

Response Shift in Health-Related Quality of Life in Older Men:

The Manitoba Follow-Up Study

By

Maryam Alshammari

A Thesis Submitted to the Faculty of Graduate Studies of

The University of Manitoba

In partial fulfillment of the requirements of the degree of

MASTER OF SCIENCE

College of Rehabilitation Sciences

University Of Manitoba

Winnipeg

Copyright © 2015 by Maryam Alshammari

## **Abstract**

**Problem:** Older adults may change their view on what is important to their health-related quality of life (HRQOL). They may alter their opinion about areas relevant to HRQOL (reconceptualization), or how important these areas are to them (reprioritization), and this can be referred to as response shift (RS). Overtime, changes in HRQOL may be imprecise (underestimated or overestimated) if RS occurs. Providing detailed information about RS in the older adult population will have many implications for health professionals, family members, caregivers, policy makers, and researchers. The purpose was to explore RS in HRQOL in community-dwelling older men.

**Methods:** Data from the Manitoba Follow-up Study (MFUS) was used as 360 older men returned the Successful Aging Questionnaire in each of five years (2007-2011). The participants identified the importance of 15 items, which reflect the physical (2 items), mental (5 items), and social domains (8 items) of HRQOL. Descriptive analysis was performed using SPSS21. An individualized method was used to identify different aspects of RS at group and individual levels, as well as the item level. Predictors of RS were also identified using logistic regression in a one-year period.

**Results:** Mean age of participants was 89.7 years (SD 2.9) in 2011. Across 15 items over a one-year period, RS varied from a low of 9.3% for the 'being mentally aware' item to 39.3% for the 'having goals/making plans' item. Because we were examining RS of 15 items, it was very uncommon to find older men with no RS on all items. Only 27 out of 360 older men (7.5%) provided the same response on all the items they answered at both times (2010-2011). The average of the percent of people showing RS over 15 items, across four time periods, within three domains, was 24.4%. Reprioritization was more common in physical and mental domains, respectively, whereas reconceptualization was seen mainly in

the social domain. Further, most of those who showed reprioritization, showed a decrease in importance, while most of those who showed reconceptualization, dropped a concept. Older men who were older, married, living independently, and recently did not participate in activities, were more likely to show RS in certain items. Older men with lower self-rated health were less likely to show RS.

**Conclusions:** Data from the MFUS presents an opportunity to assess RS by using an individualized method that is simple to conduct and interpret in research and clinical settings. This method provides extensive demonstration of RS including magnitude, timing, type, direction, and predictors. RS should be considered an important part of aging, when planning resources and individualizing interventions for the older adult population. Future studies should design a method that evaluates RS individually, similar to our method.

## **Acknowledgments**

Immeasurable appreciation and deepest gratitude for the help and support are extended to my committee members. Dr. Ruth Barclay, my advisor, for her full support, expert guidance, understanding and encouragement throughout my Master study. She gave me the opportunity to be part of the International Society for Quality of Life Research, and helped me to present my work there as well. Without her patience and counsel, my thesis work would have been frustrating and overwhelming journey. Special thanks go to Dr. Robert Tate for his inspiration, motivation, and immense knowledge. He believed in me and challenged my thinking in different ways, which incited me to widen my research from various perspectives. He helped me in the analysis of data and its statistical computations. Thanks for Dr. Donna Collins for her thoughtful questions, practical comments, and words of encouragement in every meeting.

My sincere gratitude also goes to Dr. Verena Menec, Director of the Center of Aging, who supported me in my determination to find and realize my potential. By attending her courses: ‘social aspects of aging’ and ‘health and aging’, I learned from her how to think, discuss, write, and present. She gave me the opportunity to present in the Annual Spring Research Symposium on Aging.

I am also very grateful to my family and my mother, for their prayers. My husband, Nour, Essa, and Rawan, my kids, for their love, support, and understanding throughout my life.

Last but not least, I would like to thank Khadijah Abubakar who supported my family and me physically and emotionally throughout my Master study. Thanks a lot for my friend Zainab Alreyahi for her love and support.

## **Dedication**

I would like to dedicate this thesis to my beloved country Kuwait, as I have been awarded a full scholarship from Kuwait University-greatly appreciated. I would also like to dedicate this to my husband, Ahmed, who believed in me, and gives me wings to fly high, as well as Nour, Essa, and Rawan, my kids, who are proud of me. I also dedicate this to the soul of my friend Muhammad Almutairi, who wished me all the best and success throughout his short life. I will never forget to dedicate this work to Dr. Abdullah Hadeya and Dr. Girma Telahoun, who always bring the best of me.

# Table of Contents

<b>LIST OF TABLES.....</b>	<b>IX</b>
<b>LIST OF FIGURES.....</b>	<b>XI</b>
<b>ABBREVIATIONS.....</b>	<b>XII</b>
<b>CHAPTER 1: INTRODUCTION.....</b>	<b>1</b>
QUALITY OF LIFE AND HEALTH-RELATED QUALITY OF LIFE.....	4
HEALTH-RELATED QUALITY OF LIFE AND AGING.....	6
MEASUREMENT OF HEALTH-RELATED QUALITY OF LIFE.....	8
RESPONSE SHIFT.....	9
THEORETICAL MODEL OF RESPONSE SHIFT.....	11
RESPONSE SHIFT AND AGING.....	11
IMPLICATIONS OF RESPONSE SHIFT MEASUREMENT.....	14
METHODS FOR MEASURING RESPONSE SHIFT.....	17
PROJECT PURPOSE AND OBJECTIVES.....	18
PROJECT QUESTIONS.....	19
<b>CHAPTER 2: METHODS.....</b>	<b>20</b>
THE MANITOBA FOLLOW-UP STUDY.....	20
DATA COLLECTION.....	21
<i>Understanding the dataset.....</i>	22
DATA ANALYSIS.....	22
OBJECTIVE 1.....	22
<i>Step one: Identifying reprioritization and reconceptualization response shift using group-level analysis.....</i>	22
<i>Step two: Filling the working table (table 4).....</i>	23
<i>Step three: Performing basic arithmetic calculations and answering project's questions related to the first objective.....</i>	24
OBJECTIVE TWO.....	25
<i>Response shift assessed by an individualized method.....</i>	25
<i>Regression.....</i>	26
<i>Ethical consideration.....</i>	26
TABLE 1: A BRIEF DESCRIPTION.....	27
TABLE 2: THE LIST OF 23 ITEMS.....	28
TABLE 3: VARIABLES INCLUDED IN THE STUDY.....	29
TABLE 4: THE WORKING TABLE.....	30
TABLE 5: PERCENTAGE OF MEN WHO SHOW RS/NO RS (NO CHANGE) IN THE 15 ITEMS IN THE OVERALL FIVE SURVEYS.....	31
TABLE 6: PERCENTAGE OF MEN WHO SHOW RS/NO RS (NO CHANGE) IN PHYSICAL, MENTAL, SOCIAL DOMAINS IN THE OVERALL FIVE SURVEYS.....	31
TABLE 7: RESPONSE SHIFT ASSESSED BY INDIVIDUALIZED METHOD.....	32
<b>CHAPTER 3: RESULTS.....</b>	<b>33</b>
CHARACTERISTICS OF THE PARTICIPANTS.....	33
TABLE 8: CHARACTERISTICS OF THE PARTICIPANTS.....	33
RESULTS RELATED TO THE FIRST OBJECTIVE.....	34
<i>Timing of response shift in older men.....</i>	34
Figure 1: Mean percentage of men who show response shift over 15 items.....	34
<i>Types of response shift in older men.....</i>	35
Figure 2: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization over 15 items.....	35

<i>Direction of response shift in older men.....</i>	35
Figure 3: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of 15 items.....	36
<i>Response shift and domains in older men.....</i>	36
Table 9: Mean percentage of people who show response shift over 15 items and domains .....	37
Figure 4: Mean percentage of men who show response shift in physical, mental, and social domains .....	38
Figure 5: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization in physical, mental, and social domains over 2010-2011 .....	39
Figure 6: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of physical, mental, and social domains over 2010-2011 .....	39
<i>Older men who show no response shift/response shift over the five-years data.....</i>	40
Figure 7: Percentage of men who show No response shift (no change) in physical, mental, and social domains over any of the time intervals .....	40
Table 10: Percentage of men who show RS/No RS (no change) in the 15 items in the overall five surveys .....	42
Table 11: Percentage of men who show RS/No RS (no change) in physical, mental and social domains in the overall five surveys .....	42
Figure 8: Percentage of men who show response shift in physical domain over any of the time intervals .....	43
Figure 9: Percentage of men who show response shift in mental domain over any of the time intervals .....	43
Figure 10: Percentage of men who show response shift in social domain over any of the time intervals .....	43
<i>Factors that predict response shift.....</i>	44
Identification of response shift at the individual and item level .....	44
Table 12: Evidence of item specific response shift over all 5 waves, and over one wave (2011-2010).....	47
<i>Characteristics of participants who show response shift and no response shift in each of 15 items.....</i>	48
Table 13-1: characteristics of participants who show response shift and no response shift in item 1 (Good physical health).....	50
Table 13-2: characteristics of participants who show response shift and no response shift in item 2 (Being mentally aware).....	50
Table 13-3: characteristics of participants who show response shift and no response shift in item 3 (Having a positive attitude).....	51
Table 13-4: characteristics of participants who show response shift and no response shift in item 4 (Being Happy).....	51
Table 13-5: characteristics of participants who show response shift and no response shift in item 5 (Absence of mental illness).....	52
Table 13-6: characteristics of participants who show response shift and no response shift in item 7 (keeping physically active) .....	52
Table 13-7: characteristics of participants who show response shift and no response shift in item 8 (keeping mentally active).....	53
Table 13-8: characteristics of participants who show response shift and no response shift in item 9 (keeping busy).....	53

Table 13-9: characteristics of participants who show response shift and no response shift in item 10 (volunteering).....	54
Table 13-10: characteristics of participants who show response shift and no response shift in item 11 (Having goals/making plans) .....	54
Table 13-11: characteristics of participants who show response shift and no response shift in item 12 (Helping family/friends) .....	55
Table 13-12: characteristics of participants who show response shift and no response shift in item 16 (Relationship with spouse/family) .....	55
Table 13-13: characteristics of participants who show response shift and no response shift in item 17 (Friendships) .....	56
Table 13-14: characteristics of participants who show response shift and no response shift in item 18 (Pets) .....	56
Table 13-15: characteristics of participants who show response shift and no response shift in item 19 (Being socially active) .....	57
<i>Logistic regression-bivariate</i> .....	58
Table 14: Logistic regression-bivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics.....	60
<i>Logistic regression-multivariate</i> .....	61
Table 15: Results of Logistic regression-multivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics .....	63
<i>Response shift in health-related quality of life and participation in activities in the past month</i> .....	64
Table 16: Odds ratios with 95% confidence intervals for participants who show response shift in their health-related quality of life and their participation in activities in the past month.....	66
<b>CHAPTER 4: DISCUSSION</b> .....	<b>67</b>
<i>Identification of response shift in older men at group-level and individual-level analysis</i> .....	67
<i>Predictors of response shift</i> .....	72
<b>IMPLICATIONS</b> .....	<b>77</b>
WHO CAN USE THESE RESULTS? HEALTH PROFESSIONALS.....	77
<i>Older men may experience a response shift</i> .....	77
<i>Easier way to assess a response shift</i> .....	78
<i>My older male client showed a response shift</i> .....	78
Clinical Scenario A-1 .....	79
WHO CAN USE THESE RESULTS? FAMILY-MEMBERS AND CAREGIVERS .....	80
Clinical Scenario A- 2 .....	81
WHO CAN USE THESE RESULTS? POLICY-MAKERS AND PROGRAM-PLANNERS .....	81
Clinical Scenario A- 3 .....	82
WHO CAN USE THESE RESULTS? RESEARCHERS .....	82
<b>RECOMMENDATIONS FOR FUTURE RESEARCH</b> .....	<b>83</b>
<b>LIMITATIONS</b> .....	<b>83</b>
<b>CHAPTER 5: CONCLUSION</b> .....	<b>85</b>
<b>REFERENCE LIST</b> .....	<b>87</b>
<b>APPENDICES</b> .....	<b>98</b>
APPENDIX 1: THE UNIVERSITY OF MANITOBA FOLLOW-UP STUDY QUESTIONNAIRE, 2011 .....	98
APPENDIX 2: CERTIFICATE OF FINAL APPROVAL FOR NEW STUDIES .....	113



## List of Tables

TABLE 1: A BRIEF DESCRIPTION .....	27
TABLE 2: THE LIST OF 23 ITEMS.....	28
TABLE 3: VARIABLES INCLUDED IN THE STUDY .....	29
TABLE 4: THE WORKING TABLE .....	30
TABLE 5: PERCENTAGE OF MEN WHO SHOW RS/NO RS (NO CHANGE) IN THE 15 ITEMS IN THE OVERALL FIVE SURVEYS.....	31
TABLE 6: PERCENTAGE OF MEN WHO SHOW RS/NO RS (NO CHANGE) IN PHYSICAL, MENTAL, SOCIAL DOMAINS IN THE OVERALL FIVE SURVEYS.....	31
TABLE 7: RESPONSE SHIFT ASSESSED BY INDIVIDUALIZED METHOD.....	32
TABLE 8: CHARACTERISTICS OF THE PARTICIPANTS.....	33
Table 9: Mean percentage of people who show response shift over 15 items and domains .....	37
Table 10: Percentage of men who show RS/No RS (no change) in the 15 items in the overall five surveys .....	42
Table 11: Percentage of men who show RS/No RS (no change) in physical, mental and social domains in the overall five surveys .....	42
Table 12: Evidence of item specific response shift over all 5 waves, and over one wave (2011-2010).....	47
Table 13-1: characteristics of participants who show response shift and no response shift in item 1 (Good physical health).....	50
Table 13-2: characteristics of participants who show response shift and no response shift in item 2 (Being mentally aware).....	50
Table 13-3: characteristics of participants who show response shift and no response shift in item 3 (Having a positive attitude).....	51
Table 13-4: characteristics of participants who show response shift and no response shift in item 4 (Being Happy).....	51
Table 13-5: characteristics of participants who show response shift and no response shift in item 5 (Absence of mental illness).....	52
Table 13-6: characteristics of participants who show response shift and no response shift in item 7 (keeping physically active) .....	52
Table 13-7: characteristics of participants who show response shift and no response shift in item 8 (keeping mentally active).....	53
Table 13-8: characteristics of participants who show response shift and no response shift in item 9 (keeping busy).....	53
Table 13-9: characteristics of participants who show response shift and no response shift in item 10 (volunteering).....	54
Table 13-11: characteristics of participants who show response shift and no response shift in item 12 (Helping family/friends) .....	55
Table 13-12: characteristics of participants who show response shift and no response shift in item 16 (Relationship with spouse/family) .....	55

Table 13-13: characteristics of participants who show response shift and no response shift in item 17 (Friendships) .....	56
Table 13-14: characteristics of participants who show response shift and no response shift in item 18 (Pets) .....	56
Table 13-15: characteristics of participants who show response shift and no response shift in item 19 (Being socially active) .....	57
Table 14: Logistic regression-bivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics.....	60
Table 15: Results of Logistic regression-multivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics .....	63
Table 16: Odds ratios with 95% confidence intervals for participants who show response shift in their health-related quality of life and their participation in activities in the past month.....	66

## List of Figures

Figure 1: Mean percentage of men who show response shift over 15 items .....	34
Figure 2: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization over 15 items .....	35
Figure 3: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of 15 items.....	36
Figure 4: Mean percentage of men who show response shift in physical, mental, and social domains.....	38
Figure 5: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization in physical, mental, and social domains over 2010-2011 .....	39
Figure 6: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of physical, mental, and social domains over 2010-2011 .....	39
Figure 7: Percentage of men who show No response shift (no change) in physical, mental, and social domains over any of the time intervals .....	40
Figure 8: Percentage of men who show response shift in <u>physical domain</u> over any of the time intervals.....	43
Figure 9: Percentage of men who show response shift in <u>mental domain</u> over any of the time intervals.....	43
Figure 10: Percentage of men who show response shift in <u>social domain</u> over any of the time intervals.....	43

## Abbreviations

HRQOL	health related quality of life
RS	response shift
PGI	Patient Generated Index
SEIQOL	Schedule for the Evaluation of Individual Quality of Life
MFUS	Manitoba Follow-up Study
QOL	quality of life
SF-36	Medical Outcomes Study Short-Form
EQ-5D	Euroqol group instrument-five dimensions
BC	breast cancer
SAQ	The Successful Aging Questionnaire
PCS	Physical component summary
MCS	Mental component summary
SD	Standard deviation
M	Mean
$\chi^2$	Chi-square
t	t-test
P	P-value
RS01	Response shift in item number 1 (good physical health)
RS02	Response shift in item number 2 (being mentally aware)
RS03	Response shift in item number 3 (having positive attitude)
RS04	Response shift in item number 4 (being happy)
RS05	Response shift in item number 5 (absence of mental illness)
RS07	Response shift in item number 7 (keeping physically active)
RS08	Response shift in item number 8 (keeping mentally active)

RS09	Response shift in item number 9 (keeping busy)
RS10	Response shift in item number 10 (volunteering)
RS11	Response shift in item number 11 (having goals/making plans)
RS12	Response shift in item number 12 (helping family/friends)
RS16	Response shift in item number 16 (relationship with spouse/family)
RS17	Response shift in item number 17 (friendships)
RS18	Response shift in item number 18 (pets)
RS19	Response shift in item number 19 (being socially active)
Activ1	Activity number 1 (visited with family or relatives)
Activ2	Activity number 2 (visited with friends or neighbors)
Activ3	Activity number 3 (hobby work, including collecting or handiwork)
Activ4	Activity number 4 (played sports or games (bowling, skiing, etc))
Activ5	Activity number 5 (other social group activity (cards, bingo, etc))
Activ6	Activity number 6 (church related activities)
Activ7	Activity number 7 (music, art, theatre)
Activ8	Activity number 8 (service, fraternal or legion organization)
Activ9	Activity number 9 (community volunteer work)
Activ10	Activity number 10 (working for pay (including self-employment))
Activ11	Activity number 11 (used a computer (e-mail, internet, typing))
Activ12	Activity number 12 (attended classes, workshops, lectures))
Activ13	Activity number 13 (home maintenance (indoor and/or outdoor))
Activ14	Activity number 14 (travel/vacation)
Activ15	Activity number 15 (reading and/or writing)
Activ16	Activity number 16 (watching television)
Activ17	Activity number 17 (outdoor nature activities)

Activ18                      Activity number 18 (exercise (swimming, cycling, walking, etc))

Activ19                      Activity number 19 (pet care)

## **Chapter 1: Introduction**

The world today is going through tremendous changes in the context of demographic shift as the proportion of older adults increases. Health-related quality of life (HRQOL) becomes a significant global issue among older adults, and has emerged as a health outcome variable (Hickey, Barker, McGee, & O'Boyle, 2005). HRQOL has been used as an outcome in clinical practice as well as in research for assessing impact of treatment, symptoms, individual's concerns and limitations, or as a predictor of mortality (Sprangers, 2002). HRQOL is defined as "the value assigned to duration of life as modified by the impairments, functional states, perceptions, and social opportunities that are influenced by disease, injury, treatment, or policy" (Patrick & Erickson, 1993). It is a multidimensional construct that refers to different aspects of people's lives that are related to their health. There are a wide range of domains that have been identified in the literature, however, the most common domains that have been used to estimate HRQOL are physical, mental, and social domains (Sprangers, 2002).

As people age, they may alter their internal standards, values, and concepts regarding what is important to their HRQOL. People may change their perspective or perception in interpreting their HRQOL overtime, and this is referred to as response shift (RS). Experiencing RS can explain many clinical scenarios in which some individuals with severe health problems report their HRQOL higher than expected, whereas other individuals with stable health conditions show deterioration in their HRQOL (Schwartz, Andersen, Nosek, & Krahn, 2007).

RS is considered one of the challenges when assessing HRQOL overtime. Changes in HRQOL may be imprecise (underestimated or overestimated) if RS occurs.

For example, one study conducted in 2005 showed that individuals who experienced RS, which had not been accounted for in the assessment process of HRQOL, did not demonstrate a significant improvement in HRQOL, and only when RS was considered, a significant improvement in HRQOL was reported (Ring, Hofer, Heuston, Harris, & O'Boyle, 2005). In other words, a true change in HRQOL can be underestimated or overestimated if RS occurs, and this can also underestimate or overestimate the treatment effect on HRQOL. Two studies demonstrated that changes in HRQOL expectancies can be underestimated when RS occurs (Dabakuyo et al., 2013; Ahmed, Mayo, Wood-Dauphinee, Hanley, & Cohen, 2004). Inaccuracy of estimation of HRQOL can lead to inaccurate interpretation of HRQOL.

Currently, most of the work that has been done to explore HRQOL in an aging population is diagnosis specific, such as with persons having cognitive impairment, urinary incontinence, musculoskeletal problems, or multiple sclerosis (Logsdon, Gibbons, McCurry, & Teri, 2002; Dugan et al., 1998; Giles, Hawthorne, & Grotty, 2009; Dilorenzo, Halper, & Picone, 2009). One study revealed deterioration of HRQOL that has been associated with age among community-dwelling elderly (Hoi, Chuc, & Lindholm, 2010). Other studies aimed to assess practicality and psychometric properties of different HRQOL outcome measures in the elderly (Holland, Smith, Harvey, Swift, & Lenaghan, 2004; Walters, Munro, & Brazier, 2001; Osborne, Hawthorne, Lew, & Gray, 2003; Jang, Chiriboga, Borenstein, Small, & Mortimer, 2009).

The relationship between aging and RS is unclear in the context of research. To my knowledge, there is no information about the time frame expected for older adults to experience RS, or the type and direction of RS in physical, mental, and social domains.



Some of these aspects can be examined by using group-level statistical techniques that identify RS at a group level, such as regression-based methods involving structural equation modeling (Oort, 2005). This group level identification of RS cannot identify a particular individual who experiences RS, so it limits interpretation. Other methods that can avoid this limitation by giving individual level identification of RS are the Test-Retest, that is incorporated into the study design, and individualized methods such as the Patient Generated Index (PGI), and the Schedule for Evaluation of Individual Quality of life (SEIQOL) (Ahmed, Mayo, Wood-Dauphinee, Hanley, & Cohen, 2005; Ring et al., 2005; O'Boyle, McGee, & Browne, 2000). Among all of the methods mentioned, individualized methods including qualitative data collection are valuable at the individual-level for detecting response shift. Using individualized methods will improve understanding of the timing, type, and direction of RS; and characteristics of individuals who experience or do not experience RS. In the mean time, there are limited studies that used individualized methods for detecting response shift in HRQOL among adults, but no single study used individualized methods in older adults.

Up to this date, there is limited knowledge about variables that may be associated with RS. We do not know why some individuals shift their perspective overtime while others do not. Some studies showed that having higher level of symptoms at the baseline or before treatment may be associated with a higher magnitude of RS in cancer and Meniere's disease (Andrykowski, Donovan, & Jacobsen, 2009; Yardley, & Dibb, 2007).

These gaps in the literature highlight the importance of conducting this project, which will provide an individual and group level identification of RS in community-dwelling older men over a 4-year timeframe. The purpose of this project is to explore RS

in HRQOL in community-dwelling older men. This study is a secondary analysis of data from the Manitoba Follow-up Study (MFUS) that provides the opportunity to use an individualized method for the first time to detect RS in 360 older men over a four-year period.

### **Quality of life and Health-related quality of life**

Quality of life (QOL) is a multidimensional phenomenon that has no strict definition; many people view it from different angles based on different disciplines. In the area of healthcare, QOL has been defined by the World Health Organization as “individuals’ perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns” (World Health Organization [WHO], 1997). Accordingly, QOL reflects a wide-ranging concept, encompassing physical health, mental status, level of independence, social relationships, personal beliefs, and environmental coordinates. Over the past three decades, QOL has emerged as a health outcome variable with a high peak of number of publications in 2004- it would be higher now than in 2004 (Hickey et al., 2005).

