Results: 13 patients (11 inpatients/ 2 outpatients) participated in this research, resulting in limited statistical power. Repeated measures of analysis of variance were computed, using data from T1 and T5 only, with trends indicating an overall decrease in anxiety over time for both groups. Depression was found to decrease for the intervention group, while it increased slightly for the non-intervention group (interaction effect). Trends for the non-intervention group suggested an overall decrease in uses of humor, while the intervention group increased on most subscales (except for positive humorous coping and humorous coping) with main effects obtained for positive humor production and humor production, when correcting for negative affect and social inhibition.
Conclusion: Further research with adequate sample sizes must establish whether the encouraging results of the present study may be replicated with statistical evidence in favor of the combined intervention. Adequate sample sizes will also make it possible to investigate levels of anxiety, depression and uses of humor on multiple pre-operative assessment times and analyze differences between groups more precisely.
Relevance to clinical practice: Perioperative patient education was enjoyed by all participants and the guided imagery CD used in this pilot study was listened to every day, encouraging Dutch healthcare for cardiac patients to further implement these practices.

1. Introduction

Coronary artery disease (CAD) is a leading cause of death in Western nations (American Heart Association, 2005), being the most frequent reason of death for men and the second most frequent for women in the Netherlands in 2005 (Poos, 2007). The demand for cardiac surgery is therefore strong. The most invasive forms of cardiac surgery are open heart surgeries, which include coronary artery bypass graft (CABG) surgery to achieve revascularization and heart valve replacement surgery. Followed by a revalidation period of an average of 3 months, CABG and heart valve replacement surgery significantly improve somatic health with relatively few risks (hartoperaties, 2001). However, suffering of CAD and being referred for open heart surgery poses considerable stress to cardiac patients.
Research investigating the mental health of patients referred for these forms of open heart surgery has found increased levels of anxiety and depression at both the pre- and post-operative stage (Oxlad, Stubberfield, Stuklis, Edwards & Wade, 2005a) with depression improving only little after surgery (De Boer, Boersma, Gucht, Maes & Schulte-van Maaren, 2006). Corresponding negative effects on the progression of disease and for recovery have been reported (Boudrez & De Backer, 2001; Linden, 2003). Examining personality factors related to CAD, researchers have identified hostility (aggression) (Miller, Smith, Turner, Giujarro & Hallet, 1996) and 'type D personality' (composed of negative affect and social inhibition) as independent factors contributing to adverse effects on patients' prognosis and mental health in terms of anxiety and depression (Schiffer, Pelle & Tobben, 2007; Milani & Lavie, 2006). On a more positive note, Miller (American Heart Association, 2000) argues that laughing (i.e., humor as a behavior) protects the heart. Anxiety and depression have found to contribute to an increased risk of CAD in part by impairing the endothelial function, a physiological process that can be reversed through the expression of humor in the form of laughter (Clark, Seidler & Miller, 2001; Miller et al., 2006). As for now only few studies examining the link between humor and mental health in cardiac patients exist. It appears that mental health is composed of interrelated psychological state and trait variables.
Research focusing on the chemical basis of stress and relaxation has found a body/ mind link. When a person experiences stress, the limbic system sends an alarming signal to the body, using chemical substances that cause different physiological reactions, e.g. elevated heartbeat, change in blood-pressure and oxygen-consumption. Relaxation counteracts this process and returns the body back to a *normal* state (Deisch, Soukup, Adams & Wild, 2000). One way of helping patients achieve relaxation is through guided imagery, which is a specific form of body/ mind technique and 'involves the generation of different mental images. Using the capacities of visualization and imagination, individuals evoke images, usually either sensory or affective. These images are typically visualized with the goal of evoking a psychophysiological state of relaxation or with some specific outcome in mind (e.g., visualizing

one's immune system attacking cancer cells, imagining oneself feeling healthy and well, exploring subconscious themes, etc.)' (Astin, Shapiro, Eisenberg & Forys, 2003, p. 132). Relaxation has been found to correlate negatively with pre- and post-operative levels of anxiety (Tusek, Cwynar & Cosgrove, 1999), an effect replicated with guided imagery (Halpin, Speir, CapoBianco & Barnett, 2002; Vogel et al., 2005; Kshettry, Flies Carole, Henly, Sendelbach & Kummer, 2006). With regard to depression, relaxation techniques have been found to lower levels of depression in patients with Chronic Heart Failure (CHF) (Chang et al., 2005; Van Dixhoorn & White, 2005). Johnson and Roberts (1996) advised guided imagery as a tool for nursing care of depressed patients with CHF. Alternatively, patients suffering of cancer reveal lowered levels for depression when undergoing relaxation training (Luebbert, Dahme & Hasenbring, 2001). Guided imagery was found specifically effective for decreasing levels of depression with breast cancer patients (Nunes et al., 2007). Astin et al. (2003) concluded in a review that there is sufficient evidence for the added health-promoting value of guided imagery and other types of body/ mind techniques for patients suffering of CAD. Studies investigating the relation of guided imagery with depression and/ or uses of humor in a sample of patients referred for open heart surgery were not found. It can be inferred that guided imagery appears to be effective in improving mental health in terms of lowering anxiety and depression.

Research on perioperative patient education is associated with a reduction of anxiety (Anderson, 1987), depression (Ivarrson, Larsson, Lührs & Sjöberg, 2005) and an increase in humorous coping (Strychacz, Vacek & Hajmomenian, 2000). For a reduction of anxiety, information about the procedures patients undergo and sensations they experience has been found to be most effective (Staub & Kellet, 1972; Johnson, 1973). Nguyen, Carrieri-Kohlman, Rankin, Slaughter and Stulbarg (2004) urge for a *personalized compound* in an interactive setting due to research suggesting that tailored information is more likely to be retained than general information.

As illustrated in a chapter by Linden (2003), the interconnectedness of mental health with CAD follows a complicated pathway. However, research should focus on applying successful interventions on one system and measure the positive spillovers to others. The purpose of the current pilot study[1] was to investigate the effectiveness of guided imagery and perioperative patient education on improving mental health in terms of anxiety, depression and uses of humor (state variables) in a sample of Dutch patients referred for first CABG and/ or heart valve replacement surgery and assessed on aggression, negative affect and social inhibition (trait variables).

