



**QUEEN'S
UNIVERSITY
BELFAST**

Response shift in the assessment of quality of life among people attending cardiac rehabilitation

Dempster, M., Carney, R., & McClements, R. (2010). Response shift in the assessment of quality of life among people attending cardiac rehabilitation. DOI: 10.1348/135910709X464443

Published in:

British Journal of Health Psychology

Document Version:

Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:

[Link to publication record in Queen's University Belfast Research Portal](#)

General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.



Response shift in the assessment of quality of life among people attending cardiac rehabilitation

Martin Dempster^{1*}, Rosa Carney² and Roger McClements³

¹School of Psychology, Queen's University Belfast, Northern Ireland

²Northern Health and Social Care Trust, Antrim, Northern Ireland

³Belfast Health and Social Care Trust, Northern Ireland

Objectives. To examine whether any response shift in quality of life (QoL) assessment over the course of a cardiac rehabilitation (CR) programme could be explained by changes in individuals' internal standards (recalibration), values (reprioritization), and/or conceptualization of QoL and the extent to which any response shift could be explained by health locus of control, optimism, and coping strategy.

Design. Longitudinal survey design.

Methods. The schedule for evaluation of individual QoL-direct weighting (SEIQoL-DW) was administered at the beginning and end of a CR programme. At the end of the programme, the SEIQoL-DW then-test was also administered to measure response shift. A total of 57 participants completed these measures and other measures to assess health locus of control, optimism, and coping.

Results. Response shift effects were observed in this population mainly due to recalibration. When response shift was incorporated into the analysis of QoL a larger treatment effect was observed. Active coping as a mechanism in the response shift model was found to have a significant positive correlation with response shift.

Conclusion. This study showed that response shift occurs during CR. The occurrence of response shift in QoL ratings over time for this population could have implications for the estimation of the effectiveness of the intervention.

Cardiac rehabilitation (CR) is an integrative part of the overall management of individuals who have been diagnosed with heart disease. It has been suggested that psychological difficulties may stem from an attempt to adapt to changes brought about by cardiac disease irrespective of severity of illness and as such one of the goals of CR is to facilitate adjustment and improve quality of life (QoL; Thompson, Bowman, Kitson, de Bono, & Hopkins, 1996).

*Correspondence should be addressed to Dr Martin Dempster, School of Psychology, Queen's University Belfast, University Road, Belfast BT7 1NN, Northern Ireland (e-mail: m.dempster@qub.ac.uk).

QoL research has expanded in the last two decades and the use of QoL measures in health research and clinical programmes has become the standard as researchers and managers conclude that clinical measures do not fully assess the impact and cost effectiveness of rehabilitation, treatment and surgery (Engelmann & Pehrson, 2003). However despite these advances, QoL measurement conducted in a non-critical way will face difficulties: many findings from QoL measurements are paradoxical, or seem to make little sense, and often cannot help clinicians identify between two or more clinically equivalent treatment options. For example, research has found that patients with a trauma-induced disability reported a stable QoL (Bach & Tilton, 1994), and others have documented that women with breast cancer reported a level of QoL neither inferior nor better than that of healthy people (Groenvold *et al.*, 1999). These findings tell us little of how people change in the way they construct perceptions of their QoL over time. Thus, QoL research frequently seems to lack sensitivity to the complexities inherent in human behaviour.

The construct of response shift represents a promising avenue to explore QoL over time, particularly when individuals undergo a change in health state. The working definition of response shift states that when individuals undergo a change in health state, they may change their internal standards, values, or conceptualization of QoL (Schwartz & Sprangers, 2000). These changes are also referred to as recalibration, reprioritization, and reconceptualization. Recalibration is a change in one's internal standards of measurement. For example, one's initial idea of poor functioning might become anchored at a lower level over time due to downward social comparison. Reprioritization is described as a change in importance attributed to QoL domains, for example, work may become less important than originally perceived. Reconceptualization is described as a change in the meaning of the QoL domains, in other words the domains themselves may change. Thus, if an individual undergoes a change in any of these elements, the answers to the same items in a QoL assessment by the same individual may not be comparable over time, as originally thought. Consequently, the emergence of response shift may threaten the validity of the assumptions of QoL measurement and the tools used. Incorporating the response shift construct into QoL measurement may enhance our understanding of how patients perceive their QoL over time and lead researchers and clinicians to enhance the methods of assessing change in QoL.