QOL and health-related quality of life (HRQOL) have been used interchangeably in the literature, particularly in health care research. However, QOL is an umbrella concept that reflects the experience of humans in life. The concept of HRQOL refers more specifically to different aspects of people’s lives that are related to their health. The definition of HRQOL, noted earlier, is consistent with the definition of health, which is a “state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (Fuhrer, 2000; World Health Organization [WHO], 1997). As a

result of the paradigm shift in the universal understanding of health as not just the absence nor presence of a disease, the concept of HRQOL has gained broad recognition in the healthcare system that focuses on an individual's wellbeing. The concept of HRQOL involves the assessment of many domains of individual's lives including physical, social, psychological, spiritual, and environmental domains. However, the most common ones that have been used to estimate HRQOL are the physical, social, and mental domains (Sprangers, 2002). Also, HRQOL provides an overall picture of health and wellbeing from people's own perspectives.

HRQOL has been used as an outcome measure in clinical practice as well as in research for assessing impact of treatment, symptoms, individual's concerns and limitations, or as a predictor of mortality (Sprangers, 2002). It's a parameter that has been used in clinical practice to assess the impact of a disease, effectiveness of treatments and to help both healthcare providers and their clients in making decisions about alternative treatments (Guyatt et al., 2007).

The relationship between a patient's clinical outcome variables and HRQOL is well explained in the Wilson and Cleary conceptual model (Wilson & Cleary, 1995). The model consists of biological variables, symptoms, functional status, and general health perception. Also, characteristics of the individual and the environment are linked to quality of life. It integrates both biological and psychological aspects of clinical outcomes. The model starts with biological variables that could result in symptoms, which can limit functions, and this affects the subjective evaluation of general health. In addition, this model notes that both individual and environmental factors can affect an

individual's experience and later quality of life. In this thesis, the concept of HRQOL will be used.

### **Health-related quality of life and aging**

The world today is going through tremendous changes in the context of demographic shift as the proportion of older adults increases. As a result of a decline in fertility rates and a decrease in mortality rates, more people are living longer (life extension). Recently, a report from United Nations shows that in 2013, there are 841 million people aged 60 years and over and that there will be 2 billion by 2050 and close to 3 billion by 2100 (United Nations, 2012).

Despite the fact that various chronic diseases such as dementia and chronic heart failure have a higher incidence in older adults compared to the population as a whole, there is growing evidence that people who are living longer spend fewer years in poor health at their late lives. This is called the “compression of morbidity paradigm” which was first proposed in 1980 by Fries (Fries, 2003; Fries, 1980). The evidence of life extension and the compression of morbidity paradigm, highlight the significance of addressing HRQOL as a global issue. Currently, a more positive view of old age sees it as a period of opportunity and wellbeing. In other words, quality is more important than quantity of life. This concurs with global policy interest in promoting HRQOL to be a fundamental component of individual outcome assessment among older adults.

Based on an extensive systematic review of HRQOL studies in older adult populations conducted in the period 1992 to 2003, a total of 37 studies were identified (Hickey et al., 2005). Among the 37 studies, 14 were prospective studies, 11 were randomized controlled trials, and 12 were cross sectional studies. All the prospective

studies revealed a negative impact of different health conditions on HRQOL. Older adults with cardiovascular diseases, fractures, non-specific chronic illness, frailty, schizophrenia, or chronic obstructive pulmonary diseases reported low HRQOL. A majority of the randomized controlled trials showed improvement in HRQOL with regard to following different treatments that include the application of surgeries, medications, or exercises. In the cross sectional studies, HRQOL was found to be higher in older adults with renal transplant compared with those in hemodialysis treatment. Also, it is found to be higher in older adults following mastectomy and breast reconstruction compared with older adults following mastectomy only. HRQOL was reported poor in older adults with heart failure or with diabetes compared with the general older population. This systemic review is ten years old, and there will be many more HRQOL studies now.

Several studies showed that social factors are the strongest determinants of HRQOL in older adults. For example, a study conducted in Nigeria examined the relative salience of social factors, compared to other factors among elderly persons (Gureje, Kola, Afolabi, & Olley, 2008). Their findings revealed that although health factors are important, social factors including social networks and participation in community activities are the most important predictors of HRQOL. Layte and colleagues compared the role of different life domains in determining HRQOL among 6,910 individuals aged 50 and above in the Republic of Ireland (Layte, Sexton, & Savva, 2013). They found that social participation in the context of network, labor market status, marital status, religious belief, loneliness, social isolation, and engagement in social activities, were the most important factors in determining HRQOL for older adults. All of this addresses, fundamentally, the role of social factors in HRQOL among older adults.

## **Measurement of health-related quality of life**

There are a number of HRQOL outcome measures available worldwide. Different outcome measures have been developed for healthy people or people with any disease which are referred to as 'generic' HRQOL measures. This includes the Nottingham Health Profile, Medical Outcomes Study Short-Form 36 (SF-36), and Sickness Impact Profile. Other measures, developed for people with a specific disease, are referred to as 'disease specific' HRQOL measures; such measures include Stroke Impact Scale and Arthritis Impact Measurement Scales (McDowell, 2006). Most of the measures used commonly have a predefined set of questions, whereas some measures allow individuals to generate content that may be relevant to them (Ruta, Garratt, Leng, Russell, & MacDonald, 1994; O'Boyle, McGee, Hickey, O'Malley, & Joyce, 1992).

Nevertheless, although the assessment of HRQOL has received considerable attention in older adults, most of the measures commonly used to assess HRQOL were not designed for older adults. However, some, like SF-36 have been validated with older adults (Jang et al., 2009). This may raise two important issues. First, since older adults have lower physical ability compared to younger adults, using a common HRQOL assessment may underestimate actual HRQOL due to the overemphasis on physical ability. Second, in terms of importance, what is important for younger adults may not be fundamental for older adults. Therefore, an age-specific measure would be most relevant to tap differences in the HRQOL of people of different age groups. Fortunately, to my knowledge, there are two old-age-specific HRQOL outcome measures. The version of the World Health Organization Quality of Life Assessment for Older Adults (WHOQOL-OLD) and the Control, Autonomy, self-realization and pleasure (CASP-19) have been

recently developed so that the issues related to aging would be properly covered by the measures (Power, Quinn, & Schmidt, 2005; Hyde, Wiggins, Higgs, & Blane, 2003).

### **Response shift**

The concept of HRQOL is dynamic, in which individuals may change their perception about their functioning and how much they are satisfied with their life in general. Depending on life situations, some concepts may be reprioritized, introduced, or removed from an individual's concept of HRQOL. Thus, the construct of HRQOL is not stable. The interpretation of an actual change in HRQOL over time can be complicated if we do not pay attention to the 'response shift' phenomenon.

Response shift phenomenon was first introduced in the 1970's within the area of educational training and organizational change (Howard et al., 2007; Golembiewski, Billingsley, & Yeager, 1976). In the area of HRQOL, the definition of response shift proposed by Sprangers and Schwartz (1999), is "a change in the meaning of one's self-evaluation of a target construct as a result of: (a) a change in the respondent's internal standards of measurement (scale recalibration, in psychometric terms); (b) a change in the respondent's values (i.e. the importance of component domains constituting the target construct); or (c) a redefinition of the target construct (i.e. reconceptualization)" (Sprangers & Schwartz, 1999).

From the definition presented above, there are three different types of response shift: recalibration, reprioritization, and reconceptualization.

Recalibration is one type of response shift that is related to an individual's internal measurement standards. For example, In terms of a pain score, where 0 is no pain and 10 reflects the worse pain ever, giving a score 9/10 for a fractured shoulder may be

changed when the same individual experiences a more painful health condition such as prostate or breast cancer. After realizing the later pain, scoring a fractured shoulder may be 5/10, and this reflects recalibration.

Changing the order of the importance of HRQOL dimensions is referred to as reprioritization. This type of response shift can be demonstrated when the individual ranks different aspects of HRQOL such as: golfing, working, and family. Later in life or after experiencing a health condition, the individual re-ranks the same aspects as: family, working, and golfing. In other words, the individual realized that being with family is more important than working and playing golf.

On the other hand, reconceptualization occurs when the individual redefines different aspects of HRQOL. For example, the individual may reconsider the role of friends in terms of physical and psychological support, after stroke. Before the accident, the individual was not paying attention to this aspect. All the three types of response shift may occur together; thus, they are interdependent.

Response shift has been found in patients with different conditions including cancer, stroke, multiple sclerosis, and dental disorders (Hinz et al., 2011; Barclay, Lix, Tate, Weinberg, & Mayo, 2011; Ahmed, Mayo, Scott, Kuspinar, & Schwartz, 2011; Ring et al., 2005).

With all the three types of response shift, an individual's perception of HRQOL changes over time. The process that leads to a change in one's self-evaluation of HRQOL is explained through a theoretical model.



### **Theoretical model of response shift**

The theoretical model of response shift which was first proposed in 1999 by Sprangers and Schwartz, models changes in perceived HRQOL (Sprangers & Schwartz, 1999). In this model, there is an interaction between four components, which are: catalysts, antecedents, mechanisms, and response shift. Catalysts referred to changes in health status or any life events that have impact on HRQOL. Antecedents include characteristics of the individual, involving personality traits, social and physical environments, expectations, and spirituality. Mechanisms relate to different ways or strategies that may be followed by the individual to accommodate changes in health status or life (catalysts). Coping techniques, social comparison, modifying goals and expectations, are all examples of mechanisms. Response shift includes changes in internal standards, values, or concepts. This model presents catalysts as a trigger that invokes mechanisms. The decision of choosing or following certain mechanisms is controlled by an individual's characteristics (antecedents). All of this leads to response shift and later, changes in perceived HRQOL. The model views response shift as: a result of adaptation with changes in health or life.

### **Response shift and aging**

Response shift in HRQOL over time has not been well identified in older adults. The relationship between aging and changes in internal standards, values, and concepts is still unclear in the context of research. However, a few studies tapped on this point:

Schwartz and her colleagues explored that among multiple sclerosis patients, although they had deterioration in their physical abilities, the level of their HRQOL was maintained as a result of different processes of adaptation reflective of response shift

(Schwartz, Sprangers, Carey, & Reed, 2004). In their discussion, the authors related aging to such adaptation processes in which individuals expect physical deterioration as part of growing old and find other aspects in life that may become more important in old age. The study included male and female participants with a mean age of 43 years. Thus, the study was not intended to explore response shift in older adults. However, the topic of aging was discussed.

Dilorenzo et al., explored the effect of aging among patients with multiple sclerosis by comparing HRQOL in middle-aged and older-aged groups (Dilorenzo et al., 2009). Their findings revealed higher mental health of SF-36 in older adults compared to younger adults. This directed them to highlight two significant points. First, since patients with multiple sclerosis experience physical deterioration that is similar to aging, accepting this idea and prioritizing other aspects in life, may be one strategy to maintain high HRQOL. Second, social comparison that had been mentioned earlier in response shift theory as one of the mechanisms may be another useful strategy to maintain high HRQOL.

McPhail and Haines (2010) examined the level of agreement of 103 older adults' perception of their HRQOL (response shift) with conventional longitudinal evaluation of change in their HRQOL after their hospitalization and before their discharge (McPhail & Haines, 2010). They used the EuroQol Group instrument-five dimensions (EQ-5D) for measuring HRQOL. The difference between the scores in the two occasions was used to measure the conventional change in their HRQOL. Recall bias was measured by asking the patients about what they report in the EQ-5D at the first occasion. Based on their findings, the relationship between response shift and a change in HRQOL was not strong

among older adults. So they described a method to overcome the canceling effect of response shift and recall bias.

Similar findings were also presented by McPhail, Comans, and Haines (2010); they highlighted the difference between what individuals feel as a change in their HRQOL and the actual change observed by using conventional pre and post-evaluation.

Galenkamp and his colleague showed that older adults did not experience reprioritization or conceptualization after a sudden change in health, but only recalibration was noticed (Galenkamp, Huisman, Braam, & Deeg, 2012). Also, they recommended the use of the Then test in longitudinal studies on HRQOL, particularly, after a new health condition.

The phenomenon of response shift was also explored in a cross sectional study by Daltroy, Larson, Eaton, Phillips, and Liang (1999). They included 289 community-dwelling older adults aged 65 years and above in their sample. They compare the Physical Capacity Evaluation with a self-rated measure of functional limitation. Recalibration response shift was suggested in parallel with current health problems.

Most of the work that has been done to explore response shift in older adults is diagnosis specific. This is because a disease or a health event is considered a catalyst of response shift, as it is well explained in the theory of response shift by Sprangers and Schwartz (1999). One recent study revealed that older adults, with and without stroke, experienced recalibration and reprioritization response shift over time (Barclay & Tate, 2014). This is the only study, I am aware of, that revealed that community-dwelling older adults who are free of stroke can experience recalibration and reprioritization response shift in HRQOL, using structural equation modeling.

## **Implications of response shift measurement**

Measurements of HRQOL are based on the assumption that self-evaluation of a target construct remains stable (Schwartz & Sprangers, 1999). Depending on life circumstances, individuals may change their internal standards; values; and concepts, and hence experience response shift. If response shift occurs and is not taken into account, incorrect interpretation of HRQOL may be the result. Thus, occurrence of response shift is a challenge in using HRQOL as an outcome measure.

Experiencing response shift may underestimate or exaggerate the effect of interventions or progression of a disease. For example, one study conducted in 2005 showed that individuals who experienced response shift, which had not been accounted for in the assessment process of HRQOL, did not demonstrate a significant effect of treatment on HRQOL, and only when response shift was considered, a significant improvement in HRQOL was reported (Ring et al., 2005). In other words, a true change in HRQOL can be underestimated or overestimated if response shift occurs, and this can also underestimate or overestimate the treatment effect on HRQOL. A study by Oort, aimed to assess the impact of response shift on the true change in HRQOL, by using the structural equation modeling approach, using data from cancer patients prior to their invasive surgery, and after three months following the surgery (Oort, Visser, & Sprangers, 2005). They revealed that only when considering recalibration response shift assessment, the effect size was large.

Similar findings support the impact that a change in internal standards (recalibration) had on rating HRQOL overtime by using the Then test (Ahmed et al., 2004; Dabakuyo et al., 2013). As shown by Ahmed et al., (2004), HRQOL was measured

at baseline, six and 24 weeks later following stroke. The Then test was applied by asking participants to retrospectively re-evaluate their health condition. Significant improvement in HRQOL following stroke was found only when considering changes in internal standards during that period. Dabakuyo et al., (2013), represented the same findings with women with breast cancer after their first hospitalization. They concluded, “The occurrence of RS early after the first hospitalization suggests that it needs to be taken into account to interpret QoL changes in BC” (BC= breast cancer). Without considering the assessment of response shift in HRQOL outcome measures, inaccuracy of estimation of HRQOL can lead to inaccurate interpretation of changes in HRQOL.

From a clinical perspective, response shift may be the key point that explains why some people with terminal diseases or severe chronic health conditions report a similar score of HRQOL of healthy people or people with better prognosis (Wisloff et al., 1996; Andrykowski & Hunt, 1993; Groenvold et al., 1999). In rehabilitation, improvement in HRQOL of people with chronic conditions is a common goal. Despite the limitations that may be present, people can re-frame their experiences, and cope with their new world. Changes in their internal standards, values, and concepts about how they view their HRQOL may be the opening door for living with acceptance with a new health status. Clinically speaking, health professionals often encourage people with chronic conditions to focus on the gifts that they still have and to make the best out of them. For example, a person who can no longer walk may have a higher function in other activities. This means that individuals, after re-evaluating their new health status, they may change their opinion about things that they used to do but not any more. They may not view the same things as “very important”, as compared to previously. Also, they may not consider

them in their concept of HRQOL. Consequently, the same or higher HRQOL may be the result. On the other hand, increasing the level of importance of the same items that may not be suitable for the new health status could lead to having a lower HRQOL. The more knowledge we have about response shift, the more helpful we would be as health professionals aiming at improving HRQOL.

Although older adults may lack physical ability due to aging, they may still be able to maintain a high level of HRQOL. This can be as a result of their focus shifting from physical concerns to other aspects in life. Shifting in internal standards, values and concepts is what defines response shift. Increased knowledge of response shift of older adults living in the community will therefore help in understanding how likely older adults are stable in viewing what is important and what is not important for their HRQOL. Also, what domains in HRQOL (physical, mental, and social) become more important for them and vice versa? This type of information will provide a vision for people who deal with this aged-population, such as health professionals, researchers, and policy makers. They can be more focused and clear about what is really important for an older person, for example, having normal muscle power or having the option to be a volunteer, or creating more social programs. In addition, by identifying factors that lead to response shift with regards to aging, different strategies and self-management programs can be created to improve HRQOL in older adults. For example, if a change with marital status of older adults is a predictor of having response shift in social related items, then considering a question about changes in marital status may be recommended to prevent social inactivity. All of this, addresses, fundamentally, the assessment of response shift in HRQOL.

## **Methods for measuring response shift**

A number of approaches to measure response shift are available. These approaches are often classified as design-based approaches, in which primary data collection is required, and model-based or statistical approaches, that can be used with any data set, including secondary data (Schwartz & Sprangers, 1999).

There is another classification that focuses on different levels: individual or group-level. Currently, methods that are available to detect response shift at a group-level include regression-based methods such as relative importance analysis; latent variable models such as structural equation modeling, latent class growth curve models, and latent variable mixture models (Lix et al., 2013; Oort et al., 2005; Jung & Wickrama, 2008; Sawatzky, Ratner, Kopec, & Zumbo, 2011). All of the methods mentioned above can be used with secondary data sets. Other methods that have been developed to detect response shift at the individual-level encompass the Then test, recursive partitioning and regression tree modeling, latent trajectory of residuals, qualitative method, and individualized methods (Ring et al., 2005; Ahmed et al., 2004; Hinz et al., 2011; Li & Schwartz, 2011; Mayo, Scott, & Ahmed, 2009; Schwartz & Sprangers, 1999).

Among all of the methods mentioned above, individualized methods such as the Patient Generated Index and the Schedule for Evaluation of Individual Quality of Life, are valuable at the individual-level for detecting response shift (O'Boyle et al., 2000; Ahmed et al., 2005; Beeken, Eiser, & Dalley, 2011). Individualized methods allow individuals to identify relevant areas of HRQOL, rate their level of functioning for each area, and rate the relative importance of the areas chosen. Therefore, individualized

methods assess reprioritization and reconceptualization response shift, unlike the Then-test that assesses only recalibration response shift.

Currently, there are limited studies that used individualized methods for detecting response shift in HRQOL among adults, and we are not aware of any studies that used individualized methods in older adults. This highlights the importance of conducting this study.

### **Project Purpose and objectives**

The purpose of this project was to explore RS in HRQOL in community-dwelling older men. The objectives of this project were twofold. The first objective was to estimate the magnitude of RS in older men who participated in the Manitoba Follow-up Study (MFUS) by:

- a) Timing “1 year, 2 years, 3 years, and 4 years “
- b) Types “Reprioritization and Reconceptualization”
- c) Direction “ increased and decreased order of importance in items and domains”
- d) Domains “Physical, mental, and social”

The second objective was to identify factors that predict RS in older men who participated in the MFUS such as age; successful aging; marital status; type of residence; life satisfaction; self-rated health; mental component score (MCS) and physical component score (PCS) of the Medical Outcomes Study Short-Form 36 (SF-36); and participation in different activities.



## **Project questions**

In this project, the research questions were:

Objective 1:

1. Do older men experience RS in HRQOL with aging?
2. Among those who experienced RS, what is the magnitude of RS in the four-year period (2007-2011), the three-year period (2008-2011), the two-year period (2009-2011), and the one-year period (2010-2011)?
3. Among those who experienced RS, what are the types of RS observed in each time period?
4. Among those who experienced reprioritization RS only, what is the direction of a change of order in each time period?

Objective 2:

5. Are there any significant factors predicting RS in a one-year period (2010-2011)?

## **Chapter 2: Methods**

The design of the study involves a secondary analysis of longitudinal data in the Manitoba Follow-up Study (Tate, Cuddy, & Mathewson., 2014).

### **The Manitoba Follow-up Study**

A cohort of 3,983 male World War II Royal Canadian Air Force aircrew has been followed by the MFUS since 1948 (Tate et al., 2014). The original purpose of MFUS was to study the incidence of cardiovascular disease through medical examinations including general cardiovascular assessment, blood pressure, body build measurement, and electrocardiograms. The MFUS has been expanded to include a variety of health related information with an interest to understand: morbidity and mortality, the relationship of body build and blood pressure to cardiovascular diagnosis and stroke, patterns of chronic diseases risk factors, and more recently, successful aging, quality of life and nutrition (Tate, Lah, & Cuddy, 2003).

In 1996, The Successful Aging Questionnaire (SAQ) was first sent to 2,043 participants who were alive at that time. See Appendix 1. In 1996, 2000, 2002, and annually from 2004 and on, a generic measure of HRQOL (SF-36) (Ware & Sherbourne, 1992) has been added to the SAQ. Other information about HRQOL includes a list of items or statements that reflect how important (very, moderate or not-important) specific items are in determining an individual's present quality of life (See page 3, Appendix 1). This information about HRQOL has been collected annually since 2007. Now, the SAQ includes questions about successful aging, activities, activity limitations, functioning, marital status, accommodations, life satisfaction, participation, and HRQOL.

Only data that had been collected from 2007 to 2011 and contained information about HRQOL was analyzed in this study. A brief description including the year of questionnaire, number of questionnaires returned, and age in years are outlined. See Table 1.

### **Data collection**

The list of items on page 3 of the SAQ was used in this study. The goal of these items was to determine the importance of these items from a personal point of view. The list had been developed as themes, according to two qualitative studies that define successful aging (Tate, Loewen, Bayomi, & Payne, 2009; Tate, Swift, & Bayomi, 2013). Among this list of items, only items that follow the broad domains of HRQOL involving physical, mental, and social functions (Sprangers, 2002) were included in the study. Fifteen items of the 23 items were included in the study, grouped to form physical, social, and mental components. See Table 2.

Other variables that were used in this study included age, successful aging, marital status, self-rated health, type of residence, life satisfaction, physical component summary and mental component summary of the SF-36, and participation in different activities. See Table 3. The SF-36 is known to be a valid HRQOL measure used in older adults (Jang et al., 2009). We were not aware of other studies that used these variables as predictors of response shift. Furthermore, we were not aware of any study that looked at predictors of response shift in older adults. However, several studies showed that social factors are the strongest determinants of QOL in older adults (Gureje et al., 2008; Layte et al., 2013).

This study included data from 360 men who were still alive in 2011 with a mean age of 89.7 years. Sixty-five percent of them were married, and 80 percent aged successfully. The mean of physical component summary of SF-36 was 38, while the mean of mental component summary was 54.

### **Understanding the dataset**

The participants had been asked the following question: “In looking at your own personal life, how important are the following items in determining your present quality of life?” Each participant chose one among the three possible answers: very important, moderate important, and not important. In the datasets, the level of importance was defined as: score 1 for very important, score 2 for moderate important, and score 3 for not important (Page 3, Appendix 1).

### **Data analysis**

#### **Objective 1**

*The quantitative analysis for objective 1 was conducted through three steps:*

*Step one* was to perform frequency crosstab tables in 1, 2, 3, and 4 year periods for the 15 items, using SPSS 21. *Step two* was to use the results from the cross tables to fill a ‘working table’ which helped in understanding the data. *Step three* was to perform basic arithmetic calculations on the data to answer the questions of the first objective.

#### **Step one: Identifying reprioritization and reconceptualization response shift using group-level analysis**

Reprioritization response shift can be identified if the participant changes the order of the importance of items over a period of time. For example, when a participant changes an item from being very important (score 1) to moderately important (score 2) and vice versa. We defined reprioritization response shift as not involving the option of

not important (Score 3) in the dataset. Reconceptualization response shift can be identified if the participants endorse items that were not important before and became important over a period of time and vice versa. An example for reconceptualization response shift is when a participant changes the endorsement of an item from being either very or moderately important (score 1 or score 2) to not important (score 3) and vice versa. Furthermore, if a participant didn't change responses, this indicates no response shift had occurred, and any missing answer in either time indicates an unknown response shift.

