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Frailty is a loss of human function in one or more physical, psychological, or social aspects and predisposes older adults to experience adverse health outcomes. In Jordan, the older adult population has not been treated as a separate group with their own health issues. A reliable and valid frailty instrument for use with the Jordanian population would be beneficial for identifying older adults who are frail. The Tilburg Frailty Indicator is one of the emerging frailty instruments used to screen for frailty in older adults. The purpose of this study was to establish the reliability and validity of the Arabic (Jordan) version of the Tilburg Frailty Indicator in older Jordanian adults.

A total of 109 Jordanian community dwelling older adults from Irbid, Jordan were recruited for this study and were screened for frailty by using the Arabic (Jordan) Version of the Tilburg Frailty Indicator, a 15-item questionnaire. Reliability tests were conducted by determining KR 20 values and calculating inter-item (Tetrachoric), item-total (Point-Biserial), and subscale-subscale correlations (Pearson's coefficient). The face, content, convergent, and divergent validity measures, and known group differences were used to test the validity of this instrument.

The total score of the Arabic (Jordan) version of the Tilburg Frailty Indicator had good reliability (KR 20= 0.77) and good convergent and divergent validity with the corresponding scales: physical-TFI and the SF36-physical function ($r = -0.317$), psychological-TFI and GDS ($r = 0.458$), and social-TFI and the SF 36-social function ($r = -0.304$). In addition, known group differences showed that the Jordanian older adults who

had comorbidities ($n= 75$, $M= 5.6471$, $SD = 3.70$) scored significantly higher on the frailty scale than those who did not have comorbidities ($n= 34$, $M= 7.6133$, $SD = 3.10$), $t(107) = -2.887$, $p = 0.005$). Hence, having comorbidities may contribute to frailty among older adults in Jordan. Conclusion: The Arabic (Jordan) version of the Tilburg Frailty Indicator is reliable and valid for use in Jordanian population.

THE ARABIC (JORDAN) VERSION OF THE
TILBURG FRAILTY
INDICATOR

by

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I would like to say to my parents that I could not imagine myself getting in the journey of the PhD program without your support, to my wife -Deemah- thanks for supporting me at the end of this journey, to my first baby –Muhannad- your eyes are sparking me to achieve future dreams, and to faculty, students, and staff at school of nursing/UNCG, you made me feel like I am still with my family.

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CHAPTER I

INTRODUCTION

Background of the Problem: Frailty and the Older Adult in Jordan

The Hashemite Kingdom of Jordan is an Arab nation located in the Middle East. It lies northwest of Saudi Arabia between Israel to the west and Iraq to the east. Syria borders it to the north. Jordan, as it is commonly known, is divided into 12 governorates. It has an area of 89,342 square kilometers, slightly smaller than the state of Indiana, and it has a population of 7,930,491 (CIA, 2015). Most of Jordan is arid desert, but the western part of the country has a rainy season from November to April. The life expectancy at birth is 72.79 years for males and 75.5 years for females (CIA, 2015).

Older adults in Jordan are confronted with emerging health issues. They have diabetes, hypertension, chronic heart diseases, and other conditions causing them to have a poor quality of life compared to other younger age groups of the Jordanian population and their counterparts in neighboring countries, such as North Africa and the surrounding Arab countries. The most prevalent diseases that occur in Jordan are diabetes, hypertension, and high blood cholesterol (Brown, et al., 2009). As shown in Table 1, the four leading causes of death in the Jordanian population are as follows: Ischemic Heart Diseases, cancer, stroke, and diabetes, which are also the same four leading causes of death in older adults. (IHME, 2010). Jordan has a higher total death rate caused by non-communicable diseases (79.76%) (IHME, 2010) in comparison with the Mediterranean

area (53%) (Al-Tarawneh, 2014). The crude death rate per 1,000 people in Jordan is 4. In comparison, Jordan's neighboring countries have the following crude death rates: 3 (Saudi Arabia), 5 (Iraq), 4 (Syrian Arab Republic), 5 (Israel), and 4 (Lebanon) (World Bank Group, 2015).

Table 1

Top Ten Causes of Death (All ages, 50-69, 70 and above)

| The cause of death | All ages % | 50-69yrs | 70yrs and above |
|---------------------------------------|------------|----------|-----------------|
| Ischemic Heart Disease | 18 | 23 | 23 |
| Cancer | 15 | 21 | 11 |
| Stroke | 12 | 12 | 19 |
| Diabetes | 7 | 11 | 9 |
| Congenital Abnormalities | 4 | - | - |
| Chronic Kidney Disease | 4 | 5 | 6 |
| Road Injuries | 4 | 2 | 1 |
| Lower-Respiratory Infection | 3 | 2 | 4 |
| Pre-Term Birth Complications | 2 | - | - |
| Chronic Obstructive Pulmonary Disease | 2 | 2 | 4 |

Source: IHME, 2010

It is important to mention the structure of the Jordanian healthcare system succinctly, which aims to deliver the healthcare services to the Jordanian people. Alongside private healthcare providers and international agencies (e.g. United Nations Relief and Works Agency (UNRWA)), the public health system sector in Jordan is divided into the following four main branches: the Ministry of Health (MOH), the Royal Medical Services (RMS), medical services in public universities, and health services in the ministries and government institutions (World Health Organization and Jordan's Ministry of Health, 2011). Dramatic changes have occurred in Jordan over the last 5 years that have put pressure on the healthcare system. These changes have resulted, in

part, from an influx of Syrian refugees. Syrian refugees now account for approximately 20% of the population in Jordan. Their healthcare needs have placed more demands on healthcare services and providers that are already in short supply and have reduced the allocated healthcare encounter time to Jordanian patients. Changes in family structure have also put pressure on the healthcare system. Jordanian older adults have recently confronted psychological and financial consequences as a result of the changes in the modern living pattern. For instance, the shrinking number of extended families versus nuclear ones causes financial difficulties for older adults. Nuclear families include fewer members managing financial resources and obtaining incomes compared to extended ones. The trend away from extended families also affects care issues for the older adults who are living in their own houses and pushes them to resort to nursing homes and senior care centers (NCFA, 2008).

Comprehensive, scholarly geriatric studies have not been widely conducted in Jordan to explore and assess the challenges and obstacles that older adults face in their later lives. Furthermore, the frailty concept has never been explored or addressed in Jordan. The definition of frailty varies in the field and ranges from defining the condition using the physical domain only to defining it using multi-dimensional domains (i.e., physical, psychological, social, and environmental). Knowing how factors such as comorbidities, physical function, psychological well-being, social context, and environmental conditions interact with each other and impact the life of the older adult could provide stakeholders in Jordan with important information about the older adult population. The frailty concept could be very useful as a way to understand the various

factors that contribute to disease in older adults and could be a key indicator of how successful health interventions are in preventing and treating frailty in older adults. The frailty concept can also be used in developing effective policies and procedures for providing healthcare to older adults in Jordan.

A reliable and valid frailty instrument for use with the Jordanian population would be beneficial for identifying older adults who are frail and selecting appropriate interventions such as providing in-home nursing care rather than moving an individual to institutional care. Few frailty instruments have been reported with estimates of reliability and validity, as well as whether their theoretical and conceptual models have been tested or not. A recent systematic review of the existing frailty instruments conducted by Pialoux, Goyard, and Lesourd (2012) found that the Survey of Health, Ageing and Retirement in Europe-Frailty Index (SHARE-FI) and the Tilburg Frailty Indicator (TFI) were the most suitable frailty instruments used in the primary healthcare field due to their good psychometric properties. SHARE-FI was created in a 2010 Romero-Ortuno, Walsh, Lawlor, and Kenny study. SHARE-FI only addresses the physical domain whereas the Tilburg Frailty Indicator addresses the multidimensionality of frailty.

The Tilburg Frailty Indicator (TFI) was selected for use in this study. It was developed by Gobbens and colleagues (2010a) and was created to satisfy two major gaps in the previous frailty instruments - the exclusion of disability from the instrument and addressing the three domains of frailty - physical, psychological, and social. (Gobbens et al., 2010a). The four main reasons for using the TFI were as follows: (1) The testing of its underlying conceptual model has established the relationships between life course

determinants, diseases, frailty, and health outcomes (Gobbens et al., 2012a). (2) It is a multi-dimensional instrument since it addresses the three domains of frailty (Gobbens et al. (2010b). (3) Its reliability and validity were examined and reported in two prior studies (Gobbens et al., 2010b; Gobbens et al., 2012a). Lastly, since the TFI rating scale uses “yes”, “no”, and “sometimes”, it is regarded as an elderly-friendly instrument.

This instrument has been translated into several languages (Polish, Spanish, Portuguese, and Danish). Its reliability and validity had been examined in these populations: Belgian (de Witte et al., 2013b), Dutch (Gobbens et al., 2010b), Portuguese (Coelho, Santos, Paúl, Gobbens, & Fernandes, 2014), Polish (Uchmanowicz et al., 2014), Brazilian (Santiago, Lima Luz, Mattos, Gobbens, & van Assen, 2013), and Danish (Andreasen, Sørensen, Gobbens, Lund, & Aadahl, 2014). The goal of this study was to test the reliability and validity of an Arabic version of the TFI that was developed as part of this study in collaboration with several Jordanian healthcare workers.

The Significance of the Problem

Frailty in community dwelling older adults can be used as an indicator that predicts potential health issues, such as hospitalization, health complications, disability, and death, for vulnerable people (Gobbens et al., 2010b). Thus, a study of frailty will contribute to the overall body of knowledge regarding the health of older adults, thereby offering healthcare providers a more in-depth understanding of older adults' needs. A broader understanding of the concept of frailty will also assist healthcare providers in determining health priorities pertinent to this population and how frailty intersects with related factors alongside the normal physiological changes with aging.

Statement of the Problem

The purpose of this study was to establish the reliability and validity of a frailty instrument for use with Jordanian community dwelling older adults. The first step in conducting this study was to validate the proposed instrument in the Jordanian older adult population to ensure that the results and findings were appropriate for that population. In light of the absence of an Arabic frailty instrument and the lack of research related to the Jordanian older adult population, it was important to evaluate the psychometric properties of an Arabic-translated frailty instrument. A valid frailty instrument would contribute to a deeper understanding about frailty in Jordan and would be an important addition to the existing body of knowledge, which in turn would propose the appropriate frailty interventions in a timely manner.

In addition, it would have been naïve to merely translate the instrument literally from the resource language to the target one. It was important to consider the cultural implications of the frailty concept since cultural considerations and variations could play an important role in defining and measuring frailty. Kagawa Singer (2012) reported that the absence of a scientific understanding of the role of culture in health studies contributes greatly to methodological issues in terms of validity and impedes the effective comparison between different studies based on variant operational definitions of the concept postulated by authors in the same population, thereby threatening the generalization of findings. This point raised the importance of considering the culture of the population with which the frailty instrument would be used.

Assumptions

Looking at frailty through the lens of multidimensionality was the major assumption in this study. That is, frailty is not merely a construct emanating from the physical aspect, but it also includes psychological and social aspects. Therefore, the existence of a multi-dimensional frailty instrument was necessary to capture all aspects of frailty in the Jordanian community dwelling older adult. The second assumption was that the Arabic version of the Tilburg Frailty Indicator (TFI) would be a valid and reliable frailty instrument when used in Jordan. Therefore, the specific aims of this study were to: a) examine the reliability of the TFI, entailing the inter-item tetrachoric and item-total point-biserial correlations, and the internal consistency of each sub-scale of the TFI (KR-20) and b) examine the validity of the TFI, entailing the correlations between the physical domain-TFI and the physical function-SF 36, the psychological domain-TFI and the Geriatric Depression Scale, and the social domain-TFI and social function.

Research Questions

Research Question 1

Does the Arabic version of the Tilburg Frailty Indicator yield reliable information about frailty in Jordanian community-dwelling older adults aged 60 years and older?

Research Question 2

Does the Arabic version of the Tilburg Frailty Indicator yield valid information about frailty in Jordanian community-dwelling older adults aged 60 years and older?

Relationships of Frailty to Life Course Determinants:

Physical, Psychological and Social Components

The following relational statement was depicted by the Gobbens and colleagues integral model of frailty: Life course determinants are associated with diseases and a decrease in psychological reserve, which lead to frailty, including three domains of frailty (physical, psychological, and social). Frailty, in turn, lead to increased health care utilization (visits general practitioner ($r=0.36$, $p<0.001$), contacts with healthcare professionals ($r=0.43$, $p<0.001$), receiving personal care ($r=0.47$, $p<0.001$), receiving nursing care ($r=0.34$, $p<0.001$), receiving informal care ($r=0.33$, $p<0.001$), and use of facilities in residential care ($r=0.27$, $p<0.001$)); disability ($r=0.66$, $p<0.001$); and low in quality of life domains (Physical health ($r=-0.71$, $p<0.001$), psychological health ($r=-0.69$, $p<0.001$), social relationships ($r=-0.40$, $p<0.001$), and environmental ($r=-0.52$, $p<0.001$)) (Gobbens et al., 2012a).

The relationships between the above components depicted in the Gobbens and colleagues (2010) integral model of frailty were tested by Gobbens and colleagues (2012a) and are discussed in Chapter II. The linear regression models were the following: frailty as a predictor of each disability ($R^2=0.20$, $p<0.001$), visits general practitioner ($R^2=0.06$, $p<0.01$), and contacts with healthcare professionals ($R^2=0.05$, $p<0.01$); physical frailty as a predictor of each disability ($R^2=2.87$, $p<0.001$), visits general practitioner ($R^2=0.18$, $p<0.001$), and contacts with healthcare professionals ($R^2=0.81$, $p<0.05$). The psychological frailty was significant as a predictor of disability ($R^2=1.16$, $p<0.05$), but not as a predictor of both visits general practitioner ($p>0.05$), and contacts

with healthcare professionals ($p>0.05$). However, social frailty was not significant as a predictor of each disability ($p>0.05$), visits general practitioner ($p>0.05$), and contacts with healthcare professionals ($p>0.05$). Based on their test, Gobbens and his colleagues determined that frailty leads to adverse outcomes, irrespective of disease(s) and life-course determinants. Most of the influences emanating from life-course determinants toward adverse outcomes are largely attenuated when diseases and frailty disappear. Thus, frailty represents a major mediating factor in the middle of the pathway between life course determinants and diseases and adverse outcomes (Gobbens et al., 2012a).

The integral model of frailty has also been selected for use by other researchers to underscore the significance of the multidimensional nature of frailty, such as Panza et al. (2011). This study expanded the concept of frailty to include cognitive aspects (Panza et al., 2011). Another study in which Gobbens and colleagues were involved used the integral model of frailty to explore the relationships between life course determinants and frailty (Gobbens, van Assen, Luijkx, Wijnen-Sponselee, & Schols, 2010a). Gobbens and colleagues revealed that there are some life course determinants (i.e., age, gender, education, income, unhealthy life style, life event, and multi-morbidity) that play a salient role in frailty and explained up to 35% of the variance of frailty ($p<0.001$). The findings of the study are summarized as follows: age (total frailty: $R^2=0.06$, $p=0.067$; physical: $R^2=0.06$, $p=0.013$; psychological: $R^2=-0.02$, $p=0.157$; and social: $R^2=0.02$, $p=0.170$), gender (total frailty: $R^2=0.41$, $p=0.105$; physical: $R^2=0.00$, $p=0.992$; psychological: $R^2=-0.02$, $p=0.823$; and social: $R^2=0.47$, $p<0.001$), education (total frailty: $R^2=0.00$, $p=0.988$; physical: $R^2=0.03$, $p=0.840$; psychological: $R^2=-0.07$, $p=0.367$; and social: $R^2=-0.02$,

p=0.746), income (total frailty: $R^2=-0.24$, $p=0.003$; physical: $R^2=-0.13$, $p=0.015$; psychological: $R^2=-0.04$, $p=0.119$; and social: $R^2=-0.04$, $p=0.134$), unhealthy life style (total frailty: $R^2=1.77$, $p<0.001$; physical: $R^2=1.21$, $p<0.001$; psychological: $R^2=0.38$, $p<0.001$; and social: $R^2=0.20$, $p=0.021$), life event (total frailty: $R^2=0.56$, $p=0.086$; physical: $R^2=0.21$, $p=0.358$; psychological: $R^2=0.31$, $p=0.009$; and social: $R^2=0.04$, $p=0.740$), and multi-morbidity (total frailty: $R^2=1.97$, $p<0.001$; physical: $R^2=1.64$, $p<0.001$; psychological: $R^2=0.30$, $p<0.001$; and social: $R^2=0.04$, $p=0.632$).

The multidimensional and dynamic nature of this model requires a holistic healthcare approach so the healthcare of older adults will not be jeopardized or fragmented as a result of targeting merely physical indicators (Gobbens et al., 2010). It elucidates the etiology of frailty over time depending on the existence of life course determinants and diseases, which in turn facilitate the process of identifying the people who are at higher risk for frailty, and thus, interventions can be provided in a timely manner. Furthermore, addressing frailty through a holistic approach guides healthcare providers to consider all symptoms of frailty emanating from involved frailty domains and towards holistic interventions. Lastly, this model enables healthcare providers to identify frail older adults in order to treat, delay, or reverse frailty to delay or treat its complications and adverse outcomes.

The Conceptual Definition of Concepts

Frailty

Frailty is a multidimensional and dynamic concept. It is conceptualized as a loss of human function in one or more physical, psychological, or social aspects resulting from life course determinants and predisposing individuals for adverse health outcomes (Gobbens et al., 2010b).

Life Course Determinants

Life course determinants are defined as follows: gender, age, marital status, ethnicity, education, income, lifestyle, life events and the living environment (Gobbens et al. 2012a).