A model of the relationship between response shift and QoL (Sprangers & Schwartz, 1999) proposes that changes in the individual's health status may prompt behavioural, cognitive, and affective processes necessary for accommodating illness. These processes have the potential to change an individual's standards, values, or conceptualization of QoL and this response shift will influence perceived QoL.

From this description, it becomes clear that response shift could be considered a central aspect of control theory, as proposed by Carver and Scheier (1981). Control theory suggests that individuals engage in adaptive self-regulation via a discrepancy-reducing feedback loop. This feedback loop is aimed at maintaining or improving the perception of QoL (Sprangers & Schwartz, 1999). In other words, when an individual detects a discrepancy between their current state and their reference (standard or goal), the individual will attempt to reduce that discrepancy by either improving their current state or changing the reference. When the current state cannot be improved (as is often the case when an individual has a chronic illness), an individual is likely to change the reference. It is this change of the reference which is labelled as response shift (Carver & Scheier, 2000).

Sprangers and Schwartz (1999) argue that the type and magnitude of response shift will be dependent upon dispositional characteristics. Of particular interest in the present study are the interrelated mechanisms of optimism, coping, and control.

Within the framework of control theory, Carver and Scheier (2000) posit that coping is a way of attempting to reduce the discrepancy between current state and reference. For example, an individual may engage in approach coping to address the discrepancy, or avoidance coping to disengage from the reference and perhaps develop a new goal. Therefore, the type of coping strategy adopted by an individual might, indirectly, influence the type of response shift (Richards & Folkman, 2000). In turn, the choice of coping strategies and their effectiveness, appear to be influenced by an individual's locus of control and dispositional optimism.

There is a large body of literature which demonstrates the association between coping and control and adjustment in chronic illness in general (Stanton, Revenson, & Tennen, 2007; Walker, Jackson, & Littlejohn, 2004) and heart disease in particular (Fitzgerald, Tennen, Affleck, & Pransky, 1993; Livneh, 1999; Yohannes, Yalfani, Doherty, & Bundy, 2007).

Research has shown that internal locus of control and optimism are positively related to approach coping and negatively related to avoidance coping (Solberg Nes & Segerstrom, 2006) and when approach coping is not an option, optimists turn to more adaptive emotion focused coping such as humour and acceptance (Hatchett & Park, 2004). Pessimists, on the other hand, tend to cope through overt denial and disengagement (Thropp, Szalma, Ross, & Hancock, 2003). Furthermore, those with a high external locus of control who use avoidant coping are more likely to experience higher levels of psychological well being (Gomez, 1998). Consequently, it appears that coping, control, and optimism may be interrelated and associated with the type of response shift that a person experiences.

Measuring response shift: The then-test approach

The 'then-test' was recommended as an extension of the conventional pre-test-post-test design. It is a retrospective pre-test. At the post-test session, participants complete the self-report measure twice. First they are asked how they perceive themselves now (conventional post-test), then they are asked to provide a renewed judgment of their pre-treatment level of functioning (then-test). By taking the post-test and then-test in close proximity it is assumed that the measures will be completed with respect to the same internal standard of measurement (calibration). Consequently, comparison of the post-test and then-test scores should provide a non-confounded indication of the actual treatment effect. The comparison of the mean pre-test and then-test scores would reflect an estimate of the magnitude and direction of response shift effects.

The validity of the then-test approach has been supported by several studies, including those which have focused on people with chronic illness (Howard, 1979; Howard & Dailey, 1979; Jansen, Stiggelbout, Nooij, Noordijk, & Kievit, 2000; Schwartz & Sprangers, 1999; Sprangers *et al.*, 1999).

The phenomenological approach to QoL focuses on the unique experiences of the individual where QoL can be defined as that which the individual determines it to be. This perspective has resulted in the development of a number of measures of QoL that seek to incorporate the unique views of the individual including the schedule for evaluation of individual QoL-direct weighting (SEIQoL-DW; Browne, O'Boyle, McGee, & Joyce, 1997). The advantage in using individualized measures of QoL such as the

SEIQoL-DW over pre-determined QoL measures is that response shift can be more easily assessed. A method for assessing response shift using the SEIQoL-DW has been proposed by Ring, Hofer, Heuston, Harris, and O'Boyle (2005). They have suggested that if the SEIQoL-DW were administered on two occasions pre-test and post-test, changes in the content of the cues selected by respondents as being most important to their QoL would reflect reconceptualization. Changes in cue weights would reflect reprioritization and changes in ratings would reflect recalibration.