**Step two: Filling the working table (table 4)**

The working table was created to help in understanding results from step one, and to be used later in step three. It included detailed information about:

- Number of the sample
- Total number of men who experience reprioritization RS and this number is broken down into direction of reprioritization RS
- Total number of men who experience reconceptualization RS
- Total number of men who experience RS (any type)
- Percentage of men who experience reprioritization RS: Total number of men who experience reprioritization RS/ Total number of men who experience RS (any type)
- Among men who experience reprioritization RS, percentage of men who show increased or decreased level of importance: Number of men who experience reprioritization RS in the direction of moderate important to very important or the

direction of very important to moderate / Total number of men who experience reprioritization RS

- Percentage of men who experience reconceptualization RS: Total number of men who experience reconceptualization RS/ Total number of men who experience RS (any type)
- Percentage of men who experience RS in the whole sample: Total number of men who experience RS (any type)/ Number of the sample

### **Step three: Performing basic arithmetic calculations and answering project's questions related to the first objective**

From step two, we identified the presence of RS of older men who participated in the MFUS. We estimated the mean percentage of men who showed RS over 15 items in a one year period (2010-2011), two year period (2009-2011), three year period (2008-2011), and four year period (2007-2011). We identified the mean percentage of those who demonstrated reprioritization and reconceptualization RS over 15 items in each time period. The mean percentage of men who showed RS in physical, mental, and social domains was calculated for each time period. Information about the direction of RS was estimated by calculating the mean percentage of men who showed increased or decreased importance of items and domains among men who showed reprioritization RS.

### **Older men who showed no response shift (no change) over the five-years data**

Other valuable information that was calculated from the data is the percentage of men who showed no response shift (no change) in the 15 items over the five surveys. See Table 5. By using SPSS21, a new variable was created that defined having the same answer over the five surveys (no response shift) as "score 0" and having different answers or response shift as "score 1". This provides the percentage of men who showed

no response shift or show response shift for each item. By averaging these percentages for items that comprise the physical, mental, and social domains, we can know the average percentages of men who showed no response shift (no change) in the physical, mental, and social items over the five surveys. See Table 6. Information from the no response shift category showed the percentage of men who showed no change in their answers in all of the items that comprised a certain domain over the five surveys.

## **Objective two**

### **Response shift assessed by an individualized method**

For the second objective, which is identifying factors that predict RS in older men over a one-year period, RS was assessed for each individual. Thus, in this analysis, a transformation process was followed (changing score 3 into score 4), and subtraction for scores was calculated to capture reprioritization and reconceptualization response shift individually. For example, when a participant changed an item from being very important (score 1) to moderately important (score 2) and vice versa, the difference in the score will be either 1 or -1. This indicated reprioritization response shift, and the sign (-) or (+) showed the direction of the change of order. On the other hand, when a participant changes an item from being either very or moderately important (score 1 or score 2) to not important (score 4) and vice versa, the difference in the score will be either 2, -2, 3 or -3. This indicated reconceptualization response shift, and the sign (-) or (+) showed the direction of dropping or adding a concept. Furthermore, a score of 0 indicated no response shift had occurred, and any missing answers in either time interval indicated an unknown response shift which was not used in the analysis. This transformation process was completed for one-year period (2010-2011). See Table 7.

## **Regression**

Binary logistic regression was used in this study to describe the relationship between the occurrences of RS in older men and a set of predictors over a one-year period (2010-2011). The dependent variable was a dichotomous variable of whether response shift occurred or not (Yes/No). The independent variables were age, successful aging, marital status, life satisfaction, physical component summary and mental component summary of the SF-36, self-rated health, type of residence, and participation in different activities. See Table 3. The suggested sample size needed for each variable was ranged from 10-20 (Harrell, Lee, Matchar, & Reichert, 1985; Harrell, Lee, & Mark, 1996).

## **Ethical consideration**

Ethics approval was obtained from the Health Research Ethics Board from the University of Manitoba. See Appendix 2.



**Table 1: A brief description**

<b>Year of questionnaire</b>	<b>Number of questionnaires returned</b>	<b>Age in years (Mean <math>\pm</math> Standard deviation)</b>
<b>2007</b>	680	86.30 $\pm$ 3.0
<b>2008</b>	589	87.2 $\pm$ 2.9
<b>2009</b>	522	88.0 $\pm$ 2.8
<b>2010</b>	450	88.8 $\pm$ 2.8
<b>2011</b>	360	89.7 $\pm$ 2.9

**Table 2: The List of 23 items**

<b>Items included in the study</b>		
<b>No.</b>	<b>Items</b>	<b>Domains of HRQOL</b>
1	Good physical health	Physical
7	Keeping physically active	Physical
2	Being mentally aware	Mental
3	Having a positive attitude	Mental
4	Being happy	Mental
5	Absence of mental illness (eg, Alzheimer's, depression)	Mental
8	Keeping mentally active	Mental
9	Keeping busy (eg, hobbies)	Social
10	Volunteering	Social
11	Having goals/making plans	Social
12	Helping family/friends	Social
16	Relationship with spouse/family	Social
17	Friendships	Social
18	Pets	Social
19	Being socially active	Social
<b>Items excluded from the study</b>		
6	Living to an old age	-
13	Acceptance of/coping with life changes	-
14	Adaptation to changes in life	-
15	Being spiritual/having faith	-
20	Being independent (eg, driving, being mobile, financially)	-
21	Still working	-
22	Being retired	-
23	Good lifestyle/needs are met	-

**Table 3: Variables included in the study**

<b>Variables</b>	<b>Levels of measurement</b>
Response shift	Dichotomous (yes/no)
Age	Continuous
Successful aging	Dichotomous (yes/no)
Marital status	Dichotomous (Married/Common-law VS. Single/Widowed/Divorced/Separated)
Life satisfaction	Dichotomous (Excellent/Very Good VS. Good/Fair, Poor/Bad)
Physical component summary and mental component summary of the SF-36	Continuous/ Scale (0-100)
Self-rated health	Dichotomous (Excellent/Very Good VS. Good/Fair, Poor/Bad)
Type of residence	Dichotomous (House or townhouse or condominium townhouse/Suite or apartment or condominium apartment VS. Suite in Senior Citizens' housing unit or other apartment with a minimum age restriction/ Board & Room, hostel, commercial boarding/Assisted living facility/Personal care or nursing home/Long-term care or extended care facility/other, specify)
Participation in different activities	Dichotomous (yes/no)

**Table 4: The working table**

No. Of Item	Type of RS	No. Of men in each direction of RS	Total no. Of men in each type of RS	Total no. Of men who show RS	Percentage of men who show increased level of importance	Percentage of men who show decreased level of importance	Percentage of men who experience Rep. RS	Percentage of men who experience Rec. RS	No. Of the sample	Percentage of men who experience RS in the whole sample
#	<b>Rep.</b>	Very imp-Moderately imp								
		Moderately imp-Very imp								
	<b>Rec.</b>	Very imp-Not imp								
		Moderately imp-Not imp								
		Not imp-Very imp								
		Not imp-Moderately imp								

Abbreviations: RS, response shift, Rep, reprioritization; Rec, reconceptualization

**Table 5: Percentage of men who show RS/No RS (no change) in the 15 items in the overall five surveys**

ITEM NO.	ITEM	RS (%)	NO RS (%)	DOMAINS
1	Good physical health			Physical
2	Being mentally aware			Mental
3	Having a positive attitude			Mental
4	Being happy			Mental
5	Absence of mental illness ( eg, Alzheimer's, depression)			Mental
7	Keeping physically active			Physical
8	Keeping mentally active			Mental
9	Keeping busy (eg, hobbies)			Social
10	Volunteering			Social
11	Having goals/making plans			Social
12	Helping family/friends			Social
16	Relationship with spouse/family			Social
17	Friendship			Social
18	Pets			Social
19	Being socially active			Social

**Table 6: Percentage of men who show RS/No RS (no change) in physical, mental, social domains in the overall five surveys**

Domains (No. Of items)	RS (%)	No RS (%)
Physical (2)		
Mental (5)		
Social (8)		

**Table 7: Response shift assessed by individualized method**

<b>Time</b>		<b>Time one</b>			
<b>Time two</b>	<b>Scores/Answers</b>	- <b>Missing answer</b>	<b>1 Very important</b>	<b>2 Moderately important</b>	<b>4 Not important</b>
	- <b>Missing answer</b>	-	?	?	?
	<b>1 Very important</b>	?	--	^	*
	<b>2 Moderately important</b>	?	^	--	*
	<b>4 Not important</b>	?	*	*	--

**Meaning of signs**

- No Response shift
- \* Reconceptualization
- ^ Reprioritization
- ? Unknown Response Shift

## Chapter 3: Results

### Characteristics of the participants

As shown in Table 8, 360 men, who were still alive in 2011 with a mean age of 89.7 years, had completed all the five questionnaires that had been sent yearly from 2007 to 2011. Forty-four men out of the 360 needed assistance by a relative or a friend to complete the questionnaire, whereas the rest completed it independently. Sixty-five percent of the participants are married, and 80% aged successfully. Life satisfaction was rated as very good by forty-three percent, while sixteen percent rated it as excellent. Regarding self-rated health, twelve percent described their health as excellent. Considering HRQOL, the mean of the physical component summary of SF-36 is 38, while the mean of mental component summary is 54.

**Table 8: Characteristics of the participants**

Variable/Measure	Year of Questionnaire				
	2007	2008	2009	2010	2011
Number of Questionnaires returned	680	589	522	450	360
Age in Years (Mean ± SD)	86.3± 3.0	87.2 ± 2.9	88.0 ± 2.8	88.8± 2.8	89.7 ± 2.9
Marital Status (Married, %)	66	67	66	66	65
Aged Successfully (Yes, %)	77	79	73	72	80
Life satisfaction (Excellent, %)	16	18	15	16	16
Self Rated Health (Excellent, %)	13	12	11	10	12
SF-36 (Mean ± SD)					
(PCS)					38.4 ± 10.1
(MCS)					54.2 ± 7.7

Abbreviations: SD, standard deviation; SF-36, Short Form-36; PCS, Physical Component Summary; MCS, Mental Component Summary

## Results related to the first objective

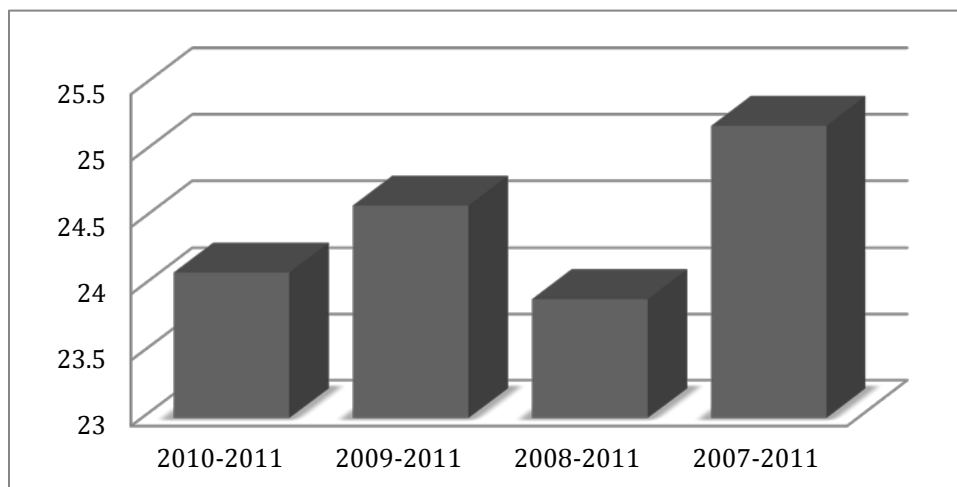
Table 9 presents the results related to the first objective, “to estimate the magnitude of RS in older men who participated in the Manitoba Follow-up Study (MFUS) by:

- a) Timing “1 year, 2 years, 3 years, and 4 years”
- b) Types “Reprioritization and Reconceptualization”
- c) Direction “increased and decreased order of importance in items and domains”
- d) Domains “Physical, mental, and social”

### Timing of response shift in older men

As presented in Figure 1, response shift (RS) was identified across all of the items at each time period. The mean percentage of older men who show response shift over the items were: 24.1 in the one-year period (2010-2011), 24.6 in the two-year period (2009-2011), 23.9 in the three-year period, and 25.2 in the four-year period (2007-2011). The average of the percent of people showing RS over 15 items, four time periods, within three domains, was 24.4%.

**Figure 1: Mean percentage of men who show response shift over 15 items**

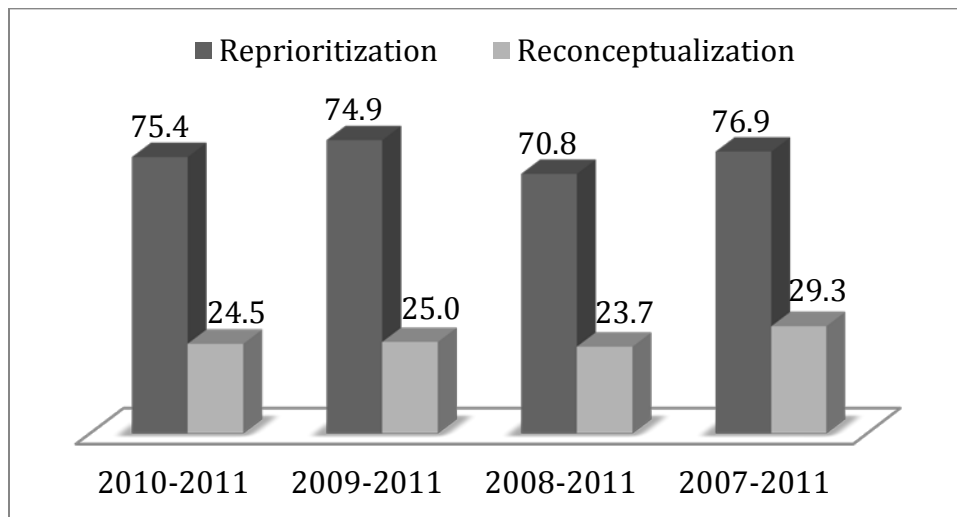




### Types of response shift in older men

Both reprioritization and reconceptualization response shift were identified at each time period. See Figure 2. Among older men who show response shift, the mean percentage of those who demonstrate reprioritization were: 75.4 in the one-year period (2010-2011), 74.9 in the two-year period (2009-2011), 70.8 in the three-year period, and 76.9 in the four-year period (2007-2011). Whereas, the mean percentages of those who demonstrate reconceptualization response shift were: 24.5 in the one-year period (2010-2011), 25.0 in the two-year period (2009-2011), 23.7 in the three-year period, and 29.3 in the four-year period (2007-2011).

**Figure 2: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization over 15 items**

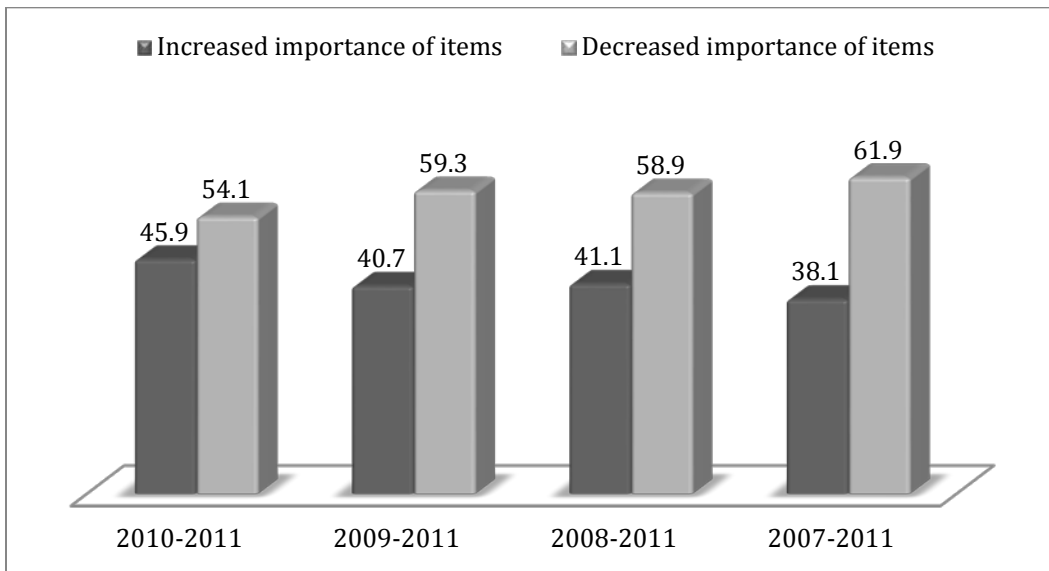


### Direction of response shift in older men

Figure 3 presents the direction of response shift in terms of increased or decreased importance of items over time by mean percentage. Among older men who show reprioritization, 45.9% showed increased importance in the one-year period (2010-2011), 40.7% in the two-year period (2009-2011), 41.1% in the three-year period, and 38.1% in

the four-year period (2007-2011). On the other hand, the mean percentage of older men who show decreased importance were: 54.1% in the one-year period (2010-2011), 59.3% in the two-year period (2009-2011), 58.9% in the three-year period, and 61.9% in the four-year period (2007-2011).

**Figure 3: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of 15 items**



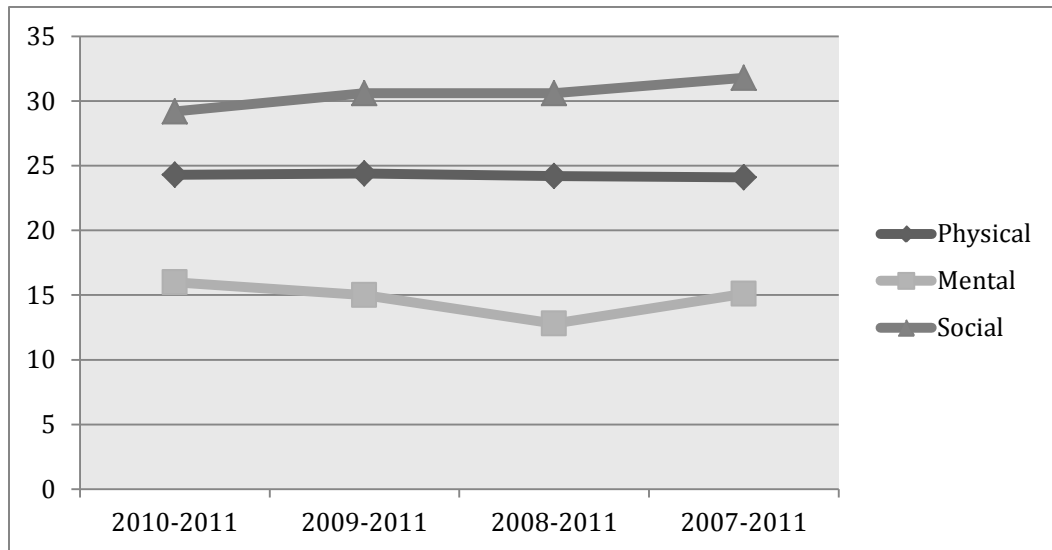
### **Response shift and domains in older men**

The magnitude of response shift varied among items and domains. Table 9 also presents magnitude, timing and types of response shift in relation to physical, mental, and social domains. Considering the magnitude of response shift in the four-year period (2007-2011), 24.1% of older men demonstrated response shift in the physical domain, whereas, 15.1% and 31.8% of older men demonstrated response shift in mental and social domains, respectively. See Figure 4.

**Table 9: Mean percentage of people who show response shift over 15 items and domains**

Outcome	Time interval			
	1 year 2010-2011	2 years 2009-2011	3 years 2008-2011	4 years 2007-2011
<b>Mean percentage of people who show response shift over 15 items.</b>	24.1	24.6	23.9	25.2
<b>Domains: Physical domain (2 items)</b>	24.3	24.4	24.2	24.1
<b>Mental domain (5 items)</b>	16.0	15.0	12.8	15.1
<b>Social domain (8 items)</b>	29.2	30.6	30.6	31.8
<b>Among people who show response shift, the mean percentage of those who demonstrate reconceptualization over 15 items.</b>	24.5	25.0	23.7	29.3
<b>Domains: Physical domain (2 items)</b>	6.1	7.7	7.4	8.1
<b>Mental domain (5 items)</b>	7.7	10.0	8.3	7.8
<b>Social domain (8 items)</b>	39.6	38.8	37.5	36.1
<b>Among people who show response shift, the mean percentage of those who demonstrate reprioritization over 15 items</b>	75.4	74.9	70.8	76.9
<b>Domains: Physical domain (2 items)</b>	93.9	92.3	92.6	91.9
<b>Mental domain (5 items)</b>	92.3	90.0	91.7	92.0
<b>Social domain (8 items)</b>	60.4	61.2	62.5	63.9
<b>Among people who show reprioritization, the mean percentage of people who show increased importance of 15 items</b>	45.9	40.7	41.1	38.1
<b>Domains: Physical domain (2 items)</b>	39.9	35.2	33.2	26.3
<b>Mental domain (5 items)</b>	43.4	40.0	40.8	35.3
<b>Social domain (8 items)</b>	48.8	42.6	43.3	42.9
<b>Among people who show reprioritization, the mean percentage of people who show decreased importance of 15 items</b>	54.1	59.3	58.9	61.9
<b>Domains: Physical domain (2 items)</b>	60.1	64.8	66.8	73.7
<b>Mental domain (5 items)</b>	56.6	60.0	59.2	64.7
<b>Social domain (8 items)</b>	51.2	57.4	56.7	57.1

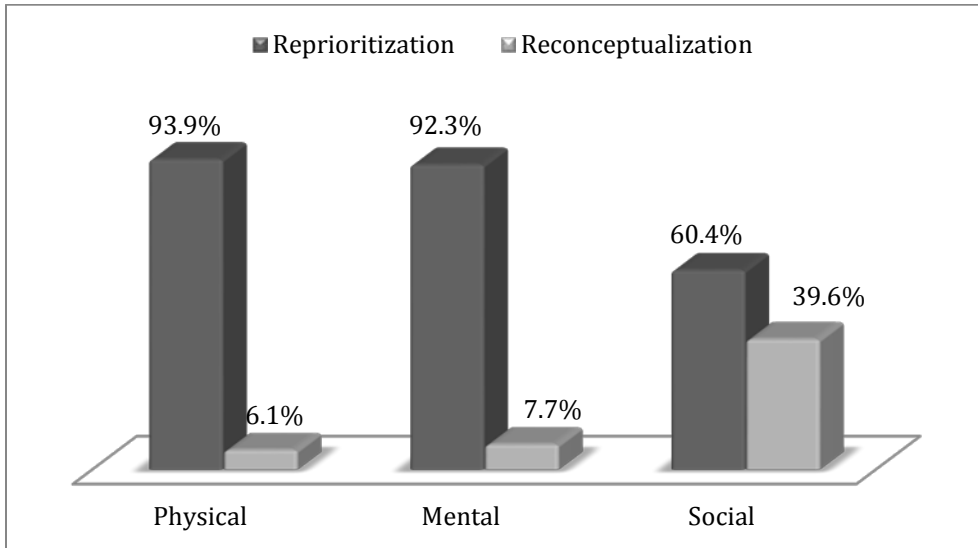
**Figure 4: Mean percentage of men who show response shift in physical, mental, and social domains**



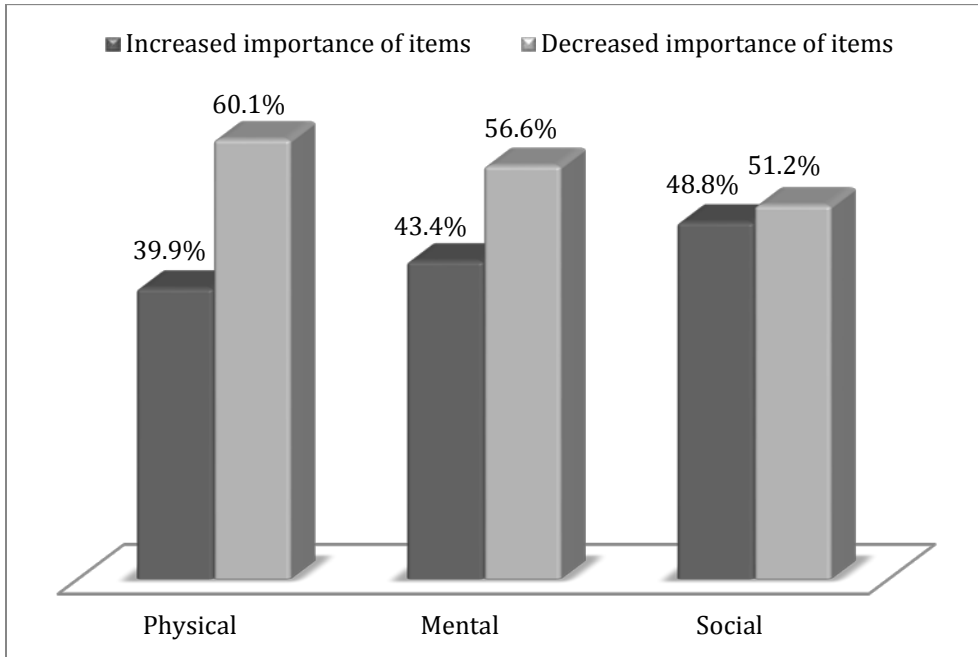
Focusing on the one-year period (2010-2011), the frequency of different types of response shift was not the same among the different domains. For example, in the physical domain (average of 2 items), 93.9% of older men showed reprioritization, while only 6.1% showed reconceptualization. In the social domain (average of 8 items), 39.6% of older men showed reconceptualization, whereas 60.4% showed reprioritization. See Figure 5.