2. Objective of the study

The objectives of this study were:

(a) To examine the changes in levels of anxiety, depression and uses of humor at baseline, at two, four, and six weeks before and at two weeks after CABG and/ or heart valve replacement surgery. Expected were an increase in anxiety, depression and uses of negative humor and a decrease in uses of positive humor before surgery with the reverse occurring after surgery where this effect is expected to be stronger for anxiety than for depression.

(b) To determine whether there is a difference in the changes examined in objective *a* between the intervention and non-intervention group. Expected was a decrease in anxiety, depression and uses of negative humor and an increase in uses of positive humor before and after surgery for the intervention group compared to the non-intervention group.

(c) To evaluate the relationship between negative affect, social inhibition and aggression with the in objective *a* and *b* predicted effects. Expected was that these three factors would negatively influence the hypothesized effects.

3. Method

3.1. Study design

This study employed a repeated measures between-subjects design. Data from the non-intervention group was collected prior to start of the intervention at which point patients were no longer entered into the non-intervention group. Pre-operative measurements were taken upon referral (T1) and at two-week intervals (T2, T3, T4). Depending on actual waiting time for surgery, the amount of measurements per patient was subject to variation. Post-operative measurement (T5) was scheduled two weeks after surgery, as found in a similar study (Halpin et al., 2002). In the literature reviewed for this study, pre-operative measurements were taken mostly a few days before and on the day of surgery. In order to expose patients as soon as possible to the intervention, T1 was scheduled close to the date of referral. Applying a two week interval for pre-operative assessment times was chosen in order to have multiple measurements while giving patients enough time in between to avoid feeling their participation is taking too much of their time. Based on reviewed literature, indication for valid sample size appeared to be at least 100 patients (Tusek, Church and Fazio, 1997; Tusek, Cwynar & Cosgrove, 1999; Kshettry et al., 2006).

[1] This pilot study was carried out as part of a project for the inclusion of guided imagery and perioperative patient education in the care offered to cardiac patients referred for CABG and/ or heart valve replacement surgery at the Diakonessenhuis general hospital in Utrecht, the Netherlands. This project emerged from the collaboration between the hospital's departments of cardiology and medical psychology and the Van Praag Institute, responsible for the development of a guided imagery CD for cardiac patients in Dutch. For this study the preliminary version of this CD titled *Gezonde Verbeelding bij Hartpatiënten* [Healthy Visualization for Cardiac Patients] was used.

3.2. Sample and setting

Between October 2007 and May 2008, 68 consecutive patients (44 inpatients/ 24 outpatients) referred for CABG and/ or heart valve replacement surgery, were invited to participate in the pilot study at the Diakonessenhuis general hospital in Utrecht, the Netherlands. The first 39 patients were approached for the non-intervention group, the subsequent 29 patients for the intervention group. Patients without fluency in the Dutch language (N=4) and patients who were not undergoing open heart surgery for the first time (N=1) were excluded as well as patients in an emergency process with less than four days of waiting for surgery (N=3) and hence an insufficient amount of time to be subjected to the intervention. A considerable amount of patients refused participation (N=17), either not seeing any personal advantage, or too anxious to think about their inner state, or simply not interested. Specifically for the intervention group, patients who could not attend the perioperative patient education meeting were excluded (N=2), resulting in the recruitment of 41 patients (60%), of which 25 (37%) entered the non-intervention group and 16 (24%) the intervention group. After initial inclusion to the study sample, a few patients got revised treatment plans[2] for either percutaneous coronary intervention (N=10) or percutaneous transluminal angioplasty (N=2) and were henceforth excluded from further participation, leading to a sample size of 29 patients. From this sample, 19 patients (15 inpatients/ 4 outpatients) entered the non-intervention group and 10 (5 inpatients/ 5 outpatients) the intervention group. For the non-intervention group, 8 patients dropped out during the research process and 1 patient passed away before undergoing surgery. The intervention group saw 7 patients drop out, leading to an overall attrition rate of 55,2%. Reasons for drop-out were not registered.

3.3. Data collection

Inpatients were visited by a student of clinical psychology, who informed them about the study and its purpose and addressed any questions. Patients were handed the baseline questionnaire, a written consent sheet and a brochure about the study. For the non-intervention group the purpose of study was framed as the monitoring of patients' experience while waiting for open heart surgery. Participation was rewarded with a national gift certificate. Patients in the intervention group received the same documentation as the non-intervention group, but were informed about the actual purpose of the study and invited to the perioperative patient education meeting closest in time. They were given a personal copy of the guided imagery CD with a CD-player to use while admitted and provided with a brochure about the CD. This brochure included a definition of guided imagery, explaining how it works and how it has proven to positively influence pain, anxiety and recovery. Outpatients in both the non-intervention and intervention group were approached by phone. Upon consent, the information was sent to them by mail, including stamped return envelopes. Outpatients in the intervention group all claimed to own a CD-player. Subsequent questionnaires were either handed out (for inpatients) or sent by mail (for outpatients). Every questionnaire included measurements for anxiety, depression, uses of humor, negative affect, social inhibition and aggression. Baseline questionnaires included a demographic section and questions on the patient's satisfaction with regard to the care provided by the hospital, the cardiologist and with regard to how prepared the patient felt to be for surgery. All post-baseline questionnaires for the intervention group included questions asking the patient to rate his/ her liking of the perioperative patient education meeting and use of the guided imagery CD. Clinical data on type of surgery and amount of waiting days was collected by inspecting patients' medical files. See table 1 for an overview of the amount of questionnaires sent out and returned per assessment time.