The aim of this research was to firstly, test if response shift occurs in a CR population between two time points (day 1 and the final day of the programme) using the SEIQoL-DW. Additionally, the research aims to explore the nature of any response shift (i.e. re-conceptualization, recalibration or reprioritization) and to explore potential antecedents (gender, age, optimism, locus of control, and coping) of response shift proposed in the literature.

Method

Sample

Participants were recruited from CR programmes over a period of 10 months. The CR programmes recruited from were 10 weeks in duration and were focused on providing a supervised physical exercise programme. They also included presentations that focused on health education (eating a healthy diet and stress management techniques). A multidisciplinary team involving nurses, medical staff, dieticians, physiotherapists, and psychologists staffed the programmes. Inclusion criteria were patients of all ages with a diagnosis of stable angina, myocardial infarction, heart failure, and post surgical interventions. Those awaiting cardiac surgery were excluded from the study.

Measures

The schedule for evaluation of individual QoL-direct weighting

The SEIQoL-DW is a measure of individual QoL and is a shortened version of the SEIQoL. Reliability and validity of the SEIQoL-DW against the full version of the SEIQoL have been found to be satisfactory (Browne *et al.*, 1997). Validity and reliability of the SEIQoL-DW have also been explored in patients with congenital heart disease and have been found to be a valid and reliable instrument to explore determinants of patients' QoL (Moons, Marquet, Budts, & de Geest, 2004). The SEIQoL-DW involved three successive steps. Participants were asked (1) to name the five most important domains in their life; (2) to rate their actual status on each domain (on a scale of 0–100, where 100 indicates the best possible functioning and 0 indicates the worst possible functioning); and (3) to indicate the relative weighting/importance of each domain using a coloured five-segment disc (which allows a weighting to be derived between 0 and 1 for each life area and where the sum of the weights for the life areas must equal 1). An overall QoL score is then obtained by multiplying each cue level (the result of step 2) with each cue weight (the result of step 3) and then summing these products.

SEIQoL-DW 'post-test'

In the current study at post-test (T2) participants were asked to nominate the five most important areas in their life, rate their functioning in each area, and finally rate the

importance of each area. If one or more of the cues nominated post-test differed from those nominated pre-test, participants were shown the original areas and asked to rate their current level of functioning and relative importance in each area.

SEIQoL-DW 'then-test'

At this stage (T2) participants were again shown the five cues nominated at baseline. The wording of the assessment was as follows:

'I would like you to look again at these 5 important life areas. This time I would like you to show me how you *now* think you *were* doing in each of these 5 areas when we first met. I am not asking you to try and remember how these important life areas were functioning, but rather how, when looking back today, you think they were functioning when we first met. Finally, I would like you to show me how important you now think your five life areas were in relation to each other when we first met using the coloured disc.'

This approach has been used previously (e.g. Ring *et al.*, 2005).

Multidimensional health locus of control

The multidimensional health locus of control (MHLOC: Wallston, Wallston, & DeVellis, 1978) scale provides measures of three dimensions of health locus of control: internality, which measures the extent to which an individual believes the locus of control for health is internal (IHLC); chance, which measures the belief in chance or external factors in determining health outcomes (CHLC); powerful others, the belief that powerful others control one's health, particularly health professionals. Each dimension of health locus of control is assessed with six items, which are scored from 1 to 6. Scores for each item are then summed within each dimension, providing a possible range of 6–36 for each dimension. In previous research with a cardiac population, IHLC and CHLC were found to have value in predicting help seeking behaviour following acute myocardial infarction (Carney, Fitzsimons, & Dempster, 2002).

Brief COPE

The Brief Coping Orientations to Problem Experiences (COPE, Carver, 1997) is a short version of the COPE questionnaire. There is evidence of internal reliability and validity of this shorter questionnaire which examines 14 coping strategies: self-distraction, active coping, denial, substance use, emotional support, instrumental support, disengagement, venting, positive reframing, planning, humour, acceptance, religion, and self-blame. The Brief COPE contains 28 items, which are scored from 1 to 4. Each coping strategy comprises the sum of two items, with higher scores reflecting use of that particular strategy. Previous research using the Brief COPE inventory in a CR population demonstrated that maladaptive coping strategies such as disengagement and denial were associated with low follow-up QoL scores (Shen, Myers, & McCreary, 2006).