The direction of response shift was also different among domains; e.g., among men who show reprioritization, the mean percentage of older men who show increased importance was: 39.9% in physical domain, 43.4% in mental domain, and 48.8% in social domain. On the other hand, the mean percentage of older men who show decreased importance was: 60.1% in physical domain, 56.6% in mental domain, and 51.2% in social domain. See Figure 6.

**Figure 5: Among men who show response shift, mean percentage of those who demonstrate reprioritization and reconceptualization in physical, mental, and social domains over 2010-2011**



**Figure 6: Among men who show reprioritization, mean percentage of people who show increased or decreased importance of physical, mental, and social domains over 2010-2011**



### Older men who show no response shift/response shift over the five-years data

Figure 7 demonstrates the percentage of older men who show no response shift (no change) in all domains over the whole five surveys. 72.2% of older men showed no response shift in the mental domain followed by 57.8% and 43.4% in physical, and social domains, respectively.

**Figure 7: Percentage of men who show No response shift (no change) in physical, mental, and social domains over any of the time intervals**

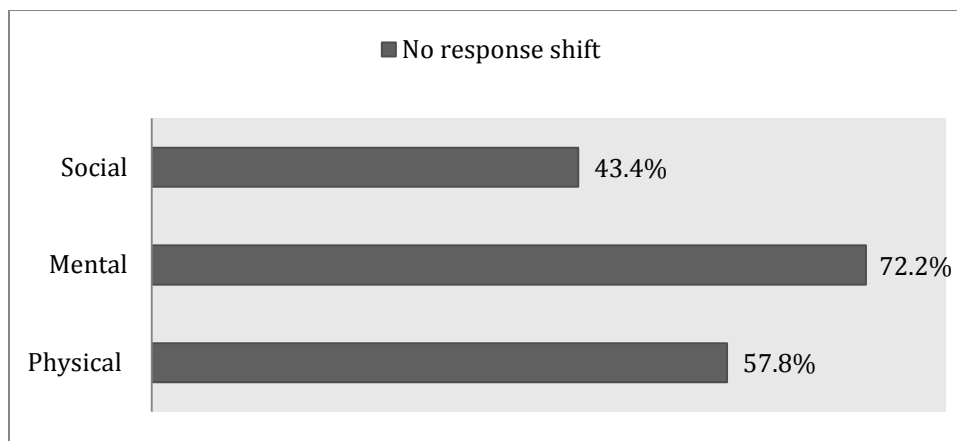


Table 10 provides detailed information about the percentage of older men who show: no response shift/response shift over the whole five surveys in the 15 items, whereas, Table 11 provides the same information but in the domains-level. In the Physical domain (Figure 8), 52.5% of older men showed response shift in the “Keeping physically active” item. In the mental domain (Figure 9), 39.7% of older men showed response shift in the “Being happy” item, whereas, in the “Being mentally aware” item and the “Absence of mental illness” item, only 17.3% showed response shift. In the social domain (Figure 10), more than the half of older men show response shift in most of the items that compose a social domain. 72.4% showed response shift in the “Having

goals/making plans” item, while, only 26.5% showed response shift in the “Relationship with spouse/family” item.

**Table 10: Percentage of men who show RS/No RS (no change) in the 15 items in the overall five surveys**

ITEM NO.	ITEM	RS (%)	NO RS (%)	DOMAINS
1	Good physical health	31.9	68.1	Physical
2	Being mentally aware	17.3	82.7	Mental
3	Having a positive attitude	27.5	72.5	Mental
4	Being happy	39.7	60.3	Mental
5	Absence of mental illness ( eg, Alzheimer's, depression)	17.3	82.7	Mental
7	Keeping physically active	52.5	47.5	Physical
8	Keeping mentally active	37.2	62.8	Mental
9	Keeping busy (eg, hobbies)	59.0	41.0	Social
10	Volunteering	64.1	35.9	Social
11	Having goals/making plans	72.4	27.6	Social
12	Helping family/friends	62.7	37.3	Social
16	Relationship with spouse/family	26.5	73.5	Social
17	Friendship	51.6	48.4	Social
18	Pets	49.6	50.4	Social
19	Being socially active	66.7	33.3	Social

Abbreviations: RS, response shift

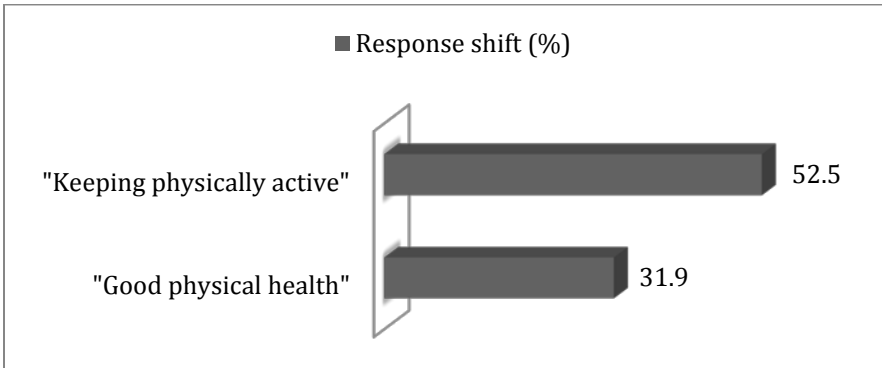
**Table 11: Percentage of men who show RS/No RS (no change) in physical, mental and social domains in the overall five surveys**

Domains (No. Of items)	RS (%)	No RS (%)
Physical (2)	42.2	57.8
Mental (5)	27.8	72.2
Social (8)	56.6	43.4

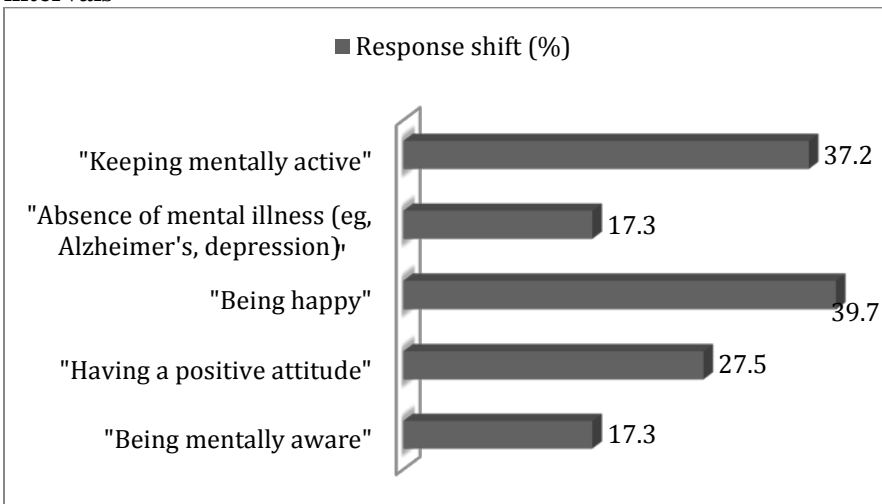
Abbreviations: RS, response shift.



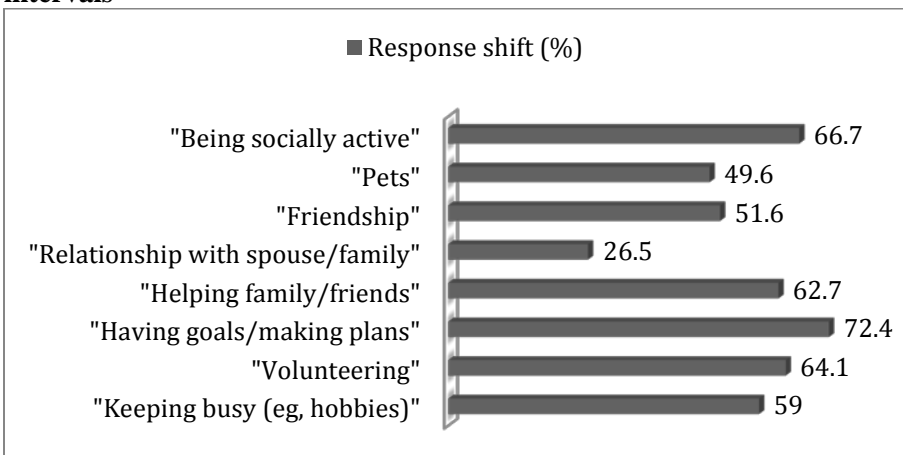
**Figure 8: Percentage of men who show response shift in physical domain over any of the time intervals**



**Figure 9: Percentage of men who show response shift in mental domain over any of the time intervals**



**Figure 10: Percentage of men who show response shift in social domain over any of the time intervals**



## **Factors that predict response shift**

The second objective was to identify factors that predict RS in older men who participated in the MFUS such as age, successful aging, marital status, type of residence, life satisfaction, self-rated health, physical component summary (PCS) and mental component summary (MCS) of the Medical Outcomes Study Short-Form 36 (SF-36), and participation in different activities.

The results related to the second objective will be presented as below:

1. Identification of response shift at the individual and item level
2. Characteristics of participants who show response shift and no response shift in each of 15 items
3. Logistic regression-bivariate analysis
4. Logistic regression-multivariate analysis
5. Odds ratios with 95% confidence intervals for participants who show response shift in health-related quality of life and their participation in activities in the past month

### **Identification of response shift at the individual and item level**

As presented in Table 12, response shift was identified individually in all of the items. Overall, response shift was identified least frequently in the 5 mental domain items ranging from 9.3% in the ‘being mentally aware’ item to 24.3% in the ‘keeping mentally active’ item. Response shift was identified most frequently in the 8 social domain items ranging from 14.8% in the ‘relationship with spouse/family’ item to 39.3% in the ‘having goals/making plans’ item. Regarding the physical domain, 20% showed response shift in

the ‘good physical health’ item, whereas, 28.7% showed response shift in the ‘keeping physically active’ item.

Between 2010 and 2011, 27 of the 360 older men showed no response shift on any item. In other words, 92.5% of older men experienced a response shift in at least one of the 15 items. The percentages of older men who experienced response shift is less, when focusing on specific items and domains.

Reprioritization was identified in all of the items with a minimum 6.3% in the ‘volunteering’ item and a maximum 27.2% in the ‘helping family/friends’ item, of all individuals. On the other hand, less than 3% of older men demonstrated reconceptualization in 9 of the items, and 5.6% to 19% demonstrated it in another 6 items related to the social domain. In other words, reprioritization was common in the physical and mental domain, whereas reconceptualization was seen mainly in the social domain.

The direction of response shift varied among items; in the ‘helping family/friends’ item, 11.6% of the entire sample showed an increase in importance and 15.6% showed a decrease in importance. In reconceptualization, it was more common to drop a concept rather than add a concept. For example, in the ‘being socially active’ item, 12% of the entire sample dropped it from their list of importance, whereas, 7.1% added it.

Table 12, also presents evidence of no response shift over all 5 waves (2011, 2010, 2009, 2008, 2007). There were older men who gave the same answer over the 5 surveys, whether it is always very important, moderately important, or not important. Overall, more older men indicated always very important for most of the items. More than 50% of them indicated always very important for 7 items with the highest percentage of 82.2% in the “absence of mental illness” item. Twenty one point three

percent of older men indicated always moderately important for the 'being socially active' item, and this is the highest percentage in the being moderately important category. In the social domain, 37.8% of older men indicated always not important for the 'pets' item, followed by 20.6% for the 'volunteering' item.

Evidence of no response shift was also presented in the same table over one wave (2011-2010). Generally, many older men showed no response shift in specific items, reaching 90% in the 'being mentally aware' item and the 'absence of mental illness' item.

**Table 12: Evidence of item specific response shift over all 5 waves, and over one wave (2011-2010).**

Item	Always same answer over all 5 waves			No RS N (%)		RS N (%)	Rep. N (%)	Increased importance N (%)	Decreased importance N (%)	Rec. N (%)	Add concept N (%)	Drop concept N
	Very important N (%)	Moderately Important N (%)	Not important N (%)	Over all 5 waves	Over 2011- 2010	Over 2011- 2010						
1-P	200 (66.4)	5 (1.4)	0	205 (68.1)	265 (80.1)	66 (20.0)	65 (19.6)	27 (8.2)	38 (11.5)	1 (0.3)	0	1 (0.3)
7-P	120 (40.4)	21 (7.0)	1 (0.3)	142 (47.5)	233 (71.3)	94 (28.7)	84 (25.7)	32 (9.8)	52 (15.9)	10 (3.1)	1 (0.3)	9 (2.8)
2-M	250 (81.6)	3 (0.9)	1 (0.3)	254 (82.7)	305 (90.8)	31 (9.3)	30 (8.9)	12 (3.6)	18 (5.4)	1 (0.3)	0	1 (0.3)
3-M	209 (70.8)	5 (1.6)	1 (0.3)	215 (72.5)	278 (85.0)	49 (14.9)	45 (13.8)	20 (6.1)	25 (7.6)	4 (1.2)	3 (0.9)	1 (0.3)
4-M	164 (55.2)	15 (5.0)	2 (0.6)	181 (60.3)	256 (78.3)	71 (21.7)	66 (20.2)	27 (8.3)	39 (11.9)	5 (1.5)	0	5 (1.5)
5-M	223 (82.2)	1 (0.3)	1 (0.3)	225 (82.7)	279 (90.0)	31 (9.9)	27 (8.7)	13 (4.2)	14 (4.5)	4 (1.3)	2 (0.6)	2 (0.6)
8-M	183 (60.7)	6 (1.9)	1 (0.3)	190 (62.8)	252 (75.7)	81 (24.3)	75 (22.5)	33 (9.9)	42 (12.6)	6 (1.8)	2 (0.6)	4 (1.2)
9-S	84 (28.9)	33 (11.3)	2 (0.6)	119 (41.0)	220 (67.7)	105 (32.3)	71 (21.8)	32 (9.8)	39 (12)	34 (10.8)	9 (2.8)	25 (7.7)
10-S	7 (2.6)	32 (12.2)	55 (20.6)	94 (35.9)	226 (74.8)	76 (25.1)	19 (6.3)	11 (3.6)	8 (2.6)	57 (18.9)	20 (6.6)	37 (12.3)
11-S	26 (9.7)	36 (13.4)	12 (4.4)	74 (27.6)	189 (60.8)	122 (39.3)	68 (21.9)	35 (11.3)	33 (10.6)	54 (17.4)	22 (7.1)	32 (10.3)
12-S	68 (25.0)	32 (11.8)	1 (0.3)	101 (37.3)	215 (67.2)	105 (32.9)	87 (27.2)	37 (11.6)	50 (15.6)	18 (5.6)	5 (1.6)	13 (4.1)
16-S	208 (72.4)	3 (1.0)	2 (0.6)	213 (73.5)	273 (85.0)	48 (14.8)	41 (12.8)	21 (6.5)	20 (6.2)	7 (2.2)	4 (1.2)	3 (0.9)
17-S	107 (37.0)	32 (11.0)	1 (0.3)	140 (48.4)	230 (71.2)	93 (28.7)	83 (25.7)	38 (11.8)	45 (13.9)	10 (3.1)	6 (1.9)	4 (1.2)
18-S	17 (6.6)	15 (5.8)	97 (37.8)	129 (50.4)	226 (75.3)	74 (24.6)	22 (7.3)	12 (4.0)	10 (3.3)	52 (17.3)	21 (7)	31 (10.3)
19-S	23 (7.9)	62 (21.3)	12 (4.1)	97 (33.3)	207 (63.5)	119 (36.5)	57 (17.5)	24 (7.4)	33 (10.1)	62 (19.0)	23 (7.1)	39 (12)

Notes: 1-P= item 1-physical (good physical health), 7-P= item 7-physical (keeping physically active), 2-M= item 2-mental (being mentally aware), 3-M= item 3-mental (having a positive attitude), 4-M= item 4- mental (being happy), 5-M= item 5-mental (absence of mental illness), 8-M= item 8-mental (keeping mentally active), 9-S= item 9-social (keeping busy), 10-S= item 10-social (volunteering), 11-S= item 11-social (having goals/making plans), 12-S= item 12-social (helping family/friends), 16-S= item 16-social (relationship with spouse/family), 17-S= item 17-social (friendship), 18-S= item 18-social(pets), 19-S= item 19-social (being socially active).

### **Characteristics of participants who show response shift and no response shift in each of 15 items**

Tables 13-1 to 13-15 summarize the characteristics of individuals who show response shift and who did not show response shift for each item. The table includes mean, standard deviation, t-test for comparing older men who show a response shift and who do not show a response shift for each continuous variable (age, PCS, and MCS). Also, it includes percentages and chi-square for comparing older men who show a response shift and who do not show a response shift for each categorical variable (successful aging, marital status, independent living, self-rated health, and life satisfaction). Overall, variables that were statistically significant ( $p < 0.05$ ) were: self-rated health, life satisfaction, PCS, MCS, marital status, and independent living.

Self-rated health was statistically significantly different between those who showed response shift and those who did not show response shift in 8 items. Among older men who showed response shift in the physical domain, 31% (in the good physical health item) and 35% (in the keeping physically active item), rated their health as excellent or very good. Fifty-five and 56% of older men, respectively, who rated their health as excellent or very good, did not show response shift. See Tables 13-1 and 13-6. Self-rated health was statistically significantly different between those who showed response shift and those who did not show response shift among all items related to mental domain. For example, 37% of older men who show response shift in the 'having a positive attitude' item and the 'being happy' item, rated their health as excellent or very good, while, 53% and 54% of older men who did not show response shift in the same items, rated their health as excellent or very good. See Tables 13-3 and 13-4. In the

‘relationship with spouse/family’ item that is related to the social domain, 32% of older men who showed response shift rated their health as excellent or very good, whereas, 53% of older men who did not show response shift rated their health as excellent or very good. See Table 13-12.

In the ‘absence of mental illness’ item, for older men who showed response shift, MCS was lower (M=51.2, SD=6.9), compared to men who do not have response shift (M=54.5, SD=7.7);  $t= 2.17$ ,  $p= 0.03$ . See Table 13-5. In addition, men who showed response shift in the ‘keeping mentally active’ item, had a lower score of MCS, compared to others who did not have response shift in the same item. See Table 13-7. Regarding PCS, it was lower in older men who showed response shift (M=36.4, SD=9.7), compared to men who did not have response shift (M=39.4, SD=10.0);  $t=2.06$ ,  $p=0.04$  in the ‘good physical health’ item. See Table 13-1. Also, there was a significant difference between the scores of PCS for older men who showed response shift (M=36.1, SD=9.5) and no response shift (M=39.7, SD=10.1) in the ‘keeping physically active’ item;  $t=2.82$ ,  $p=0.00$ . See Table 13-6. Among men who had response shift in the ‘keeping mentally active’ item, PCS was lower as well, compared to men who did not have response shift. See Table 13-7.

There was a significant difference in the marital status for older men who showed response shift, and no response shift in the ‘relationship with spouse/family’ item. 73% of older men who showed no response shift were married, whereas 40% of those who showed response shift were married ( $\chi^2=20.22$ ,  $p=0.00$ ). See Table 13-12. Of the older men who showed no response shift in the ‘pets’ item, 85% of them lived independently in

their own home, while 69% of those who showed response shift in the same item, lived in their own home ( $\chi^2=9.97$ ,  $p=0.00$ ). See Table 13-14.

**Table 13-1: characteristics of participants who show response shift and no response shift in item 1 (Good physical health)**

Variable	Number	Number Group No-RS, RS	M±SD	t-test	%	$\chi^2$	p.value
Age	331	265 66	89.61±2.8 90.1±3.2	-1.16	-	-	0.24
PCS	300	241 59	39.4±10.0 36.4±9.7	2.06	-	-	0.04
MCS	300	241 59	54.4±7.6 53.3±7.7	0.99	-	-	0.32
Successful Aging (Yes)	331	265 66	-	-	87 80	1.79	0.18
Marital Status (Married)	331	265 66	-	-	66 62	0.35	0.55
Independent Living (Own home)	331	265 66	-	-	83 79	0.77	0.37
Self Rated Health (Excellent, Very good)	325	260 65	-	-	55 31	12.20	0.00
Life Satisfaction (Excellent, Very good)	323	258 65	-	-	64 45	8.09	0.00

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and  $\chi^2$ = chi-square.

**Table 13-2: characteristics of participants who show response shift and no response shift in item 2 (Being mentally aware)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	$\chi^2$	p.value
Age	336	305 31	89.61±2.9 90.06±2.7	-0.80	-	-	0.42
PCS	304	276 28	38.8±10.0 37.9±9.7	0.44	-	-	0.65
MCS	304	276 28	54.4±7.6 53.3±7.5	0.62	-	-	0.53
Successful Aging (Yes)	336	305 31	-	-	86 77	1.75	0.18
Marital Status (Married)	336	305 31	-	-	66 61	0.26	0.60
Independent Living (Own home)	336	305 31	-	-	81 90	1.65	0.19
Self Rated Health (Excellent, Very good)	330	299 31	-	-	52 23	9.84	0.00
Life Satisfaction (Excellent, Very good)	328	298 30	-	-	60 53	0.51	0.47

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and  $\chi^2$ = chi-square.