Table 1
Number of questionnaires sent out (s) and returned (r) for the five assessment times per group

	T1 s / r	T2 s / r	T3 s / r	T4 s / r	T5 s / r
non-intervention group	19/ 19	8/ 8	3/ 3	1/ 1	14/ 10
intervention group	10/ 9	6/ 5	5/ 3	1/ 0	6/ 3

3.4. Measures

The Hospital Anxiety and Depression Scale (*HADS*) (Zigmond & Snaith, 1983) is an extensively used self-assessment tool to screen patients in non-psychiatric hospitals on levels of anxiety and depression with 7 items per subscale. In order to allow for a discriminating measure of depression in a somatic setting, the HADS depression items make no reference to physical complaints and focus on anhedonia only (Aylard, Gooding, McKenna & Snaith, 1987). The general cutoff score lies at 7/8 for both subscales, although a lower cutoff score for depression has been observed (Strik, Honig, Lousberg & Denollet, 2001). In an updated literature review (Bjelland, Dahl, Haug & Neckelmann, 2002) both subscales demonstrated internal consistency with Cronbach's alpha at 0.68-0.93 (mean 0.83) for anxiety and at 0.67-0.90 (mean 0.82) for depression. A reliable score should have an internal consistency correlation between 0.7 and 0.9 (Portney & Watkins, 2000). Spinhoven et al. (1997) confirmed validity for the Dutch translation.
The Humor Check List (HCL) (Doosje, 2007) is a newly developed Dutch self-assessment questionnaire inquiring about the respondent's use of and engagement in humor in the past 2 weeks. Conceptualizing humor as a state, the

[2] The Diakonessenhuis general hospital in Utrecht provides pre- and post-operative care to its cardiac patients, but does not carry out open heart surgeries. Instead it works together with two other hospitals, where the team of cardiologists inspects the patients' medical files and makes the final decision whether to follow the advice of the cardiologist from the Diakonessenhuis for surgery or change treatment plan to exclude open heart surgery.

HCL is composed of 20 items (answered on a 5-point Likert scale) to measure two one-dimensional subscales (i.e., humor enjoyment and expression of enjoyment), three bi-dimensional subscales specifying both the negative and positive form (i.e., humor reproduction, humor production and humorous coping) and three subscales, each the sumscore of the corresponding bi-dimensional subscale (i.e., negative + positive). For this study the one-dimensional subscales, the sumscore subscales and positive forms of the bi-dimensional subscales will be referred to as *positive* uses of humor, whereas the three negative forms of the bi-dimensional variables will be termed *negative* uses of humor. In a study Doosje (2008) found satisfactory internal consistency when combining the subscales according to dimension, being humor appreciation (Cronbach's alpha = 0.86), humor reproduction (Cronbach's alpha = 0.68), humor production (Cronbach's alpha = 0.75), humorous coping (Cronbach's alpha = 0.79), and humor expression (Cronbach's alpha = 0.90).

The Type D Scale-14 (DS14) was developed by Johan Denollet (2005) to provide a brief and simple measure for negative affect (NA), social inhibition (SI) and type D personality. NA and SI are each measured with 7 items on a 5-point Likert scale and can vary in total score from 0 to 28. For a positive type D score, both scales need to yield a total score of 10 or higher. In a validating study, using 3678 subjects, the two scales were found to be internally consistent (Cronbach's alpha = 0.88/ 0.86). The DS14 was developed in the Dutch language.

The New-Buss-Perry Aggression Questionnaire (AQ) is the shortened version of the 29 items containing Buss-Perry Aggression Questionnaire (BPAQ) (Buss & Perry, 1992) and was obtained from the two most strongly correlating items per subscale. Consisting of four subscales, the eight items were assessed on their internal consistency by Gidron, Davidson and Ilia (2000), who found moderately satisfactory (Cronbach's alpha = 0.66, 0.69) to satisfactory values (Cronbach's alpha = 0.81) in their three studies. Eckhardt, Norlander and Deffenbacher (2004) concluded that 'the AQ is a very promising scale in terms of psychometric adequacy, conceptual clarity, and practical utility' (p. 24). In order to provide for a Dutch version of the scale, forward and back translations of the eight items were performed by eight bilingual speakers of English and Dutch. All differences were subsequently discussed to decide on the closest translation. Although the number of data was too limited to provide for reliable values for each assessment moment, Cronbach's alpha was computed with values ranging from 0.37-0.65 (see table 2). The specific translated items are shown in Appendix A.

Table 2
Cronbach's alpha for the Dutch back translation of the New-Buss Aggression Questionnaire per assessment time

	T1	T2	T3	T4	T5
number of cases	30	11	6	1	20
cronbach's alpha	0.48	0.45	0.65	-*	0.37

* too few cases for reliability analysis

3.5. Intervention

The intervention contained two elements. Patients waiting for open heart surgery were handed a guided imagery CD specifically developed for their group of patients. The CD consisted of six tracks. The first track was a brief introduction. Patients were told that the five exercises on the CD are aimed at reducing any tension they might feel while waiting for an important and invasive operation. The exercises intended to support this process and help patients prepare mentally before and after surgery. In a study using functional magnetic resonance imaging, vast overlap in neural activity between visual imagery and visual perception was reported (Ganis, Thompson & Kosslyn, 2004), suggesting that cognitive processes when imagining a situation are very similar to when being in the situation. Guided imagery therefore intends to train patients in being relaxed in a stressful situation (e.g., open heart surgery), expecting this effect to replicate when the situation is occurring. Track 2 aimed at relaxing patients through progressive muscle relaxation (originally developed by Jacobson, 1929), while track 3 employed autogenic training (originally developed by Luthe, 1963). The subsequent three tracks were guided imagery exercises, which followed the same structure. First the patient was asked to physically relax through a brief version of track 3. Next the patient was instructed to focus on a location and activate all five senses after which, depending on the track's purpose, the patient would be asked to perform a mental exercise. Once accomplished, the patient's senses were directed to focus on the here and now again. Track 4 asked patients to visualize their personal safe haven, a place where worries and anxiety do not exist and where they feel protected and peaceful. Track 5 was intended to prepare patients for surgery, while track 6 was a post-operative exercise to support patients with recovery and rehabilitation. In the introduction patients were requested to at least listen to one track a day for a minimum of seven days. Additionally, patients were requested to attend a meeting in which a nurse specialized in cardiology would give perioperative patient education, providing medical information concerning cardiac disease, the two types of surgery and the revalidation process, using patients' feedback to add a tailored compound. The information included a section on the sensations patients could expect. Patients were stimulated to ask questions. For this part 30 minutes were reserved. Subsequently, a social worker would discuss with patients the use and benefits of the guided imagery CD and practice the exercises on track 2 and 4. This part lasted an hour and included time for patients to ask questions about the CD and guided imagery.