Optimism

The life orientation test-revised (LOT-R: Scheier *et al.*, 1989) assesses individual differences in generalized optimism versus pessimism. The authors describe optimism as a stable personality characteristic with a predictive ability for coping strategies and health. It has also been reported that individual differences in optimism play an

important role in adjustment to stressful life-events. There are six optimism items within the measure and four filler items. Responses to the optimism scores are rated 0–4 with higher ratings implying optimism. The overall optimism score is obtained by summing the six items.

Procedure

Data were collected from participants on day 1 of the CR programmes (pre-test (T1)), and the final day of the CR programmes ((T2) post-test and then-test). There was a 10-week gap between the two data collection points.

At T1 participants completed the SEIQoL-DW in the presence of the researcher. They were then given a questionnaire pack containing the MHLOC scale, the LOT-R, the Brief COPE, and a demographic questionnaire examining gender, age, diagnosis, past medical history, and date of admission to hospital, to be completed at home and returned. Participants were seen again on the final day of the 10-week CR programme (T2) and completed the SEIQoL-DW and then-test.

Analysis

To determine the extent of reconceptualization, chi-square was used to examine the changes from T1 to T2 in the frequency of nominated cues. Recalibration was examined by assessing the differences between the pre-test and the then-test in the levels of functioning ascribed to each of the five cues by the respondents using a MANOVA and by assessing the level of agreement between the pre-test and the then-test in the levels of functioning ascribed to each of the five cues using the intra-class correlation coefficient. The intra-class correlation coefficient was also used to assess the level of agreement between T1 and T2 on the weights applied to each cue, in order to establish the extent of reprioritization. The relationship between response shift and the potential antecedents measured was analysed using Pearson's correlation coefficient.

Results

A total of 84 patients consented to participate in the study and completed the pre-test SEIQoL-DW. Of the 84 participants recruited, 27 were unavailable to complete the post-test interview. Of these 27 participants, 19 did not complete the CR programme, 2 were re-admitted to hospital, 3 had other medical complications, and 3 did not wish to be interviewed. The remaining 57 participants completed the SEIQoL-DW post-test and then-test interview (T2).

Of the 57 participants completing the study, 40 were male (70.2%) and 17 were female (29.8%) with a mean age of 62.9 years. For the 27 participants who did not complete the study 21 were male (77.8%) and 6 were female (22.2%) with a mean age of 59.7 years.

Primary indications for admission were myocardial infarction with/without stenting (38.6%), coronary artery bypass grafting (CABG, 33.4%), and angina with/without stenting (28.1%).

Response shift

Response shift was calculated as the QoL index derived from the pre-test subtracted from the then-test (i.e. then-test - T1). The mean response shift score was -9.56

($SD = 18.07$), indicating that when asked to look back to the pre-test stage, participants rated their QoL slightly lower (on average) than they did at the time of the pre-test. This difference between pre-test and then-test indices was statistically significant: ($t = 3.993$, $df = 56$, $p < .001$). Descriptive statistics for the other variables assessed in the study are presented in Table 1.

Table 1. Descriptive statistics for the MHLOC scale, the Brief COPE, and the LOT-R at time 1

Measures	Constructs	Mean	SD	Possible range
MHLOC scale	Internal health locus of control	26.11	4.92	6–36
	Chance health locus of control	17.47	5.80	6–36
	Powerful others health locus of control	22.96	5.84	6–36
Brief COPE	Self-distraction	4.54	1.48	2–8
	Active coping	6.54	1.55	2–8
	Denial	3.26	1.45	2–8
	Substance use	2.64	1.14	2–8
	Emotional support	5.67	1.87	2–8
	Instrumental support	5.01	1.51	2–8
	Disengagement	2.32	0.87	2–8
	Venting	3.16	1.25	2–8
	Positive reframing	5.43	1.62	2–8
	Planning	5.49	1.78	2–8
	Humour	4.00	1.77	2–8
	Acceptance	7.05	0.98	2–8
	Religion	4.43	2.29	2–8
LOT-R	Self-blame	3.41	1.29	2–8
	Optimism	12.52	1.99	0–24

A one-way between groups ANOVA was conducted to explore the impact of past medical history on response shift. Participants were divided into three groups according to their past diagnoses (Group 1: none ($n = 19$); Group 2: Coronary Heart Disease (CHD) ($n = 16$); and Group 3: Other illnesses ($n = 22$)). There were no statistically significant differences in response shift scores for the three groups: ($F(2, 54) = 0.29$, $p = .74$). There were also no statistically significant differences in response shift scores between current diagnoses: ($F(4, 52) = 0.14$, $p = .96$).