Chronic Diseases

The U.S. National Center for Health Statistics defines the chronic disease as "a disease lasting three months or longer" (National Health Council, 2014). Based on Gobbens and colleagues' (2012a) test of the integral conceptual model of frailty, frailty plays an essential role in mediating partially or fully the influence of chronic diseases on adverse health outcomes; its mediation on the effect of diseases on adverse health outcomes is up to 57% based on the recruited sample in Gobbens and colleagues' study.

The Adverse Health Outcomes

According to the Integral Model of Frailty, frailty predisposes older adults to three negative health outcomes - disability, high healthcare utilization, and low quality of life (Gobbens et al., 2012a).

Summary

Chapter I provides the background for and significance of the existence of a valid and reliable frailty instrument for use in the country of Jordan. It presents why it was important to validate a frailty instrument to screen frail community dwelling older adults in Jordan. Jordanian healthcare providers lack a frailty instrument that can be utilized to screen frail older adults and, in turn, enable them to intervene accordingly. The integral theoretical framework of frailty and its frailty instrument (TFI) were designed to capture the aspects of the multi-dimensional frailty, entailing physical, psychological, and social domains. The Arabic translation of the TFI that was developed as part of this research project is the first Arabic and Jordanian frailty instrument for screening frail older adults. Therefore, the goal of the proposed study was to evaluate the psychometric properties of the Arabic version-TFI by testing it with Jordanian older adults to determine if this instrument was valid and reliable for use with this population.

CHAPTER II

REVIEW OF THE LITERATURE

The Scope of Frailty, and Its Variables, Factors, and Outcomes

The body of scholarly articles about frailty is quite large. A search of the frailty literature resulted in the selection of 19 studies based on meeting the following inclusion criteria: a) studies that recruited participants aged 60 years and older, b) studies in which the participants were community dwellers, and c) studies that used both the conceptual and operational definitions of frailty. Key words used in the search were as follows:

frailty, elder*, aged, old*, senior, community, and society. The databases used were: *Age Line, Academic Search Complete, CINAHL Plus with Full Text, CINAHL with Full Text, eBook Collection (EBSCO host), Environment Complete, Health Source: Nursing/Academic Edition, and Master FILE Complete.*

Ten of the 19 studies located in this search used participants in the 65 years and older age group (52) (Fried et al., 2001; Hastings et al., 2008; Lakey et al., 2012; Mitnitski et al., 2001; Newman & Gottdiener, 2001; Pozos-López et al., 2011; Ravaglia et al., 2008; Rolfson et al., 2006; Song et al., 2010; Theou et al., 2012). Four studies sampled older adults either aged 70 years or older, or aged 70 to 79 years (21%) (Bandeem-Roche et al., 2006; Gill et al., 2006; Khan et al., 2013; Rochat et al., 2010). One study sampled older adults aged 75 and older (5%) (Nourhashémi et al., 2001). Three studies included participants aged less than 65 years old (16%) (de Souto Barreto

et al., 2012; De Witte et al., 2013a; Romero-Ortuno et al., 2011). Romero-Ortuno and colleagues (2011) reported the mean age of the sample, which was 63.3 years, but did not report the age range (See Table 2.).

Table 2
Characteristics of Studies Reviewed

| Article | Demographics | Design/Method | Conceptual Definitions | Operational Definitions |
|---|---|--|--|---|
| Bandein-Roche, et al., 2006 | 786 women 70-79 older adults (Women's Health and Aging Studies) | Cross-validity of phenotype of frailty based on WHAS data sets | A decline in physiologic systems | The phenotype of frailty (Fried, et al., 2001) |
| de Souto Barreto, Greig, & Ferrandez, 2012 | 398 older adults 60 + | Stratified random sampling method based on original sample | A decline in physiologic reserves (Walston et al., 2006) | Four criteria: low body mass index (BMI), low level of physical activity, and dissatisfaction with both muscle strength and endurance |
| De Witte, et al., 2013 | 33,629 older adults 60 +(51% female,49% male) | Stratified, using quotas for gender and age | Loss of human functioning in one of frailty domains (Gobbens, et al., 2010b) | Comprehensive Frailty Assessment Instrument |
| Fried, et al., 2001 | 5,317 older adult 65+ | Convenience sampling methods/ Longitudinal study | Decreased reserve and resistance to stressors | The phenotype of frailty: weight loss, fatigue, slow walking, physical inactivity, and weakness. |
| Gill, Gahbauer, Allore, & Han, 2006 | 754 older adults 70 and above | Prospective | Reduction in reserve capacity | The phenotype of frailty |

Table 2 (cont.)

| Article | Demographics | Design/Method | Conceptual Definitions | Operational Definitions |
|--|--|--|--|--|
| Gobbens, van Assen, Luijkx, Wijnen-Sponselee, & Schols, 2010c | 484 aged 75 years and older | Cross-sectional. Setting/Community-based | Loss of human functioning in one of frailty domains (Gobbens, et al., 2010b) | Tilburg Frailty Instrument |
| Hastings, Purser, Johnson, Sloane, & Whitson, 2008 | 1,851 older adults 65 and above | Secondary analysis of data from the Medicare Current Beneficiary Survey/stratified sampling method (age) and clusters designated as primary sampling units | Deficit accumulation | Deficit Accumulation Index (DAI) |
| Khan, et al., 2013 | 2,825 older adults 70 + | Longitudinal study | Decreased reserve and resistance to stressors (Fried, et al., 2001) | The phenotype of frailty (Fried, et al., 2001) |
| Lakey, et al., 2012 | 33,324 Women aged 65 to 79 | Secondary analysis of the Women's Health Initiative Observational Study (WHI-OS), a prospective cohort study | Lack in physiologic reserve | The phenotype of frailty (Fried, et al., 2001) |
| Mitnitski, Mogilner, & Rockwood, 2001 | 1,468 participants 65 + | Based on cross-sectional and longitudinal components of the Canadian Study of Health and Aging | A proportion of deficits | Frailty Index |
| Newman & Gottdiener, 2001 | 4,735 CHS (Cardiovascular Health Study) 65 + | Ongoing observation of Cohort/prospective | Decreased reserve and resistance to stressors (Fried, et al., 2001) | The phenotype of frailty (Fried, et al., 2001) |

Table 2 (cont.)

| Article | Demographics | Design/Method | Conceptual Definitions | Operational Definitions |
|--|---|--|---|--|
| Nourhashémi, et al., 2001 | 7,364 women aged over 75 years | Cross-sectional analysis was carried out on the data from 7364 women aged over 75 years. | Incapacities in IADLs | Impairment in IADLs |
| Pozos-López, Navarrete-Reyes, & Ávila-Funes, 2011 | 250 older adults 65+ | Cross sectional | Decreased reserve and resistance to stressors (Fried, et al., 2001) | The phenotype of frailty (Fried, et al., 2001) |
| Ravaglia, et al, 2008 | 1,007 aged 65 + | Prospective population-based study | Decreased reserve and diminished resistance to stressors | Nine independent predictors of mortality: age ≥ 80 years, male gender, low physical activity, comorbidity, sensory deficits, calf circumference, < 31 cm, IADL dependence, gait and performance test score ≤ 24 , and pessimism about one's health |
| Rochat, et al., 2010 | 1,674 community-dwelling men, 70 or older | Cross-sectional | Decrease in physiological reserve (Fried, et al., 2001; Walston, et al., 2006; Bergman, et al., 2007) | The phenotype of frailty |
| Rolfson, Majumdar, Tsuyuki, Tahir, & Rockwood, 2006 | 158 (43% eligible) 53% women 47% men, older adult 65+ | Cross sectional | State of vulnerability | Edmonton Frailty Scale (EFS) |

Table 2 (cont.)

| Article | Demographics | Design/Method | Conceptual Definitions | Operational Definitions |
|---|---|--|----------------------------------|---|
| Romero-Ortuno, O'Shea, & Kenny, 2011 | 17,567 mean age 63.3 years | Longitudinal study | Complex, multidimensional | Survey of Health, Ageing, and Retirement in Europe (SHARE-FI) |
| Song, Mitnitski, & Rockwood, 2010 | 52,740 older adult 60.8% women 39.2% male aged 65 + | Prospective cohort study | Reduction in physiologic reserve | Frailty Index |
| Theou, Rockwood, Mitnitski, & Rockwood, 2012 | 2,305 older adults 65+ (874 male, 1431 female) | Secondary analysis regarding the clinical data extrapolated from population-based cohort study | Accumulated deficits | Two different frailty index (FI) measures (with/without disability and comorbidity) |

The frailty studies included longitudinal, prospective, cross-sectional, and secondary data analysis designs. Three studies addressed frailty in female participants only (Bande-en-Roche et al., 2006; Lakey et al., 2012; Nourhashémi et al., 2001) and one addressed frailty in males only (Rochat et al., 2010). Some frailty studies utilized previous data sets to conduct research for a different purpose such as cross-validation of the phenotype of frailty (Bande-en-Roche et al., 2006), creating a new frailty instrument (De Witte et al., 2013a), and conducting secondary data analysis (Hastings, et al., 2008; Mitnitski et al., 2001; Nourhashémi et al., 2001; Theou et al., 2012). Some studies were conducted to create and validate frailty instruments (de Souto Barreto et al., 2012; De Witte et al., 2013b; Fried, et al., 2001; Gobbens, van Assen et al., 2010; Romero-Ortuno

et al., 2011). The use of the term “frailty” is being debated in the current frailty literature. Some researchers define ‘multidimensional frailty’ as a distinct and separate concept from physical or uni-dimensional frailty. Physical frailty denotes the following biomedical indicators postulated by Fried and colleagues (2001): weight loss, slow walking, weakness, fatigue, and physical inactivity. The term ‘multidimensional frailty’ means that one or more of several domains; including physical, psychological, social, and environmental; could have a disturbance or loss in its function, as postulated by Gobbens et al. (2010). Consequently, multidimensional frailty could represent the loss or in-equilibrium in the general total image of the interactions occurring within an individual and the environment over time. In-equilibrium in the interactions within the individual could result in physical and psychological symptoms, and in-equilibrium in the interactions between an individual and the external environment could result in social issues, such as lack of support, and environmental issues, such as less safe environment.

Conceptual Definitions of Frailty

Because the etiology of frailty has been poorly understood, frailty has been conceptualized and defined differently in the nineteen studies. The four main categories of definitions of the concept of frailty in these studies were uni-dimensional, multidimensional, accumulation of deficits, and incapacities in the instrumental activities of daily living. The uni-dimensional concept implies a decline in physiologic or capacity reserve (Bandein-Roche et al., 2006; de Souto Barreto et al., 2012; Fried et al., 2001; Gill et al., 2006; Hastings et al., 2008; Newman & Gottdiener, 2001; Khan et al., 2013; Lakey et al., 2012; Pozos-López et al., 2011; Rochat et al., 2010). The multidimensional concept

implies a loss in one or more than one of the following domains: physical, psychological, social, etc. (De Witte et al., 2013a; Gobbens et al., 2010b; Ravaglia et al., 2008; Rolfson et al., 2006; Romero-Ortuno et al., 2011). The third category is accumulation of deficits, which means that the number of chronic diseases and health conditions (Mitnitski et al., 2001; Song et al., 2010; Theou et al., 2012), and the last is defined as incapacities as measured by the Instrumental Activities of Daily Living scale (IADLs) (Nourhashémi et al., 2001). Slightly over half (52%) of the nineteen studies conceptualized frailty as a one-dimensional concept and just over one fourth (26%) of the studies conceptualized frailty on a holistic, multidimensional basis. Of the remaining studies, 16% defined frailty in terms of deficits accumulation studies, and one study (5%) conceptualized frailty in the context of impairment in the instrumental activities of daily living (Nourhashémi et al., 2001).

Operational Definitions of Frailty

Frailty has been operationalized most commonly in these 19 studies as the phenotype of frailty, which means that if at least three of the following five criteria are met, then a person is considered to be frail: weight loss, fatigue, slow walking, physical inactivity, and weakness. Nine of the nineteen studies (47%) used this operational definition of frailty (Gill et al., 2006; Fried et al., 2001; Newman & Gottdiener, 2001; Khan et al., 2013; Rochat et al., 2010; Pozos-López et al., 2011; Bandeen-Roche et al., 2006; de Souto Barreto et al., 2012; Lakey et al., 2012). Nourhashémi et al (2001) used instrumental activities of daily living.

The second most common instrument used in the studies to recognize frailty was the Frailty Index (16%), which was used in four of the nineteen studies (Hastings et al., 2008; Mitnitski et al., 2001; Song et al., 2010; Theou et al., 2012). The Frailty Index was developed by Mitnitski and colleagues (2001) and consists of the following: symptoms (e.g., changes in sleep, memory complaints, low mood), signs (e.g., tremor, decreased peripheral pulses), abnormal laboratory values (e.g., urea, creatinine, calcium), disease classifications (e.g., diabetes mellitus, Parkinson' disease), and disabilities (e.g., dependence in bathing or dressing).

The remaining six studies (21%) used a variety of instruments to examine frailty on a multidimensional basis. One research group determined the following predictor variables from six domains: socio-demographic, lifestyle, medical status, physical function, nutrition, and mood and cognitive status (Ravaglia et al., 2008). Some researchers developed instruments to measure the following three domains of frailty: the physical, psychological, and social domains. These include the Edmonton Frail Scale (Rolfson et al., 2006), the Tilburg Frailty Instrument (Gobbens et al., 2010b), and the Survey of Health and Ageing and Retirement in Europe (SHARE-FI) (Romero-Ortuno et al., 2011). The only instrument developed that measures the environmental domain of frailty is the Comprehensive Frailty Assessment Instrument (De Witte et al. 2013a).

Theoretical Models of Frailty

Fried and colleagues (2001) postulated a model which they named the “hypothesized cycle of the phenotype of frailty.” The major relational statement in this model is that disease and aging changes contribute to sarcopenia, which lead to a lower

metabolic rate resulting in slow walking, disability, loss of energy, and undernutrition.

The following seven studies were guided by the hypothesized model postulated by Fried and colleagues: Bandeen-Roche et al., 2006; de Souto Barreto et al., 2012; Gill et al., 2006; Newman & Gottdiener, 2001; Lakey et al., 2012; Pozos-López et al., 2011; Rolfson et al., 2006. Two of the studies used the integral conceptual model of frailty (De Witte et al., 2013a; Gobbens, van Assen et al., 2010). Theoretical or conceptual models were not clearly reported in nine of the studies (Hastings et al., 2008; Khan et al., 2013; Mitnitski et al., 2001; Nourhashémi et al., 2001; Ravaglia et al., 2008; Rochat et al., 2010; Romero-Ortuno et al., 2011; Song et al., 2010; Theou et al., 2012).

The Conceptual Framework: The Integral Conceptual Model of Frailty

As stated in Chapter I, this research study was based on the integral model of frailty because of its holistic approach. The integral model of frailty was analyzed based on Walker and Avant's (2011) method, entailing the context of purpose, conceptual and operational definitions of concepts, major relational statements, usefulness, generalizability, and testability.

The conceptual model of frailty that Gobbens and his colleagues developed is an adaptation of a model developed in 2004 by Bergman and colleagues'. Bergman et al.'s model is named "Working Framework," in which Bergman et al. (2004) added cognitive decline and depressive symptoms, the psychological domain. The Working Framework model included components belonging to two aspects of frailty: physical and psychological. Gobbens and colleagues (2010) adapted the Working Framework to be more holistic by adding a third aspect of frailty, the social aspect. Gobbens and

colleagues (2010) hypothesized a new pathway in the existing model from life course determinants to frailty and then to adverse outcomes and they also indicated that frailty is influenced by several physical, psychological, and social domains as shown in Figure 1.

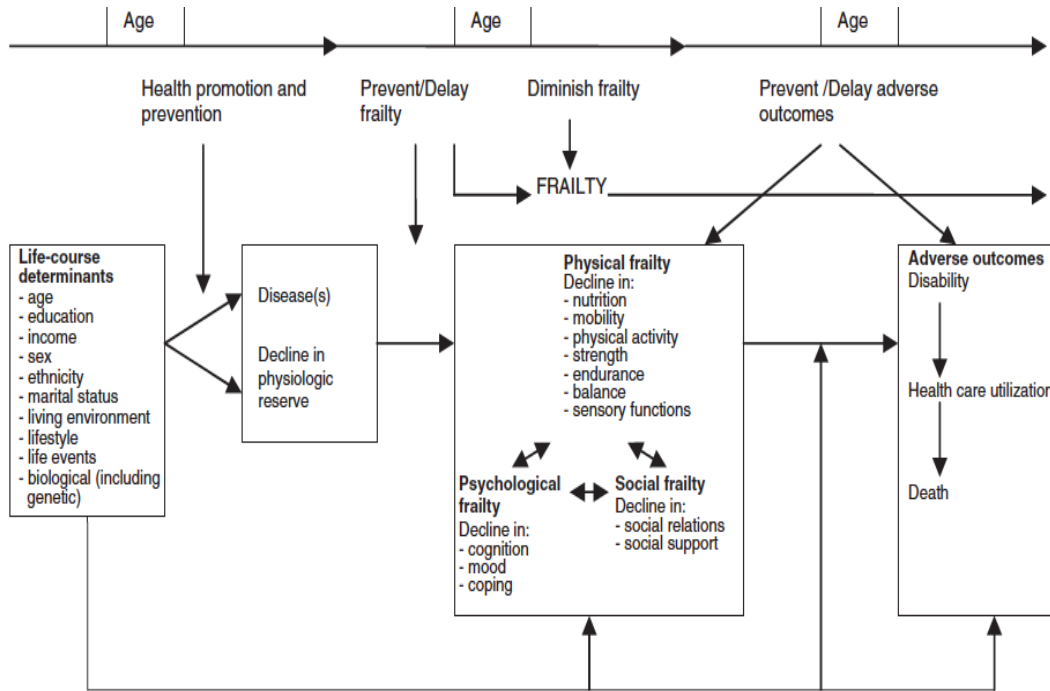


Figure 1. The Integrated (Named as Integral) Conceptual Model of Frailty by Gobbens and Colleagues' Model.