3.6. Data analysis

Statistical analyses were performed using SPSS (version 15) for Windows. To analyze the study variables, the demographic and clinical data, mean values were used for continuous variables and frequency for categorical variables. With very limited amount of data (see table 1), it was decided to consider for analyses only measurements at baseline (T1) and at two weeks after surgery (T5) to maximize amount of computable data. To analyze changes in

anxiety, depression and uses of humor across time, repeated measures of analysis of variance (repeated MANOVA) was used. For the effect over time and over time across groups, Wilks' Lambda multivariate result test statistic was used, being the most common approach (Munro, 2005). Repeated MANOVA was used to test the differences between levels of anxiety and depression and uses of humor between both groups. Additionally, measurements of negative affect, social inhibition and aggression at every assessment time were entered as covariates in two separate models to evaluate their relationship with anxiety, depression and uses of humor. The level of significance was set at 0.05

4. Results

4.1. Description of study population

The study population consisted of a total of 13 patients with 10 (8 inpatients/ 2 outpatients) in the non-intervention group and 3 (3 inpatients) in the intervention group. See table 3 for an overview of demographic data for both groups. Subjecting the means to multivariate analysis of variance (MANOVA), patients across groups did not differ in age ($F(1,11) = 0.50$; *n.s.*), length of wait ($F(1,11) = 0.53$; *n.s.*) or level of education ($F(1,9) = 3.22$; *n.s.*). Patients from the intervention group gave favorable ratings for the perioperative patient education meeting on a range of 1 through 10 (mean 7.33, SD ± 0.58). All patients used the CD every day and were able to do so for a minimum of 7 days.

Table 3
Demographic and clinical characteristics per group

	non-intervention group	intervention group
N total	10	3
N male	10	1
N female	-	2
Age range in years (mean, SD)	52-79 (62, ±10.3)	61-74 (66.7, ±6.7)
N annual income =< € 50.000*	9	2
N annual income > € 50.000*	-	1
N completed secondary education*	6	3
N completed tertiary education*	2	-
N unmarried, divorced, widowed*	3	-
N married, domestic partner*	7	3
N CABG	8	1
N heart valve replacement	2	2
N both procedures	-	-
Range of wait in days** (mean, SD)	6-102 (27, ±27.9)	10-23 (15, ±7)

*contains missing values
**from date of referral to date of surgery

4.2. Changes in anxiety, depression and uses of humor over time

The mean anxiety scores (see figure 1) decreased for the non-intervention group from 4.70 to 2.00 and for the intervention group from 6.33 to 2.67 with an effect for time ($F(1,11) = 4.84$; $p =< 0.05$). When only considering the means, patients' levels of anxiety were below cutoff at baseline and two weeks after surgery. The mean score for depression (see figure 2) increased for the non-intervention group after surgery, while decreasing for the intervention group without an effect of time ($F(1,11) = 9.81$; *n.s.*). Mean scores for depression also remained below cutoff (see table 4). For uses of humor no significant differences over time were found.

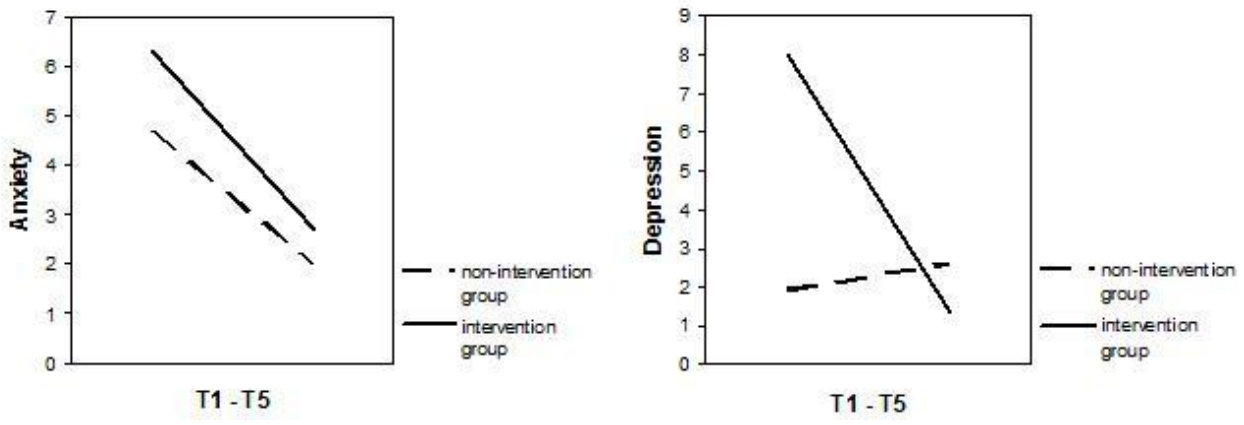

Fig. 1. (*left above*) Means for anxiety at T1 and T5 for the non-intervention and intervention group
Fig. 2. (*right above*) Means for depression at T1 and T5 for the non-intervention and intervention group

4.3. Changes in anxiety, depression and uses of humor due to the intervention

Repeated MANOVA did not yield any significant main effects for intervention for any of the study variables, suggesting no effect of the intervention on levels of anxiety, depression and uses of humor. Both groups decreased in levels of anxiety as noted above (see § 4.2). Level of depression (see figure 2) increased for subjects in the non-intervention group, while decreasing for subjects in the intervention-group with a significant interaction effect ($F(1,11) = 21.26$; $p =< 0.001$). Looking at the means (see table 4), all subscales for uses of humor show a decrease for the non-intervention group, whereas favorable measures are obtained for the intervention group with means rising from T1 to T5 for positive forms of humor and remaining stable for negative forms of humor. Exceptions are the subscales positive humorous coping and humorous coping, where both means for the intervention group decreased slightly.