The relationship between gender, age, and response shift was investigated using the Pearson product moment correlation coefficient. There were no significant correlations observed between gender and response shift ($r = .05$, $p = .691$) or between age and response shift: $r = .20$, $p = .126$).

Reconceptualization

Table 2 shows the most frequently nominated cues at pre-test and post-test. Chi-square analyses show that of all the cues nominated only the frequency with which the cue 'Health' was elicited was significantly higher at post-test than pre-test ($\chi^2(1) = 5.154$, $p = .023$).

Recalibration

Table 3 shows the changes in perceived levels of functioning between the pre-test and the then-test for cues 1–5. In the then-test, participants recorded their levels of

Table 2. Life areas (or cues) nominated by participants

Cues	Frequency (Pre)	% (Pre)	Frequency (Post)	% (Post)
Family	52	91.2	48	84.2
Hobby	30	52.6	22	38.6
Social Life	29	50.9	26	45.6
Work	27	47.4	20	35.1
Health	26	45.6	39	68.4
Home	18	31.6	15	26.3
Relationship	17	29.8	13	22.8
Holidays	16	28.1	7	12.3
Leisure	13	22.8	21	36.8
Finances	9	15.8	9	15.8
Religion	8	14	10	17.5
Sport	8	14	10	17.5
Childcare	8	14	6	10.5
Relatives	5	8.8	6	10.5
Life	5	8.8	10	17.5
Stress	3	5.3	7	12.3
Living Conditions	3	5.3	3	5.3
Extra Curricular	3	5.3	3	5.3
Cooking	2	3.5	4	7
Smoking	1	1.8	2	3.5
Driving	1	1.8	2	3.5
Pets	1	1.8	2	3.5

functioning as lower than at pre-test indicating that some degree of recalibration had taken place. The intra-class correlation coefficient for pre-test and then-test levels was .55. Furthermore, a MANOVA indicated that there was a statistically significant difference between pre-test and then-test mean scores ($F(5, 52) = 3.88, p = .005$).

Reprioritization

The intra-class correlation coefficient for pre-test and post-test assessments of relative importance of each life area (i.e. cue weights) was .74, indicating little change in the weights/importance assigned to each life area. Comparing pre-test and then-test cue weights, the intra-class correlation coefficient was .80.

Effect of response shift on analysis of change scores

An analysis of the simple pre-test to post-test (using the life areas nominated by participants at the post-test stage) change in QoL scores indicates a small but statistically

Table 3. Mean scores for pre-test and then-test levels of functioning across five cues from the SEIQoL-DW

	Pre-test mean (SD)	Then-test mean (SD)	Difference	
Cue 1	72.1 (26.3)	62.0 (26.2)	10.1	$t = 3.61, p = .001$
Cue 2	66.1 (26.5)	57.8 (27.6)	8.3	$t = 2.39, p = .020$
Cue 3	65.6 (27.1)	52.0 (27.0)	13.6	$t = 3.04, p = .004$
Cue 4	56.0 (29.1)	48.4 (27.1)	7.6	$t = 1.78, p = .080$
Cue 5	59.0 (25.9)	49.0 (25.3)	10.0	$t = 2.29, p = .026$

significant improvement in QoL over time ($M(SD) = 5.09(17.08)$; $t = 2.251$, $p = .028$). Given that little reconceptualization has taken place, a similar magnitude of change was found in a comparison of the pre-test scores to post-test scores using consistent life areas nominated by participants at the pre-test stage (although the change is no longer statistically significant; $M(SD) = 3.34(13.40)$; $t = 1.88$, $p = .065$). However, the fact that response shift has occurred in the direction noted above suggests that the change in QoL may be underestimated by these figures. If we examine the difference between the post-test score and the then-test score, we find that the improvement in QoL is much larger ($M(SD) = 14.65(19.84)$; $t = 5.575$, $p < .001$).

Correlates of response shift

Pearson correlation coefficients suggest that as participants engage more in active coping they are more likely to retrospectively rate their level of functioning as lower at then-test than at pre-test ($r = -.31$, $p = .02$). Table 4 indicates that the remaining potential antecedents of response shift had a weak correlation with response shift score.