**Table 13-3: characteristics of participants who show response shift and no response shift in item 3 (Having a positive attitude)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	327	278 49	89.5±2.9 90.3±2.3	-2.00	-	-	0.04
PCS	297	252 45	38.8±10.4 38.2±8.5	0.33	-	-	0.73
MCS	297	252 45	54.5±7.6 52.5±7.8	1.56	-	-	0.11
Successful Aging (Yes)	327	278 49	-	-	85 90	0.92	0.33
Marital Status (Married)	327	278 49	-	-	67 59	1.21	0.27
Independent Living (Own home)	327	278 49	-	-	83 76	1.45	0.22
Self Rated Health (Excellent, Very good)	321	272 49	-	-	53 37	4.36	0.03
Life Satisfaction (Excellent, Very good)	319	270 49	-	-	62 49	2.86	0.09

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-4: characteristics of participants who show response shift and no response shift in item 4 (Being Happy)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	327	256 71	89.5±2.8 89.9±3.0	-1.07	-	-	0.28
PCS	298	233 65	38.7±10.2 38.9±9.4	-0.17	-	-	0.86
MCS	298	233 65	54.3±7.8 54.1±7.0	0.16	-	-	0.87
Successful Aging (Yes)	327	256 71	-	-	85 90	1.32	0.24
Marital Status (Married)	327	256 71	-	-	69 56	3.81	0.05
Independent Living (Own home)	336	256 71	-	-	83 77	1.23	0.22
Self Rated Health (Excellent, Very good)	321	251 70	-	-	54 37	6.35	0.01
Life Satisfaction (Excellent, Very good)	319	250 69	-	-	62 51	2.85	0.09

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-5: characteristics of participants who show response shift and no response shift in item 5 (Absence of mental illness)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	310	279 31	89.6±2.7 89.6±3.1	-0.09	-	-	0.92
PCS	286	257 29	38.9±9.9 36.7±11.1	1.10	-	-	0.26
MCS	286	257 29	54.5 ±7.7 51.2±6.9	2.17	-	-	0.03
Successful Aging (Yes)	310	279 31	-	-	86 77	1.80	0.17
Marital Status (Married)	310	379 31	-	-	67 52	3.08	0.07
Independent Living (Own home)	310	279 31	-	-	83 74	1.53	0.21
Self Rated Health (Excellent, Very good)	304	273 31	-	-	53 19	12.69	0.00
Life Satisfaction (Excellent, Very good)	305	274 31	-	-	62 32	10.21	0.00

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-6: characteristics of participants who show response shift and no response shift in item 7 (keeping physically active)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	327	233 94	89.6±2.8 89.7±2.9	-0.47	-	-	0.63
PCS	300	215 85	39.7±10.1 36.1±9.5	2.82	-	-	0.00
MCS	300	215 85	54.6 ±7.4 52.8±8.1	1.84	-	-	0.06
Successful Aging (Yes)	327	233 94	-	-	85 87	0.38	0.53
Marital Status (Married)	327	233 94	-	-	69 60	2.47	0.11
Independent Living (Own home)	327	233 94	-	-	82 82	0.00	0.99
Self Rated Health (Excellent, Very good)	321	230 91	-	-	56 35	10.94	0.00
Life Satisfaction (Excellent, Very good)	321	227 94	-	-	64 47	8.43	0.00

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-7: characteristics of participants who show response shift and no response shift in item 8 (keeping mentally active)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	333	252 81	89.7±3.0 89.5±2.2	0.56	-	-	0.57
PCS	303	233 70	39.3±10.0 36.5±8.6	2.04	-	-	0.04
MCS	303	233 70	54.7 ±7.6 52.3±7.7	2.27	-	-	0.02
Successful Aging (Yes)	333	252 81	-	-	87 80	1.88	0.17
Marital Status (Married)	333	252 81	-	-	68 58	2.84	0.09
Independent Living (Own home)	333	252 81	-	-	81 84	0.28	0.59
Self Rated Health (Excellent, Very good)	327	248 79	-	-	54 33	11.10	0.00
Life Satisfaction (Excellent, Very good)	325	246 79	-	-	63 46	7.50	0.00

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-8: characteristics of participants who show response shift and no response shift in item 9 (keeping busy)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	336	220 105	89.5±2.7 89.7±3.0	-0.49	-	-	0.62
PCS	304	204 92	39.2±10.2 38±9.7	0.90	-	-	0.36
MCS	304	204 92	54.5 ±7.4 53.8±8.2	0.65	-	-	0.51
Successful Aging (Yes)	336	220 105	-	-	86 86	0.02	0.87
Marital Status (Married)	336	220 105	-	-	66 67	.003	0.95
Independent Living (Own home)	336	220 105	-	-	82 81	.083	0.77
Self Rated Health (Excellent, Very good)	330	216 103	-	-	54 43	3.65	0.05
Life Satisfaction (Excellent, Very good)	328	217 102	-	-	63 53	2.72	0.09

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-9: characteristics of participants who show response shift and no response shift in item 10 (volunteering)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	302	226 76	89.5±2.8 89.6±2.8	-0.20	-	-	0.83
PCS	273	201 72	38.7±9.8 38.9±10.6	-0.17	-	-	0.86
MCS	273	201 72	54.2 ±7.7 54.2±7.4	0.00	-	-	0.99
Successful Aging (Yes)	302	226 76	-	-	85 87	0.09	0.75
Marital Status (Married)	302	226 76	-	-	63 75	3.49	0.06
Independent Living (Own home)	302	226 76	-	-	81 82	.001	0.97
Self Rated Health (Excellent, Very good)	296	224 72	-	-	48 50	.070	0.79
Life Satisfaction (Excellent, Very good)	296	222 74	-	-	59 59	.005	0.94

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-10: characteristics of participants who show response shift and no response shift in item 11 (Having goals/making plans)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	311	189 122	89.5±2.7 89.7±3.0	-0.43	-	-	0.66
PCS	283	173 110	38.4±10.0 39.3±9.8	-0.78	-	-	0.43
MCS	283	173 110	54.1±7.8 53.6±7.6	0.56	-	-	0.57
Successful Aging (Yes)	311	189 122	-	-	87 84	0.83	0.36
Marital Status (Married)	311	189 122	-	-	63 70	1.87	0.17
Independent Living (Own home)	311	189 122	-	-	80 83	0.40	0.52
Self Rated Health (Excellent, Very good)	306	186 120	-	-	52 48	0.63	0.42
Life Satisfaction (Excellent, Very good)	306	184 122	-	-	59 57	0.10	0.74

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-11: characteristics of participants who show response shift and no response shift in item 12 (Helping family/friends)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	320	215 105	89.6 ±3.0 89.5±2.6	0.366	-	-	0.71
PCS	304	276 28	38.4±9.9 39.1±10.2	-0.535	-	-	0.59
MCS	304	276 28	54.2 ±7.6 53.8±7.7	0.479	-	-	0.63
Successful Aging (Yes)	336	305 31	-	-	86 85	0.03	0.84
Marital Status (Married)	336	305 31	-	-	62 71	2.83	0.09
Independent Living (Own home)	336	305 31	-	-	80 86	1.55	0.21
Self Rated Health (Excellent, Very good)	330	299 31	-	-	52 44	2.11	0.14
Life Satisfaction (Excellent, Very good)	328	298 30	-	-	61 56	0.54	0.46

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-12: characteristics of participants who show response shift and no response shift in item 16 (Relationship with spouse/family)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	321	273 48	89.5±2.8 90.0±2.9	-1.07	-	-	0.28
PCS	293	249 44	38.8±10 37.4±8.9	0.80	-	-	0.41
MCS	293	249 44	54.7 ±7.5 52.5±7.3	1.77	-	-	0.07
Successful Aging (Yes)	321	273 48	-	-	86 88	0.07	0.79
Marital Status (Married)	321	273 48	-	-	73 40	20.22	0.00
Independent Living (Own home)	321	273 48	-	-	84 75	2.02	0.15
Self Rated Health (Excellent, Very good)	315	268 47	-	-	53 32	7.35	0.00
Life Satisfaction (Excellent, Very good)	313	266 47	-	-	62 47	3.65	0.05

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-13: characteristics of participants who show response shift and no response shift in item 17 (Friendships)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	323	230 93	89.5±2.8 89.8±2.8	-1.04	-	-	0.29
PCS	295	212 83	38.6±10.0 38.7±9.8	-0.09	-	-	0.92
MCS	295	212 83	54.4±7.6 53.3±7.5	1.18	-	-	0.23
Successful Aging (Yes)	323	230 93	-	-	87 85	0.22	0.63
Marital Status (Married)	323	230 93	-	-	67 65	0.11	0.73
Independent Living (Own home)	323	230 93	-	-	83 78	0.74	0.38
Self Rated Health (Excellent, Very good)	317	227 90	-	-	52 43	1.73	0.18
Life Satisfaction (Excellent, Very good)	317	228 89	-	-	61 56	0.72	0.39

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-14: characteristics of participants who show response shift and no response shift in item 18 (Pets)**

Variable	Number	Number Group No-RS, RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	300	226 74	89.41±2.9 89.7±2.6	-0.67	-	-	0.50
PCS	274	203 71	38.6±9.8 37.6±10.8	0.67	-	-	0.49
MCS	274	203 71	54.2±7.4 54.8±8.0	-0.65	-	-	0.51
Successful Aging (Yes)	300	226 74	-	-	87 80	2.46	0.11
Marital Status (Married)	300	226 74	-	-	67 62	0.53	0.46
Independent Living (Own home)	300	226 74	-	-	85 69	9.97	0.00
Self Rated Health (Excellent, Very good)	294	223 71	-	-	46 59	3.62	0.05
Life Satisfaction (Excellent, Very good)	294	221 73	-	-	59 62	0.12	0.72

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

**Table 13-15: characteristics of participants who show response shift and no response shift in item 19 (Being socially active)**

Variable	Number	Number Group No-RS, Group RS	Mean±SD	t-test	%	χ <sup>2</sup>	p.value
Age	326	207 119	89.7±2.9 89.5±2.7	0.48	-	-	0.62
PCS	298	187 111	38.9±10.0 38±9.5	0.72	-	-	0.46
MCS	298	187 111	54.2±7.6 54±7.8	0.31	-	-	0.75
Successful Aging (Yes)	326	207 119	-	-	85 89	1.30	0.25
Marital Status (Married)	326	207 119	-	-	66 66	0.01	0.90
Independent Living (Own home)	326	207 119	-	-	83 80	0.54	0.46
Self Rated Health (Excellent, Very good)	320	203 117	-	-	51 49	0.12	0.72
Life Satisfaction (Excellent, Very good)	320	203 117	-	-	60 60	0.00	0.96

Notes: PCS= physical component summary, MCS=mental component summary, No-RS= no response shift, RS= response shift, M= mean, SD= standard deviation, and x<sup>2</sup>= chi-square.

### **Logistic regression-bivariate**

The results of the logistic regression-bivariate analysis that relates characteristics of individuals who showed response shift in each of the 15 items are presented in Table 14. Regarding age, for an additional year in age, the odds of having response shift in the 'having a positive attitude' item was 1.11, and this result is statistically significant at  $p < 0.05$ . In other words, for an additional year in age, the odds of having response shift in the 'having a positive attitude' item was higher by 11% ( $= 1.11 * 100 - 100$ ). For a 1 unit difference in PCS score, the odds of having response shift in the 'good physical health' item as well as in the 'keeping mentally active' item was lesser by 3% ( $= 0.97 * 100 - 100$ ), and lesser by 4% in the 'keeping physically active' item. On the other hand, the odds ratio of having response shift in the 'absence of mental illness' item and the 'keeping mentally active' item was 0.95 and 0.96 for 1 unit difference in MCS.

Married men were only 24% as likely to have response shift in item number 16 that is 'relationship with spouse/family', compared to non-married men. Older men who lived independently in their own home were 37% as likely to have response shift in item number 18 that is 'pets'.

Self-rated health of excellent or very good identified men less likely to show response shift in physical and mental domains. Men who rated their health as excellent or very good were only: 36% as likely (ie: about 1/3 less likely) to have response shift in the 'good physical health' item, 43% in the 'keeping physically active' item, 26% in the 'being mentally aware' item, 51% in the 'having a positive attitude' item, 50% in the 'being happy' item, 21% in the 'absence of mental illness' item, 41% in the 'keeping mentally active' item. Further, the men with high self-rated health were less likely to



have response shift in the 'relationship with spouse/family' item. Men rating their satisfaction with life as excellent or very good were significantly less likely to have response shift in items related to physical domain and in two items related to mental domain: 'absence of mental illness' and 'keeping mentally active'.

**Table 14: Logistic regression-bivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics**

	Items/Variables	Age	PCS	MCS	SA (Yes)	MS (Married)	TOR (Own home)	SRH (Excellent or Very good)	LS (Excellent or Very good)
Physical	1. Good physical health	1.05 (0.9-1.1) 0.24	0.97 (0.9-1.0) 0.04**	0.98 (0.9-1.0) 0.32	0.62 (0.3,1.2) 0.18	0.84 (0.4,1.4) 0.55	0.73 (0.3,1.4) 0.37	0.36 (0.2, 0.6) 0.00**	0.45 (0.2,0.7) 0.00**
	7. Keeping physically active	1.02 (0.9-1.1) 0.63	0.96 (0.9-1.0) 0.00**	0.97 (0.9-1.0) 0.06	1.24 (0.6,2.5) 0.53	0.67 (0.4,1.1) 0.11	0.99 (0.5,1.8) 0.99	0.43 (0.2,0.7) 0.00**	0.48 (0.3,0.7) 0.00**
Mental	2. Being mentally aware	1.05 (0.9-1.1) 0.42	0.99 (0.9-1.0) 0.65	0.98 (0.9-1.0) 0.53	0.54 (0.2,1.3) 0.18	0.81 (0.3,1.7) 0.60	2.19 (0.6,7.4) 0.19	0.26 (0.1,0.6) 0.00**	0.76 (0.3,1.6) 0.47
	3. Having a positive attitude	1.11 (1.0-1.2) 0.04**	0.99 (0.9-1.0) 0.73	0.97 (0.9-1.0) 0.11	1.61 (0.6,4.2) 0.33	0.70 (0.3,1.3) 0.27	0.64 (0.3,1.3) 0.22	0.51 (0.2,9.6) 0.03**	0.59 (0.3,1.0) 0.09
	4. Being Happy	1.05 (0.9-1.1) 0.28	1.00 (0.9-1.0) 0.86	0.99 (0.9-1.0) 0.87	1.64 (0.7,3.8) 0.24	0.58 (0.3,1.0) 0.05	0.69 (0.3,1.3) 0.26	0.50 (0.2,0.8) 0.01**	0.63 (0.3,1.0) 0.09
	5. Absence of mental illness	1.00 (0.8-1.1) 0.92	0.97 (0.9-1.0) 0.26	0.95 (0.9-1.0) 0.03**	0.54 (0.2,1.3) 0.17	0.51 (0.2,1.0) 0.07	0.58 (0.2,1.3) 0.21	0.21 (0.0,0.5) 0.00**	0.29 (0.1,0.6) 0.00**
	8. Keeping mentally active	0.97 (0.8-1.0) 0.57	0.97 (0.9-1.0) 0.04**	0.96 (0.9-1.0) 0.02**	0.63 (0.3,1.2) 0.17	0.64 (0.3,1.0) 0.09	1.19 (0.6,2.3) 0.59	0.41 (0.2,0.6) 0.00**	0.49 (0.2,0.8) 0.00**
Social	9. Keeping busy	1.02 (0.9-1.1) 0.62	0.98 (0.9-1.0) 0.36	0.99 (0.9-1.0) 0.51	0.94 (0.4,1.8) 0.87	1.01 (0.6,1.6) 0.95	0.91 (0.5,1.6) 0.77	0.63 (0.3,1.0) 0.05	0.67 (0.4,1.0) 0.09
	10.volunteering	1.01 (0.9-1.1) 0.83	1.00 (0.9-1.0) 0.86	1.00 (0.9-1.0) 0.99	1.12 (0.5,2.4) 0.75	1.74 (0.9,3.1) 0.06	1.01 (0.5,1.9) 0.97	1.07 (0.6,1.8) 0.79	1.01 (0.5,1.7) 0.94
	11.Having goals/making plans	1.01 (0.9-1.1) 0.66	1.01 (0.9-1.0) 0.43	0.99 (0.9-1.0) 0.57	0.74 (0.3,1.4) 0.36	1.40 (0.8,2.2) 0.17	1.21 (0.6,2.1) 0.52	0.83 (0.5,1.3) 0.42	0.92 (0.5,1.4) 0.74
	12.Helping family/friends	0.98 (0.9-1.0) 0.71	1.00 (0.9-1.0) 0.59	0.99 (0.9-1.0) 0.60	0.93 (0.4,1.8) 0.84	1.54 (0.9,2.5) 0.09	1.50 (0.7,2.8) 0.21	0.70 (0.4,1.1) 0.14	0.83 (0.5,1.3) 0.46
	16.Relationship with spouse/family	1.05 (0.9-1.1) 0.28	0.98 (0.9-1.0) 0.41	0.96 (0.9-1.0) 0.07	1.13 (0.4,2.8) 0.79	0.24 (0.1,0.4) 0.00**	0.59 (0.2,1.2) 0.15	0.41 (0.2,0.7) 0.00**	0.54 (0.2,1.0) 0.05
	17.Friendships	1.04 (0.9-1.1) 0.29	1.00 (0.9-1.0) 0.92	0.98 (0.9-1.0) 0.23	0.84 (0.4,1.6) 0.63	0.91 (0.5,1.5) 0.73	0.76 (0.4,1.4) 0.38	0.71 (0.4,1.1) 0.18	0.80 (0.4,1.3) 0.39
	18.Pets	1.03 (0.9-1.1) 0.50	0.99 (0.9-1.0) 0.49	1.01 (0.9-1.0) 0.51	0.57 (0.2,1.1) 0.11	0.81 (0.4,1.4) 0.46	0.37 (0.2,0.7) 0.00**	1.68 (0.9,2.9) 0.05	1.10 (0.6,1.9) 0.72
	19.Being socially active	0.98 (0.9-1.0) 0.62	0.99 (0.9-1.0) 0.46	0.99 (0.9-1.0) 0.75	1.49 (0.7,2.9) 0.25	1.03 (0.6,1.6) 0.90	0.80 (0.4,1.4) 0.46	0.92 (0.5,1.4) 0.72	1.00 (0.6,1.6) 0.96

Notes: odds ratio in the first row, 95% confidence intervals in the second row, and p-value in the third row. PCS = physical component summary, MCS = mental component summary, SA = successful aging, MS = marital status, TOR = type of residence, SRH = self-rated health, and LS = life satisfaction.

## **Logistic regression-multivariate**

As shown in Table 15, logistic regression multivariate analysis was conducted to show how characteristics of individuals predict response shift in each of 15 items (15 models). The number of observations for each model is based on men who had no missing data for response shift-items and all the eight independent variables. Generally, among all of the independent variables, self-rated health, marital status, type of residence, and age were seen to be significant predictors for some items. In the 'good physical health' item, men who rated their health as excellent or very good were 31% as likely to have response shift in this item. Further, in the 'being mentally aware' item, men with high self-rated health were 29% as likely to show response shift. On the other hand, age was a significant predictor for men who showed response shift in the 'having a positive attitude' item. For an additional year in age, the odds of having response shift in this item were higher by 12%.

In the 'absence of mental illness' item, people with excellent or very good self-rated health were 22% as likely to show response shift. In addition, self-rated health was a predictor for men who showed response shift in the 'keeping physically active' item (odds=0.40) and in the 'keeping mentally active' item (odds=0.41). Marital status was a predictor for men who showed response shift in three social items, and not in the mental and physical items. Married men were more likely to show response shift in the 'volunteering' item (odds=1.94) and in the 'helping family/ friends' item (odds=1.81). In contrast, married men were 27% less likely to show response shift in the 'relationship with spouse/family' item. Furthermore, men who rated their health as excellent or very good were 38% as likely to show response shift in the same item. Men who

lived in their own home, not in a senior residence, were 33% as likely to show response shift in the 'pets' item.

**Table 15: Results of Logistic regression-multivariate analysis with odds ratio for response shift for each of 15 items associated with individual characteristics**

	Items/Variables	(N)	Intercept	Age	PCS	MCS	SA (Yes)	MS (Married)	TOR (Own home)	SRH (Excellent or Very good)	LS (Excellent or Very good)
Physical	1. Good physical health	292	-0.90	-	-	-	-	-	-	0.31(0.1-0.5) 0.00	-
	7. Keeping physically active	292	-0.51	-	-	-	-	-	-	0.40 (0.2-0.6) 0.00	-
Mental	2. Being mentally aware	296	-1.78	-	-	-	-	-	-	0.29(0.1-0.7) 0.00	-
	3. Having a positive attitude	289	-11.92	1.12 (1.0-1.2) 0.04	-	-	-	-	-	0.38(0.3-0.1) 0.00	-
	4. Being Happy	290	-0.98	-	-	-	-	-	-	0.53(0.3-0.9) 0.03	-
	5. Absence of mental illness	278	-1.60	-	-	-	-	-	-	0.22(0.0-0.5) 0.00	-
	8. Keeping mentally active	295	-0.80	-	-	-	-	-	-	0.41(0.2-0.7) 0.00	-
Social	9. Keeping busy	288	None	-	-	-	-	-	-	-	-
	10.volunteering	265	-1.54	-	-	-	1.94(1.0-3.6) 0.03	-	-	-	-
	11.Having goals/making plans	276	None	-	-	-	-	-	-	-	-
	12.Helping family/friends	286	-1.17	-	-	-	1.81(1.0-3.1) 0.03	-	-	-	-
	16.Relationship with spouse/family	285	-0.62	-	-	-	0.27(0.1-0.5) 0.00	-	-	0.38(0.1-0.7) 0.00	-
	17.Friendships	287	None	-	-	-	-	-	-	-	-
	18.Pets	266	-0.23	-	-	-	-	-	0.33(0.1-0.6) 0.00	-	-
	19.Being socially active	290	None	-	-	-	-	-	-	-	-

Notes: Odds ratio and 95% confidence intervals in the first row. P-value in the second row. PCS = physical component summary, MCS = mental component summary, SA = successful aging, MS = marital status, TOR = type of residence, SRH = self rated health, and LS = life satisfaction.  
(N)= the number of observation for each model is based on men who have no missing data for all the response shift-items and all the eight independent variables.

## **Response shift in health-related quality of life and participation in activities in the past month**

Table 16 presents the association between participants who show response shift in each of 15 items and their type of activities. For example, men who show response shift in the ‘good physical health’ item (RS01) and the ‘keeping physically active’ item (RS07) were more than twice as likely to not participate in visiting with friends or neighbors (Activ2). On the other hand, men who did not participate in hobby work, including collecting or handiwork (Activ3) were three times likely to show response shift in the ‘being mentally aware’ item (RS02), and 1.86 times as likely to show response shift in the ‘keeping busy’ item (RS09). Men who showed response shift in the ‘good physical health’ item were four times more likely to not participate in playing sports or games such as bowling or skiing (Activ4). Regarding social activities, men who did not play cards or bingo (Activ5), were three times more likely to show response shift in the ‘absence of mental illness’ item (RS05). Further, men who did not play cards or bingo as part of social activity were 1.80 times more likely to show response shift in the ‘helping family/friends’ item (RS12).

Church related activities (Activ6) were associated with having response shift in two items. Men who showed response shift in the ‘helping family/friends’ item (RS12) were 1.72 times more likely to not participate in church relates activities. In addition, men who showed response shift in the ‘being socially active’ item (RS19) were 2.18 times as likely to not participate in the same activity. Not participating in activities related to music, art, and theatre (Activ7) was associated with odds of showing response shift in many items. For example, men who show response shift in the ‘good physical health’ item (RS01) were 2.52 times more likely to not participate in arts. This result was

similar to men who showed response shift in the ‘having a positive attitude’ item (RS03). In addition, men who showed response shift in the ‘keeping mentally active’ item (RS08) and the ‘volunteering’ item (RS10) were 1.86 and 1.88 times more likely to not participate in activities related to arts, respectively. Men who did not participate in community volunteer work (Activ9) were two and a half times more likely to show response shift in the ‘helping family/friends’ item (RS12). The strongest association was seen in men who did not participate in working for pay including self-employment (Activ10). They were almost five times (4.80) more likely to show response shift in the ‘having goals/making plans’ item (RS11). Men who showed response shift in the ‘being happy’ item (RS04) were 2.13 as likely to not use computer (Activ11). Also, it was found that men who did not spend their time in travelling (Activ14) were twice as likely to show response shift in the ‘keeping physically active’ item (RS07). Men who did not participate in home maintenance activities (Activ13) were 1.66 times more likely to show response shift in the ‘keeping busy’ item (RS09). Men who did not participate in swimming, cycling, walking, etc (Activ18) were 1.78 times more likely to show response shift in the ‘keeping mentally active’ item (RS08). On the other hand, men who showed response shift in the ‘pets’ item (RS18) were 0.48 less likely to participate in ‘pet care’ (Activ19).

Men who did not participate in outdoor nature activities (Activ17) were more likely to show response shift in the physical domain’s items (RS01 and RS07), ‘having a positive attitude’ item (RS03), and ‘being socially active’ item (RS19).