Table 4
Means and standard deviations for anxiety, depression, and uses of humor at baseline (T1) and 2 weeks after surgery (T5) for the non-intervention and intervention group for all participants who completed all questionnaires

	non-intervention group (n = 10)		intervention group (n = 3)	
	T1	T5	T1	T5
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Anxiety	4.70 (4.35)	2.00 (2.49)	6.33 (7.51)	2.67 (1.53)
Depression	1.90 (2.18)	2.60 (3.27)	8.00 (6.00)	1.33 (1.53)
Humor enjoyment	10.80 (4.44)	9.50 (3.27)	9.00 (6.08)	11.67 (5.13)
Positive humor reproduction	3.90 (1.20)	3.20 (0.79)	4.00 (3.46)	4.33 (3.21)
Negative humor reproduction	2.70 (1.06)	2.30 (0.48)	2.00 (0.00)	2.00 (0.00)
Humor reproduction	6.60 (1.90)	5.50 (1.18)	6.00 (3.46)	6.33 (3.21)
Positive humor production	3.80 (1.20)	3.50 (1.43)	4.67 (3.06)	5.00 (2.65)
Negative humor production	2.60 (0.97)	2.50 (0.85)	2.00 (0.00)	2.00 (0.00)
Humor production	6.40 (2.55)	6.00 (1.89)	6.67 (3.06)	7.00 (2.65)
Positive humorous coping	4.00 (2.45)	3.10 (1.60)	4.00 (2.00)	2.67 (1.15)
Negative humorous coping	2.70 (1.06)	2.40 (0.52)	2.00 (0.00)	2.00 (0.00)
Humorous coping	6.70 (3.06)	5.50 (1.78)	6.00 (2.00)	4.67 (1.15)
Expression of enjoyment	10.60 (3.31)	9.20 (2.82)	9.67 (5.51)	13.00 (6.25)
Negative affect	2.80 (1.18)	6.00 (2.09)	6.33 (3.84)	3.00 (1.00)
Social inhibition	10.60 (1.11)	12.10 (1.34)	9.67 (0.88)	9.33 (0.33)
Aggression	14.40 (1.23)	14.30 (1.08)	14.33 (2.60)	11.33 (0.88)

4.4. Changes in anxiety, depression and uses of humor when controlling for negative affect and social inhibition

When controlling for negative affect and social inhibition, the previously obtained significant effect for decrease in anxiety over time is not replicated ($F(1,11) = 0.02$; *n.s.*). Instead an interaction effect is obtained ($F(1,11) = 5.70$; $p =< 0.05$). For the non-intervention group the mean scores for anxiety decrease from 5.62 at baseline to 1.66 two weeks after surgery, whereas for the intervention group these scores increase slightly from 3.27 to 3.28 (see figure 3). Examining the means of negative affect and social inhibition, negative affect appears to differ over time across groups ($F(1,11) = 5.25$; $p =< 0.05$), decreasing for the intervention group, while increasing for the non-intervention group. Despite the small sample size, it appears that subjects in the intervention group decrease in irritability and worrying (negative affect), which can be related to lowered levels of anxiety after surgery. An interaction effect for levels of depression across time and groups is also obtained $F(1,11) = 10.25$; $p =< 0.05$). Changes over time are observed for positive humor production ($F(1,11) = 6.58$; $p =< 0.05$) and for humor production ($F(1,11) = 5.51$; $p =< 0.05$) with main effects for both variables ($F(1,11) = 20.75$; $p =< 0.05$) ($F(1,11) = 17.95$; $p =< 0.05$) suggesting an effect for the intervention with subjects in the intervention group making more jokes and ridiculing others more after surgery, related to an improvement in mood.

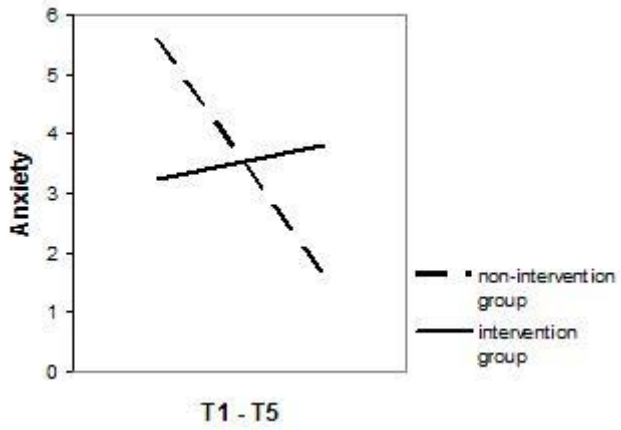

Fig. 3. (*above*) Means for anxiety at T1 and T5 for the non-intervention and intervention group when corrected for negative affect and social inhibition at T1 and T5

4.5. Changes in anxiety, depression and uses of humor when controlling for aggression

Repeated MANOVA with as covariate aggression at baseline and two weeks after surgery showed no significant change for levels of anxiety over time ($F(1,11) = 0.24$; *n.s.*) nor across groups ($F(1,11) = 2.35$; *n.s.*). An interaction effect for depression is observed as before ($F(1,11) = 12.32$; $p =< 0.05$). Changes over time are found for humor enjoyment ($F(1,11) = 5.57$; $p =< 0.05$) and positive humor production ($F(1,11) = 6.48$; $p =< 0.05$). Inspecting the means, this suggests for patients in the intervention group to increasingly find pleasure in humor and using non-offensive forms of it over time, while patients in the non-intervention group decreased in this behavior when

considering levels of aggression for both groups. For aggression, the mean decreases slightly for the intervention group while remaining close to stable for the non-intervention group.