Table 4. Pearson product moment correlations between response shift and the MHLOC scale, the Brief COPE and the LOT-R at time 1

	Response shift
<i>MHLOC scale</i>	
Internal health locus of control	.01
Chance health locus of control	.13
Powerful others health locus of control	.12
<i>Brief COPE</i>	
Self-distraction	-.16
Active coping	-.31*
Denial	-.04
Substance use	-.15
Emotional support	-.07
Instrumental support	-.12
Disengagement	.08
Venting	-.16
Positive reframing	-.07
Planning	-.09
Humour	-.03
Acceptance	-.23
Religion	-.16
Self-blame	.08
<i>LOT-R</i>	
Optimism	.06

* $p < .05$.

Discussion

This study set out to determine whether recalibration, reprioritization, and reconceptualization (response shift) could be detected using the SEIQoL-DW 'then-test' in a CR population and what the antecedents of response shift might be.

The results indicate that when asked to retrospectively rate their functioning at baseline, participants rated their functioning to be significantly lower than their original rating at baseline indicating that response shift had occurred among the participants. Similar findings have been found in other research among people with chronic illness (Schwartz *et al.*, 2006; Yardley & Dibb, 2007). This would suggest that response shift may have taken place as a result of recalibration. It would appear, then, that participants may have changed their internal standards and perhaps they now have higher goals than they did at pre-test. Further exploration of the data revealed that there was no significant difference in the frequency by which cues were nominated at baseline and post-test indicating that the response shift was not attributed to reconceptualization. Additionally, response shift could not be attributed to reprioritization, as there was little change in the weights/importance attributed to cues at either baseline and post-test or baseline and then-test.

There was a significant improvement in QoL between the standard pre- and post-measures. When participants were asked to rate their QoL on their original cues at post-test (as standard QoL measures request) improvement was still noted yet it was now not significant. However, taking response shift into account a much larger effect emerged and this may reflect a more accurate measure of treatment effect. This finding may provide insight into the paradoxical findings of some research where little or no change has been reported in QoL status over time or following interventions.

A limitation of this study is that it does not allow us to examine whether the response shift detected was caused by the CR programme. This was not the aim of the present study and it does not diminish the finding that response shift is an important consideration in the evaluation of such programmes, however, it would be an interesting and useful additional investigation to determine whether response shift would likely have occurred, or occurred to the same extent among people who had not received a CR programme. Such an investigation would help us to further understand the concept of response shift and would require an experimental design using a control group.

According to the Sprangers and Schwartz model, changes in one's own health state act as catalytic events of response shifts. From the results, it is evident that there was no statistical difference between response shift scores and diagnosis or past medical history. This study did not identify one diagnosis as being more likely to produce response shifts over another. Sprangers and Schwartz suggest that regarding the catalyst it would be important to identify what parameters of health state changes would initiate the response shift process. Such parameters would include severity, duration, and rate of onset (sudden vs. gradual) and this focus for future research may identify the role of the catalyst in the response shift process.

There were also no significant relationships between optimism, locus of control, and response shift. Schwartz and Sprangers have hypothesized that these personality characteristics may play a role at a later stage in the disease trajectory. Therefore, it may prove important for future research to focus on the response shift process over a longer time scale for this population.

In the present study, an active coping strategy was found to be significantly correlated with response shift suggesting that those participants who engage more in active coping were significantly more likely to retrospectively rate their QoL lower than they did at baseline. This lends support to Richards and Folkman's suggestion that in order for response shift to occur individuals must first appraise the situation as threatening and subsequently engage in problem focused coping such as problem

solving and taking direct action. They suggest that taking greater control of the situation is associated with higher levels of problem-focused coping.

A caveat to be considered in the interpretation of all these findings is that the measurement of response shift in this study is influenced by the measurement instrument chosen - the SEIQoL-DW. This instrument provided us with the overall QoL score, and hence the index of response shift, and a method of assessing the separate elements of response shift (recalibration, reconceptualization, and reprioritization). Therefore, our findings rely heavily on the properties of this instrument. Particular limitations which should be taken into consideration are that the SEIQoL-DW and its accompanying then-test are interviewer administered and that the then-test may be affected by recall bias. Within the study, we attempted to reduce interviewer bias by providing a set of standardized instructions for the administration of these instruments and by ensuring that the interviewer had received training in using the instruments. In addition, the effect of recall bias on the then-test has been investigated statistically by Visser, Oort, and Sprangers (2005), who found little evidence to support the suspicion of recall bias.