**Table 16: Odds ratios with 95% confidence intervals for participants who show response shift in their health-related quality of life and their participation in activities in the past month**

	Activities/RS-items	Physical domain		Mental domain					Social domain							
		RS01	RS07	RS02	RS03	RS04	RS05	RS08	RS09	RS10	RS11	RS12	RS16	RS17	RS18	RS19
Physical	Activ4	<b>4.20</b> 1.2-13.9	1.79 0.8-3.8	5.47 0.7-41.1	1.61 0.6-4.3	1.63 0.6-3.8	2.71 0.6-11.7	2.32 0.9-5.7	1.14 0.5-2.2	0.96 0.4-2.0	0.74 0.3-1.4	1.57 0.7-3.2	2.80 0.8-9.4	1.56 0.7-3.2	1.10 0.5-2.3	1.13 0.5-2.1
	Activ13	1.53 0.8-2.6	1.40 0.8-2.3	1.35 0.6-2.8	1.47 0.7-2.7	1.52 0.8-2.6	2.06 0.9-4.3	1.25 0.7-2.1	<b>1.66</b> 1.0-2.7	0.92 0.5-1.5	1.24 0.7-2.0	0.99 0.6-1.6	1.73 0.9-3.2	1.05 0.6-1.7	1.09 0.6-1.8	0.86 0.5-1.4
	Activ14	1.31 0.7-2.3	<b>2.16</b> 1.2-3.8	0.88 0.4-1.9	0.81 0.4-1.5	1.74 0.9-3.2	1.47 0.6-3.4	1.61 0.9-2.8	1.50 0.8-2.5	0.81 0.4-1.4	1.14 0.7-1.8	1.44 0.8-2.4	1.48 0.7-3.0	1.24 0.7-2.1	1.31 0.7-2.3	0.90 0.5-1.4
	Activ17	<b>1.89</b> 1.0-3.3	<b>1.95</b> 1.1-3.2	0.91 0.4-1.9	<b>2.10</b> 1.0-4.1	1.15 0.6-2.0	0.92 0.4-1.9	1.57 0.9-2.6	1.22 0.7-1.9	1.13 0.6-1.9	1.08 0.6-1.7	1.07 0.6-1.7	0.96 0.5-1.8	1.14 0.6-1.8	1.28 0.7-2.2	<b>1.78</b> 1.1-2.8
	Activ18	1.40 0.7-2.5	1.18 0.6-2.0	1.71 0.7-3.7	1.51 0.7-2.9	1.06 0.5-1.9	0.88 0.3-2.1	<b>1.78</b> 1.0-3.0	1.13 0.6-1.9	1.33 0.7-2.3	1.07 0.6-1.8	1.15 0.6-1.9	1.00 0.4-2.0	1.15 0.6-2.0	0.95 0.5-1.7	1.24 0.7-2.0
	Activ19	0.71 0.3-1.4	1.19 0.6-2.3	0.85 0.3-2.1	2.52 0.8-7.3	1.59 0.7-3.4	0.47 0.2-1.1	0.56 0.3-1.0	0.66 0.3-1.2	1.55 0.7-3.2	0.72 0.4-1.3	0.86 0.4-1.6	1.01 0.4-2.3	1.48 0.7-2.9	<b>0.48</b> 0.2-0.9	0.69 0.3-1.2
Mental	Activ11	0.86 0.5-1.4	1.28 0.7-2.0	1.36 0.6-2.8	1.13 0.6-2.0	<b>2.13</b> 1.2-3.6	0.86 0.4-1.8	1.25 0.7-2.0	0.83 0.5-1.3	0.86 0.5-1.4	1.05 0.6-1.6	0.78 0.4-1.2	1.50 0.8-2.7	0.91 0.5-1.4	1.17 0.6-1.9	0.78 0.4-1.2
	Activ15	2.15 0.9-4.8	1.05 0.4-2.3	2.12 0.7-6.0	1.90 0.7-4.7	0.87 0.3-2.2	2.32 0.8-6.6	1.31 0.5-2.9	0.86 0.3-2.0	1.36 0.5-3.2	1.07 0.4-2.4	1.38 0.6-3.0	1.60 0.6-4.1	1.31 0.5-3.0	1.51 0.6-3.5	1.31 0.5-2.9
	Activ16	0.34 0.0-2.7	1.55 0.4-4.8	1.78 0.3-8.4	1.98 0.5-7.6	1.17 0.3-4.4	0.71 0.0-5.7	1.38 0.4-4.6	2.52 0.8-7.7	1.77 0.5-6.2	0.56 0.1-2.1	0.78 0.2-3.0	0.46 0.0-3.6	1.06 0.3-3.5	2.76 0.8-8.5	0.56 0.1-2.1
Social	Activ1	1.79 0.8-3.8	1.32 0.6-2.7	1.08 0.3-3.2	1.08 0.4-2.7	1.65 0.7-3.5	1.20 0.3-3.6	0.75 0.3-1.7	1.54 0.7-3.1	1.18 0.5-2.6	1.33 0.6-2.7	1.43 0.6-2.9	1.76 0.7-4.1	1.20 0.5-2.5	0.64 0.2-1.6	1.24 0.6-2.5
	Activ2	<b>2.22</b> 1.0-4.5	<b>2.75</b> 1.4-5.3	0.98 0.3-2.9	0.94 0.3-2.3	0.83 0.3-1.8	1.04 0.3-3.1	1.46 0.7-2.9	1.56 0.7-3.1	0.52 0.2-1.3	1.10 0.5-2.1	1.53 0.7-3.0	0.94 0.3-2.3	1.28 0.6-2.5	0.40 0.1-1.0	1.00 0.5-1.9
	Activ5	1.15 0.6-2.0	0.96 0.5-1.6	1.34 0.5-3.1	1.28 0.6-2.5	0.80 0.4-1.4	<b>3.12</b> 1.0-9.2	0.79 0.4-1.3	1.04 0.6-1.7	0.92 0.5-1.6	1.46 0.8-2.4	<b>1.80</b> 1.0-3.0	1.17 0.5-2.3	1.64 0.9-2.8	0.67 0.3-1.1	1.31 0.7-2.1
	Activ6	1.83 0.9-3.4	0.80 0.4-1.3	0.89 0.4-1.9	0.90 0.4-1.7	1.14 0.6-2.0	0.87 0.3-1.9	0.97 0.5-1.6	1.01 0.6-1.6	0.83 0.4-1.4	1.02 0.6-1.6	<b>1.72</b> 1.0-2.9	1.25 0.6-2.4	0.95 0.5-1.6	1.17 0.6-2.1	<b>2.18</b> 1.2-3.7
	Activ8	1.81 0.9-3.3	0.87 0.5-1.4	1.49 0.6-3.4	1.69 0.8-3.4	0.92 0.5-1.6	0.88 0.4-1.8	0.85 0.5-1.4	1.32 0.7-2.2	1.24 0.7-2.1	1.11 0.6-1.8	1.18 0.7-1.9	1.50 0.7-2.9	0.91 0.5-1.5	0.90 0.5-1.5	1.16 0.7-1.8
	Activ9	1.54 0.6-3.8	1.66 0.7-3.7	1.31 0.3-4.5	0.56 0.2-1.2	2.10 0.7-5.5	4.83 0.6-36.5	0.85 0.4-1.7	1.56 0.7-3.3	1.42 0.6-3.2	1.90 0.9-3.9	<b>2.59</b> 1.1-6.0	0.83 0.3-2.0	1.13 0.5-2.3	0.85 0.3-1.9	1.59 0.7-3.3
	Activ3	1.24 0.6-2.2	1.25 0.7-2.1	<b>3.07</b> 1.1-8.2	1.47 0.7-2.8	0.86 0.5-1.5	2.41 0.9-6.0	1.73 0.9-3.0	<b>1.86</b> 1.1-3.1	0.79 0.4-1.3	0.95 0.5-1.5	0.66 0.4-1.0	1.03 0.5-1.9	1.35 0.8-2.2	1.40 0.7-2.5	0.91 0.5-1.4
Combined	Activ7	<b>2.52</b> 1.3-4.6	1.41 0.8-2.3	1.64 0.7-3.7	<b>2.26</b> 1.1-4.5	1.30 0.7-2.2	1.19 0.5-2.6	<b>1.86</b> 1.0-3.2	1.57 0.9-2.5	<b>1.88</b> 1.0-3.3	1.25 0.7-2.0	1.18 0.7-1.9	1.82 0.9-3.5	1.37 0.8-2.2	1.01 0.5-1.7	1.02 0.6-1.6
	Activ10	3.99 0.5-30.8	3.17 0.7-14.1	1.58 0.2-12.4	-	2.03 0.4-9.1	-	1.52 0.4-5.4	2.12 0.5-7.6	1.49 0.4-5.3	<b>4.80</b> 1.0-21.5	1.47 0.4-4.6	2.52 0.3-19.6	0.89 0.3-2.6	0.70 0.2-2.1	1.25 0.4-3.7
	Activ12	2.14 0.8-5.6	1.91 0.8-4.2	1.45 0.4-5.0	2.59 0.7-8.7	1.33 0.5-3.0	0.76 0.2-2.1	1.49 0.6-3.3	1.65 0.7-3.4	1.44 0.6-3.2	1.81 0.8-3.7	1.25 0.6-2.5	0.87 0.3-2.0	0.96 0.4-1.9	0.51 0.2-1.0	0.92 0.4-1.8

Notes: Odds ratios in bold font are statistically significant at p<0.05.

RS01= response shift in item 1(good physical health), RS02= response shift in item 2(being mentally aware), RS03= response shift in item 3(having a positive attitude), RS04= response shift in item 4 (being happy), RS05= response shift in item 5(absence of mental illness), RS07= response shift in item 7(keeping physically active), RS08= response shift in item 8(keeping mentally active), RS09=response shift in item 9(keeping busy), RS10=response shift in item 10 (volunteering), RS11= response shift in item 11(having goals/making plans), RS12=response shift in item 12(helping family/friends), RS16= response shift in item 16 (relationship with spouse/family), RS17=response shift in item17(friendship), RS18=response shift in item 18(pets), RS19=response shift in item 19(being socially active).

Activ1=visited with family or relatives, Activ2= visited with friends or neighbors, Activ3= hobby work, including collecting or handwork, Activ4= played sports or games (bowling, skiing, etc), Activ5= other social group activity (cards, bingo, etc), Activ6= church related activities, Active7= music, art, theatre, Activ8= service, fraternal or legion organizations, Activ9= community volunteer work, Activ10= working for pay (including self-employment), Activ11= used a computer (e-mail, internet, typing), Activ12= attended classes, workshops, lectures, Activ13= home maintenance (indoor and/or outdoor), Activ14= travel/vacation, Activ15= reading and/or writing, Activ16= watching television, Activ17= outdoor nature activities, Active18= exercise (swimming, cycling, walking, etc), Activ19= pet care.



## **Chapter 4: Discussion**

The purpose of our study was to explore response shift in health-related quality of life in community-dwelling older men. By using data from the Manitoba Follow-up Study, we were able to perform an individualized method for the first time to assess response shift in 360 community-dwelling older men. Individualized methods give the opportunity for individuals to identify important areas of health-related quality of life, and to rate their level of importance as well. Moreover, we examined response shift at both the group-level and individual level over a minimum of a one-year period to a maximum of a four-year period. In addition, we assessed the item-level and composite-level response shift in older men. This data also allows us to examine potential predictors of response shift in older men. Therefore, to our knowledge, this is a first extensive demonstration of response shift in an aging population.

In the study population, participants demonstrated a lower mean score in the physical component summary (PCS), while the mean score of the mental component summary (MCS) of the Medical Outcomes Study Short-Form 36 (SF-36) was similar, compared to the Canadian norms (older adults aged  $\geq 75$ , PCS=  $42.0 \pm 10.3$ , MCS=  $54.5 \pm 8.6$ ) (Hopman et al., 2000).

### **Identification of response shift in older men at group-level and individual-level analysis**

We estimated the magnitude of response shift in older men who participated in the Manitoba Follow-up Study by: a) Timing, b) Type, c) Direction, and d) Domain. With both group-level and individual-level analysis, we found that response shift was identified at each time period across items and domains. In the individual analysis, among the entire sample, response shift ranged across 15 items in a one-year period from 9.3% to 39.3%. On the average, response shift was 24.2% across all time periods and all 15 items. These percentages are similar

to what is available in the literature. Based on a study conducted by Ahmed et al., (2005) in people with stroke, 28% of people interviewed experienced response shift in their HRQOL between the 6 and 24-week of assessment, but only 8.5% experienced it as identified with the Patient Generated Index (PGI). Despite the differences between the two populations and the timeframe, they used the PGI as an individualized method to detect response shift that is similar to the idea used in our method. Also, Mayo et al. examined response shift in people with stroke at the individual level (Mayo, Scott, Dendukuri, Ahmed, & Wood-Dauphinee, 2008). They found that 67.4% did not show a response shift, whereas, 28% showed a response shift. Another study conducted by the same main author, demonstrated that 82% of individuals with inflammatory bowel disease did not show response shift over a two-year period, whereas, 14% showed a response shift (Mayo, Scott, Bernstein, & Lix, 2015). Ring et al., (2005) found that 81% of edentulous patients showed response shift, using the Schedule for the Evaluation of Individual quality of life (SEIQOL). SEIQOL is considered as an individualized measure that focuses on patient's choices, and it is similar to the concept used in our method.

In contrast to our method, Ahmed et al. did not find substantial response shift among community-dwelling with chronic diseases such as: arthritis, heart failure, diabetes, or chronic obstructive pulmonary disease, over a one-year period (Ahmed, Sawatzky, Levesque, Ehrmann-Feldman, & Schwartz, 2014). These individuals may have a stable health condition that may not be considered as a catalyst for response shift. In our study, we also had no specific catalyst.

Regarding type of response shift, both reprioritization and reconceptualization response shift were identified in each time period, but the majority of older men who show response shift demonstrated reprioritization (75.4%), while only 24.5% demonstrated reconceptualization in the

one-year period. Furthermore, in the individual-level analysis, we found that 17.3% of the entire sample showed reprioritization, while only 6.9% showed reconceptualization in a one-year period. From both analyses, reprioritization was more common, compared to reconceptualization. Both Ahmed and Ring looked at the type of response shift, but they primarily described reconceptualization (Ahmed et al., 2005 and Ring et al., 2005). In their studies, it was difficult to compare different domains or areas picked by individuals, unlike our study where we have a fixed list of domains. Therefore we can see how people change their weights (reprioritization).

Regarding the direction of response shift, our results confirmed that most older men who demonstrated reprioritization response shift showed a decrease in importance, whereas, most older men who demonstrated reconceptualization response shift leaned toward dropping a concept from the list of importance. In the group-level analysis, we found that most of older men who show reprioritization, showed decreased importance (54.1%), whereas, 45.9% showed increased importance in the one-year period. Moreover, at the individual level, we found that 9.5% of the entire sample decreased importance, while 7.7% increased importance in a one-year period. The direction of response shift has been explored in other three studies, but it has been defined differently (Mayo et al., 2008; Hinz et al., 2011; Mayo et al., 2015). For example, positive response shift applies to respondents who rate their health worse than predicted initially, and continue rating it to be better than predicted at follow up. Also, it applies to respondents who started rating their health better than predicted and continue rating it better than predicted. On the other hand, negative response shift applies to respondents who rate their health better than or closer to the expected, then decrease it later compared to the expected. Based on this definition,

Mayo et al., (2008) identified response shift at the individual level using residuals (difference between reported and predicted) to create trajectories at six months after stroke. In their analysis, they found the majority of participants did not show response shift (67%), while 13% showed negative response shift, and 15% showed positive response shift. Another study which used the same method but with a different population, showed that 82% did not show response shift, while 8% showed negative response shift, and 6% showed positive response shift (Mayo et al., 2015). Hinz et al., (2011), identified response shift at the individual level using the Then test in patients with urologic cancer at three months of their hospital admission, and they found that 38% of participants had no response shift. Furthermore, of those who showed response shift, 30% showed negative response shift, while 47.9% showed positive response shift. Differences in percentages of response shift in the literature are likely due to different methods that have been used. Researchers are still exploring this area.

Considering the magnitude of response shift among domains, we found that the average response shift for items within each domain, were more common in social-related items (31.8%), then physical-related items (24.1%), and last, mental-related items (15.1%) in the four-year period. This result is similar to our results found at the individual level analysis in the one-year period. In addition to our results, we realized that reconceptualization was seen mainly in the social domain, whereas, reprioritization was seen more in physical and mental domains (in all time periods).

This finding was in line with previous findings (Sajobi, Fiest, & Wiebe, 2014; Lix et al., 2013). In the first study conducted by Sajobi et al., reprioritization response shift was identified in people with epilepsy, using changes in the relative importance weights resulting from

regression analysis. In their results, they confirmed that there was a significant change in values of relative importance for the social function and seizure domains. Moreover, they found that patients who were treated surgically were more likely to experience response shift (increased importance) of social function, and less likely to worry about seizure. Lix and her colleagues used the same method of relative importance in identifying response shift in patients with inflammatory bowel disease at six months (Lix et al., 2013). They found that there was an evidence of reprioritization response shift in the social functioning domain of the SF-36 as well as in the Inflammatory Bowel Disease Questionnaire. Other studies showed different findings in which response shift was seen mainly in physical functioning among: spinal surgery patients; and stroke-free older men (Schwartz, Sajobi, Lix, Quaranto, & Finkelstein, 2013; Barclay & Tate, 2014). One study demonstrated that people with stroke can experience response shift in their physical functioning after one year (Barclay et al., 2011).

One recent study conducted by Sajobi et al., confirmed that even stroke-caregivers showed an evidence of response shift in both physical and mental functioning of the SF-36 at six months (Sajobi et al., 2015). Their results were significant only when they used changes in relative importance weights with multiple imputation method for incomplete longitudinal data. In patients with breast cancer, reprioritization response shift was evident in self-care and usual activities of the EuroQoL-EQ-5D, using the Then-test at the end of first hospital admission (Dabakuyo et al., 2013).

Two other studies used the random forest method to examine response shift reprioritization in multiple sclerosis and schizophrenia at 24 months (Boucekine et al., 2013; Boucekine et al., 2015). Individuals with multiple sclerosis were grouped into two groups: not

worsened and worsened (Boucekine et al., 2013). They found that response shift was evident in the worsened group. Furthermore, items related to the mental domain became more important after 12 months. After the second year of assessment, items related to the physical domain became more important. Individuals with schizophrenia who were grouped into three categories of stable, improved, or worsened, showed reprioritization response shift (Boucekine et al., 2015). In the stable individuals, items related to social functioning became more important compared to mental health, vitality, and role-emotional issues, whereas in the improved cases, mental health and social functioning became more important. Individuals who worsened over time, showed response shift in mental domain that became less important; and in vitality and bodily pain that became more important.

### **Predictors of response shift**

The second objective of our study was to identify factors that predict RS in older men who participated in the MFUS. , We found that many of the variables that were significant in the logistic regression -bivariate-analysis were not significant in the logistic regression-multivariate analysis, across the 15 models. Based on our results, age predicts response shift in the ‘having a positive attitude’ item. We found that marital status was a predictor for men who show response shift in only three social items: ‘volunteering’, ‘relationship with spouse/family’ and ‘helping family/ friends’, but not in the mental and physical items. Also, we found that self-rated health was a significant predictor for all of the physical and mental items; and for one of the social items, that is, ‘relationship with spouse/family’. Living independently predicts response shift in the ‘pets’ item.

Also, none of the physical component summary, mental component summary, successful aging, or life satisfaction were significant predictors for older men who show response shift in the multivariate analysis. These results can be supported by the contradictory results found in the literature about individuals with severe health problems who report their HRQOL higher than expected, whereas other individuals with stable health conditions show deterioration in their HRQOL (Schwartz et al., 2007). These changes could be as a result of response shift.

Although the list of items used in this study had been developed as themes, according to two qualitative studies that define successful aging (Tate et al., 2009; Tate et al., 2013), successful aging was not associated with having response shift in these items. We are not aware of other studies that looked at the association between successful aging and response shift.

Life satisfaction was a significant predictor of response shift only in the bivariate-analysis in three items. Older men who were highly satisfied with their life were less likely to show response shift. This means that older men who were not satisfied with their life were more likely to show response shift. However, in the multivariate-analysis, life satisfaction was not significant in any items. We are not aware of articles that focused on the association between life satisfaction and response shift.

Up to this date, there is limited knowledge about predictors of response shift. Some studies showed that having higher levels of symptoms such as fatigue and vertigo at the baseline or before treatment may be associated with a higher magnitude of response shift in cancer and Meniere's disease (Andrykowski et al., 2009; Yardley & Dibb, 2007). Moreover, individuals who have longer membership in a self-help group were less likely to show a response shift (Yardley & Dibb., 2007). Another study showed that individuals who survived from

hematopoietic stem cell transplants and had strong social support were associated with response shift (Beeken et al., 2011).

Mayo et al., (2015) used latent trajectory analysis of residuals to detect response shift in individuals with inflammatory bowel disease (n=388), and logistic regression for prediction over a two-year period. In their analysis, individuals were grouped into two categories: those who demonstrated a positive response shift and those who demonstrated a negative response shift. Twenty-three individuals were identified to have positive response shift, while thirty-one individuals were identified to have negative response shift. Those who showed positive response shift were more likely to be younger; to have more hostility symptoms; and to report worse scores for pain, mental health, physical functioning, social functioning, and general health perception at the baseline. On the other hand, individuals with negative response shift were more likely to report worse scores in pain and social functioning. Further, they did not find associations between response shift and individual's gender, personality, and coping type. Their findings are similar to the findings of Lix et al., (2013). The latter found that response shift was associated with pain and social function (Lix et al., 2013).

From our logistic regression-multivariate analysis, unsurprisingly, self-rated health was a significant predictor in eight items for older men who show response shift. It is linked to the theoretical model of response shift. Based on the theory, a change in health status becomes a catalyst, which invokes mechanisms leading to response shift. Mechanisms relate to different ways or strategies that may be followed by the individual, and may be associated with individual's characteristics (antecedents). A change in frame of reference is one of the mechanisms of response shift, and it is related to the nature of self-rated health (Rapkin &



Schwartz, 2004; Krause & Jay, 1994). In other words, individuals may change their frame of reference based on their physical health as well as their social comparison. For example, an older man who can walk independently using a cane may first rate his health as fair or poor. After comparing himself to a peer who used a wheelchair for transportation, he may later rate his health higher than before based on this social comparison. So, older men who rated their health as excellent or very good were less likely to experience response shift, whereas, older men who rated their health as fair or poor were more likely to experience response shift. Therefore, self-rated health is a significant variable that is associated with response shift. This is supported by two studies, which both highlighted the importance of selecting self-rated health as the most important question that matters to patients (Rosenzweig, Kuspinar, Daskalopoulou, & Mayo, 2014; Mayo et al., 2015). Mayo et al., (2015) conclude that ‘This adds to the evidence that the single question on self-rated health is useful for monitoring individuals over time’.

In addition, marital status was not surprisingly a significant predictor of response shift for three items in the social domain. Our results showed that married men were less likely to show response shift in social item that is ‘relationship with spouse/family’, and more likely to show response shift in other social-related items such as ‘volunteering’ and ‘helping family/friends’. Moreover, from the individual analysis, we found that older men increased importance of the ‘relationship with spouse/family’ item, and intended to drop the ‘volunteering’ and ‘helping family/friends’ items from list of importance.

On the other hand, age was a significant predictor for only one mental item, ‘having a positive attitude’. The experience of aging including health challenges and life events might be considered as a catalyst for a response shift process. Following this result, age was likely not a

catalyst. We think the reason why aging was not significant in many items in our results is because the age difference in our sample was not large. The mean age of older men in 2011 was 89.7 with standard deviation of only 2.9. Another reason could be that aging may be a gradual catalyst rather than a sudden event.

Surprisingly, the type of residence was a significant predictor for older men who show response shift in one social item that is 'pets'. Older men who live independently in their own home whether its house, townhouse, condominium townhouse, suite, apartment, or condominium apartment, were less likely to show response shift in this particular item. On the other hand, older men who live in a senior citizens residence, assisted living facility, personal care, or nursing home were more likely to show response shift in the 'pets' item. Some senior's facilities do not allow pets, and this may be a trigger to reconsider having a pet.