5. Discussion

To the author's knowledge, this is the first study that explored the effect of guided imagery and perioperative patient education in a sample of Dutch patients referred for first CABG and/ or heart valve replacement surgery. A low attrition rate resulted in a limited sample size and low power for statistical analyses, which therefore does not ensure the validity of the presented results. This pilot study should be seen as an explorative source for further research in this area to establish firm conclusions on the effectiveness of guided imagery and perioperative patient education that can be generalized to Dutch cardiac patients. With regard to the quantitative approach chosen for this pilot study, future research will have to ensure the gathering of sufficient data across the several assessment times to examine the trends of levels of anxiety, depression and uses of humor across time more clearly and establish the hypothesized effects of the combined intervention on these dimensions of mental health. As for now, the present results concurred with other studies with regard to the trends observed for levels of anxiety after exposure to guided imagery (Tusek et al., 1999) and perioperative patient education (Anderson, 1987). When only considering data from the non-intervention group, the present results concur with the finding for anxiety decreasing more rapidly than depression shortly after surgery (Boudrez & De Backer, 2001; De Boer et al., 2006). It should be noted that most research using multiple measurements has examined mental health in patients referred for CABG surgery only. More research is needed to assess the exact similarities and differences in mental health before and after surgery between patients undergoing CABG and/ or heart valve replacement surgery. The decrease for level of depression in the three patients in the intervention group presents an interesting trend in favor of the intervention and follows the findings on effectiveness of relaxation (Van Dixhoorn & White, 2005). The small sample size, however, limits the extent to which this finding can be used as evidence in favor of the intervention. Nevertheless, the results form a further step in stimulating research investigating the effectiveness of guided imagery and perioperative patient education to consider levels of depression in a sample of patients referred for open heart surgery. Interesting trends witnessed in this sample also concern the favorable rise observed in uses of (positive) humor, except for (positive) humorous coping, i.e. the use of humor as a way to cope with a stressor, making a first step towards assessing the behavioral aspect of humor by means of the HCL and its association to CAD with interventions aimed at improving mental health. The non-intervention group shows an overall decrease in use(s) of humor. When corrected for the two variables that compose type D personality, the intervention group increases especially in positive humor production and overall humor production, although this increase doesn't statistically speak for an effect attributable to the intervention nor an obvious relation with decreasing scores for negative affect over time. The relation between humor and aggression appears to be unclear with patients in the intervention group increasing in humor enjoyment and positive humor production when corrected for levels of aggression. Patients attending the perioperative patient education meeting and using the guided imagery CD felt less anxious after surgery, similarly to patients in the non-intervention group. They did, however, feel more depressed. Decreasing in negative affect, results suggest that the intervention helped these patients to make more jokes and ridicule others more after surgery. This observed decrease in irritability and worrying also accounted for less anxiety, a relationship that has been confirmed in previous research (Kring, Persons & Thomas, 2007). Generally more enjoyment for humor and joking around was observed, when patients' levels of aggression were not considered. This trend applied to those patients, who knew what to expect and who had been given a technique to mentally prepare for that.

A major limitation of this study is the aforementioned small sample size, which significantly decreased the power for the quantitative approach. Small sample studies should be conducted according to an ABA-design, in which after initial establishment of baseline through observation of the dependent variable(s) without introduction of the independent variable (i.e., the intervention), the experimental manipulation is introduced and subsequently followed by a final period of observation in which the independent variable is removed. In the case of the dependent variable(s) returning to baseline again, an effect of intervention has been observed. However, besides the ethical issues such an approach would have evoked with regard to the present study, at which point removal of the guided imagery CD would not lead to a persisting effect is unknown and therefore would lead to additional analytical complications. Furthermore, small sample studies require far more assessment times than included in the present study's design (see Robinson & Foster, 1979). With an interest in the changes of levels of anxiety, depression and uses of humor over time, corrected for negative affect, social inhibition and aggression, repeated MANOVA was the most adequate method of statistical analysis to choose and resulted in the discarding of a nonparametric test (e.g., Wilcoxon signed-ranks test), which seem better suited for small samples although faced with a relative decrease in power (Myers & Hansen, 1997). Furthermore, the small sample size made it impossible to analyze gender and age differences in this sample. Women have been reported to be at a disadvantage in terms of depression when recovering from CABG (Con, Linden, Thompson & Ignaszewsk, 2003), but score significantly less on styles of humor (trait) related to adverse health (Martin, Puhlik-Doris, Larsen, Gray & Weir, 2003). Age and gender have been related to cardiovascular morbidity (Denollet, 2005) and aggression as assessed by the AQ correlated with CAD for men under age 60 and not for women (Gidron et al., 2001). As mentioned before, a larger sample size would have allowed for an adequate amount of data to be collected on all assessment times making it possible to shed more light on the expected advantages the intervention carries for cardiac patients. Here it must be mentioned that the intervention consisted of two components, which in the current design could not have been compared with each other to assess their relative weight with regard to the hypothesized mental health benefits. The order in which patients were subjected to the intervention was also not randomized as to eliminate effects due to patients getting used to the measurements. Specifically with regard to the effect of attention received by patients in the intervention group as a nonspecific treatment factor it could be argued that patients in the non-intervention group should have been invited to participate

in a meeting discussing each others' perception of the process of waiting for open heart operation to equal this effect for both groups (see Kazdin, 1980). Another limitation concerns the sole focus on psychological factors, when research investigating the advantage of guided imagery has also examined the effects on analgesic requirement and length of stay in hospital (Halpin et al., 2002). Besides alleviating the process of analysis of the objectives of this pilot study and ensuring that results can be generalized by means of a larger sample, future research should consider changing the design in order to overcome testing a 'combined intervention' instead of separate components. Attempts should also be made to recruit an equal number of participants in terms of gender and age for comparison across these two factors and to collect information from patients' medical files on data related to improved recovery. This pilot study presents encouraging results for the practice of nursing in the Dutch healthcare system to employ perioperative patient education and guided imagery geared specifically towards patients referred for CABG and/ or open heart surgery. With favorable ratings for the perioperative patient education meeting and mostly everyday use of the guided imagery CD, the data from this sample of patients supports these two practical ways to broaden the current spectrum of care.

Acknowledgements

This pilot study was carried out by a student in clinical psychology at the University of Utrecht and funded by the NutsOhra foundation in Amsterdam through the department of cardiology from the Diakonessenhuis general hospital in Utrecht. The author would like to thank the assistance of the nursing unit from the department of cardiology and the involved cardiologist, manager and social worker for their collaboration. Gratitude is also expressed to the director from the Van Praag Institute, who provided the guided imagery CD and acted as a source of information on several occasions. Finally the author's appreciation goes out for the support and enthusiasm for this study expressed by the collaborating medical psychologist of the department and the supervisor from the University of Utrecht.