The Gobbens and Colleagues' (2010b) integral model of frailty aims to encourage investigators to define frailty on a holistic basis, cultivate preventive approaches in averting frailty, develop a multidimensional frailty instrument, and consider the relationships between frailty and life course determinants. Life course determinants are measured through a demographic survey designed by Gobbens and colleagues. Diseases are primarily determined using self-report measures (Puts, et al., 2005). Based on

Gobbens and colleagues' model (2010b), adverse health outcomes are defined as healthcare utilization, disability, and death.

The integral model of frailty was used in the following two studies: Gobbens et al. (2010b) and De Witte and colleagues (2013). Both research teams used the integral model of frailty to create a frailty instrument. Gobbens and his colleagues (2010b) developed the Tilburg Frailty Indicator (TFI), which is a multidimensional frailty survey to screen for frailty in older adults. The TFI is included in its entirety in Appendix I. Gobbens and his colleagues provide a model to guide healthcare providers (HCPs) to assess the physical, psychological, and social areas of human functioning in the older adult. That is, HCPs could use this model to identify frailty in each of the three domains and address the interventions toward the frailty issues identified in each domain. In doing so, the community dwelling older adults will be provided with a way to deal with their loss of human functioning based on the involved physical, psychological, or social frailty domain. In other words, they will have the opportunity to delay the adverse outcomes of frailty as shown in the model.

Gobbens et al's model is an appropriate model to use in combating the emerging health issues in Jordan that are affecting the health of community dwelling older adults. Using a multidimensional frailty model considering psychological and social factors alongside physical ones is appropriate to Jordanian culture due to two main characteristics. On the first hand, the disturbance in social factors leads to psychological health problems in Jordanian older adults (Mohammad, Kassim, & Yasir, 2013). On the other hand, since Jordanian culture values a close-knit family (NCFA, 2008), it is

important to take into account the nature of social interactions within the family, not merely the presence or number of people who live with older adults. The Gobbens and colleagues' model (2010) was adapted and used in this study to validate the Arabic version of the TFI among community-dwelling older adults in Jordan as shown in Figure 2. Thus, the three domains of frailty (physical, psychological, and social) were addressed in the study using the translated Arabic version of the TFI based on Gobbens and colleagues' (2010b) study.

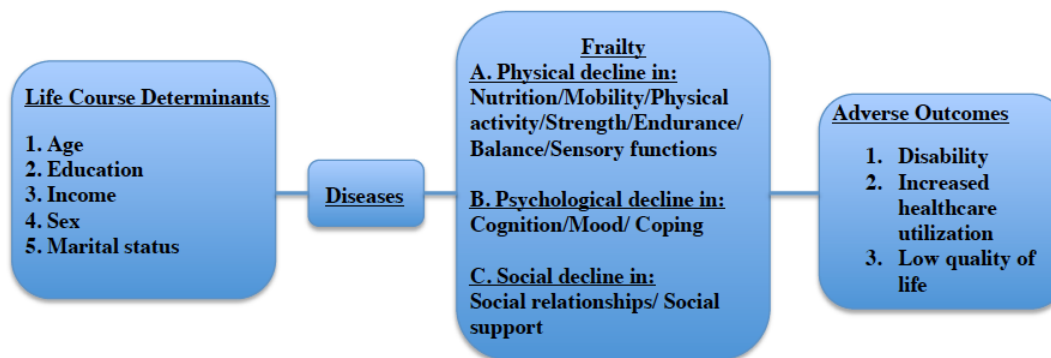


Figure 2. The Adapted Integral Model of Frailty to Validating the TFI Among Community-Dwelling Older Adults in Jordan.

Regarding its weaknesses, the integral model of frailty was based on the working framework of frailty postulated by Bergman et al. (2004), in which antecedents to frailty entail diseases and biological, psychological, and social factors. However, both Gobbens and Bergman s' postulations have not addressed vulnerable populations that have unique needs in the context of their behaviors, life style, and environment (Salem et al., 2014). The correlations between life course determinants and homeless populations were not addressed in the integral model of frailty (Salem et al., 2014). Some of the life course

determinants posited in the Gobbens and colleagues' model, such as genetic factors, are still under investigation in the literature.

Components of the Theoretical Framework: The Integral Conceptual Model of Frailty

Life Course Determinants

Several causes and indicators that occur prior to frailty have been considered as major concepts of life course determinants and antecedents of frailty. The concept of life course determinants and antecedents of frailty include the following: age (de Souto Barreto et al., 2012; de Witte et al., 2013a, Fried et al., 2001; Mitnitski et al., 2001; Rolfson et al., 2006; Song et al., 2010), diabetes, heart disease, depression, social activity (Nourhashémi et al., 2001), lifestyle, medical status, physical function, nutrition, mood and cognitive status (Ravaglia et al., 2008). The results of Hastings and colleagues' (2008) study show that there is an association between frailty and the following outcomes: hospitalization, nursing home admission, or imminent death (HR 5 1.98, 95% CI = 1.29–3.05). However, they found no correlation between frailty and the repeat outpatient Emergency Department visits during 30 days (HR 5 1.06, 95% CI = 0.73–1.54). Rochat and colleagues' study (2010) found that frailty is associated with the use of health and community services in the last 12 months of life regardless of "age, number of comorbidities, living alone, home ownership, post-school qualification, and being born in an English-speaking country" (OR ranged from 2.4, 95% CI= (1.58–3.50) to 11.5, 95%CI=7.22–18.44) (p.230).

Diseases

The de Witte and colleagues' (2013a) study found that emotional problems and mood-disorders; limitations in physical health; lack or loss of a social network or social support; and environment all contribute to frailty (The total explained variance ranged from 34.5% to 70%). The study conducted by Nourhashémi and colleagues (2001) showed that limitations in instrumental activities of daily living lead to frailty through association with cognitive impairment (OR 3.101, 95% CI=2.19–4.38) and fear of falling (OR 1.47, 95% CI= 1.28–1.69). Three studies addressed the associations among frailty, disability, and comorbidity (Gobbens et al., 2010b; Rochat et al., 2010; Theou et al., 2012). Gobbens and his colleagues found that frailty predicted disability (AUC=0.86, 95% CI=0.81–0.92) (Gobbens et al., 2010b). The Rochat study, which only included men, found a high correlation between frailty and disability in men (adjusted OR 2.04, 95% CI=1.21–3.44) (Rochat et al., 2010). Theou and his colleagues found that the presence of a disability and comorbidity predict an increase of 0.1 in the Frailty Index (HR 1.25, 95% CI: 1.20–1.30) (Theou et al., 2012). Their study also indicated that the cut-off of the FI is above 0.52, in which 98% of participants had dependency in at least one activity of daily living (ADL) and 99% in at least one instrumental activity of daily.

Lakey and colleagues (2012) have shown that depression is highly associated with the incidence of frailty in older adult women who used antidepressants for 3 years follow-up (<1 year OR = 1.95, 95% CI = 1.41-2.68; 1-3 years OR = 1.99, 95% CI = 1.45-2.74; >3 years OR = 1.60, 95% CI = 1.20-2.14). De Souto Barreto et al. (2012) explored the relationships among disability, comorbidity, and frailty and reported that 20.5% of frail

people had no disease, 30.8% had co-morbidity, 17.9% needed help with at least one physical activity, and 30.8% had both. Whereas Romero-Ortuno, et al. (2011), whose group conducted a longitudinal study to investigate the same relationships, discovered that the number of limitations increased in 3.6% of the non-frail, 12.2% of the pre-frail, and 30.4% of the frail participants.

The longitudinal study conducted by Fried, et al. (2001) discovered the prevalence of disease in 93% of the frail older adults in the study (7% frail: no disease, 25% frail: one disease, 56% frail: arthritis, 25% frail: HTN disease, 6% frail: diabetes). Newman and Gottdiener (2001) found that 11% of their frail participants had cardiovascular disease and 38% of their frail participants had some type of cardiovascular diagnosis. In addition, they found that frailty is associated with congestive heart failure (OR = 7.51, 95% CI= 4.66–12.12). Furthermore, psychological issues and disorders, such as cognitive decline, Alzheimer's disease (AD), and cognitive impairment were also shown to be associated with physical frailty in a 2011 Panza and colleagues' review.

Physical Frailty

Physical frailty has been conceptualized as a medical syndrome comprising weakness, less endurance, and diminished physiologic function making individuals more vulnerable to dependency and/or death (Gordon, Masud, & Gladman, 2014). There have been five recent studies showing that there is a relationship between physical frailty and psychological frailty symptoms. The relationship between physical frailty and depression or depressive symptoms was shown in two of those studies (OR = 2.66, 95% C.I =(1.36, 5.24), p= .004) (Collard, Comijs, Naarding, & Oude Voshaar, 2014) and (adjusted OR=

1.86, 95% CI= (1.30,2.66), $P < .01$) (Makizako et al., 2015). Two other studies showed the relationship between physical frailty and cognitive impairment (HR=1.63, 95% CI=1.27, 2.08) (Boyle, Buchman, Wilson, Leurgans, & Bennett, 2010) and ($p < 0.001$) (Buchman et al., 2014). The fifth study explored the relationship between physical frailty and cognition, affectivity, and housekeeping efficacy (Langlois et al., 2012).

Self-reporting and/or objective measurement of physical performance assist the healthcare provider in anticipating physical frailty (Abate et al., 2007). Savela and his colleagues found that physical frailty can be prevented or delayed by performing leisure-time physical activity (LTPA). In this study, the risk of frailty was found to be 80% lower in the high LTPA group versus the low LTPA group (adjusted OR = 0.20; 95% CI= 0.07, 0.55) (Savela et al., 2013). Additionally, comorbidity or the presence of at least two chronic diseases was found to be a predictor of frailty (Theou et al., 2012). As a result, older adults with frailty may have impairment in their ability to perform activities of daily living alongside their chronic diseases, contributing greatly to their functional decline. This results in a greater need for help with these daily life activities. In addition, it increases the potential for more frequent fractures and hospitalization (Martin & Brighton, 2008).

Psychological Frailty

Exploring frailty using a holistic approach sheds light on all domains of frailty, not merely the physical one. The psychology literature discusses frailty in the context of cognition, depression, or mood in the Edmonton Frail Scale (Cronbach's $\alpha = 0.62$) (Rolfson, Majumdar, Tsuyuki, Tahir, & Rockwood, 2006) and anxiety as a part of the

Edmonton Frail Scale (Schuurmans, Steverink, & Lindenberg, 2004). Recent studies have demonstrated a strong relationship between the psychological and social aspects of frailty as depicted in the Integrated Model of Frailty. The psychological well-being can play a major role in preventing frailty among older people and can have a tremendously positive effect on their later lives (adjusted HR=0.49, 95% CI=0.35, 0.70) (Park-Lee, Fredman, Hochberg, & Faulkner, 2009). In a qualitative study, concepts like positive thinking and hope positively impact the way older adults cope with frailty in their advanced age (Ebrahimi et al., 2013).

Depression, on the other hand, predisposes middle-aged people to a higher risk of disability and dependency in their later lives (12 years follow-up, Cox HR= 2.33, 95% CI =2.06, 2.63) (Covinsky et al., 2010), which in turn makes them more vulnerable to psychological frailty. In addition, living alone (27.2%, p=0.009) (Rochat et al., 2010), depression (adjusted OR=3.21, p<0.01), and social isolation (adjusted OR= 1.57, p > 0.1) (Strawbridge et al., 1998) are commonly referred to as predictors of frailty. Thus, individuals who have depression, negative thinking, anxiety, or decreased ability to handle daily stressors are more susceptible to being frail. It is clear that physiological changes occurring over time are correlated with psychological well-being, resulting in the rise of “frailty identity crisis”, which is a consequence of a maladaptive response of the sense of self resulting from health deficits accumulation (Andrew, Fisk, & Rockwood, 2012). Therefore, psychological well-being is negatively impacted by frailty (adjusted OR=0.29, 95% CI= 0.22, 0.36, p < 0.001), especially in terms of self-acceptance, and it is

of the utmost importance not to overlook the psychological aspect of frailty, or view it as a fragmented part (Andrew et al., 2012).

Furthermore, frailty has not merely been shown to disrupt psychological well-being (Andrew et al., 2012), but has also been associated with cognitive decline in two studies: (RR=4.6, 95%CI 1.93, 11.2, p=0.005) (Alencar, Domingues Dias, Figueiredo, & Dias, 2013), and (HR=1.63; 95% CI=1.27, 2.08) (Boyle et al., 2010). In addition, several mental disorders were revealed to be linked with frailty, such as Alzheimer's disease (for 3 years follow-up, (HR: 2.44, 95% CI= 1.49, 3.37) (Buchman, Boyle, Wilson, Tang, & Bennett, 2007). Other variables accompanying cognitive and depressive issues contribute to predicting frailty. An increase in depressive symptoms (OR: 3.13), cognitive impairment (OR: 3.22), advancing in age (OR: 3.61), and comorbidity (OR: 5.20) all anticipate frailty (Jürschik et al., 2012). Frailty is also linked to the extent to which individuals have the Allostatic Load, which is referred to as the process of wear and tear occurring in the body. The Allostatic Load increases over time as a result of chronic stress and can be measured (Dures, 2005). In a previous study, the risk for frailty increased by 10% with every additional one unit increase in the Allostatic Load Score (Gruenewald, Seeman, Karlamangla, & Sarkisian, 2009).

Social Frailty

From a sociological standpoint, frailty can arise in response to a loss of connections between individuals who have frailty and the surrounding world, which leads to an imbalance in their lives and forces them to look for new connections with what they usually do on a daily basis (Nicholson, Meyer, Flatley, & Holman, 2013). Poor social

integration can predispose men to frailty through increasing the level of C-reactive protein (CRP) concentration as one of the inflammatory markers (adjusted OR=2.23, 95% CI= 1.05, 4.76) (Loucks, Berkman, Gruenewald, & Seeman, 2006). A study by Landi showed that living alone (OR = 2.59, 95% CI = 1.82, 3.69) and low economic status (OR = 3.01, 95% CI = 1.75, 5.18) are factors that contribute to social frailty (Landi et al., 2004). Heuberger studied frailty in older Latin American adults and determined that a lack of education and unemployment are associated with frailty in that population (Heuberger, 2011). Thus, individuals are considered frail if they have issues with or loss in social activities, their level of social integration, or the availability of a social support network. Rochat concluded from his review of the research on frailty that the general conclusion of the research studies is that all social issues leading older adults toward living alone contribute significantly to frailty (27.2%, $p= 0.009$), which is the basis for the term “social frailty” (Rochat et al., 2010). In Gobbens, Luijkx, and van Assen’s study, social frailty components were correlated with other frailty components with these results: negatively with the quality of life domains (Bivariate correlations: living alone and physical QOL= -0.843; living alone and psychological QOL= -0.727; living alone and social relations QOL=-0.875; living alone and environmental QOL=-0.378; lack of social relations and physical QOL= -1.001; lack of social relations and psychological QOL= -1.112; lack of social relations and social relations QOL= -1.375; lack of social relations and environmental QOL= -0.837; lack of social support and physical QOL= -1.577; lack of social support and psychological QOL=-1.921; lack of social support and social relations QOL=-2.509; lack of social support and environmental QOL= -1.729; all

$p < 0.001$, except living alone and environmental QOL- $p = 0.006$) (Gobbens, Luijkx, & van Assen, 2013). The Alvarado, et al. study established the relationships between life social conditions and frailty in both men and women (Alvarado, Zunzunegui, Beland, & Bamvita, 2008). Bilotta and his research team found that people who live alone, including frail individuals, were found to have dependence in bathing (OR= 62.74, 95% CI= 12.17, 323.32, $p < 0.001$), depression (OR=10.43, 95% CI 2.31, 47.13, $p = 0.002$) and incontinence (OR=3.98; 95% CI= 1.01, 15.66, $p = 0.048$) (Bilotta et al., 2010).

The existence of an association between frailty and social components paves the road for taking social measures into account when assessing, measuring, and treating frailty. Thus, the management of social conditions lends itself to frailty combating factors, such as enhancing safety in the social milieu (OR=0.729, 95% CI=0.711, 0.748, $p < 0.001$), ‘social cohesion’, and ‘sense of belonging within the neighborhood’ (OR=0.831, 95% CI=0.810, 0.852, $p < 0.05$) (Cramm & Nieboer, 2013). The research makes it evident that frailty does not merely entail physical and psychological components, but also social ones, which in turn, formulates the frailty instruments in terms of the multidimensional construct.

Adverse Outcomes

According to the de Souto-Barreto study, the following concepts are regarded as adverse outcomes of frailty: disability, chronic diseases, hospitalization, functional decline, osteo-articular chronic pain, and mortality (de Souto-Barreto et al., 2012). In the Integrated Conceptual Model, Gobbens and colleagues (2010b) depicted the adverse outcomes of frailty as disability, healthcare utilization, and death. In their study, they

reported how frailty contributes significantly to disability (AUC=0.86, 95% CI= 0.81–0.92), increased health care utilization (visits general practitioner: AUC= 0.64, 95% CI=(0.52, 0.76); hospital admission: AUC= 0.61, 95% CI= (0.51–0.71); receiving personal care: AUC= 0.85, 95% CI=(0.78–0.92); receiving nursing care: AUC= 0.77, 95% CI=(0.69–0.86); and receiving informal care: AUC= 0.74, 95% CI= (0.67–0.81)); disability (AUC=0.86, 95% CI= 0.81–0.92), and death as parts of the integral model of frailty.