In the last analysis of our study, we calculated the odds ratio of having a response shift in each item of health-related quality of life associated with each activity participated in during the past month. Generally, we found that older men who showed response shift in items related to the physical domain, were more likely to not participate in activities that are physical in nature. For example, older men who show response shift in the 'good physical health' item were four times more likely to not participate in playing sports or games. Also, we found that older men who showed response shift in the social item, 'helping family/friends' were more likely to not participate in three activities: other social group activity (cards, bingo, etc), church related activities, and community volunteer work.

Information about the association of response shift and individual's participation is unique, as we are not aware of any study that looked at it. However, the association between

social participation and self-rated health was explored among Canadian older adults (Gilmour, 2012). In their study, they confirmed that 80% of Canadian older adults were regular participants in at least one social activity. Furthermore, there was significant positive association between participation and high self-rated health, but not with loneliness or dissatisfaction with life. The most common type of activity among older adults was related to family or friends, followed by church-related activities. Based on our results, older men who did not participate in activities related to ‘visited with friends or neighbors’ or ‘church related activities’, were more likely to have response shift in physical health as well as in ‘helping family/friends’ item and the ‘being socially active’ item.

## **Implications**

### **Who can use these results? Health professionals**

#### **Older men may experience a response shift**

The fact that older men change their opinion about areas relevant to health-related quality of life (reconceptualization), and how important these areas are to them (reprioritization), has many clinical implications. We demonstrated that older men experienced a response shift in a four and one-year period. Despite reasons or catalysts that initiate the shift, older men may not have the same opinion over time about their physical, mental, and social health. This may also apply to older men who may change their views about using a drug, undergoing surgery, or following a rehabilitation program. Therefore, measuring their health-related quality of life without considering the occurrence of a response shift, may not reflect the actual effect that may be as a result from a drug, surgery, or rehabilitation program. Consequently, health professionals who deal with older male clients should consider assessing response shift.

Another piece of information that may be useful is about assessing self-rated health. In our study, we demonstrated that having a single question about self-rated health is a predictor for having a response shift in eight items of health-related quality of life. Therefore, health professionals may incorporate question about self-rated health in their assessment.

### **Easier way to assess a response shift**

In our study, by adapting page number three of the Successful Aging Questionnaire, we showed how to assess reprioritization and reconceptualization using an individualized method that can be completed easily by clients at the same time with less memory involvement or mental effort compared to the PGI (Ahmed at al., 2005). Using a list that includes items about health-related quality of life (pre-defined items), and having three options of: very important; moderate important; and not important, allows clients to easily choose the relevant areas and rate the relative importance of the areas chosen. It is similar to the most developed measures of individualized quality of life: the SEIQOL and the PGI, but easier to be used by clients, and simpler to be interpreted by health professionals. Without using sophisticated statistical analyses, it provides information at the individual level. Thus, it allows health professionals to identify possible response shift over time.

### **My older male client showed a response shift**

It is important to know whether a client has experienced a response shift or not, but this information may not be useful on its own. What is really useful is to know more details about this response shift including: what type of response shift (reprioritization or reconceptualization); what direction (increased or decreased importance); and in which items and domains (physical, mental, or social). Having a better idea about what is happening with a gentleman's life may help

in creating a relevant therapeutic program. To illustrate the usefulness of having a better idea about response shift experienced by an older man in a clinical-setting, we use the following clinical scenario:

### **Clinical Scenario A-1**

Mr. John, an 83-year-old man who is retired and lives with his family, is diagnosed with stroke. After this incident, he is no longer able to walk safely or to use his right hand for most of the daily living activities (such as eating, washing face, and combing hair). Mr. John was referred by his medical doctor to the rehabilitation clinic, including physiotherapy and occupational therapy, to improve his functional level as much as possible. In the physiotherapy clinic, Mr. John was interviewed by his physical therapist. In the first session, functional assessment was performed and a treatment program was planned. Also, assessment of health-related quality of life was demonstrated at baseline by allowing Mr. John to choose the relevant areas from predefined items, and rate the relative importance of those areas. The physical therapist focused on preventing further complications that may result from inactivity such as muscle shortening, joint stiffness, and pressure sores as well as mobility. On the other hand, in the occupational therapy clinic, more attention was given to the activities of daily living. After three months of rehabilitation, Mr. John was not compliant with his sessions, and he was not consistent in doing his home exercise program. Both of the physical therapist and the occupational therapist were surprised because in the first session, Mr. John was worried about activities related to physical and mental health. So what is happening? After reading this study, both therapists decided to assess what is called a 'response shift' using the same method. They

discovered that Mr. John showed an evidence of a reprioritization in the physical items, which become less important.

In addition, Mr. John showed a reconceptualization response shift in three of the social related items such as being socially active, keeping busy, and friendships. These social items were not important to Mr. John in the first session of rehabilitation. Both therapists noticed that Mr. John experienced a response shift during a time of three months. In the following session, the physical therapist asked Mr. John about any changes that had happened during the last three months. Mr. John said ‘I lost my wife who used to talk to me. Now I have nobody. Maybe if I can attend some of the social programs available in my area, I will be able to have friends. Anyway, I can not do anything with this wheelchair.’ Based on our results in this study, both therapists may change the rehabilitation program by focusing more on participation in social activities. Moreover, they may prevent depression, loneliness, or feelings of social isolation by encouraging Mr. John’s activity in the social items which are now important to him. They can help Mr. John to find appropriate sources of social activities in terms of age, distance, and level of difficulty.

### **Who can use these results? Family-members and Caregivers**

Family-members and caregivers may also benefit from our results, especially from the prediction of response shift. Based on our study, if they know that non-married older men are: more likely to show response shift in relationship with spouse or family, and less likely to show response shift in the concept of volunteering and helping family or friends, they may change their approach. Also, they may have more meaningful discussion with other healthcare professionals. We can use the same clinical scenario to highlight this part.

## **Clinical Scenario A- 2**

Mr. John's daughter was aware of our study. The daughter encouraged her father to go and play cards with his neighbors. Most of the older adults in his neighborhood meet every Sunday in the park to play cards. The daughter thought that her Dad might consider having a new relationship with somebody. On the other hand, the daughter decided to spend the weekend with him because Mr. John may also change his relationship with his daughter, which may become stronger.

Mr. John's caregiver, who used to come every other day, was aware of our study too, maybe because of the daughter. She noticed that Mr. John did not participate in church related activities in the past month. Maybe Mr. John is going through a 'response shift' she said. The caregiver tried to encourage Mr. John to be socially active.

### **Who can use these results? Policy-makers and program-planners**

Policy makers and program planners who are interested in issues related to older adults, may be also interested in our results. They may evaluate the programs available for this population or they can create programs that may be more relevant to the older adults. First of all, based on our results, they understand that older men may change their opinion about components that make up health-related quality of life. They may consider more social activities for older adults. Based on our result that older men who show response shift in health-related quality of life, are more likely to not participate in activities, they may create a prevention policy that focused on assessing older adult's level of participation. By this, they may prevent social inactivity, loneliness, or depression.

### **Clinical Scenario A- 3**

After realizing that Mr. John is experiencing a response shift involving all the details about timing, types, direction, items, domains, and predictors involving participation, the family members and the therapists had a meeting with the people who are responsible for creating social programs in their area. After the meeting, people who are in charge of creating social programs realized that most of the programs available were designed for younger older adults, or for people with no functional disabilities. Furthermore, they have a small, limited variety of programs. After adapting this new information, more programs were planned for older adults with functional disabilities.

#### **Who can use these results? Researchers**

This study provides valuable and unique information about response shift phenomena in health-related quality of life among community-dwelling older men. In this study, many aspects of response shift have been exposed, such as timing, type, and direction. Further, information about response shift occurring at the item-level and composite-level are available too. Now, researchers have a better picture about this phenomenon in older men at both the group-level and the individual-level. On the other hand, information about predictors of response shift in older men can be useful for future prediction studies. All of this will add to the knowledge towards appropriately interpreting health-related quality of life outcomes in the older adults.

Also, we realized that showing no response shift in a four-year period (2011 and 2007), does not mean that there was no response shift happening during the five surveys. For example, an individual who may consider an item as: very important in 2007, then moderately important in 2008 and in 2009, very important in 2010, then very important in 2011, would still experience



response shift during the five surveys, it would not be identified by only looking at two of the time points (2007 and 2011). This information could be used as a caution when interpreting response shift in a long timeframe assessment.

### **Recommendations for future research**

Since the data from the Manitoba Follow-up Study provides the opportunity to examine different aspects of response shift at the individual and item-level, different ideas for future work can be mentioned. For example, response shift can be assessed among men who remained free from disease and men with disease. Also, we can determine if there is an association between response shift and the eight domains of the SF-36. In our study, we examined reprioritization and reconceptualization response shift in each item independently from other items. We would like to know, for example, if somebody shows a response shift in mental items is he going to show a response shift in other items? Also, we did not determine if there was a change in the marital status, health, or type of residence over time. This information may explore a catalyst of response shift. Designing a similar method that evaluates response shift individually, that is easy to use and interpret in research and clinical settings would be beneficial. There is an opportunity to interview individuals in the Manitoba Follow-up Study, to gather qualitative information about response shift.

### **Limitations**

Limitations of this study need to be considered. First, the psychometric properties of the 15 items used in the study have not been tested. However, it has content validity. The list had been developed as themes generated from older adults' definition of successful aging (Tate et al., 2009; Tate et al., 2013). Therefore, it represents the older adult population. Second, the result of

this study are limited to one sex and consequently, it will lack generalization. Third, we were not able to conduct a logistic regression for individuals who experienced different types and directions of response shift because of the small number of individuals.

## Chapter 5: Conclusion

This is not the first study to identify the occurrence of response shift in older men. A previous study identified the presence of recalibration and reprioritization response shift at the group-level among older men with and without stroke, using the same MFUS data, but with structural equation modeling (Barclay & Tate, 2014). These results, combined with our results, present extensive knowledge about response shift in older men. Despite the complexity of capturing and understanding individuals' perspective in relation to health-related quality of life, simpler individualized methods are needed. Data from the MFUS presents an opportunity to assess response shift by using an individualized method that is simpler to conduct and interpret. Across 15 items over a one-year period, response shift varied from a low of 9.3% for the 'being mentally aware' item to 39.3% for the 'having goals/making plans' item. Because we were examining response shift of 15 items, it was very uncommon to find older men with no response shift on any item. Only 27 out of 360 older men (7.5%) provided the same response on all the items they answered at both times (2010-2011). Within three domains, the average of the one-year period item specific response shift varied from 24.1% (physical), 16.0% (mental), and 29.2% (social). The average percentage of people showing response shift over 15 items, four time periods, within three domains, was 24.4%. Furthermore, reprioritization was more common in older men, especially in physical and mental related items, whereas, reconceptualization was noticed mainly in social related items. Also, our study revealed that older men who were older were more likely to show response shift in the 'having a positive attitude' item, whereas, older men who rated their health high are less likely to show a response shift in eight items. Further, married men were more likely to show response shift in volunteering and helping family/friends,

and less likely to show response shift in the 'relationship with spouse/family' item. Older men who lived independently in their home, not in a senior residence were less likely to show response shift in the 'pets' item. In our study, we found that older men who showed response shift were less likely to participate in activities. Therefore, this is a novel study exploring response shift in community-dwelling older men.

## Reference List

- Ahmed, S., Mayo, N. E., Wood-Dauphinee, S., Hanley, J. A., & Cohen, S. R. (2004). Response shift influenced estimates of change in health-related quality of life poststroke. *Journal of Clinical Epidemiology*, *57*(6), 561-570. doi: 10.1016/j.jclinepi.2003.11.003
- Ahmed, S., Mayo, N. E., Wood-Dauphinee, S., Hanley, J. A., & Cohen, S. R. (2005). Using the patient generated index to evaluate response shift post-stroke. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *14*(10), 2247-2257. doi: 10.1007/s11136-005-8118-4
- Ahmed, S., Mayo, N., Scott, S., Kuspinar, A., & Schwartz, C. (2011). Using latent trajectory analysis of residuals to detect response shift in general health among patients with multiple sclerosis. [corrected. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *20*(10), 1555-1560. doi:10.1007/s11136-011-0005-6
- Ahmed, S., Sawatzky, R., Levesque, J. F., Ehrmann-Feldman, D., & Schwartz, C. E. (2014). Minimal evidence of response shift in the absence of a catalyst. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, *23*(9), 2421-2430. doi: 10.1007/s11136-014-0699-3
- Andrykowski, M. A., & Hunt, J. W. (1993). Positive psychosocial adjustment in potential bone marrow transplant recipients: cancer a psychosocial transition. *Psycho-Oncology*, *2*(4), 261-276. doi: 10.1002/pon.2960020406
- Andrykowski, M. A., Donovan, K. A., & Jacobsen, P. B. (2009). Magnitude and correlates of response shift in fatigue ratings in women undergoing adjuvant therapy for breast cancer. *Journal of Pain and Symptom Management*, *37*(3), 341-351. doi: 10.1016/j.jpainsymman.2008.03.015

- Barclay-Goddard, R., Lix, L. M., Tate, R., Weinberg, L., & Mayo, N. E. (2011). Health-related quality of life after stroke: Does response shift occur in self-perceived physical function? *Archives of Physical Medicine and Rehabilitation*, 92(11), 1762-1769. doi:10.1016/j.apmr.2011.06.013
- Barclay, R., & Tate R. B. (2014). Response shift recalibration and reprioritization in health-related quality of life was identified prospectively in older men with and without stroke. *Journal of Clinical Epidemiology*, 67, 500-507.
- Beeken, R. J., Eiser, C., & Dalley, C. (2011). Health-related quality of life in haematopoietic stem cell transplant survivors: A qualitative study on the role of psychosocial variables and response shifts. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 20(2), 153-160. doi: 10.1007/s11136-010-9737-y
- Boucekine, M., Boyer, L., Baumstarck, K., Millier, A., Ghattas, B., Auquier, P., & Toumi, M. (2015). Exploring the response shift effect on the quality of life of patients with schizophrenia: An application of the random forest method. *Medical Decision Making: An International Journal of the Society for Medical Decision Making*, 35(3), 388-397. doi: 10.1177/0272989X14559273
- Boucekine, M., Loundou, A., Baumstarck, K., Minaya-Flores, P., Pelletier, J., Ghattas, B., & Auquier, P. (2013). Using the random forest method to detect a response shift in the quality of life of multiple sclerosis patients: A cohort study. *BMC Medical Research Methodology*, 13, 20-2288-13-20. doi: 10.1186/1471-2288-13-20
- Dabakuyo, T. S., Guillemin, F., Conroy, T., Velten, M., Jolly, D., Mercier, M., . . . Bonnetain, F. (2013). Response shift effects on measuring post-operative quality of life among breast cancer patients: A multicenter cohort study. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 22(1), 1-11. doi:10.1007/s11136-012-0135-5

- Daltroy, L. H., Larson, M. G., Eaton, H. M., Phillips, C. B., & Liang, M. H. (1999). Discrepancies between self-reported and observed physical function in the elderly: The influence of response shift and other factors. *Social Science & Medicine* (1982), 48(11), 1549-1561.
- Dilorenzo, T. A., Halper, J., & Picone, M. A. (2009). Quality of life in MS: Does aging enhance perceptions of mental health? *Disability and Rehabilitation*, 31(17), 1424-1431. doi: 10.1080/09638280802624543
- Dugan, E., Cohen, S. J., Robinson, D., Anderson, R., Preisser, J., Suggs, P., . . . McGann, P. (1998). The quality of life of older adults with urinary incontinence: Determining generic and condition-specific predictors. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 7(4), 337-344.
- Fries, J. F. (1980). Aging, natural death, and the compression of morbidity. *New England Journal of Medicine*, 303(3), 130-135.
- Fries, J. F. (2003). Measuring and monitoring success in compressing morbidity. *Annals of Internal Medicine*, 139(5 II), 455-459.
- Fuhrer, M. J. (2000). Subjectifying quality of life as a medical rehabilitation outcome. *Disability and Rehabilitation*, 22(11), 481-489.
- Galenkamp, H., Huisman, M., Braam, A. W., & Deeg, D. J. (2012). Estimates of prospective change in self-rated health in older people were biased owing to potential recalibration response shift. *Journal of Clinical Epidemiology*, 65(9), 978-988. doi:10.1016/j.jclinepi.2012.03.010
- Giles, L. C., Hawthorne, G., & Crotty, M. (2009). Health-related quality of life among hospitalized older people awaiting residential aged care. *Health and Quality of Life Outcomes*, 7, 71-7525-7-71. doi:10.1186/1477-7525-7-71

- Gilmour, H. (2012). Social participation and the health and well-being of canadian seniors. *Health Reports, 23*(4), 23-32.
- Golembiewski, R. T., Billingsley, K., Yeager, S. (1976). Measuring change and persistence in human affairs: Types of change generated vy OLD designs. *Journal of Applied Behavioural Research, 12*, 133-57.
- Groenvold, M., Fayers, P. M., Sprangers, M. A., Bjorner, J. B., Klee, M. C., Aaronson, N. K., . . . Mouridsen, H. T. (1999). Anxiety and depression in breast cancer patients at low risk of recurrence compared with the general population: A valid comparison? *Journal of Clinical Epidemiology, 52*(6), 523-530.
- Gureje, O., Kola, L., Afolabi, E., & Olley, B. O. (2008). Determinants of quality of life of elderly nigerians: Results from the ibadan study of ageing. *African Journal of Medicine and Medical Sciences, 37*(3), 239-247.
- Guyatt, G. H., Ferrans, C. E., Halyard, M. Y., Revicki, D. A., Symonds, T. L., Varricchio, C. G., . . . Clinical Significance Consensus Meeting Group. (2007). Exploration of the value of health-related quality-of-life information from clinical research and into clinical practice. *Mayo Clinic Proceedings, 82*(10), 1229-1239.
- Harrell, F. E., Jr, Lee, K. L., Matchar, D. B., & Reichert, T. A. (1985). Regression models for prognostic prediction: Advantages, problems, and suggested solutions. *Cancer Treatment Reports, 69*(10), 1071-1077.
- Harrell, F. E., Jr, Lee, K. L., & Mark, D. B. (1996). Multivariable prognostic models: Issues in developing models, evaluating assumptions and adequacy, and measuring and reducing errors. *Statistics in Medicine, 15*(4), 361-387.



- Hickey, A., Barker, M., McGee, H., & O'Boyle, C. (2005). Measuring health-related quality of life in older patient populations: A review of current approaches. *Pharmacoeconomics*, 23(10), 971-993.
- Hinz, A., Finck Barboza, C., Zenger, M., Singer, S., Schwalenberg, T., & Stolzenburg, J. U. (2011). Response shift in the assessment of anxiety, depression and perceived health in urologic cancer patients: An individual perspective. *European Journal of Cancer Care*, 20(5), 601-609. doi: 10.1111/j.1365-2354.2011.01256.x
- Hoi le, V., Chuc, N. T., & Lindholm, L. (2010). Health-related quality of life, and its determinants, among older people in rural vietnam. *BMC Public Health*, 10, 549-2458-10-549. doi: 10.1186/1471-2458-10-549
- Holland, R., Smith, R. D., Harvey, I., Swift, L., & Lenaghan, E. (2004). Assessing quality of life in the elderly: A direct comparison of the EQ-5D and AQoL. *Health Economics*, 13(8), 793-805. doi: 10.1002/hec.858
- Howard, G. S., Ralph, K. M., Gulanick, N. A., Maxwell, S. F., Nance, S. W., & Gerber, S. K. (2007). Internal invalidity in pretest-posttest self-report evaluations and a reevaluation of retrospective pretests. *Applied Psychological Measurement*, 1-23.
- Hopman, W. M., Towheed, T., Anastassiades, T., Tenenhouse, A., Poliquin, S., Berger, C., . . . Papadimitropoulos, E. (2000). Canadian normative data for the SF-36 health survey. canadian multicentre osteoporosis study research group. *CMAJ: Canadian Medical Association Journal = Journal De l'Association Medicale Canadienne*, 163(3), 265-271.
- Hyde, M., Wiggins, R. D., Higgs, P., & Blane, D. B. (2003). A measure of quality of life in early old age: The theory, development and properties of a needs satisfaction model (CASP-19). *Aging and Mental Health*, 7(3), 186-194. doi:10.1080/1360786031000101157

- Jang, Y., Chiriboga, D. A., Borenstein, A. R., Small, B. J., & Mortimer, J. A. (2009). Health-related quality of life in community-dwelling older whites and african americans. *Journal of Aging and Health, 21*(2), 336-349. doi: 10.1177/0898264308329001
- Jung, T., & Wickrama, K. A. S. (2008). An introduction to latent class growth analysis and growth mixture modeling. *Social and Personality Psychology Compass, 2*(1), 302-317.
- Krause, N. M., & Jay, G. M. (1994). What do global self-rated health items measure? *Medical Care, 32*(9), 930-942.
- Li, Y., & Schwartz, C. E. (2011). Data mining for response shift patterns in multiple sclerosis patients using recursive partitioning tree analysis. *Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation, 20*(10), 1543-1553. doi:10.1007/s11136-011-0004-7
- Lix, L. M., Sajobi, T. T., Sawatzky, R., Liu, J., Mayo, N. E., Huang, Y., . . . Bernstein, C. N. (2013). Relative importance measures for reprioritization response shift. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation, 22*(4), 695-703. doi: 10.1007/s11136-012-0198-3
- Layte, R., Sexton, E., & Savva, G. (2013). Quality of life in older age: Evidence from an irish cohort study. *Journal of the American Geriatrics Society, 61 Suppl 2*, S299-305. doi:10.1111/jgs.12198; 10.1111/jgs.12198
- Logsdon, R. G., Gibbons, L. E., McCurry, S. M., & Teri, L. (2002). Assessing quality of life in older adults with cognitive impairment. *Psychosomatic Medicine, 64*(3), 510-519.
- Mayo, N. E., Scott, S. C., Dendukuri, N., Ahmed, S., & Wood-Dauphinee, S. (2008). Identifying response shift statistically at the individual level. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation, 17*(4), 627-639. doi: 10.1007/s11136-008-9329-2

- Mayo, N., Scott, C., & Ahmed, S. (2009). Case management post-stroke did not induce response shift: The value of residuals. *Journal of Clinical Epidemiology*, 62, 114-1156.
- Mayo, N. E., Scott, S. C., Bernstein, C. N., & Lix, L. M. (2015). How are you? do people with inflammatory bowel disease experience response shift on this question? *13*(1), 52. doi: 10.1186/s12955-015-0232-6
- McDowell, I. (2006). *Measuring health: A guide to rating scales and questionnaires* (3rd ed.). New York: Oxford University Press.
- McPhail, S., Comans, T., & Haines, T. (2010). Evidence of disagreement between patient-perceived change and conventional longitudinal evaluation of change in health-related quality of life among older adults. *Clinical Rehabilitation*, 24(11), 1036-1044. doi: 10.1177/0269215510371422
- McPhail, S., & Haines, T. (2010). Response shift, recall bias and their effect on measuring change in health-related quality of life amongst older hospital patients. *Health and Quality of Life Outcomes*, 8, 65-7525-8-65. doi: 10.1186/1477-7525-8-65
- O'Boyle, C. A., McGee, H., Hickey, A., O'Malley, K., & Joyce, C. R. B. (1992). Individual quality of life in patients undergoing hip replacement. *Lancet*, 339(8801), 1088-1091. doi:10.1016/0140-6736(92)90673-Q
- O'Boyle, C. A., McGee, H., & Browne, J. (2000). Measuring response shift using the schedule for evaluation of individual quality of life. In Schwartz, C. E., & Sprangers, M. (Eds.). (2000). *Adaptation to changing health response shift in quality of life research* (1st ed.). Washington: American Psychological Association.
- Oort, F. J. (2005). Using structural equation modeling to detect response shifts and true change. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 14(3), 587-598.