Appendix A

Dutch back-translation of the 8 items from the New-Buss Aggression Questionnaire:

Hieronder staan een aantal uitspraken die mensen vaak gebruiken om zichzelf te beschrijven. Lees elke uitspraak zorgvuldig door en geef aan in welke mate de uitspraak op u van toepassing is door een *cirkel* om het *cijfer* te zetten.

1 = helemaal niet op mij van toepassing
2 = niet op mij van toepassing
3 = niet/ wel op mij van toepassing
4 = op mij van toepassing
5 = helemaal op mij van toepasssing

1. Mijn vrienden vinden mij enigszins ruziezoekend.
2. Ik heb weleens het gevoel dat het mij nooit mee zit.
3. Soms ga ik zonder goede reden door het lint.
4. Als ik maar voldoende uitgedaagd word, dan zou ik iemand kunnen slaan.
5. Ik vind het moeilijk om niet in discussie te gaan wanneer men het met mij niet eens is.
6. Ik heb moeite mijn zelfbeheersing te bewaren.
7. Ik heb soms het gevoel dat men achter mijn rug om over mij aan het lachen is.
8. Wanneer iemand mij slaat, sla ik terug.

References

American Heart Association. (2005). *Heart Disease and Stroke Statistics – 2005 Update*. Retrieved from http://www.americanheart.org/downloadable/heart/1105390918119HDSStats2005Update.pdf

American Heart Association. (November 14, 2000). *Don't get mad, get funny.* Retrieved from http://www.eurekalert.org/pub_releases/2000-11/AHA-Dgmg-1411100.php

Anderson, E.A. (1987). Preoperative preparation for cardiac surgery facilitates recovery, reduces psychological distress, and reduces the incidence of acute postoperative hypertension. *Journal of Consulting and Clinical Psychology, 55,* 513-520.

Aylard, P.R., Gooding, J.H., McKenna, P.J., & Snaith, R.P. (1987). A validation study of three anxiety and depression self-assessment scales. *Journal of Psychosomatic Research, 31,* 261-268.

Astin, J.A., Shapiro, S.L., Eisenberg, D.M., & Forys, K.L. (2003). Mind-body medicine: state of the science, implications for practice. *Journal of American Family Practice, 16,* 131-147.

Bjelland, I., Dahl, A.A., Haug, T.T., & Neckelmann, D. (2002). The validity of the hospital anxiety and depression scale. An updated literature review. *Journal of Psychosomatic Research, 52,* 69-77.

Boudrez, H., & De Backer, G. (2001). Psychological status and the role of coping style after coronary artery bypass graft surgery. Results of a prospective study. *Quality of Life Research*, *10,* 37-47.

Buss, A.H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology*, *63,* 452-459.

Chang, B., Hendricks, A., Zhao, Y., Rothendler, J.A., LoCastro, J.S., & Slawsky, M.T. (2005). A relaxation response randomized trial on patients with chronic heart failure. *Journal of Cardiopulmonary Rehabilitation*, *25,* 149-157.

Clark, A., Seidler, A., & Miller, M. (2001). Inverse association between sense of humor and coronary heart disease. *International Journal of Cardiology*, *80,* 87-88.

Con, A.H., Linden, W., Thompson, J., & Ignaszewsk, A. (1999). The psychology of men and women recovering from coronary artery bypass surgery. *Journal of Cardiopulmonary Rehabilitation*, *19,* 152-161.

De Boer, J., Boersma, S.N., Gucht, V.M.J., Maes, S., & Schulte-van Maaren, Y.W.M. (2006). *Psychosociale Problemen Bij Hart- en Vaatziekten*. Retrieved from http://www.hartstichting.nl/Uploads/Brochures/Psychosociale%20problemen%20bij%20HVZ.pdf

Deisch, P., Soukup, M., Adams, P., & Wild, M.C. (2000). Guided imagery. Replication study using coronary artery bypass graft patients. *Nursing Clinics of North America*, *35,* 417-425.

Denollet, J. (2005). DS14: standard assessment of negative affectivity, social inhibition, and type D personality. *Psychosomatic Medicine, 67,* 89-97.

Doosje, S. (2007). *The Humor Check List (HCL).* Unpublished manuscript, University of Utrecht.

Doosje, S. (2008). *A Sense of Humor: State versus Trait* [PowerPoint slides]. Presented at the 20th International ISHS Humor Conference at the University of Alcalá, Alcalá de Henares, Spain.

Eckhardt, C., Norlander B., & Deffenbacher, J. (2004). The assessment of anger and hostility: a critical review. *Aggression and Violent Behavior*, *9,* 17-43.

Ganis, G., Thompson, W.L., & Kosslyn, S.M. (2004). Brain areas underlying visual mental imagery and visual perception: an fMRI study. *Cognitive Brain Research*, *20,* 226-241.

Gidron, Y., Davidson, K., & Ilia, R. (2000). Development and cross-cultural and clinical validation of a brief comprehensive scale for assessing hostility in medical settings. *Journal of Behavioral Medicine*, *24,* 1-15.

Halpin, L.S., Speir, A.M., CapoBianco, P., & Barnett, S.D. (2002). Guided imagery in cardiac surgery. *Outcomes Management*, *6,* 132-137.

Hartoperaties [Brochure]. (2001). Leuven: Universitaire Ziekenhuizen K.U. Leuven.

Ivarrson, B., Larsson S., Lührs C., & Sjöberg T. (2005). Extended written pre-operative information about possible complications at cardiac surgery – do the patiënts want to know? *European Journal of Cardio-Thoracic Surgery, 28,* 407-414.

Jacobson, E. (1929). *Progressive relaxation*. Chicago: University of Chicago Press.

Johnson, J.E. (1973). Effects of accurate expectations about sensations on the sensory and distress components of pain. *Journal of Personality and Social Psychology*, *27,* 261-275.

Johnson, L.H., & Roberts, S.L. (1996). A cognitive model for assessing depression and providing nursing interventions in cardiac intensive care. *Intensive and Critical Care Nursing*, *12,* 138-146.

Kazdin, A.E. (1980). *Research Design in Clinical Psychology*. New York: Harper & Row.

Kring, A.M., Persons, J.B., & Thomas, C. (2007). Changes in affect during treatment for depression and anxiety. *Behaviour Research and Therapy*, *45,* 1753-1764.