Frailty Interventions

A search of the frailty literature revealed that over the last 20 years, there has been a greater recognition of the need for frailty interventions to combat or reverse frailty among community-dwelling older adults. These interventions have entailed physical activity and exercises, nutritional interventions and weight control, hormone replacement, and anemia correction. On the other hand, these are all physical related interventions, so there were no interventions targeting other frailty domains.

Physical Activity or Exercises

In a 2015 Cesari and colleagues' study (2015), a regular physical activity program was aimed at treating frailty in older persons who lived a sedentary lifestyle. Their program was comprised chiefly of three stages: adoption, transition, and maintenance. The adoption stage included three exercise sessions under supervision per week for a period of 8 weeks. The transition stage involved two exercise sessions under supervision per week along with home based exercises over a period of 16 weeks. The third stage involved only home based interventions over 24 weeks. The types of exercises offered through their interventions were for the purpose of increasing walking, building

endurance, improving flexibility, and improving balance. Their study revealed that a physical activity program minimizes the occurrence and severity of physical frailty. The role of exercise in promoting the health status of frail elderly people is also supported in the findings of Theou and colleagues' study (2011). Based on their findings, establishing an exercise program of three thirty to forty-five minute sessions per week that lasts for more than 5 months fulfill the maximum benefit for frail older adults.

Nutritional Interventions and Weight Control

Inadequate vitamins and minerals in serum, such as 'fat soluble vitamins A, D, and E'; 'water soluble vitamins B6, B12, folate, and C'; and 'calcium, zinc and selenium minerals,' were found to be associated with frailty (Kaiser, Bandinelli, & Lunenfeld, 2009 as cited in Heuberger, 2011). Thus, healthy nutrition and controlling body weight play a crucial role in combating symptoms of physical frailty, such as weight loss and fatigue. In a 2009 Wengstrom, Wahren, and Grodzinsky study, the investigators found that taking daily supplements contributed significantly to sustaining a healthy body mass index for the participants (Morley, 2011; Wengstrom et al., 2009). Furthermore, protein and micronutrients intake provides the required energy and assists in combating frailty (Kaiser, Bandinelli, Lunenfeld, 2010).

Hormone Replacement

A decrease in muscle mass and changes in body composition including water, muscle, and fat contribute to the development of physical frailty according to one study reported in the literature (Srinivas-shankar et al., 2010). In the Srinivas-shankar and colleagues' (2010) study, they found that testosterone had a positive influence on muscle

mass building. Their study concluded that testosterone hormone replacement contributes implicitly to delay or reverse the symptoms of frailty (Srinivas-shankar et al., 2010 as cited in Morley, 2011). However, in the same paper by Morley, the author reported that an insignificant effect of dehydroepiandrosterone (DHEA) was shown in many studies. One study presented the probability of combating frailty through using selective androgen receptor modulators (SARMs) to treat sarcopenia (Chumlea et al., 2011 as cited in Morley, 2011), which is the salient symptom of physical frailty.

Anemia Correction

There is a controversial point in the literature about whether anemia accelerates frailty or averts it. Some previous studies showed that there was no significant effect of treating anemia on frailty (Morley, 2011). In a study by Artz, the author concluded that anemia contributed to the development of frailty (Artz, 2008). A systematic review of the literature reported that anemia in and of itself exaggerated completely or partially the inflammatory process that was a salient component of the frailty cascade (Partridge, Harari, & Dhesi, 2012). However, further investigations should be conducted in the future to explore the relationships between anemia and frailty indicators in older adults and if anemia correction has a negative relationship to the occurrence of frailty.

The Frailty Literature Gap

The concept of frailty has been debated in the literature for the last 20 years (Partridge, Harari, & Dhesi, 2012). The importance of frailty arises from frequent observation or interpretations of elderly people who are at a higher risk for health complications than others. These people have unique needs and their health issues should

be handled effectively in hospitals, community settings, and at homes. This point, in turn, urges the investigator to define and understand what frailty is. Is it a medical syndrome or part of the aging process? (Marlene, 2013). Researchers disagree about the definition of frailty, which necessitates qualitative inquiries to understand and interpret this phenomenon. However, this goes hand-in-hand with quantitative inquiries required to understand the relationships between frailty and demographic and health variables. Older adults are at a higher risk for developing many health conditions and associated disabilities than younger people (HealthyPeople, 2015), and their lives could be negatively impacted by such conditions over time. This increased vulnerability to diseases in older adults has been associated with the term ‘frailty’, which has been widely adopted in the current literature by both clinical care and geriatric researchers (Bergman et al., 2004). Frailty is a concept that can be useful to healthcare providers by helping them predict which elderly people are at risk for health complications, then offer appropriate interventions depending on where an individual is on the frailty continuum as shown in the model. In doing so, the clinical approach of diagnosing people at risk of becoming frail or already frail can replace the managerial approach of caring for older adults (De Lepeleire, Iliffe, Mann, & Degryse, 2009). Future studies are needed to explore comprehensively the connections between frailty and health factors, The frailty concept has an optimistic future, shedding light on the high vulnerability to diseases and adverse effects while aging. Thus, frailty could be a gold standard of how successful health interventions and policies are in light of recognizing, preventing, and treating frailty in older adults.

Several frailty instruments have been developed and discussed in the literature, but only a few have been evaluated in terms of validity and reliability. Therefore, any frailty instrument need to be validated in the context of the target population prior to conducting a study using the frailty instrument. It should not be assumed that a frailty instrument that is valid and reliable for use with one population is valid and reliable when used with another population. Regarding the importance of studying frailty in Jordan, Jordanian older adults are admitted to nursing home centers based on one or more of the following: their families' desire, transfer by the Ministry of Social Development after assessing the social and financial situation of these older adults, or having issues vis-à-vis economic status, social conditions, and/or health conditions (Al-Qudah, 2011). Frailty has never been addressed in Jordanian older adults to screen its extent and anticipate its complications. Jordanian older adults have a higher prevalence of chronic diseases and risk factors, in particular diabetes, compared to those in other age groups in Jordan as well as their counterparts in the surrounding countries (WHO, 2014b). These diseases are associated with frailty (Chek Hooi et al., 2010) and could place Jordanian older adults at higher risk for frailty. As a result, introducing frailty as a clinical concept contributes to the inception of mechanisms of caring for older adults and regarding nursing home admissions in Jordan. Furthermore, the existence of a valid frailty instrument contributes inevitably to predict frailty complications, such as disability. As reported by the Department of Statistics, 11.8% of the Jordanian older adults are affected by disabilities, in particular the most common type, physical disabilities (Department of Statistics, 2004 as cited in NCFA, 2008). Vis-à-vis future qualitative frailty research, the frailty literature

lacks inquiry geared toward cultural differences and the interpretation of frailty among different populations. In an effort to glean information about cultural differences of how frailty is defined, additional qualitative studies are needed.

Summary

This chapter described the scope of frailty and its attributes, factors, and outcomes. It also provided conceptual and operational definitions of frailty. The Gobbens and colleagues' Integral Model of Frailty was used as the theoretical framework upon which this research was based. Each of the following components of the Integral Model of Frailty was discussed: life course determinants, diseases, physical frailty, psychological frailty, social frailty, and adverse outcomes. The frailty interventions currently used in medicine were also presented. These included physical activity or exercises, nutritional interventions and weight control, hormone replacement, and anemia correction. Lastly, frailty literature gaps were identified.

CHAPTER III

METHODOLOGY

Research Design

A descriptive, correlational, cross-sectional design was utilized to establish the reliability and validity of the Arabic Version-Tilburg Frailty Indicator (TFI) for use with Jordanian community-dwelling older adults. Cross-sectional design was used to examine correlation coefficients and the magnitude of how strong the linear correlations were between scale variables (Browner, Newman, & Hulley, 2013).

Sampling and Setting

Convenience sampling was used in quantitative research due to the inability to collect data from the target population on a random basis (Moule & Goodman, 2013).. With an assumed two-sided Type I error rate (p value) = $0.05/3 = 0.0167$, there is sufficient power ($\geq 80\%$) to detect a weak-to-moderate size correlation ($r = 0.35$) when the study sample size is at least 82 participants. When the sample size is 100 participants, a correlation of $r = 0.32$ can be detected under the same assumptions (nQuery Advisor Version 7.0. Los Angeles, CA) (Elashoff, 2007). Inclusion criteria were as follows: participants who were Jordanians, aged 60 years old and older, and living at their own community dwellings in the Irbid governorate. Exclusion criteria were as follows: people who had cognitive impairment as determined by the Montreal Cognitive Assessment (MoCA), or people who lived at nursing homes or rental apartments.

A total of 109 Jordanian participants from Irbid, a governorate located in the north of Jordan, were recruited for the study through local healthcare centers and home visits. The healthcare centers are designated to provide the healthcare services for defined geographical areas. The area of the Irbid governorate is 3,372 km² and its population was 1.14 million in 2012, which represents 17.8% of Jordan's population (DOS, 2014). This governorate has 200 healthcare centers including holistic, local, and peripheral centers, which recorded 346,542 patient encounters for those aged 45 years old and older in 2013 (MOH, 2012).

Human Subjects Protection

Institutional Review Board (IRB) approval was obtained from both the University of North Carolina at Greensboro (UNCG) and the Jordan University of Science and Technology (JUST). As mentioned earlier, the participants were recruited through local healthcare centers and home visits. Consent forms were handed out and explained to the participants; one signed copy from each remained with the PI and the other with the participant. The participants had the right to ask any questions about the study and withdraw at any time. The PI, Co-I, and local data collectors informed them that it was voluntary to take part in the study, that no identifiable data would be shown on any documents or publicly, and that the data set would be kept confidential. A master list was used to code their names and was destroyed once the data was entered into the software program used for analysis. The electronic file was saved on the PI's password-protected computer. The original questionnaires were transported from the data collection sites in Jordan to the academic advisor's office at UNCG in Greensboro, North Carolina. The PI

stored the original data in a locked cabinet in his home office. The risk to participants was minimal and could have involved an uncomfortable situation in the event that a participant was embarrassed by a question or did not understand a question. In that situation, the data collector reassured the participant by explaining the purpose of the study and how the responses the participants provided would be used. The data collector repeated or explained any question to ensure that the participant understood the question.

Recruitment and Data Collection

Participants interested in participating in the study were contacted through home visits and asked to indicate their interest in participating in the study, and then an exploratory letter was provided to them accordingly. This letter had the pertinent information about the study and was written at a 6th grade reading level. The participants had the opportunity to meet the investigator, Co-I, or data collector, ask questions related to the study, and then sign the consent form if they decided to participate in the study at their homes. The Co-Investigator along with data collectors conducted face-to-face interviews with participants in a private room at the interviewees' homes after they agreed to participate in the study. Consent forms were handed to or read aloud and explained to the participants at the beginning of the interview. The Co-Investigator along with local data collectors collected the data. In an attempt to avoid the drift caused by using different data collectors, local data collectors were trained about how to collect the data through using the following tests: Arabic-TFI, Arabic GDS, Arabic SF- 36 (only the subscales for physical function and social function), and Arabic-MoCA. To accomplish this, the PI and Co-I held one training session for three data collectors. The training

session was about one hour using a case as an example in the presence of the other data collectors to ascertain that all data collectors understood the participant's responses. The names of the data collectors were added to the IRB application as a part of the IRB modification process.

Measures: Instruments

Demographic and Variables Survey

Demographic and health variables were collected through a survey created by the PI. These variables were as follows: age, gender, marital status, education level, household income, the number of family members that live with the participant, and chronic diseases that they have. Both English and Arabic versions of the demographic and health variables surveys are shown in appendices A and B, respectively.

The Montreal Cognitive Assessment (MoCA)

In order to assess the potential mental impairment that could influence the ability to comprehend the questions by the older adult participants (Polit & Beck, 2012), the Montreal Cognitive Assessment (MoCA) was used as a cognitive screening tool (Appendix C). Nasreddine and colleagues (2005) developed the MoCA test to screen Mild Cognitive Impairment (MCI) and Alzheimer's disease. This test is a 30-point test administered in 10 minutes. The original test is available at <http://www.mocatest.org>. The total score possible is 30. A score of 26 or above (20/25 or above in case of psychometric issues) denotes no cognitive impairment and if it is less than 26 (20/25 or above in case of psychometric issues), it indicates a cognitive impairment. It includes ten items aiming to evaluate different cognitive domains (attention and concentration,

executive functions, memory, language, visuoconstructional skills, conceptual thinking, calculations, and orientation) (Nasreddine et al., 2005). The MoCA test with a cutoff score of 26 had a sensitivity of 90% to detect MCI and 100% to detect mild AD. In addition, the specificity of MoCA was excellent (87%) (Nasreddine et al., 2005). Rahman and El Gaafary (2009) checked the reliability and validity of the Arabic version-MoCA, revealing that a Cronbach's α was 0.83, 92.3% sensitivity, and 85.7% specificity. Its score is adjusted by adding two points to the total MoCA score for participants with 4-9 years of education or by adding one point to the total MoCA score for those with 11-12 years of education (Johns et al., 2010 as cited in Doerflinger, 2012). Thus, this tool has been validated in Arabic-speaking elderly participants in Cairo, Egypt (Rahman & El Gaafary, 2009), which is the same language that Jordanian people speak (Appendix D).

The Geriatric Depression Scale (GDS-15)

The purpose of this test is to screen older adults for depression and consists of 15 items. The categories of the total scores are as follows: 0-4 denotes normal, 5-8 mild depression, 9-11 moderate depression, and 12-15 severe depression (Greenberg, 2012). This test (Appendix E) was used to measure the convergent and divergent validity of the psychological domain of the TFI. It was also used in older adults with mild to moderate cognitive impairment in community (Greenberg, 2012). The original validation study of GDS-15 reported high sensitivity and specificity, 92% and 89%, respectively (Greenberg, 2012), and it showed high correlation ($r=0.84$, $p<0.001$) with the long version of GDS (Sheikh & Yesavage, 1986). In a 2005 Friedman, Heisel, and Delavan study, the GDS-short form had good internal consistency (Cronbach's $\alpha=0.749$) and was moderately

correlated with depressed mood ($r=0.415$, $p<0.001$) and life satisfaction measures ($r=0.430$, $p<0.01$). In the same study, its sensitivity and specificity of a cut score of 6 were 81.45% and 75.36%, respectively. The Arabic version of GDS-15 has been validated in Lebanon by Chaaya and colleagues (2008); it showed a high Cronbach's α (0.88), and the item correlations ranged from 0.57 to 0.75. Chaaya and colleagues recommended the 7 or 8 of 15 as a cutoff with best estimates for people with depression. Therefore, this version was used in community dwelling older adults as recommended by Chaaya et al. (2008) (Appendix F).

Health Related Quality of Life (SF-36)

SF 36 is regarded as a generic measure, purporting to evaluate the burden of diseases and the effectiveness of the proposed interventions and treatments (Ware, n.d.). The SF 36-health survey consists of two main domains - physical and mental and includes 36 questions divided into eight categories as follows: Physical Functioning (PF), Role-Physical (RP), Bodily Pain (BP), General Health (GH), Vitality (V), Social Functioning (SF), Role-Emotional (RE), and Mental Health (MH). The Physical Functioning (PF) (10 items) and Social Functioning (SF) (two items) categories from the validated Arabic-SF 36 were used in the study. Each category was scored on a 0-100 scale by special software. The lower score denotes more disability and the higher one denotes less disability or higher HRQOL on its category. The Arabic version-SF 36 had been validated and implemented in Arab-speaking countries. In 2003, the Sabbah, Drouby, Sabbah, Retel-Rude, and Mercier study reported that the Arabic version-SF 36 had acceptable internal consistency (Cronbach's $\alpha >0.70$) and the structure pattern of

the Arabic version-SF 36 had the same structure as the SF 36 version used in the U.S. and France. According to Barbara Gande, a director of the International Quality of Life Assessment Project (IQOLA), this version had been translated and subsequently modified by Arabic-speaking translators in Jordan, taking into account cultural differences and following the criteria reported by the IQOLA approach (Barbara Gande, personal communication, March, 14, 2014). Therefore, the Arabic version SF-36v2® - was obtained from Qualtrics Software (Medical Outcomes Trust) for use in this study.

Gande stated that the study entitled *Translating health status questionnaires and evaluating their quality: The International Quality of Life Assessment Project approach* elucidated the process of translation in detail. This resource reported detailed information about the translation methods used in translating the SF-36 Health Survey, which entailed forward and backward translations, difficulty and quality ratings, pilot studies, and a cross-cultural comparison (Bullinger et al., 1998). Two categories of the validated Arabic version-SF 36 v2 were used in this study. Those were the Physical Functioning (PF) category, which includes ten items, and the Social Functioning (SF) category, which includes two items. Each category was scored on a 0-100 scale by Qualtrics software. The lower score denotes more disability and the higher one denotes less disability. The scores were used to compare with the results of tests using the physical and social domains of the TFI in terms of convergent and divergent validity to measures and the construct validity of the TFI. Both English and Arabic versions of the SF-36 are shown in appendices G and H, respectively.

Tilburg Frailty Indicator (TFI)

The original TFI developed by Gobbens and colleagues (2010b) is comprised of 15 items that target three domains -physical, psychological, and social. Eleven questions have yes or no answers and the rest have yes, no, or sometimes (Appendix I). It has a cut-off in which an individual with a score from 11-15 is considered normal and less than 11 denotes a frail person. The TFI has been used, validated, or cross-validated with another frailty instrument in Belgian (de Witte et al., 2013b), Dutch (Gobbens et al., 2010b), Portuguese (Coelho et al., 2014), Polish (Uchmanowicz et al., 2014), Brazilian (Santiago et al., 2013), and Danish (Andreasen et al., 2014) populations.