In conclusion, it appears that response shift in QoL measurement occurs within CR mainly because of changes in calibration. In other words, patients' perceptions of their functioning in important areas of life alter over time. Generally, when patients who have completed a CR programme look back on their QoL before CR, they believe they were functioning at a lower level than they reported at that time. Yet, the individual's perception of the areas of life which impact on QoL and the importance of each of these areas does not change over the same time period. The shift in perceptions is related to the extent to which an individual engages in active coping. Individuals who are more likely to adopt this as a coping strategy are also more likely to experience greater response shift (in the direction noted). In many ways, CR aims to promote active coping and therefore response shift should be expected to occur during the course of a CR programme. Consequently, it is surprising that this measurement phenomenon is not routinely considered in evaluations of such programmes.

If we wish to continue to develop interventions to improve psychosocial outcomes among people with heart disease, then we need to use appropriate methods to evaluate these interventions. The present study suggests that future research and clinical evaluations of CR programmes which omit an assessment of response shift will probably underestimate the effect of this intervention and, therefore, lead to erroneous conclusions.

References

- Bach, J. R., & Tilton, M. C. (1994). Life satisfaction and well-being measures in ventilator assisted individuals with traumatic tetraplegia. *Archives of Physical and Medical Rehabilitation*, *75*, 626-632.
- Browne, J. P., O'Boyle, C. A., McGee, H. M., & Joyce, C. R. B. (1997). Development of a direct weighting procedure for quality of life domains. *Quality of Life Research*, *6*, 301-309.
- Carney, R., Fitzsimons, D., & Dempster, M. (2002). Why people experiencing acute myocardial infarction delay seeking medical assistance. *European Journal of Cardiovascular Nursing*, *1*, 237-242.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the Brief COPE. *International Journal of Behavioural Medicine*, *4*, 92-100.

- Carver, C. S., & Scheier, M. F. (1981). *Attention and self-regulation: A control theory approach to human behavior*. New York: Springer.
- Carver, C. S., & Scheier, M. F. (2000). Scaling back goals and recalibration of the affect system are processes in normal adaptive self-regulation: Understanding 'response shift' phenomena. *Social Science and Medicine*, *50*, 1715-1722.
- Engelmann, M. D. M., & Pehrson, S. (2003). Quality of life in nonpharmacologic treatment of atrial fibrillation. *European Heart Journal*, *24*, 1387-1400.
- Fitzgerald, T. E., Tennen, H., Affleck, G., & Pransky, G. S. (1993). The relative importance of dispositional optimism and control appraisals in quality of life after coronary bypass surgery. *Journal of Behavioral Medicine*, *16*, 25-43.
- Gomez, R. (1998). Locus of control and avoidant coping: Direct, interactional and meditational effects on maladjustment in adolescents. *Personality and Individual Differences*, *24*, 325-334.
- Groenvold, M., Fayers, P. M., Sprangers, M. A. G., Bjorner, J. B., Klee, M. C., Aaronson, N. K., et al. (1999). Anxiety and depression in breast cancer patients at low risk of recurrence compared with the general population: Unexpected findings. *Journal of Clinical Epidemiology*, *52*, 523-530.
- Hatchett, G. T., & Park, H. L. (2004). The relationships among optimism, coping styles, psychopathology, and counseling outcome. *Personality and Individual Differences*, *36*, 1755-1769.
- Howard, G. S. (1979). Internal invalidity in pretest-posttest self-report evaluations and a re-evaluation of retrospective pretests. *Applied Psychological Measurement*, *3*, 1-23.
- Howard, G. S., & Dailey, P. R. (1979). Response-shift bias: A source of contamination of self-report measures. *Journal of Applied Psychology*, *64*, 144-150.
- Jansen, S. J., Stiggelbout, A. M., Nooij, M. A., Noordijk, E. M., & Kievit, J. (2000). Response shift in quality of life measurement in early-stage breast cancer patients undergoing radiotherapy. *Quality of Life Research*, *9*, 603-615.
- Livneh, H. (1999). Psychosocial adaptation to heart diseases: The role of coping strategies. *Journal of Rehabilitation*, *65*, 24-32.
- Moons, P., Marquet, K., Budts, W., & De Geest, S. (2004). Validity, reliability and responsiveness of the SEIQoL-DW in congenital heart disease. *Health and Quality of Life Outcomes*, *2*, 27.
- Richards, T. A., & Folkman, S. (2000). Response shift: A coping perspective. In C. Schwartz & M. A. G. Sprangers (Eds.), *Adaptation to Changing Health. Response Shift in Quality of Life Research* (pp. 25-36). Washington, DC: American Psychological Association.
- Ring, L., Höfer, S., Heuston, F., Harris, D., & O'Boyle, C. A. (2005). Response shift masks the treatment impact on patient reported outcomes (PROs): The example of individual quality of life in edentulous patients. *Health and Quality of Life Outcomes*, *3*, 55.
- Scheier, M. F., Matthews, K. A., Owens, J. F., Magovern, G. L., Lefbvre, R. C., Abbott, R. R., et al. (1989). Dispositional optimism and recovery from coronary artery bypass surgery. The beneficial effects on physical and psychological well being. *Journal of Personality and Social Psychology*, *57*, 1024-1040.
- Schwartz, C. E., Bode, R., Repucci, N., Becker, J., Sprangers, M. A. G., & Fayers, P. M. (2006). The clinical significance of adaptation to changing health: A meta-analysis of response shift. *Quality of Life Research*, *15*, 1533-1550.
- Schwartz, C. E., & Sprangers, M. A. G. (1999). Methodological approaches for assessing response shift in longitudinal health-related quality-of-life research. *Social Science and Medicine*, *48*, 1531-1548.
- Schwartz, C. E., & Sprangers, M. A. G. (2000). *Adaptation to changing health. Response shift in quality of life research*. Washington, DC: American Psychological Association.
- Shen, B., Myers, H. F., & McCreary, C. P. (2006). Psychosocial predictors of cardiac rehabilitation quality of life outcomes. *Journal of Psychosomatic Research*, *60*, 3-11.
- Solberg Nes, L., & Segerstrom, S. C. (2006). Dispositional optimism and coping: A meta-analytic review. *Personality and Social Psychology Review*, *10*, 235-251.