Kshettry, V.R., Flies Carole, L., Henly, S.J., Sendelbach, S., & Kummer, B. (2006). Complementary alternative medical therapies for heart surgery patiënts: feasibility, safety, and impact. *The Society of Thoracic Surgeons*, *81*, 201-206.

Linden, W. (2003). Cardiac Conditions. In S. Llewelyn & P. Kennedy (Eds.), *Handbook of Clinical Health Psychology* (pp. 81-101). Hoboken, NJ: John Wiley & Sons, Inc.

Luebbert, K., Dahme B., & Hasenbring, M. (2001). The effectiveness of relaxation training in reducing treatment-related symptoms and improving emotional adjustment in acute non-surgical cancer treatment: a meta-analytical review. *Psycho-Oncology*, *10,* 490-502.

Luthe, W. (1963). Autogenic training: method, research and application in medicine. *American Journal of Psychotherapy*, *17,* 174-195.

Martin, R.A., Puhlik-Doris, P., Larsen, G., Gray, J., & Weir, K. (2003). Individual differences in uses of humor and their relation to psychological well-being: development of the humor styles questionnaire. *Journal of Research in Personality*, *37,* 48-75.

Milani, R., & Lavie, C. (2006). Adverse psychological and coronary risk profiles in young patients with coronary artery disease and benefits of formal cardiac rehabilitation. *Archives of Internal Medicine (1960), 166,* 1878-1883.
Miller, M., Mangano, C., Park, Y., Goel, R., Plotnick, G.D., & Vogel, R.A. (2006). Impact of cinematic viewing on endothelial function. *Heart*, *92,* 261-262.
Miller, T.Q., Smith, T.W., Turner, C.W., Giujarro, M.L., & Hallet, A.J. (1996). A meta-analytical review of research on hostility and physical health. *Psychological Bulletin, 119*, 322-348.
Munro, B.H. (2005). *Statistical Methods for Health Care Research*. Philadelphia: Lippincott.
Myers, A., & Hansen, C. H. (1997). *Experimental Psychology* (4th ed.). Pacific Grove: Brooks/ Cole Publishing.
Nguyen, H.Q., Carrieri-Kohlman, V., Rankin, S.H., Slaughter, R., & Stulbarg, M.S. (2004). Supporting cardiac recovery through eHealth technology. *Journal of Cardiovascular Nursing*, *19,* 200-208.
Nunes, D.F.T., Rodriguez, A.L., da Silva Hoffmann, F., Luz, C., Filho, A.P.F.B., Muller, M.C., & Bauer, M.E. (2007). Relaxation and guided imagery program in patients with breast cancer undergoing radiotherapy is not associated with neurimmunomodulatory effects. *Journal of Psychosomatic Research*, *63,* 647-655.
Oxlad, M., Stubberfield, J., Stuklis, R., Edwards, J., & Wade, T.D. (2005a). Psychological risk factors for cardiac-related hospital readmission within 6 months of coronary artery bypass graft surgery. *Journal of psychosomatic research*, *61,* 775-781.
Oxlad, M., Stubberfield, J., Stuklis, R., Edwards, J., & Wade, T.D. (2005b). Psychological risk factors for increased post-operative length of hospital stay following coronary artery bypass graft surgery. *Journal of Behavioral Medicine*, *29,* 179-190.
Portney, L.G., & Watkins, M.P. (2000). *Foundations of Clinical Research: Applications to Practice*. New Jersey: Prentice Hall Health.
Poos, M.J.J.C. (2007). Waaraan overlijden mensen in Nederland? *Volksgezondheid Toekomst Verkenning, Nationaal Kompas Volksgezondheid*. Retrieved from http://www.rivm.nl/vtv/object_document/o2305n18837.html
Robinson, P.W., & Foster, D.F. (1979). *Experimental Psychology: A Small-N Approach*. New York: Harper & Row.
Schiffer, A.A., Pelle, A.J., & Tobben, A.M. (2007). Type D gaat je aan het hart. *De Psycholoog*, *42,* 272-278.
Spinhoven, P.H., Ormel, J., Sloekers, P.P.A., Kempen, G.I.J.M., Speckens, A.E.M., & Van Hemert, A.M. (1997). A validation study of the hospital anxiety and depression scale (HADS) in different groups of Dutch subjects. *Psychological medicine*, *27,* 363-370.
Staub, E., & Kellet, D.S. (1972). Increasing pain tolerance by information about aversive stimuli. *Journal of Personality and Social Psychology*, *21,* 198-203.
Strik, J.J.M.H., Honig, A., Lousberg, R., & Denollet, J. (2001). Sensitivity and specificity of observer and self-report questionnaires in major and minor depression following myocardial infarction. *Psychosomatics*, *42,* 423-428.
Strychacz, C.P., Vacek, J.L., & Hajmomenian, H. (2000). Differences between participants and non-participants in cardiac rehabilitation programs on psychological and medical outcomes. *Journal of General Internal Medicine*, *15,* 5.
Tusek, D.L., Church, J.M., & Fazio, V.W. (1997). Guided imagery as a coping strategy for perioperative patiënts. *Journal of Association of periOperative Registered Nurses*, *66,* 644-649.
Tusek, D.L., Cwynar, R., & Cosgrove, D.M. (1999). Effect of guided imagery on length of stay, pain and anxiety in cardiac surgery patients. *The Journal of Cardiovascular Management*, *10,* 23-27.
Van Dixhoorn, J., & White, A. (2005). Relaxation therapy for rehabilitation and prevention in ischaemic heart disease: a systematic review and meta-analysis. *European Journal of Cardiovascular Prevention & Rehabilitation*, *12,* 193-202.
Vogel, J.H.K., Bolling, S.F., Costello, R.B., Guarneri, E.M., Krucoff, M.W., Longhurst, J.C., Olshansky, B., Pelletier, K.R., Tracy, C.M., & Vogel, R.A. (2005). Integrating complementary medicine into cardiovascular medicine: a report of the American College of Cardiology Foundation Task Force on Clinical Expert Consensus Documents. *Journal of the American College of Cardiology*, *46,* 184-221.
Zigmond, A., & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica, 67,* 361-370.