In terms of reliability, the test-retest reliability of the overall score of frailty was good, 0.79 for one-year, and the test-retest reliability for one-year for other subscale scores were as follows: 0.78, 0.67, and 0.76 for the physical, psychological, and social domains respectively (Gobbens et al., 2010b). There were weak significant correlations between the frailty domains of the TFI as follows: 0.42 between the physical and psychological domains, 0.19 between the physical and social domains, and 0.18 between the psychological and social domains (Gobbens et al., 2010b). The convergent validity, divergent validity, and predictive validity of the TFI were good and shown in the validation study while correlating the domains of the TFI with the physical measures and the domains of the quality of life measure (WHOQOL-BREF) (Gobbens et al., 2010b). These domains are physical health, psychological health, social relationships and environment (Group development WHO, 1998). Lastly, the predictive validity of the TFI was evaluated using the Area Under Curve (AUC) for the health outcomes represented by

the Groningen Activity Restriction Scale (GARS) to explore the disability, health care utilization measures, and quality of life domains (WHO-BRFF) (Gobbens et al., 2012a; Gobbens et al., 2012b).

Scales used to develop the domains of the Tilburg frailty indicator were as follows:

Physical domain. The physical aspect of frailty is operationalized through using the criteria of the frailty phenotype postulated by Fried and colleagues (2001), which are weight loss, slow walking, weakness in hands, and fatigue. In addition, the other measures have been added based on whether or not the individuals have problems with their physical health, balance, vision, and hearing. As a result, the physical frailty-TFI is comprised of eight items indicating that the older adults are physically frail if they obtained at least a 3 on that scale (Gobbens et al., 2010b). This cut-off is the same one in the phenotype of frailty, which consists of five criteria: weight loss, slow walking, fatigue, physical inactivity, and weakness (Fried et al., 2001). The validated instruments utilized to establish the convergent and divergent validity of the physical domain-TFI were physical frailty components and the following: the Longitudinal Aging Study Amsterdam (LASA)-Physical Activity Questionnaire (LAPAQ), the Body Mass Index (BMI), the Timed Up & Go (TUG) test, the Four-test balance scale, questions about hearing and vision, hand grip strength test, and the Shortened Fatigue Questionnaire (Gobbens et al., 2010b).

Psychological domain. Based on a 2010b Gobbens and colleagues study, this construct has been operationalized on a scale with a range from 0 to 4. It has four

components as follows: cognition, depressive symptoms, anxiety, and coping. The individuals are asked whether or not they have issues with their memory, feeling down, being nervous, and whether they have an inability to cope with problems. The other psychological components measured under the term of psychological frailty are the following: Mini-Mental State Examination (MMSE), the 20-item Center for Epidemiologic Studies Depression Scale (CES-D), the 7-item Anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A), and a short 5-item version of the Pearlin and Schooler Mastery Scale (MAS).

Social domain. This aspect of frailty is measured through ad hoc questions targeting the social context that the older adults live within. One item asks about whether the older adults live alone or not, the second one asks if the older adults miss the surrounding people, and the last one asks if they have enough social support. The items devoted to measuring the social components of frailty were extrapolated from the following social instruments: the Loneliness Scale and the Social Support List (SSL) (Gobbens et al., 2010b).

In summary, the overall frailty score is calculated from the summation of the sub-scores of the three frailty domains. The entire TFI has fifteen items. An individual can score from 0 to 8 on the physical domain, from 0 to 4 on the psychological domain, and from 0 to 3 on the social domain. If an individual has an overall frailty score less than 11, then the individual is considered frail. The highest frailty score is fifteen and the cut-off is 5 over all three domains of frailty (Gobbens et al., 2010b).

Translation and Cultural Adaptation of the Arabic Version-TFI

According to the World Health Organization (WHO), the process of translating and adapting healthcare instruments passes through the following four stages: (1) forward translation, (2) discussion by a panel of experts, (3) back translation, (4) pre-testing and cognitive interviewing, and final version after reconciling the discrepancies in an attempt to evaluate the cross-cultural and conceptual adequacy (WHO, n. d.). Permission from the original author was obtained to translate the TFI into Arabic and to use it in Jordan with the Jordanian older adult population. Two translators who were fluent in both English and Arabic and who were also from the nursing discipline translated the instrument forward into Arabic, and two other translators who were fluent in both Arabic and English and who were from outside the nursing discipline translated the instrument backward into English. The four translators discussed and reconciled the differences between the two versions of the TFI to reach agreement on the final Arabic version-TFI. In order to ensure that the final Arabic version-TFI was culturally appropriate, a panel of two-bilingual experts was assigned to assess and discuss the consistency of words and expressions used in the final version. To comply with the last stage of pre-testing and cognitive interviewing, a pilot study was conducted with fifty Jordanian community-dwelling older adults, the target population. The purpose of the pilot study was to determine if the items were understandable or not based on Jordanian culture. Based on the pilot study, the items of both the psychological and social domains-TFI were reworded and modified due to their low KR-20 values, 0.047 and 0.354 respectively. The approval was taken from the developers of the TFI on the final backward translated-TFI. Table 3 shows the three

versions of the TFI - the original TFI, the English back translated TFI, and the Arabic version-TFI.

Table 3

The Three Versions of the TFI: the Original TFI, the English Back Translated, and the Arabic Version-TFI

| The Original TFI Version | The English Back Translation | The Arabic Version –TFI |
|---|--|---|
| Physical components | Physical components | 1 الجوانب الجسدية: |
| Do you feel physically healthy? | Do you feel physically healthy? | 1. هل تشعر بأنك في صحة جيدة من ناحية جسدية؟ |
| Have you lost a lot of weight recently without wishing to do so? ('a lot' is: 6 kg or more during the last six months, or 3 kg or more during the last month) | Did you unwillingly lose a lot of weight? (a lot of weight is defined as loosing 6 Kg. in the last six months or losing 3 Kg. in the last month). | 2. هل فقدت الكثير من وزنك دون رغبة منك؟ (فقدان الكثير من الوزن هو 6 كغم أو أكثر خلال الستة أشهر الأخيرة أو 3 كغم خلال الشهر الأخير) |
| Do you experience problems in your daily life due to: | Do you face any problems in your daily life due to: | هل تواجه أية مشاكل في حياتك اليومية نتيجة لوجود: |
| Difficulty in walking? | Difficulty in walking? | 3. صعوبة لديك في المشي؟ |
| Difficulty maintaining your balance? | Difficulty in maintaining your balance? | 4. صعوبة لديك في المحافظة على توازنك؟ |
| Poor hearing? | Poor hearing? | 5. ضعف في سمعك؟ |
| Poor vision? | Poor vision? | 6. ضعف في بصرك؟ |
| Lack of strength in your hands? | Weakness in your hands? | 7. ضعف في قوة يديك؟ |
| Physical tiredness? | Physical tiredness? | 8. تعب جسدي؟ |
| Psychological components | Psychological components | 2 الجوانب النفسية: |
| Do you have problems with your memory? | Do you have problems in the ability to remember things? | 9. هل تواجه مشاكل بقدرتك على تذكر الأشياء؟ |

Table 3 (cont.)

| The Original TFI Version | The English Back Translation | The Arabic Version –TFI |
|---|--|--|
| Have you felt down during the last month? | Have you felt depressed during the last month? | 10. هل شعرت بالإحباط خلال الشهر الأخير؟ |
| Have you felt nervous or anxious during the last month? | Have you felt anxious during the last month? | 11. هل شعرت بالقلق خلال الشهر الأخير؟ |
| Are you able to cope with problems well? | Are you able to adjust with problems well? | 12. هل أنت قادر على التكيف مع المشاكل جيداً؟ |
| Social components | Social components | 3 الجوانب الإجتماعية: |
| Do you live alone? | Is there a reciprocal social activity with your neighborhood? | 13. هل يوجد نشاط اجتماعي متبادل مع المحيط الذي حولك؟ |
| Do you sometimes miss having people around you? | Have you felt alone? | 14. هل شعرت بالوحده؟ |
| Do you receive enough support from other people? | Do you receive enough support from the social milieu? | 15. هل تتلقى الدعم الكافي من المحيط الاجتماعي؟ |

Note: The changes among the three versions are bolded in the table.

Data Analysis Procedures

The major goal of the statistical analysis was to assess the reliability and validity of the Arabic version-TFI, exploring the relationships between the three latent variables of frailty in the Arabic version-TFI (physical, psychological, and social domains) and their indicators. Descriptive statistics were initially examined using mean/standard deviation (SD) for continuous variables according to the presence of outliers. In addition, frequencies and percentages were reported for categorical variables. Continuous variables (frailty-TFI) were checked for outliers and normality in univariate analysis using boxplots, normal P-P plots, and Kolmogorov-Smirnov tests (Mertler & Vannatta, 2002). Furthermore, normality for any variables correlating with Pearson's r and scatterplots

with linear and LOESS fit lines were checked for normality and linearity, respectively (Thomas McCoy, personal communication, December 6, 2014).

Item Analysis Using Cronbach's Alpha

Item analysis for reliability of the Arabic version-TFI and the correlations between its subscales were performed. To evaluate the reliability of a multidimensional instrument, the Cronbach's alpha was calculated for the overall instrument and each of its subscales. Based on George and Mallery (2003), the common rules of the internal consistency using Cronbach's alpha are as follows: $\alpha \geq 0.9$ Excellent, $0.7 \leq \alpha < 0.9$ Good, $0.6 \leq \alpha < 0.7$ Acceptable, $0.5 \leq \alpha < 0.6$ Poor, and $\alpha < 0.5$ unacceptable. On the other hand, the internal consistency of 0.70 may be adequate but those of 0.8 and higher are desirable (Polit & Beck, 2012).

The Arabic version-TFI has 15 items: 8 physical, 4 psychological, and 3 social. The Cronbach's alpha goes up as a result of adding either more items (Cortina, 1993) or more categories per item (Boone, Staver, & Yale, 2013). However, the Arabic version-TFI was not lengthened in order to avoid potential negative aspects that the participants could experience such as boredom and fatigue, which could have led to a low response rate (Waltz, Strickland, & Lenz, 2010). Because of the Arabic version-TFI's dichotomous items, KR-20 values (Allen & Yen, 2001; Kuder & Richardson, 1937) were calculated for each subscale to examine the internal consistency for dichotomous variables. Correlation matrices using tetrachoric coefficients were analyzed. Pearson correlations were estimated to explore whether the subscales were highly correlated or not. A Spearman-Brown formula was calculated in case the instrument were to undergo any modifications

(Waltz et al., 2010). The Spearman-Brown prophecy of each subscale of the Arabic version-TFI was used to calculate the average inter-item correlations to get reliability of either 0.7 or 0.8. The following table (Table 4) has the needed average inter-item (tetrachoric) correlations for each subscale of frailty measured by the Arabic version-TFI.

Table 4

The Needed Average Inter-Item Correlations for Each Subscale of the Arabic Version-TFI

| The domain of frailty/The projected reliability | Cronbach's alpha: 0.7 (average inter-item correlations) | Cronbach's alpha: 0.8 (average inter-item correlations) |
|--|--|--|
| Physical (8 items) | .23 | .34 |
| Psychological (4 items) | .37 | .50 |
| Social (3 items) | .44 | .58 |

Note: The Spearman-Brown formula is calculated as follows: ((number of items) x (average inter-item correlation)) / (1 + (number of items - 1) x (average inter-item correlation)).

Additionally, for sample size for the reliability of the Arabic version-TFI, we can provide the “precision” of the KR-20 reliability estimate by considering the width of a bootstrap 95% confidence interval (CI). Because the actual data to estimate KR-20 was not collected, pilot data were used. The first row of the following table provides the precision based on the pilot data with 50 participants. The second row provides the precision based on simulated data with a sample size of N = 82 under the scenario that data are similar to the pilot study. Table 5 shows that the precision is increased in our reliability estimate with the larger planned sample size of 82 participants to this width.

Table 5

Precision in Estimating KR-20 Using Bootstrap 95% CI*

| Data source | Physical frailty | Psychological | Social |
|---|-------------------------|-------------------------|-------------------------|
| | KR-20=0.70 | KR-20=0.04 | KR-20=0.34 |
| Pilot study (n=50) | 95% CI = [0.592, 0.813] | 95% CI = [0.049, 0.466] | 95% CI = [0.087, 0.622] |
| Simulated future study if similar to pilot study (n=82) | 95% CI = [0.621, 0.785] | 95% CI = [0.102, 0.439] | 95% CI = [0.077, 0.531] |

*Note. Bootstrap 95% CIs were estimated in STATA v13.1 (STATA Corp, College Station, TX).

In regard to the validity of the Arabic version-TFI, the following validity aspects were used: face, content, construct, convergent, and divergent. Face validity was established through consultations with healthcare providers at primary healthcare centers, nursing faculty members who were experts in geriatric care, and elderly people who were visiting primary healthcare centers. Content validity aims to assess the appropriateness of the instrument's items for the construct that is being measured and whether all components of the construct are covered by the items (Polit & Beck, 2012). Thus, the content validity was obtained from a panel of experts in Jordan (a sociologist, a speech specialist, and two nursing faculty members, who teach at the Jordan University of Science and Technology and have published several geriatric studies). The content validity was guided using the method reported by Polit and Beck (2012) in which each item is rated on a four-point scale of relevance (1=not relevant, 2=somewhat relevant, 3=quite relevant, 4=highly relevant) by at least 3 experts. Then, the Item-Content Validity Index (I-CVI) is measured for each item. This is done by calculating the number of experts giving a 3 or 4 for the item divided by the total number of experts (Polit &

Beck, 2012). Then, the Scale-CVI (S-CVI) is calculated by averaging the I-CVIs (Polit & Beck, 2006). An excellent content validity score would be a score of at least 0.90 for S-CVI and at least 0.78 for I-CVI (Polit & Beck, 2012).

The construct validity aims to test the theoretical model on which the construct is based (Polit & Beck, 2012), which is the integral model of frailty in this study. The construct validity was checked through a two-step process as follows: (1) Inter-item correlations using the correlation matrix (Tetrachoric) of each sub-scale of the Arabic version-TFI, in which inter-item correlations between 0.30 and 0.70 (Ferketich, 1991) or even higher than 0.70 (Thomas McCoy, personal communication, December 6, 2014) are desirable. However, corrected item-total correlations of each sub-scale of the Arabic version-TFI that are less than 0.30 (Polit & Beck, 2012) could undergo modifications. The negative corrected item-total correlations can be revised or reworded. (2) Convergent validity is how two instruments measuring the same construct could correlate positively with each other (McDowell, 2006). Divergent validity is the absence of a correlation between a certain scale and other scales measuring different constructs (Faries & Yalcin, 2007). If correlations between the same components in both presumed scales measuring the same construct equal or exceed 0.4, they are considered evidence for convergent validity, whereas values equal to or less than 0.3 are evidence of divergent validity (Faries & Yalcin, 2007). Faries and Yalcin (2007) also reported that correlations between 0.3 and 0.4 are not regarded to show either convergent or divergent validity. Therefore, in regard to convergent validity, the correlations between the domains of the TFI (physical, psychological, and social) and the corresponding construct in each of the MoCA, GDS,

and SF-36 were measured as follows: the correlation between the *physical domain*-TFI and the *physical function* of SF-36 (a sub-scale from physical health-SF-36), the correlation between the *psychological domain*-TFI and each of the MoCA and the GDS, and the correlation between the *social domain*-TFI and the *social function* of SF-36 (a sub-scale from mental health-SF-36).

Convergent validity was empirically assessed between the domains of the TFI and each of the MoCA and GDS. The assumption was that there would be a high correlation (at least 0.4) between the TFI and the MoCA and between the TFI and the GDS.

Convergent validity was also empirically assessed between the domains of the TFI and both physical function and social function from the SF-36. Negative correlations were expected from the relationships between the *physical domain*-TFI and the PF-SF 36 and between the *social domain*-TFI and the SF 36, respectively. In regard to divergent validity, the correlations between each domain of the TFI and the other two constructs measuring different domains were measured. The correlations between the physical domain of the TFI and each of the GDS and Social Function SF 36 instruments showed low correlations since the latter two scales measured domains from the physical domain. A two-sided p-value < 0.05 was considered statistically significant. All analyses were performed using SPSS v23.0 (SPSS Inc., Chicago, IL).

Vis-à-vis convergent and divergent validity, NQuery was used as shown earlier in order to determine the required significant correlation between the Arabic version-TFI's subscales (physical, psychological, and social) with each of Physical Function-SF 36, GDS, and Social Function-SF 36, respectively. According to the TFI publications, three

studies presented the construct validity through presenting the correlations between TFI-subscales and different scales measuring the same domain (Coelho et al., 2014; Gobbens, 2010; Santiago et al., 2013) (Tables 6, 7, and 8). The correlations in these three studies ranged as follows: 0.16 to 0.48, 0.09 to 0.58, and 0.28 to 0.45 for physical, psychological, and social domains, respectively.

Table 6

Physical Scales Used to Show Construct Validity of the TFI in the Three Studies.

| The study/The TFI domain | Physical scales | Physical-TFI | Psychological-TFI | Social-TFI | Sample size |
|--------------------------|--|--------------|-------------------|------------|-------------|
| Coelho et al., 2014 | BMI | .16* | .07 | .00 | 252 |
| Coelho et al., 2014 | Timed Up & Go test | .48*** | .21*** | .12 | 252 |
| Coelho et al., 2014 | Hand grip strength | -.34*** | -.28*** | -.19** | 252 |
| Santiago et al., 2013 | BMI | .12 | .07 | .20* | 219 |
| Santiago et al., 2013 | Timed Up & Go test | .42*** | .17* | .11 | 219 |
| Gobbens et al., 2010 | LASA Physical Activity Questionnaire (LAPAQ) | -.28*** | -.09 | -.02 | 245 |
| Gobbens et al., 2010 | Body Mass Index (BMI) | .20** | -.10 | .08 | 245 |
| Gobbens et al., 2010 | Timed Up & Go test | .36*** | -.04 | .12* | 245 |
| Gobbens et al., 2010 | Four test balance scale | .30*** | -.02 | .12* | 245 |

Note: *P < 0.05. **P < 0.01. ***P < 0.001. BMI, body mass index; GDS, Geriatric Depression Scale; MMSE, Mini-Mental State Examination; TFI, Tilburg Frailty Indicator.