- Oort, F. J., Visser, M. R., & Sprangers, M. A. (2005). An application of structural equation modeling to detect response shifts and true change in quality of life data from cancer patients undergoing invasive surgery. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 14(3), 599-609.
- Osborne, R. H., Hawthorne, G., Lew, E. A., & Gray, L. C. (2003). Quality of life assessment in the community-dwelling elderly: Validation of the assessment of quality of life (AQoL) instrument and comparison with the SF-36. *Journal of Clinical Epidemiology*, 56(2), 138-147.
- Patrick, D., & Erickson, P. (1993). *Health status and health policy- quality of life in health care evaluation and resource allocation*. Oxford: Oxford University Press.
- Power, M., Quinn, K., & Schmidt, S. (2005). Development of the WHOQOL-old module. *Quality of Life Research*, 14(10), 2197-2214. doi:10.1007/s11136-005-7380-9
- Rapkin, B. D., & Schwartz, C. E. (2004). Toward a theoretical model of quality-of-life appraisal: Implications of findings from studies of response shift. *Health and Quality of Life Outcomes*, 2, 14. doi: 10.1186/1477-7525-2-14
- Ring, L., Hofer, 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. doi: 10.1186/1477-7525-3-55
- Ruta, D. A., Garratt, A. M., Leng, M., Russell, I. T., & MacDonald, L. M. (1994). A new approach to the measurement of quality of life. the patient-generated index. *Medical Care*, 32(11), 1109-1126.
- Rosenzweig, A., Kuspinar, A., Daskalopoulou, S. S., & Mayo, N. E. (2014). Toward patient-centered care: A systematic review of how to ask questions that matter to patients. *Medicine*, 93(22), e120. doi: 10.1097/MD.0000000000000120

- Sajobi, T. T., Fiest, K. M., & Wiebe, S. (2014). Changes in quality of life after epilepsy surgery: The role of reprioritization response shift. *Epilepsia*, 55(9), 1331-1338. doi: 10.1111/epi.12697
- Sajobi, T. T., Lix, L. M., Singh, G., Lowerison, M., Engbers, J., & Mayo, N. E. (2015). Identifying reprioritization response shift in a stroke caregiver population: A comparison of missing data methods. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 24(3), 529-540. doi: 10.1007/s11136-014-0824-3
- Sawatzky, R., Ratner, P. A., Kopec, J. A., & Zumbo, B. D. (2012). Latent variable mixture models: A promising approach for the validation of patient reported outcomes. *Quality of Life Research : An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 21(4), 637-650. doi:10.1007/s11136-011-9976-6
- Schwartz, C. E., & Sprangers, M. A. (1999). Methodological approaches for assessing response shift in longitudinal health-related quality-of-life research. *Social Science & Medicine* (1982), 48(11), 1531-1548.
- Schwartz, C. E., Sprangers, M., Carey, A., & Reed, G. (2004). Exploring response shift in longitudinal data. *Psychology & Health*, 19(1), 51-69.
- Schwartz, C. E., Andresen, E. M., Nosek, M. A., Krahn, G. L., & RRTC Expert Panel on Health Status Measurement. (2007). Response shift theory: Important implications for measuring quality of life in people with disability. *Archives of Physical Medicine and Rehabilitation*, 88(4), 529-536. doi: 10.1016/j.apmr.2006.12.032
- Schwartz, C. E., Sajobi, T. T., Lix, L. M., Quaranto, B. R., & Finkelstein, J. A. (2013). Changing values, changing outcomes: The influence of reprioritization response shift on outcome assessment after spine surgery. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 22(9), 2255-2264. doi: 10.1007/s11136-013-0377-x

- Sprangers, M. A. (2002). Quality-of-life assessment in oncology. Achievements and challenges. *Acta Oncologica (Stockholm, Sweden)*, 41(3), 229-237.
- Sprangers, M. A., & Schwartz, C. E. (1999). Integrating response shift into health-related quality of life research: A theoretical model. *Social Science & Medicine (1982)*, 48(11), 1507-1515.
- Tate, R. B., Loewen, B. L., Bayomi, D. J., & Payne, B. J. (2009). The consistency of definitions of successful aging provided by older men: The manitoba follow-up study. *Canadian Journal on Aging = La Revue Canadienne Du Vieillissement*, 28(4), 315-322. doi: 10.1017/S0714980809990225
- Tate, R. B., Lah, L., & Cuddy, T.E. (2003). Definition of successful aging by elderly Canadian males: The Manitoba Follow-up Study. *Gerontologist*, 43, 735–744.
- Tate, R. B., Swift, A. U., & Bayomi, D. J. (2013). Older men's lay definitions of successful aging over time: The manitoba follow-up study. *International Journal of Aging & Human Development*, 76(4), 297-322.
- Tate, R. B., Cuddy, T. E., & Mathewson, F. (2014). Cohort profile: The Manitoba Follow-up Study (MFUS). *International Journal of Epidemiology*, doi: 10.1093/ije/dyu141
- United Nations Department of Economics and Social Affaires/Population Division World Population Prospects: The 2012 Revision.
- Walters, S. J., Munro, J. F., & Brazier, J. E. (2001). Using the SF-36 with older adults: A cross-sectional community-based survey. *Age and Ageing*, 30(4), 337-343.
- Ware, J. E., Jr, & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. conceptual framework and item selection. *Medical Care*, 30(6), 473-483.
- Wilson, I. B., & Cleary, P. D. (1995). Linking clinical variables with health-related quality of life. A conceptual model of patient outcomes. *Jama*, 273(1), 59-65.

Wisloff, F., Eika, S., Hippe, E., Hjorth, M., Holmberg, E., Kaasa, S., . . . Westin, J. (1996). Measurement of health-related quality of life in multiple myeloma. nordic myeloma study group. *British Journal of Haematology*, 92(3), 604-613.

World Health Organization, Division of Mental Health and Prevention of Substance Abuse. (1997). *WHOQOL: Measuring quality of life*. Retrieved from [http://www.who.int/mental\\_health/media/68.pdf](http://www.who.int/mental_health/media/68.pdf)

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(7), 813-828.

## Appendices

### Appendix 1: The University of Manitoba Follow-Up Study Questionnaire, 2011

#### UNIVERSITY OF MANITOBA FOLLOW-UP STUDY QUESTIONNAIRE, 2011

---

What is today's date? day \_\_\_\_\_ month \_\_\_\_\_ year \_\_\_\_\_

#### Whose opinions or answers will be presented in this questionnaire?

1. MFUS Member, unassisted
2. MFUS Member, assisted by relative or friend  
By whom and why? \_\_\_\_\_
3. Relative or friend (MFUS Member unable to fully understand and answer the questions)  
By whom and why? \_\_\_\_\_

#### How would you describe your health compared to others your age?

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor/Bad

#### What is your current marital status?

1. Single, for \_\_\_\_\_ years
2. Married/Common-law, for \_\_\_\_\_ years
3. Widowed, for \_\_\_\_\_ years
4. Divorced/Separated, for \_\_\_\_\_ years



**Please check  if you live alone \_\_\_ or live with others \_\_\_.**

If “live with others”, I live with ...

My spouse/partner .....  Yes  No

My grown-up child/children  
(18 years of age or older) ..  Yes  No

One or more other adults not  
mentioned above .....  Yes  No

One or more young children  
(under 18 years of age) .....  Yes  No

**What type of residence do you currently live in?**

1. House or townhouse or condominium townhouse
2. Suite or apartment or condominium apartment
3. Suite in Senior Citizens' housing unit or other apartment with a minimum age restriction
4. Board & Room, hostel, commercial boarding
5. Assisted living facility
6. Personal care or nursing home
7. Long-term care or extended care facility
8. Other, specify \_\_\_\_\_

**How long have you lived in your current place of residence?**

- |               |                     |
|---------------|---------------------|
| 1. 0-2 years  | 4. 11-25 years      |
| 2. 3-5 years  | 5. 26-50 years      |
| 3. 6-10 years | 6. 50 years or more |

**How long have you lived in your community?**

- |               |                     |
|---------------|---------------------|
| 1. 0-2 years  | 4. 11-25 years      |
| 2. 3-5 years  | 5. 26-50 years      |
| 3. 6-10 years | 6. 50 years or more |

**In looking at YOUR own personal life, how important are the following items in determining YOUR present quality of life?**

	<b>Very Important</b>	<b>Moderately Important</b>	<b>Not Important</b>
Good physical health .....	_____	_____	_____
Being mentally aware .....	_____	_____	_____
Having a positive attitude ...	_____	_____	_____
Being happy .....	_____	_____	_____
Absence of mental illness (eg, Alzheimer's, depression)	_____	_____	_____
Living to an old age .....	_____	_____	_____
Keeping physically active ....	_____	_____	_____
Keeping mentally active .....	_____	_____	_____
Keeping busy (eg, hobbies)....	_____	_____	_____
Volunteering .....	_____	_____	_____
Having goals/making plans ....	_____	_____	_____
Helping family/friends .....	_____	_____	_____
Acceptance of/coping with life changes .....	_____	_____	_____
Adapting to changes in life .	_____	_____	_____
Being spiritual/having faith .	_____	_____	_____
Relationship with spouse/family	_____	_____	_____
Friendships .....	_____	_____	_____
Pets .....	_____	_____	_____
Being socially active .....	_____	_____	_____
Being independent (eg, driving being mobile, financially)	_____	_____	_____
Still working .....	_____	_____	_____
Being retired .....	_____	_____	_____
Good lifestyle/needs are met .	_____	_____	_____

**Do you ... (please circle all that apply)**

- 1. walk unassisted
- 2. walk with the use of a cane / walker
- 3. use a scooter
- 4. use a wheel chair
- 5. cannot walk at all
- 6. other, please specify \_\_\_\_\_

**Following are some questions about how you spend your time.**

**In the past month, have you participated in these activities?**

- 1. Visited with family or relatives .....  Yes  No
- 2. Visited with friends or neighbours .....  Yes  No
- 3. Hobby work, including collecting or handiwork..  Yes  No
- 4. Played sports or games (bowling, skiing, etc)..  Yes  No
- 5. Other social group activity(cards, bingo, etc).  Yes  No
- 6. Church related activities .....  Yes  No
- 7. Music, art, theatre .....  Yes  No
- 8. Service, fraternal or Legion organizations ....  Yes  No
- 9. Community volunteer work .....  Yes  No
- 10. Working for pay (including self-employment)...  Yes  No
- 11. Used a computer (e-mail, Internet, typing)....  Yes  No
- 12. Attended classes, workshops, lectures .....  Yes  No
- 13. Home maintenance (indoor and/or outdoor).....  Yes  No
- 14. Travel/Vacation.....  Yes  No
- 15. Reading and/or writing .....  Yes  No
- 16. Watching television .....  Yes  No
- 17. Outdoor nature activities.....  Yes  No
- 18. Exercise (swimming, cycling, walking, etc.)...  Yes  No
- 19. Pet care .....  Yes  No
- 20. Flying .....  Yes  No
- 21. Other \_\_\_\_\_

**Which of the above activities are the most important to you?**

\_\_\_\_\_

*Now I have some questions about your ability to carry on different activities. I am interested in your capability, not whether or not you actually do them.*

**Are you capable of ..... without any help from anyone else?**

- Doing light housework (washing up, dusting etc.).  Yes  No  
Doing heavy housework (cleaning floors, windows).  Yes  No  
Making a cup of tea or coffee .....  Yes  No  
Preparing a hot meal .....  Yes  No  
Shovelling and yard work .....  Yes  No  
Shopping .....  Yes  No  
Managing financial affairs (banking,paying bills)  Yes  No  
Laundry (household and personal) .....  Yes  No  
Major house or household repairs .....  Yes  No  
Going up and down the stairs .....  Yes  No  
Getting about the house .....  Yes  No  
Going out of doors in good weather .....  Yes  No  
Getting in and out of bed .....  Yes  No  
Washing or bathing or grooming .....  Yes  No  
Dressing and putting shoes on .....  Yes  No  
Cutting your toenails .....  Yes  No  
Eating .....  Yes  No  
Taking medication or treatment .....  Yes  No  
Using the toilet .....  Yes  No  
Watching television or listening to radio .....  Yes  No  
Reading or writing .....  Yes  No  
Using the telephone .....  Yes  No  
Buttoning a sweater .....  Yes  No  
Getting up out of a chair and walking 3 meters ..  Yes  No

*The following question asks about how much control you believe you have over certain aspects of your life. Most of us can't directly control every aspect of our life. Also, one's ability to control certain aspects of life may change over time.*

Please indicate the extent to which you presently feel you can directly control the following aspects of life .....

	Not at all	A little	A lot	Completely
<b>Your physical health .....</b>	_____	_____	_____	_____
<b>Where you live or will be living .....</b>	_____	_____	_____	_____
<b>Who you spend your time with .....</b>	_____	_____	_____	_____
<b>The things you can do for fun and enjoyment .....</b>	_____	_____	_____	_____
<b>Developing new friendships</b>	_____	_____	_____	_____
<b>Your physical fitness .....</b>	_____	_____	_____	_____
<b>Your physical comfort (e.g., pain) .....</b>	_____	_____	_____	_____
<b>The basic things you must do just to look after yourself (e.g., bathing, eating, etc.) .....</b>	_____	_____	_____	_____
<b>The usual tasks that need to be done (e.g., housework, shopping, yardwork, laundry).....</b>	_____	_____	_____	_____
<b>Your life in general.....</b>	_____	_____	_____	_____

*Sometimes directly controlling certain aspects of life is not possible. With this in mind, please indicate the extent to which the following **THREE STATEMENTS** apply to you:*

STATEMENT 1: “I see the following things as LESS IMPORTANT NOW than when I was younger...”

	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>
<b>Good health .....</b>	_____	_____	_____	_____
<b>My family .....</b>	_____	_____	_____	_____
<b>My friendships .....</b>	_____	_____	_____	_____
<b>Planning for the future ...</b>	_____	_____	_____	_____
<b>Being knowledgeable .....</b>	_____	_____	_____	_____
<b>Doing a good job of what I do .....</b>	_____	_____	_____	_____
<b>Being physically active ...</b>	_____	_____	_____	_____
<b>Being efficient at what I do (e.g., getting things done quickly) .....</b>	_____	_____	_____	_____

STATEMENT 2: “I relate to others who are important to me.  
That is...”

	Never	Sometimes	Often	Always
<b>I take pride in the achievements of family and friends.....</b>	_____	_____	_____	_____
<b>I identify with people that have problems similar to mine</b>	_____	_____	_____	_____
<b>I let my doctor be the best judge of my health problems...</b>	_____	_____	_____	_____
<b>I enjoy the accomplishments of others .....</b>	_____	_____	_____	_____
<b>I find it comforting to learn that someone famous, successful, or powerful has problems similar to mine .....</b>	_____	_____	_____	_____
<b>I think that whether my health gets better or worse depends very much on my doctor .....</b>	_____	_____	_____	_____
<b>I feel a shared success when a person or team I want to win succeeds .....</b>	_____	_____	_____	_____
<b>I gain comfort from being around others who have problems like mine .....</b>	_____	_____	_____	_____
<b>I accept my doctor’s advice .....</b>	_____	_____	_____	_____

STATEMENT 3: “I hold certain beliefs about things...”

	Never	Sometimes	Often	Always
I believe that much of what happens in our lives is a part of the way ‘Mother Nature’ works .....	_____	_____	_____	_____
I believe that the way nature works is all for the best in the end .....	_____	_____	_____	_____
I believe that “Mother Nature knows best”.....	_____	_____	_____	_____
I believe that much in life is determined by fate or chance.....	_____	_____	_____	_____
I believe that good things are more likely to happen to people who are lucky .....	_____	_____	_____	_____
I fully accept that life sometimes works in ‘mysterious ways’ that are out of our control .....	_____	_____	_____	_____
I believe that if someone is unable to influence a major life event, that person should just “take it in stride”.....	_____	_____	_____	_____
I believe that when people cannot have what they want, they should learn to ignore their desires .....	_____	_____	_____	_____
I believe that it is better not to expect to have control over those things that are important to me .....	_____	_____	_____	_____



**In general, would you say your health is ...**

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

**Compared to one year ago, how would you rate your health in general now?**

1. Much better now than one year ago
2. Somewhat better now than one year ago
3. About the same as one year ago
4. Somewhat worse now than one year ago
5. Much worse than one year ago

**During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities *as a result of your physical health*?**

- a. Cut down the *amount of time* you spent on work or other activities .....  Yes  No
- b. *Accomplished less* than you would like .  Yes  No
- c. Were limited in the *kind* of work or other activities..... Yes  No
- d. Had *difficulty* performing the work or other activities (for example, it took extra effort) .....  Yes  No

The following questions are about activities that you might do during a typical day. Does *your health now limit you* in these activities? If so, how much?

ACTIVITY	Yes, Limited A Lot	Yes, Limited A Little	No, Not Limited At All
a. <i>Vigorous activities</i> , such as running, lifting heavy objects, participating in strenuous sports .....	_____	_____	_____
b. <i>Moderate activities</i> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf .....	_____	_____	_____
c. Lifting or carrying groceries	_____	_____	_____
d. Climbing <i>several</i> flights of stairs .....	_____	_____	_____
e. Climbing <i>one</i> flight of stairs	_____	_____	_____
f. Bending, kneeling, or stooping .....	_____	_____	_____
g. Walking <i>more than a mile</i> ....	_____	_____	_____
h. Walking <i>several blocks</i> .....	_____	_____	_____
i. Walking <i>one block</i> .....	_____	_____	_____
j. Bathing or dressing yourself.	_____	_____	_____

**During the *past 4 weeks*, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?**

- a. Cut down the *amount of time* you spent on work or other activities .....  Yes  No
- b. *Accomplished less* than you would like .  Yes  No
- c. Didn't do work or other activities as *carefully* as usual .....  Yes  No

**During the *past 4 weeks*, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups?**

1. Not at all
2. Slightly
3. Moderately
4. Quite a bit
5. Extremely

**How much *bodily* pain have you had in the *past 4 weeks*?**

1. None
2. Very mild
3. Mild
4. Moderate
5. Severe
6. Very severe

**During the *past 4 weeks*, how much did *pain* interfere with your normal work (including both work outside the home and housework)?**

1. Not at all
2. A little bit
3. Moderately
4. Quite a bit
5. Extremely

**These questions are about how you feel and how things have been with you *during the past 4 weeks*. For each question, please give the one answer that comes closest to the way you have been feeling.**

**How much of the time during the *past 4 weeks* ....**

	<b>All of the time</b>	<b>Most of the time</b>	<b>A good bit of the time</b>	<b>Some of the time</b>	<b>A little of the time</b>	<b>None of the time</b>
a. Did you feel full of pep?	_____	_____	_____	_____	_____	_____
b. Have you been a very nervous person? .....	_____	_____	_____	_____	_____	_____
c. Have you felt so down in the dumps that nothing could cheer you up? .....	_____	_____	_____	_____	_____	_____
d. Have you felt calm and peaceful? .....	_____	_____	_____	_____	_____	_____
e. Did you have a lot of energy? .....	_____	_____	_____	_____	_____	_____
f. Have you felt downhearted and blue? ....	_____	_____	_____	_____	_____	_____
g. Did you feel worn out?....	_____	_____	_____	_____	_____	_____
h. Have you been a happy person? .....	_____	_____	_____	_____	_____	_____
i. Did you feel tired? .....	_____	_____	_____	_____	_____	_____

**During the *past 4 weeks*, how much of the time has your *physical\_health or emotional problems* interfered with your social activities (like visiting with friends, relatives, etc.)?**

1. All of the time
2. Most of the time
3. Some of the time
4. A little of the time
5. None of the time

**How TRUE or FALSE is *each* of the following statements for you?**

**Definitely Mostly Don't Mostly Definitely  
true true know false false**

- a. I seem to get sick  
a little easier than  
other people ..... \_\_\_\_\_
- b. I am as healthy  
as anybody I know .. \_\_\_\_\_
- c. I expect my health  
to get worse ..... \_\_\_\_\_
- d. My health  
is excellent ..... \_\_\_\_\_

**How would you describe your satisfaction with life in general at present?**

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor/Bad

**What is YOUR definition of successful aging? \_\_\_\_\_**

---

---

---

---

**Would YOU say you have "AGED SUCCESSFULLY"? \_\_\_\_\_**

---

---

---

**Thank you very much for completing this lengthy questionnaire.**

**Please use the remainder of this page if you  
have any suggestions for the content of future surveys,  
or wish to comment on your experience with  
The Manitoba Follow-up Study.**

---

## Appendix 2: Certificate of final approval for new studies

		P126 - 770 Bannatyne Avenue Winnipeg, Manitoba Canada R3E 0W3 Telephone 204-789-3255 Fax 204-789-3414	
UNIVERSITY OF MANITOBA		BANNATYNE CAMPUS Research Ethics Board	
<b>HEALTH RESEARCH ETHICS BOARD (HREB)</b> <b>CERTIFICATE OF FINAL APPROVAL FOR NEW STUDIES</b> Delegated Review			
<b>PRINCIPAL INVESTIGATOR:</b> Mrs. Maryam Alshammari		<b>INSTITUTION/DEPARTMENT:</b> U of M/College of Rehabilitation Sciences	
		<b>ETHICS #:</b> H2015:046	
<b>APPROVAL DATE:</b> February 5, 2015		<b>EXPIRY DATE:</b> February 5, 2016	
<b>STUDENT PRINCIPAL INVESTIGATOR SUPERVISOR (If applicable):</b> Dr. Ruth Barclay			
<b>PROTOCOL NUMBER:</b> N/A		<b>PROJECT OR PROTOCOL TITLE:</b> Response Shift in Health-Related Quality of Life in Older Men: The Manitoba Follow-up Study [linked to HS15482(E96:320)]	
<b>SPONSORING AGENCIES AND/OR COORDINATING GROUPS:</b> N/A			
<b>Submission Date of Investigator Documents:</b> January 23, 2015		<b>HREB Receipt Date of Documents:</b> January 27, 2015	
<b>THE FOLLOWING ARE APPROVED FOR USE:</b>			
<b>Document Name</b>		<b>Version(if applicable)</b>	<b>Date</b>
<b>Protocol:</b> Proposal			submitted January 23, 2015
<b>Consent and Assent Form(s):</b>			
<b>Other:</b>			
<b>CERTIFICATION</b> The above named research study/project has been reviewed in a <i>delegated manner</i> by the University of Manitoba (UM) Health Research Board (HREB) and was found to be acceptable on ethical grounds for research involving human participants. The study/project and documents listed above was granted final approval by the Chair or Acting Chair, UM HREB.			
<b>HREB ATTESTATION</b> The University of Manitoba (UM) Research Board (HREB) is organized and operates according to Health Canada/ICH Good Clinical Practices, Tri-Council Policy Statement 2, and the applicable laws and regulations of Manitoba. In respect to clinical trials, the HREB complies with the membership requirements for Research Ethics Boards defined in Division 5 of the Food and Drug Regulations of Canada and carries out its functions in a manner consistent with Good Clinical Practices.			
<b>QUALITY ASSURANCE</b> The University of Manitoba Research Quality Management Office may request to review research documentation from this research study/project to demonstrate compliance with this approved protocol and the University of Manitoba Policy on the Ethics of Research Involving Humans.			
- 1 -			
<a href="http://www.umanitoba.ca/faculties/medicine/ethics">www.umanitoba.ca/faculties/medicine/ethics</a>			

**CONDITIONS OF APPROVAL:**

1. The study is acceptable on scientific and ethical grounds for the ethics of human use only. ***For logistics of performing the study, approval must be sought from the relevant institution(s).***
2. This research study/project is to be conducted by the local principal investigator listed on this certificate of approval.
3. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to the research study/project, and for ensuring that the authorized research is carried out according to governing law.
4. **This approval is valid until the expiry date noted on this certificate of approval.** A **Bannatyne Campus Annual Study Status Report** must be submitted to the HREB within 15-30 days of this expiry date.
5. Any changes of the protocol (including recruitment procedures, etc.), informed consent form(s) or documents must be reported to the HREB for consideration in advance of implementation of such changes on the **Bannatyne Campus Research Amendment Form**.
6. Adverse events and unanticipated problems must be reported to the HREB as per Bannatyne Campus Research Boards Standard Operating procedures.
7. The UM HREB must be notified regarding discontinuation or study/project closure on the **Bannatyne Campus Final Study Status Report**.

Sincerely,



John Arnett, PhD. C. Psych.  
Chair, Health Research Ethics Board  
Bannatyne Campus

- 2 -

Please quote the above Human Ethics Number on all correspondence.  
Inquiries should be directed to the REB Secretary Telephone: (204) 789-3255/ Fax: (204) 789-3414