- Sprangers, M. A. G., & Schwartz, C. E. (1999). Integrating response shift into health related quality of life research: A theoretical model. *Social Science and Medicine*, *48*, 1507-1515.
- Sprangers, M. A. G., Van Dam, F. S., Broersen, J., Lodder, L., Wever, L., Oosterveld, P., *et al.* (1999). Revealing response shift in longitudinal research on fatigue - The use of the thetest approach. *Acta Oncologica*, *38*, 709-718.
- Stanton, A. L., Revenson, T. A., & Tennen, H. (2007). Health psychology: Psychological adjustment to chronic disease. *Annual Review of Psychology*, *58*, 565-592.
- Thompson, D. R., Bowman, G. S., Kitson, A. L., de Bono, D. P., & Hopkins, A. (1996). Cardiac rehabilitation in the United Kingdom: Guidelines and audit standards. *Heart*, *75*, 89-93.
- Thropp, J. E., Szalma, J. L., Ross, J. M., & Hancock, P. A. (2003). Individual differences in dispositional pessimism, stress, and coping as a function of task type. *Proceedings of the Human Factors and Ergonomics Society*, *47*, 1073-1077.
- Visser, M. R. M., Oort, F. J., & Sprangers, M. A. G. (2005). Methods to detect response shift in quality of life data: A convergent validity study. *Quality of Life Research*, *14*, 629-639.
- Walker, J. G., Jackson, H. J., & Littlejohn, G. O. (2004). Models of adjustment to chronic illness: Using the example of rheumatoid arthritis. *Clinical Psychology Review*, *24*, 461-488.
- Wallston, K. A., Wallston, B. S., & DeVellis, R. (1978). Development of the multidimensional health locus of control (MHLC) scales. *Health Education Monographs*, *6*, 161-170.
- Yardley, L., & Dibb, B. (2007). Assessing subjective change in chronic illness: An examination of response shift in health-related and goal-oriented subjective status. *Psychology and Health*, *22*, 813-828.
- Yohannes, A. M., Yalfani, A., Doherty, P., & Bundy, C. (2007). Predictors of drop-out from an outpatient cardiac rehabilitation programme. *Clinical Rehabilitation*, *21*, 222-229.

Received 24 June 2008; revised version received 10 June 2009