Table 7

Psychological Scales Used to Show Construct Validity of the TFI in the Three Studies.

| The study/The TFI domain | Psychological scales | Physical-TFI | Psychological-TFI | Social-TFI | Sample size |
|--------------------------|---|---------------------|---------------------|--------------------|-------------|
| Coelho et al., 2014 | MMSE | -.26 ^{***} | -.22 ^{***} | -.06 | 252 |
| Coelho et al., 2014 | GDS | .58 ^{***} | .58 ^{***} | .41 ^{***} | 252 |
| Coelho et al., 2014 | GAI | .58 ^{***} | .56 ^{***} | .29 ^{***} | 252 |
| Santiago et al., 2013 | MMSE | .36 ^{***} | .20* | .01 | 219 |
| Gobbens et al., 2010 | Mini-Mental State Examination (MMSE) | -.24 ^{***} | -.09 | -.11* | 245 |
| Gobbens et al., 2010 | Center for Epidemiologic Studies Depression Scale (CES-D) | .31 ^{***} | .45 ^{***} | .34 ^{***} | 245 |

Note: *P < 0.05. **P < 0.01. ***P < 0.001. GAI, Geriatric Anxiety Inventory; GDS, Geriatric Depression Scale; MMSE, Mini-Mental State Examination; TFI, Tilburg Frailty Indicator.

Table 8

Social Scales Used to Show Construct Validity of the TFI in the Three Studies

| The study/The TFI domain | Social scales | Physical-TFI | Psychological-TFI | Social-TFI | Sample size |
|--------------------------|---|---------------------|---------------------|---------------------|-------------|
| Coelho et al., 2014 | SSSS | -.35 ^{***} | -.37 ^{***} | -.43 ^{***} | 252 |
| Santiago et al., 2013 | Are you happy with the way you are treated in your family? | .11 | .26 ^{**} | .28 ^{**} | 219 |
| Santiago et al., 2013 | Do you feel people support and listen to you and that they share problems and family concerns with you? | .10 | .26 ^{**} | .28 ^{**} | 219 |

Table 8 (cont.)

| | | | | | |
|-------------------------|------------------------------|--------------------|--------------------|--------------------|-----|
| Gobbens et al., 2010 | Loneliness Scale | .24 ^{***} | .24 ^{***} | .45 ^{***} | 245 |
| Gobbens et al., 2010 | Social Support List (SSL) | .11 [*] | .14 [*] | .31 ^{***} | 245 |

Note: *P < 0.05. **P < 0.01. ***P < 0.001. SSSS, Social Support Satisfaction Scale; TFI, Tilburg Frailty Indicator.

Limitations

Use of a convenience sample instead of a random sample could have threatened the external validity. The participants in the study could have been atypical of the Jordanian population in terms of the pertinent variables. This point, in turn, makes convenience sampling the weakest form of sampling (Polit & Beck, 2012) and limits the findings of the study to only the specific small sample of the Jordanian older adult population. Secondly, it is noteworthy that the construct validity should entail factor analysis as a crucial and complementary component. Factor analysis in and of itself necessitates a large sample size. According to the recommendations reported in Mundfrom, Shaw, and Ke (2005), the minimum sample size ranges from 3 to 20 per item or variable and the absolute sample size ranges from 100 to around 1,000. However, the factor analysis of binary items can potentially show 'difficulty' factors (factors resulting from variables with different splits or difficulty levels, leading to spurious factors (Gorsuch, 1983), such as dichotomous variables in the TFI (11 items have 'yes' or 'no' responses and 4 have 'yes', 'sometimes', or 'no' as responses) and definitely needs a larger sample size (Flora & Curran, 2004). In summary, the current sample size limited the application of factor analysis. However, correlation matrices were estimated and inspected by domain. Lastly, using a rating scale versus using a dichotomous response

format is still a controversial point. Some specialists in psychometrics criticized the dichotomous response formats, such as Comrey (1988) (as cited in Clark & Watson, 1995), favoring rating scales in terms of their reliability and the stability of their findings. However, dichotomous response formats have many advantages over rating scales, such as gleaning a lot of information in a limited time (Clark & Watson, 1995) and being less prone to biases than Likert-type scales (Loevinger, 1957 as cited in Clark & Watson, 1995). Furthermore, dichotomous response formats are appropriate in the case of older adult participants because it helps to conserve their energy while answering questions and helps to avoid confusion that could result from having to choose answers in Likert-type scales.

Summary

This chapter presented the research methodology, including research design, sampling, human subjects protection, recruitment, and data collection that was used to establish the psychometric properties of the Arabic version of the Tilburg Frailty Indicator for use with Jordanian community dwelling older adults. The psychometric properties entailed face, content, convergent, and divergent validity alongside the internal consistency of the instrument. The statistical methods used to establish the reliability and validity of the instrument included the internal consistency, face, content, convergent, and divergent validity. Translation and cultural adaptation of the Arabic version-TFI was elucidated in a separate section. Lastly, potential limitations were discussed at the end of the chapter.

CHAPTER IV

RESULTS

This chapter illustrates the characteristics of study participants and presents answers to research study questions. The Arabic version of the Tilburg Frailty Indicator (Arabic-TFI) is the first Arabic frailty instrument and was developed for the purpose of measuring frailty in Jordan. The existence of such an instrument contributes genuinely to identify the Jordanian older adults who are at higher risk for frailty complications, such as disability, hospitalization, and nursing home admission. The Arabic (Jordan) version of the TFI has 15 items, as in the original TFI. As mentioned earlier in Chapter III, some items were culturally adapted to be applicable to Jordanian older adults.

Characteristics of Sample

A total of 109 study participants were recruited from Irbid city in the northern part of the Hashemite Kingdom of Jordan. The participants were recruited through home visits. Table 9 displays the demographic characteristics of the study population. The mean age of study participants was 67.5714 years (SD = 6.95) ranging from 60 to 88 years old. The majority of participants were male (61.5%), married (66.1%), living with spouse and children (45.9%), having vision impairment (53.2%), and had total monthly household income below 450 JOD or \$634.56 (40.4%). Over half of the participants (51.4 %) had less than 12 years of formal education.

Table 9

Demographic Characteristics of Jordanian Community-Dwelling Older Adults

| Characteristics | N(%) or | Mean (SD)* |
|-------------------------------------|----------------|-------------------|
| Age (yrs.) | | 67.5714 (6.95) |
| 60-70 years old | 72 (66.1) | |
| >70 years old | 33 (30.3) | |
| Refuse to answer | 3 (2.7) | |
| Do not know | 1 (0.9) | |
| Gender | | |
| Male | 7 (61.5) | |
| Female | 2 (38.5) | |
| Marital status | | |
| Single | 11 (10.1) | |
| Married | 72 (66.1) | |
| Divorced | 3 (2.8) | |
| Widow | 20 (18.3) | |
| Missing | 3 (2.8) | |
| Education | | |
| No school | 31 (28.4) | |
| Basic (8 Grade) | 16 (14.7) | |
| Primary (10 Grade) | 9 (8.3) | |
| Secondary (12 Grade) | 8 (7.3) | |
| Diploma | 6 (5.5) | |
| University | 27 (24.8) | |
| Refuse to answer | 12 (11.0) | |
| Income | | |
| Less than 450 JOD | 44 (40.4) | |
| 450-650 JOD | 21 (19.3) | |
| 650-950 JOD | 15 (13.8) | |
| More than 950 JOD | 10 (9.2) | |
| Do not know | 3 (2.8) | |
| Refuse to answer | 16 (14.7) | |
| Living with who | | |
| Alone | 18 (16.5) | |
| Spouse only | 7 (6.4) | |
| Spouse and children only | 50 (45.9) | |
| Spouse, children, and siblings only | 17 (15.6) | |
| Others | 17 (15.6) | |

Table 9 (cont.)

| Characteristics | N(%) or | Mean (SD [*]) |
|-------------------------------|------------|-------------------------|
| Hospitalized during last year | 34 (31.2) | |
| Chronic Diseases | | |
| Hypertension | | |
| (Yes) | 54 (49.5) | |
| (No) | 55 (50.5) | |
| Coronary Artery Diseases | | |
| (Yes) | 23 (21.1) | |
| (No) | 86 (78.9) | |
| Stroke | | |
| (Yes) | 11 (10.1) | |
| (No) | 98 (89.9) | |
| ** COPD | | |
| (Yes) | 11 (10.1) | |
| (No) | 98 (89.9) | |
| Asthma | 15 (13.8) | |
| (Yes) | 94 (86.2) | |
| (No) | | |
| Arthritis | 43 (39.4) | |
| (Yes) | 66 (69.6) | |
| (No) | | |
| Diabetes | 35 (32.1) | |
| (Yes) | 74 (86.9) | |
| (No) | | |
| Cancer | 6 (5.5) | |
| (Yes) | 103 (94.5) | |
| (No) | | |
| Vision impairment | 58 (32.1) | |
| (Yes) | 51 (67.9) | |
| (No) | | |
| Hearing impairment | 37 (33.9) | |
| (Yes) | 72 (66.1) | |
| (No) | | |
| Comorbidities | | |
| Have no or one disease | 34 (31.2) | |
| Have ≥ 2 diseases | 75 (68.8) | |
| Geriatric Depression Scale | | 6.2243 (3.51) |
| SF 36- Physical Function | | 54.6729 (27.25) |
| SF 36- Social Function | | 58.1776 (22.98) |
| Missing | 2 (1.83) | |
| TFI – Physical domain | | 3.7196 (2.33) |
| TFI – Psychological domain | | 1.9720 (1.02) |
| TFI – Social domain | | 1.3551 (0.94) |
| TFI Total Score | | 7.0467 (3.39) |

Note: ^{*}SD: Standard Deviation.

^{**}COPD: Constructive Obstructive Pulmonary Disease.

^{***}TFI: Tilburg Frailty Indicator

Research Questions

Two specific aims were developed to examine the psychometric properties of the Arabic version of the TFI. Research questions were phrased as follows: a) Does the Arabic version of the Tilburg Frailty Indicator yield reliable information about frailty in Jordanian community-dwelling older adults aged 60 years and older? and b) Does the Arabic version of the Tilburg Frailty Indicator yield valid information about frailty in Jordanian community-dwelling older adults aged 60 years and older?

Research Question 1

Does the Arabic version of the Tilburg Frailty Indicator yield reliable information about frailty in Jordanian community-dwelling older adults aged 60 years and older?

KR 20 values. The KR-20 formula (Allen & Yen, 2001; Kuder & Richardson, 1937) was used to examine the internal consistency for dichotomous variables of each subscale of the Arabic version-TFI's dichotomous items (Table 10). The internal consistency of the subscale and total scores of the TFI were as follows: 0.74 (Physical-TFI), 0.46 (Psychological-TFI), 0.39 (Social-TFI), and 0.77 (Total-TFI). There is no TFI item that can be removed to achieve a higher KR 20 for the total score based on the Point-Biserial correlation values, which are shown in Table 12.

Table 10

Pearson Correlations of Subscale to Subscale and Subscale to Total Score of TFI

| The TFI domain | Physical-TFI | Psychological-TFI | Social-TFI | Total score | N |
|-------------------|--------------|---------------------|---------------------|---------------------|-----|
| Physical-TFI | 0.744 | 0.441 ^{**} | 0.306 ^{**} | 0.903 ^{**} | 109 |
| Psychological-TFI | | 0.464 | 0.377 ^{**} | 0.710 ^{**} | 109 |
| Social-TFI | | | 0.388 | 0.601 ^{**} | 109 |
| Total score | | | | 0.771 | 109 |

Note: ^{**} $p < 0.01$; ***Bold italics***=KR 20 values.

Pearson's correlation coefficients. Pearson's correlation coefficient was used to examine the magnitude and direction of relationships between subscale-subscale and subscale-total TFI scores (Table 10). Pearson's correlation coefficients between the subscales of TFI ranged from 0.31 to 0.44 ($p < 0.01$). These correlations show that the subscales of TFI are moderately and positively correlated with each other. Nunnally and Bernstein (1994) reported that subscale-to-subscale correlations of 0.40 to 0.65 are acceptable. The three subscales of the TFI had desirable subscale-to-subscale (Pearson's coefficients) correlations. Pertaining to subscale-to-total correlations, the three subscales of the TFI were highly correlated to the total TFI score ranging from 0.601 to 0.903. According to Nunnally and Bernstein (1994), $r \geq 0.55$ is recommended for subscale-to-total correlations indicating adequate correlations between subscale-to-total scores of the TFI (Table 10).

The inter-item (tetrachoric) correlations. Tetrachoric correlations of dichotomous items of the TFI were calculated using Mplus. Tetrachoric correlation coefficients aim to quantify association and similarity of category definitions (Uebersax,

2015). Tetrachoric correlation coefficients of physical domain-TFI ranged from 0.03 to 0.77, psychological domain-TFI from 0.03 to 0.73, and social domain-TFI from 0.01 to 0.52 (Table 11). Desirable inter-item correlations should be between 0.30 and 0.70 (Ferketich, 1991) or even higher than 0.70 (Thomas McCoy, personal communication, December 6, 2014). However, these coefficients display that the items of the TFI domains had low to high correlations between items. The item of weight loss (PH2) from the physical domain did not adequately correlate with the two items of feeling physically healthy (PH1, $r=0.14$) and the item of difficulty in maintaining balance (PH4, $r=0.03$). Regarding the psychological domain, the item of the ability to remember things (PS1) did not correlate adequately with the item of the ability to adjust with problems well (PS4, $r=0.03$). Lastly, the item of feeling alone (SO2) did not adequately correlate with the item of having enough social support (SO3, $r=0.01$).

Table 11

Tetrachoric Correlation Coefficients of Dichotomous Items of the TFI

| | PH1 | PH2 | PH3 | PH4 | PH5 | PH6 | PH7 | PH8 | PS1 | PS2 | PS3 | PS4 | SO1 | SO2 | SO3 |
|-----|------------|------------|------------|------------|------------|------------|------------|----------|------------|------------|------------|----------|------------|------------|----------|
| PH1 | 1 | | | | | | | | | | | | | | |
| PH2 | .14 | 1 | | | | | | | | | | | | | |
| PH3 | .77 | .27 | 1 | | | | | | | | | | | | |
| PH4 | .43 | .03 | .59 | 1 | | | | | | | | | | | |
| PH5 | .41 | .38 | .40 | .34 | 1 | | | | | | | | | | |
| PH6 | .50 | .28 | .41 | .29 | .25 | 1 | | | | | | | | | |
| PH7 | .44 | .63 | .60 | .47 | .44 | .45 | 1 | | | | | | | | |
| PH8 | .35 | .26 | .40 | .64 | .59 | .50 | .46 | 1 | | | | | | | |
| PS1 | .18 | .11 | .13 | .19 | .50 | -.20 | .27 | .23 | 1 | | | | | | |
| PS2 | .42 | .25 | .56 | .28 | .22 | .37 | .57 | .20 | .41 | 1 | | | | | |
| PS3 | .66 | .20 | .34 | .30 | .40 | .48 | .28 | .54 | .44 | .73 | 1 | | | | |
| PS4 | .37 | -.07 | .48 | .35 | .11 | .24 | .12 | .09 | .03 | .20 | .24 | 1 | | | |
| SO1 | .06 | .33 | .04 | .04 | .19 | .23 | .08 | .08 | .09 | .38 | .30 | .24 | 1 | | |
| SO2 | .22 | .13 | .32 | .45 | .47 | .28 | .48 | .41 | .00 | .57 | .61 | .09 | .32 | 1 | |
| SO3 | .23 | .17 | .26 | .13 | -.35 | .16 | .26 | .09 | .13 | .20 | .37 | .25 | .52 | .01 | 1 |

Note: PH: Physical-TFI; PS: Psychological-TFI; SO: Social-TFI.

Item to total (point-biserial) correlations. Corrected item-total correlations of each sub-scale of the Arabic version-TFI are considered as acceptable if these correlations have ≥ 0.30 (Polit & Beck, 2012) or ≥ 0.20 (Thomas McCoy, personal communication, December 6, 2014). All items of the TFI had acceptable positive Point-Biserial correlations except the item of psychological domain regarding the problems in memory ($r=0.18$) in the psychological domain and the item of social domain regarding receiving social support ($r=0.19$) in the social domain (Table 12). These two items failed to meet the criteria for item-total correlation. However, the majority of the items of the TFI met the item-total (Point-Biserial) correlation criteria.

Table 12

Item to Total (Point-Biserial) Correlations of the TFI

| | Corrected Item-Total Correlation | KR 20 if Item Deleted |
|-------|-------------------------------------|-----------------------|
| Phy_1 | 0.461 | 0.751 |
| Phy_2 | 0.280 | 0.767 |
| Phy_3 | 0.533 | 0.743 |
| Phy_4 | 0.410 | 0.755 |
| Phy_5 | 0.394 | 0.757 |
| Phy_6 | 0.388 | 0.757 |
| Phy_7 | 0.525 | 0.744 |
| Phy_8 | 0.429 | 0.754 |
| Psy_1 | 0.177 | 0.773 |
| Psy_2 | 0.463 | 0.751 |
| Psy_3 | 0.468 | 0.752 |
| Psy_4 | 0.225 | 0.770 |
| Soc_1 | 0.245 | 0.770 |
| Soc_2 | 0.396 | 0.756 |
| Soc_3 | 0.192 | 0.773 |

Note: Phy: Physical-TFI; Psy: Psychological-TFI; Soc: Social-TFI.

Research Question 2

Does the Arabic version of the Tilburg Frailty Indicator yield valid information about frailty in Jordanian community-dwelling older adults aged 60 years and older?

Face and content validity. The evaluation criteria of face validity are to have a well-phrased instrument of all frailty components. It is achieved through consultations with healthcare providers at primary healthcare centers, nursing faculty members who are experts in geriatric care, and elderly people visiting primary healthcare centers. The content validity was evaluated using the Scale-Content Validity Index (S-CVI) and the Item-Content Validity Index (I-CVI). A content validity of at least 0.90 for Scale-Content Validity Index (S-CVI) and at least 0.78 for Item-Content Validity Index (I-CVI) is considered excellent (Polit & Beck, 2012). The S-CVI of Arabic version-TFI was 96.7%. The Arabic version-TFI had 100% on I-CVI for all its items except the two items of the social domain regarding feeling alone (75%) and social support (75%). These results indicate that the Arabic-TFI items met content validity as shown in the Table 13.

Table 13

Item-Content Validity Index (I-CVI) and Scale-Content Validity Index (S-CVI) of the Arabic Version of the Tilburg Frailty Indicator (TFI)

| Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | (ICV-I) |
|------------|-----------------|-----------------|-----------------|-----------------|----------|
| Physical 1 | Highly relevant | Highly relevant | Highly relevant | Quite relevant | 4/4=100% |
| Physical 2 | Highly relevant | Highly relevant | Highly relevant | Quite relevant | 4/4=100% |
| Physical 3 | Highly relevant | Highly relevant | Highly relevant | Highly relevant | 4/4=100% |

Table 13 (cont.)

| Item | Expert 1 | Expert 2 | Expert 3 | Expert 4 | (ICV-I) |
|-----------------|------------------|-------------------|-------------------|-----------------|----------|
| Physical 4 | Highly relevant | Highly relevant | Highly relevant | Highly relevant | 4/4=100% |
| Physical 5 | Highly relevant | Highly relevant | Highly relevant | Highly relevant | 4/4=100% |
| Physical 6 | Highly relevant | Highly relevant | Highly relevant | Highly relevant | 4/4=100% |
| Physical 7 | Highly relevant | Quite relevant | Quite relevant | Quite relevant | 4/4=100% |
| Physical 8 | Highly relevant | Quite relevant | Quite relevant | Quite relevant | 4/4=100% |
| Psychological 1 | Quite relevant | Quite relevant | Highly relevant | Quite relevant | 4/4=100% |
| Psychological 2 | Quite relevant | Quite relevant | Highly relevant | Quite relevant | 4/4=100% |
| Psychological 3 | Quite relevant | Quite relevant | Highly relevant | Quite relevant | 4/4=100% |
| Psychological 4 | Quite relevant | Quite relevant | Quite relevant | Quite relevant | 4/4=100% |
| Social 1 | Highly relevant | Quite relevant | Quite relevant | Quite relevant | 4/4=100% |
| Social 2 | Highly relevant | Quite relevant | Somewhat relevant | Quite relevant | 3/4=75% |
| Social 3 | Highly relevant | Somewhat relevant | Quite relevant | Quite relevant | 3/4=75% |
| S-CVI | Average of I-CVI | | | | 96.7% |

Note: Each item was rated based on a four-point scale of relevance reported by Polit and Beck (2011) (1=Not relevant, 2=somewhat relevant, 3=quite relevant, 4=quite relevant). The I-CVI=the number of experts giving 3 or 4 for the item divided by the total number of experts. The S-CVI=the average of I-CVIs.

Construct validity: convergent validity. Convergent validity was used to explore the correlations between the domains of the TFI and their corresponding scales measuring the same construct. These scales are Physical Function of the SF 36, the GDS, and the Social Function of the SF 36. The Faries and Yalcin rule was used to evaluate the convergent validity. This rule states that correlations between the same components in both presumed scales measuring the same construct should equal or exceed 0.40 (Faries & Yalcin, 2007). The correlations between the physical-TFI and the Physical Function of

SF 36 was -0.317 ($p < 0.01$), psychological-TFI and GDS was 0.46 ($p < 0.01$), and social-TFI and the Social Function of SF 36 was -0.30 ($p < 0.01$). The correlations between the Physical Function of the SF 36, the GDS, the Social Function of the SF 36 and the total scores of the TFI were -0.36 ($p < 0.01$), 0.52 ($p < 0.01$), and -0.52 ($p < 0.01$), respectively (Table 14). Therefore, the psychological-TFI and the total TFI scores met the cut-off of the Faries and Yalcin (2007) s' rule.

Construct validity: divergent validity. The evaluation criteria are to have equal to or less than 0.30 (Faries & Yalcin, 2007) for correlations among each domain of the TFI and the other two constructs measuring different domains. The correlations of the physical domain of the TFI with the GDS and the SF36-Social Function instruments were 0.41 ($p < 0.01$) and -0.46 ($p < 0.01$), respectively. The correlations of the psychological domain of the TFI with each of the SF36-Physical Function and SF36-Social Function instruments were -0.34 ($p < 0.01$) and -0.38 ($p < 0.01$), respectively. The correlations of the social-TFI with the Physical Function of the SF 36 and the GDS were -0.13 (non significant) and 0.36 ($p < 0.01$), respectively (Table 14). Therefore, the social-TFI met partially the cut-off of the Faries and Yalcin (2007) s' rule for divergent validity (between the social-TFI and the SF36-Physical Function, $r=0.13$). The rest of the correlations, as discussed earlier, belong to convergent validity.

Table 14

Construct Validity (Convergent and Divergent Validity): Pearson Correlations of Frailty Domains with Other Corresponding Measures

| Corresponding measures/TFI domains | Physical-TFI | Psychological-TFI | Social-TFI | Total-TFI |
|------------------------------------|--------------|-------------------|------------|-----------|
| SF36-Physical Function | -.317** | -.337** | -.130 | -.355** |
| GDS | .408** | .458** | .356** | .517** |
| SF36-Social Function | -.458** | -.381** | -.304** | -.516** |

Note: TFI: Tilburg Frailty Indicator; GDS: Geriatric Depression Scale; ** $p < 0.01$

Known group differences. The known group difference method was used to examine construct validity. Independent t tests were conducted to determine if statistically significant differences existed between the mean frailty scores of older adults aged 60-70 years and those aged 71 or older, males and females, and older adults who had comorbidities and those without comorbidities. There was no statistically significant difference between the mean frailty scores of older adults aged 60-70 ($n = 72$, $M = 6.53$, $SD = 3.34$) and those aged 71 or older ($n = 33$, $M = 7.91$, $SD = 3.45$), $t(103) = -1.949$, $p = 0.054$. The effect size was 0.41. The 95% CI was -2.79 to 0.024. There was no statistically significant difference between the mean frailty scores of males ($n = 66$, $M = 6.5909$, $SD = 3.47$) and females ($n = 43$, $M = 7.6279$, $SD = 3.24$), $t(107) = -1.564$, $p = 0.121$. The effect size was 0.31. The 95% CI was -2.351 to 0.277. Although both two p values were not statistically significant, they had moderate effect size, which represented the magnitude of the difference between groups (Sullivan & Feinn, 2012). However, there was a statistically significant difference between the mean frailty scores of older

adults who had comorbidities ($n= 75$ $M= 5.6471$, $SD = 3.70$) and those who did not have ($n= 34$ $M= 7.6133$, $SD = 3.10$), $t(107) = -2.887$, $p = 0.005$). The effect size was 0.576. The 95% CI was -3.32 to -0.62.

Summary

In this chapter, characteristics of 109 Jordanian community dwelling older adults recruited for this study are displayed, including demographic and health variables. In addition, the results of reliability and validity tests conducted on the Arabic version of the Tilburg Frailty Index are discussed and presented. The reliability tests conducted included determining KR 20 values and calculating inter-item (Tetrachoric), item-total (Point-Biserial), and subscale-subscale correlations (Pearson's coefficient). The validity tests conducted included using the face, content, convergent, and divergent validity measures, and known group differences. The total score of the Arabic version of the Tilburg Frailty Indicator had good reliability (KR 20= 0.77) and good convergent and divergent validity with the corresponding scales: physical-TFI and SF36-physical function ($r= -0.317$), psychological-TFI and GDS ($r= 0.458$), and social-TFI and SF 36-social function ($r= -0.304$). In addition, known group differences showed that the Jordanian older adults who had comorbidities ($n= 75$, $M= 5.6471$, $SD = 3.70$) were significantly scored higher on frailty scale than those who did not have ($n= 34$, $M= 7.6133$, $SD = 3.10$), $t(107) = -2.887$, $p = 0.005$). Hence, having comorbidities may contribute to frailty among older adults in Jordan.

CHAPTER V

DISCUSSION

In this chapter, the methodological aspects of the TFI are discussed in the context of the current study as compared to previous studies. The specific psychometric properties discussed in this chapter are based on the findings of the current study and include internal consistency or reliability, face validity, content validity, criterion validity, and construct validity.

The Arabic version of the TFI was modified after the original instrument developed by Gobbens and colleagues (2010b) and is comprised of fifteen items that address the three domains of frailty. The physical domain (8 items) addresses physical health, body weight, walking, balance, hearing and vision issues, hand strength, and tiredness. The psychological domain (4 items) assesses remembering things/memory, depression, anxiety, and coping issues. Lastly, the social domain (3 items) assesses social activity within the neighborhood, feeling alone, and having enough social support. The total score is fifteen, and a score of 5 or above denotes a frail person.

The TFI: The Purposes, Settings, Samples, and Designs

The goal of the current study was to determine if the Arabic (Jordan) version of the TFI yields reliable and valid information about frailty in the population of community dwelling older adults aged 60 years and above in Jordan. This is the first study in which this Arabic translation of the TFI has been tested in this country. The TFI has been

translated for use in and tested in the Netherlands (Gobbens, van Assen, & Luijkx, 2010), Belgium (De Witte et al., 2013b), Denmark (Andreasen et al., 2014), Portugal (Coelho et al., 2014), Poland (Uchmanowicz et al., 2014), and Brazil (Santiago et al., 2013). The findings of the current study should be a valuable addition to the TFI literature regarding the adaptation of this tool for use in different countries and with different cultures.

Numerous studies using the TFI have been reported in the literature and were discussed in Chapter II. These studies have used the TFI for screening older adults for frailty by assessing complications, determinants, or quality of life issues (Cramm, Twisk, & Nieboer, 2014; Gobbens, Luijkx, & van Assen, 2013; Gobbens & van Assen, 2012; Gobbens & van Assen, 2014; Gobbens, van Assen, Luijkx, & Schols, 2012; Gobbens, van Assen, Luijkx, Wijnen-Sponselee, & Schols, 2010; Gobbens, van Assen, Luijkx, Wijnen-Sponselee, Schols, 2012; Gobbens, van Assen, & Schalk, 2014); testing a theoretical model of frailty (Gobbens et al., 2012); cross-validating it against another frailty instrument (De Witte et al., 2013b); comparing it to other frailty instruments reported in the literature (Daniels, van Rossum, Beurskens, van den Heuvel, & de Witte 2012; Pialoux et al., 2012; Theou, Brothers, Mitnitski, & Rockwood, 2013; Theou, Brothers, Peña, Mitnitski, & Rockwood, 2014); and validating the cultural and psychometrical aspects of it in different populations (Andreasen, Sørensen, Gobbens, Lund, & Aadahl, 2014; Coelho, Santos, Paúl, Gobbens, Fernandes, 2014; Metzelthin et al., 2010; Santiago, Luz, Mattos, Gobbens, & van Assen, 2013; Santiago, Luz, Mattos, & Gobbens, 2012; Uchmanowicz et al., 2014). The characteristics of the sample in the current study share some similarities that have been addressed in some of the earlier TFI

studies. The participants in the current study were 109 older Jordanian adults aged 60 to 88 years old who were recruited from Irbid city in the Hashemite Kingdom of Jordan. The samples recruited in the other countries in which this instrument has been tested ranged from 141 (Gobbens & van Assen, 2012) to 27,527 community dwelling older adults (Theou et al., 2014). The age range in those samples ranged from young elderly aged 58-64 years in one study (Gobbens, van Assen, Luijkx, et al., 2012) to older adults aged 65 years and older in the rest of the studies (Andreason et al. 2014; Coelho et al. 2014; Cramm et al. 2014; Daniels et al. 2012; Gobbens & van Assen, 2014; Gobbens et al. 2010b; Gobbens, et al. 2012; Gobbens, Luijkx, et al. 2013; Metzeltin et al. 2010; Pialoux et al. 2012; Santiago et al. 2012; Santiago et al. 2013; Theou et al. 2014; Theou, Brothers, et al. 2013; Uchmanowicz et al. 2014). A large percentage of the participants in the current study had a low educational level similar to the sample in the Portuguese study (Coelho et al., 2014). However, the current study included a majority of males and married elders compared to the Portuguese study (Coelho et al., 2014).

Interpretation of Findings

Reliability of the TFI

The KR 20 values of the three subscales and the total scores of the Arabic version of the TFI were as follows: 0.744 (Physical-TFI), 0.46 (Psychological-TFI), 0.39 (Social-TFI), and 0.77 (Total-TFI). These KR 20 values mean that the Arabic version of the TFI and the physical domain of the instrument have good reliability. The KR 20 of the physical domain of the TFI means that this subscale measures the physical attribute only and does not measure other dimensions. The low KR 20 values of both the psychological

domain (0.46) and the social domain (0.39) of the TFI indicate that both subscales could measure other dimensions.

The two low values of the reliability of both the psychological and social domains are in line with the results found in Gobbens et al. (2010b), Santiago et al. (2013), and Coelho et al. (2014). Gobbens and colleagues' study (2010b) reported a low reliability value of the social domain of the TFI (0.34), which is similar to the current KR 20 of the Arabic version TFI (KR 20=0.39). Santiago et al. (2013) reported low values for both the psychological (0.53) and the social (0.38) domains. Coelho et al. (2014) had similar results and found KR 20 values of 0.48 and 0.49 for the psychological and social domains respectively.

The number of items in a scale or subscale contributes considerably to the magnitude of the reliability. Therefore, the low reliability of the two subscales may be attributed to the small number of items included in the psychological (4 items) and social (3 items) domains. Both domains entail the salient components of both the psychological and social aspects of frailty, so using a reduced number of items is justified because it lessens the burden on the participants. A second possible explanation for the low reliability of these two subscales is Jordanian culture. The fact that Jordanian families tend to live together and take care of older adults may play a partial role in lowering the reliability of both domains; Jordanian older adults, as a member of the culture, are more likely to express their answers to the psychological and social questions in a positive way.

In the current study, the TFI has an adequate KR 20 value of 0.77, which indicates that the TFI measures one attribute, that is, the frailty concept. The value of reliability of the total items of the TFI is in line with the internal consistency of the TFI reported in previous studies: 0.72 and 0.68 to 0.72 for the total score and the TFI items, respectively (Uchmanowicz et al., 2014); 0.78 (Santiago et al., 2013); 0.79 (Metzelthin et al., 2010); and the Gobbens and colleagues' study (2010a) reported internal consistency estimates of the TFI domains above 0.70, except for the social domain (0.34). However, one study reported a KR20 of 0.78 (Coelho et al., 2014). Other studies have shown adequate Cronbach's alpha values above 0.70 (Coelho et al., 2014; Metzelthin et al., 2010; Santiago et al., 2013; Uchmanowicz et al., 2014). Comparing the KR 20 values of the Arabic version of the TFI to the previous studies, having a 0.77 of KR 20, as a total score, is regarded to the highest value of the reliability. Despite the low KR 20 values for both the psychological and social domains, presenting the KR 20 of total score is the most important while measuring the frailty on a holistic approach, rather than considering each domain separately.

On the other hand, Pearson's correlation coefficients between the subscales of the Arabic version-TFI ranging from 0.306 to 0.441 ($p < 0.01$) support that the subscales are low to moderately correlated with each other, which makes using the KR 20 of the total score more reasonable. Additionally, the absence of the negative point-biserial correlations and having the correlations above 0.2 for all items except two (ability to remember things and having enough support from social context) show that all items are correlated with the total score of the TFI. Lastly, the prior TFI studies and the conceptual

considerations developed by Gobbens and colleague (2010)'s support adopting the KR 20 of the total TFI score, that is, 0.77. The Arabic version of the TFI tested in older Jordanian participants has yielded a good internal consistency as shown by the KR 20 value of 0.77.

Face and Content Validity

The face and content validity of the Arabic version of the TFI were assessed by a panel of Jordanian healthcare providers and experts. This panel included several faculty members from the Jordan University of Science and Technology, one of the largest academic institutions in Jordan, who were authors of numerous geriatric publications. The panel also included health professionals, such as clinical nurse specialists and registered nurses. The members of the panel agreed on the importance of using the TFI for detecting the components of frailty in older adults, which indicates this instrument is suitable for use in the Jordanian culture.

Thirteen out of fifteen items of the Arabic version of the TFI had an Item-Content Validity Index (I-CVI) of 100%. Two items of the social domain, one about feeling alone and one regarding social support, had an I-CVI value of 75%. One panelist suggested that a reason for lack of agreement was that the Jordanian culture was a close-knit culture, that is, the older adults have social support always and they would not feel alone. Then, the two items of having social support and feeling alone were responded in positive way. However, other panelists argued that the Jordanian culture had been undergoing change and most of the younger family members tended to work outside of the home, leading to leave older adults at home alone. Thus, the items of social support and feeling alone

should still be addressed. The Scale-Content Validity Index of the Arabic version-TFI was 96.7%. This result is in concordance with several previous TFI studies that used a panel of experts to explore the face and content validity of the instrument (Andreasen et al., 2014; Coelho et al., 2014; Gobbens et al., 2010a; Santiago, Luz, Mattos, & Gobbens, 2012). As a result of the face and content validity displayed in the current study, the Arabic version of the Tilburg Frailty Indicator has significant face and content validity.

Criterion Related Validity: Convergent and Divergent Validity

The values of the inter-item (Tetrachoric) correlations of the physical domain (Table 11) ranged from 0.14 to 0.77. The absence of negative correlations reveals that all of these items are consistent with the frailty concept in the Jordanian participants and none of them might measure a different concept or are not related to the frailty concept. The values are considered as low-moderate correlations. All of the inter-item (Tetrachoric) correlations of the physical domain were above 0.30 except for eight correlations (PH 1 and PH2; PH2 and PH3; PH2 and PH4; PH1 and PH5; PH2 and PH6; PH6 and PH4; PH6 and PH5; and PH2 and PH8). Half of the inter-item (Tetrachoric) correlations of the psychological domain were above 0.30, except for three correlations (PS2 and PS1; PS4 and PS2; and PS4 and PS3). Lastly, most of the inter-item (Tetrachoric) correlations of the social domain were above 0.30, except for one correlation (SO3 and SO2).

The variations in the values of the inter-item correlations may be explained by having a small sample size that would not capture the correlations among the dichotomous variables. However, the existence of positive correlations within each of the

three sub-scales indicates that the sub-scale correlations are correlated to each other. Hence, the most of the inter-item (Tetrachoric) correlations within each of the sub-scale are in line with convergent validity.

The inter-item (Tetrachoric) correlations between each of the items in one domain with each of the items in the other two different domains ranged from -0.07 to 0.61 and included three negative correlations. The existence of very low to moderate inter-item correlations between different domains is congruent with good divergent validity. The small sample size might have reduced the magnitude of the inter-item (Tetrachoric) correlations. As a result, most of the inter-item (Tetrachoric) correlations met the criterion of having a value of 0.30 or above within each of the subscales of the Arabic version of the Tilburg Frailty Indicator.

The physical domain of the TFI was negatively correlated with the Physical Function-SF 36. This was expected because the older adults who are physically frail will not be able to perceive their physical function positively. The value of correlation was 0.32, which could not be considered either convergent or divergent validity based on the Faries and Yalcin (2007) s' rule. However, obtaining a significant correlation of 0.30 (or 0.40) or above indicates generally meaningful or significant correlation (convergent) that two scales belong to the same concept in the Jordanian participants. The value of 0.32 is congruent with previous studies (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013). For instance, the correlations of physical-TFI with other physical measures ranged from 0.12 to 0.48.

The correlation between the psychological-TFI with the GDS was 0.46 which met the cut-off of the Faries and Yalcin (2007) s' rule. This value is in concordance with the correlations between the psychological-TFI and other psychological measures reported in previous studies, which ranged from 0.26 to 0.58 (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013) (Table 7). Hence, the findings of the current study show that the psychological-TFI has convergent validity. The correlation between the social-TFI and the Social Function-SF 36 was negative. This is expected since the older adults who are socially frail will not be able to view their social function in a positive way. Its value of 0.30 does not meet the requirement of the cut-off of the Faries and Yalcin (2007) s' rule. However, the correlation of the present study is close to the highest value (0.35) found in the correlations between the social-TFI and other social measures discussed in previous studies (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013). Consequently, the psychological-TFI was shown to have convergent validity in based on the Faries and Yalcin (2007) s' rule, and it was shown in both the physical and social domains of the TFI in previous TFI studies (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013). As a result, the findings of this study might reveal that it is important to use more corresponding scales other than the SF 36- Physical Function, GDS, and SF 36- Social Function, which have already been validated for use with the Jordanian population. However, there is one item that might be interpreted differently by older Jordanian adults. In the GDS, item 11 asks "Do you think it is wonderful to be alive now?" In Jordanian culture, older adults value being alive and know that they are valued and appreciated by their extended families even if they have health issues that make life

difficult for them and their families. Suicide is considered taboo. Therefore, this question could give an indication that older adults may have suicidal thoughts if they answer this question in a negative way.

The insufficient number of instruments validated for use with Jordanian participants limits the ability to find more scales to assess the convergent validity of the Arabic version of the TFI. However, based on the findings of this study, the convergent validity for both the psychological and social domains of the TFI should be interpreted cautiously due to their low reliability. In order to establish any instrument in a new population, a higher priority should be placed on the reliability or the internal consistency; the convergent validity should be considered next.

Vis-à-vis divergent validity, the results show that the physical-TFI was positively correlated with the GDS ($r=0.41$) and negatively with the SF36-Social Function ($r=-0.46$). The significant correlation between depression and physical frailty can be explained by the significant prevalence and co-occurrence of frailty and depression in older adults (Buigues et al., 2015). In addition, cognition, including depression and anxiety, and physical frailty were found to be positively correlated with each other (Uchmanowicz & Gobbens, 2015). Based on these positive correlations, a significant correlation between the physical-TFI and GDS is expected. In spite of the fact that these correlations are not less than 0.30 and do not meet the requirement of the Faries and Yalcin (2007) s' cut-offs, which is not considered problematic, they are in line with taking into account the psychological aspect of frailty through the demonstration of significant correlations between depression and physical frailty. On the other hand,

correlations of 0.41 and 0.46 are close to numerous previous studies that reported the correlations between the physical-TFI and other psychological and social scales (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013). These correlations ranged from 0.24 to 0.58 for the physical-TFI and psychological scales and from 0.10 to 0.35 for the physical-TFI and social scales, which indicate that the physical, psychological, and social domains are correlated to each other and support the role of both the psychological and social domains as essential aspects of frailty.

Secondly, the psychological-TFI was correlated negatively with the Physical Function-SF36 ($r=-0.34$) and negatively with the Social Function-SF36 ($r=-0.381$) (Table 14). These negative correlations are expected because the participants with higher frailty scores have less ability on both the physical and social functions of the SF36. These correlations are significantly higher than those reported in the previous studies addressing the correlations between the psychological-TFI and other physical scales (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013). These correlations ranged from 0.02 to 0.28 for the psychological-TFI and physical scales. On the other hand, the previous studies reported that correlations between the psychological-TFI and social scales ranged from 0.14 to 0.37, which are close to what was found in this study ($r=0.38$).

These findings reveal that the psychological aspect of frailty may have a negative impact on the health-related quality of life for Jordanian older adults. Older Jordanian adults might not perceive themselves as being physically healthy and socially active while being psychologically frail. The inability to remember things, the inability to adjust to problems, feeling depressed, and feeling anxious may prevent some older Jordanian

adults from living comfortably and perceiving of a better health-related quality of life for themselves. It is not surprising that the psychological-TFI is significantly correlated with the physical and social functioning of the health-related quality of life measured by the SF-36. The finding of the current study is consistent with significant inverse correlations found between both of the SF 36 physical component scale (PCS) and the mental component scale (MCS) domain and the TFI score (Uchmanowicz & Gobbens, 2015).

Lastly, the social-TFI was correlated negatively with the Physical Function-SF36 ($r = 0.13$) and positively with the GDS ($r=0.36$) (Table 14). The correlation between the social-TFI and the Physical Function-SF36 met the criteria of divergent validity based on the Faries and Yalcin (2007) s' cut-offs. However, based on the findings of this study, the divergent validity for the social domain of the TFI should be interpreted cautiously due to its low reliability. This correlation ($r=0.13$) is consistent with low correlations between the social-TFI and physical scales reported in table 6, which ranged from 0.00 to 0.20. The correlation between the social-TFI and the GDS ($r=0.36$) is not regarded as having either convergent or divergent validity based on the Faries and Yalcin (2007) s' cut-off criteria. However, this value is close to the average of the correlations between the social-TFI and psychological scales (Coelho et al., 2014; Gobbens et al., 2010; Santiago et al., 2013), which ranged from 0.01 to 0.41. The variation in the correlations between the social-TFI and psychological scales might be attributed to the different corresponding or alternative scales used in different populations. For instance, the current study used the physical function subscale of the SF 36, the GDS, and the social function subscale of the SF 36, but other studies used different scales.

In Gobbens and colleagues (2010b)' study, the physical domain was better correlated with the other physical measures: LASA Physical Activity Questionnaire ($r = -0.28, p < 0.001$), Timed Up & Go ($r = 0.36, p < 0.001$), the four-test balance scale ($r = 0.30, p < 0.001$), grip strength test ($r = -0.27, p < 0.001$), and Shortened Fatigue Questionnaire (SFQ) ($r = 0.53, p < 0.001$). Unexpectedly, BMI and 'unexplained weight loss' was not correlated well (Gobbens et al., 2010b). Moreover, the psychological domain of the TFI was adequately correlated with other psychological measures as follows: Center for Epidemiologic Studies ($r = 0.45, p < 0.001$), Hospital Anxiety and Depression Scale–Anxiety subscale (HADS-A) ($r = 0.39, p < 0.001$), and Mastery Scale ($r = 0.40, p < 0.001$), except for MMSE ($r = -0.09, p = 0.076$). Lastly, correlation values were reported between the social domain-TFI and the Loneliness scale ($r = 0.45, p < 0.001$) and Social Support List (SSL) ($r = 0.31, p < 0.001$). Santiago and colleagues' (2012) also found varied correlations between the TFI domains and corresponding scales. The authors revealed that the relationships between some corresponding physical and psychological frailty measures were not strongly correlated with the proposed domains in the TFI. Thus, the evidence of convergent validity has been shown in physical, psychological, and social components of the Arabic version of TFI.

Known group difference was also used to support the construct validity of the Arabic version of the TFI. Comorbidities have been found in previous studies to be associated with frailty (Bergman et al., 2004; Chek Hooi et al., 2010; Gobbens et al., 2012a; Mitnitski et al., 2001; Song et al., 2010; Theou et al., 2012). Therefore, the scores of the Arabic version of the TFI were expected to discriminate between the older adults

with comorbidities and those who did not have comorbidities. The current study reveals that the differences in frailty scores were statistically significant between the older adults with comorbidities and those who did not have comorbidities ($t(107) = -2.887, p = 0.005$). Thus, known group difference in comorbidities was established in the current study. The findings of the current study are in concordance with the conceptual framework of the integral model of frailty. The findings show that frailty can not be considered as only a physical attribute but that it is a multidimensional concept entailing physical, psychological, and social domains.

Implications for Nursing Theory, Research, and Practice

In the current literature, frailty has been found to be associated with a stage of loss of resources and a lowered ability to tolerate stressors (Pialoux, Goyard, & Lesourd, 2012). Frailty emerges as considerably important in anticipating health complications, such as disability, low quality of life, and life satisfaction (Peters, Boter, Buskens, & Slaets, 2012). This point, in turn, has sparked a tireless search for an instrument contributing significantly to screening for frailty. However, most of the frailty instruments have never been validated in terms of reliability and validity (Bouillon et al., 2013); furthermore, the psychometric proprieties of most frailty instruments have not been established (de Vries et al., 2011). As a result, several reviews and comparisons among frailty instruments have been addressed in the literature in an effort to establish the most valid tools to predict frailty (Daniels et al., 2012; Daniels, van Rossum, Beurskens, van den Heuvel, & de Witte, 2012; de Vries et al., 2011; Metzelthin et al., 2010; Pialoux et al., 2012).

The results of the current study have shown that frailty, as a concept, should not be considered merely by physical indicators, but that there are other salient aspects of frailty, such as psychological and social aspects, that go hand in hand with the physical indicators. In spite of the low reliability of the two domains, the psychological and social domains were positively and moderately correlated with the physical domain, demonstrating the multi-dimensional nature of the frailty concept. The existence of the low to moderate correlations between items of each of the physical, psychological, and social subscales of the Arabic version of the Tilburg Frailty Indicator supports Gobbens and colleagues' integral conceptual model of frailty. Furthermore, the domains of the Arabic version-TFI were found to be correlated with numerous corresponding physical, psychological, and social scales in the current study. Moreover, the physical domain of the TFI was correlated with other scales, such as the GDS, that measure different domains. This guides us toward the fact that frailty is a multidimensional attribute that needs to be assessed in older adults. For instance, if there is an issue in psychological domain of older adults' lives, their physical domain might be negatively influenced.

Future interventions should be tailored to manage the emerging issues in physical, psychological and social domains. The Arabic version of the TFI has not been used in intervention studies so far. Its efficacy could be evaluated using the proposed interventions specific to the people who are determined to be frail based on receiving a score of 5 or above on this 15 point screening test. Health providers should develop intervention programs for frail older adults. The interventions should be tailored to manage the physical, psychological, and social issues in an effort to reverse frailty and

avert its complications (e.g. nursing home admission, hospitalization, and disability). In addition, health policy makers will have a better sense of what challenges comprise the physical, psychological, and social aspects of frailty in the context of geriatric healthcare in the community, permitting older adult-related policies to be tailored accordingly. In order to change the behavior of older Jordanian adults toward engaging in physical activity, an effective communication with policy makers should coexist with the other interventions devoted to creating policies and legalization to build elderly-friendly clubs and facilities, training sport specialists, and protecting the older adults' right to access such services. In addition, the dissemination of information about the importance of physical activity in public places and healthcare settings would contribute to the acceptance of engaging in physical activity as a part of the cultural norm for older adults aged 60 years old and above. The target audience should involve the family, friends, and local influential peers to cultivate the strong social support because the most distinguishable feature of Jordanian culture is that close-knit family and peer groups support one another. In addition, local workshops should be held on the health benefits of physical activity. Posters about moderate physical activities can be created and displayed at primary healthcare centers, and family members could be encouraged to practice exercise and offer a support for older adults. Videos on physical activity can be distributed to broadcast media representatives.

Since frailty has not been studied in Jordan, no frailty interventions have been developed to combat frailty in Jordanian older adults. Therefore, it is important for healthcare policymakers and workers in Jordan to be educated about frailty. In addition, it

will be necessary to identify appropriate assessment tools in order to begin to assess older adults for frailty. This will have to be achieved before intervention strategies can be developed that can be tailored to manage the physical, psychological, and social issues in an effort to reverse frailty and avert its complications (e.g. nursing home admission, hospitalization, and disability).

In order to start an intervention program in Jordan quickly, a physical activity and exercise intervention program should be implemented on a short-term basis. The intervention program should be targeted at: 1) Increasing the level of knowledge about appropriate exercise tolerated by older adults, 2) Changing attitudes of older adults about engaging in physical exercise, 3) Enabling older adults to perceive regular physical activity as a health behavior, and 4) Guiding community health nurses and nursing students who conduct home visits to distribute brochures, hold events, and deliver appropriate physical activity materials as part of their nursing curriculum. Lastly, surveys are important for screening the best way of communicating health information to older adults by determining how they get their information, such as reading, watching television, listening to the radio, accessing the internet, or having conversations. Such surveys and studies also assist in tailoring the best interventions because of insufficient knowledge about the critical characteristics effecting a desired outcome about physical activity in Jordanian older adults.

Limitations

The results of this study have several limitations. First, the use of a convenience sample limits the generalizability of the findings to the target population. Second, the

psychological and social domain of the Arabic version of the Tilburg Frailty Indicator had low reliability, so the results of the convergent validity must be interpreted with caution. The sample size of 109 participants is considered too small to conduct the construct validity (Factor Analysis) deemed necessary to validate a new instrument, such as the Arabic version of the Tilburg Frailty Indicator. A larger sample size is needed for dichotomous instruments (Flora & Curran, 2004). Lastly, the temporal stability or test-retest and the inter-rater reliability could be additional methods to measure the reliability of the Arabic version of the TFI in future research. The interval of test-retest could be in 2-week, such as in Gobbens and colleagues' (2010b) study.

Conclusion

The Tilburg Frailty Indicator is an emerging frailty instrument that has been translated for use and validated in several countries in the past three years. The Arabic version of the TFI obtained a good reliability to screen frailty in older Jordanian adults. The face and content validity was adequately established through a panel of experts by assessing item and scale content indices. The construct validity was established in the three domains of the TFI, psychological, physical, and social, through exploring the correlations between domains and their corresponding and non-corresponding scales. Moreover, known group difference was established in comparing older adults with comorbidities and those without based on frailty scores obtained using the Arabic version of the TFI. The Arabic version of the TFI is the preliminary step in guiding health providers to screen for frailty in Jordan. Notwithstanding, no gold standard has been developed for screening for frailty (Daniels et al., 2012); the Arabic version of the TFI

could bring researchers closer to achieving this standard. Sustaining efforts to compare different frailty instruments in the literature using numerous literature reviews is indispensable for establishing the most suitable frailty instruments.

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APPENDIX A

THE ENGLISH VERSION OF DEMOGRAPHIC/HEALTH VARIABLES

Demographics:

- 1 What is your age?
__ Code age in years
0 7 Don't know / Not sure
0 9 Refused
- 2 Are you?
0 Male
1 Female
- 3 Are you...?
1 Married
2 Divorced
3 Widowed
4 Separated
5 Never married
- 4 How many **family members live in your household?**
- 5 What is the highest grade or year of school you completed?
1 Never attended school or only attended kindergarten
2 Grades 1 through 8 (Elementary)
3 Grades 9 through 11 (Some high school)
4 Grade 12 or GED (High school graduate)
5 College 1 year to 3 years (Some college or technical school)
6 College 4 years or more (College graduate)
9 Refused
- 7 Monthly household income:
1 Less than 250 JD
2 between 250-350 JD
3 between 350-450 JD
4 between 450-550 JD
5 between 550-650 JD
6 between 650-750 JD
7 between 750-850 JD
8 between 850-950 JD
9 over 950 JD
7 7 Don't know / Not sure
9 9 Refused

Demographics (cont.)

7.8 Do you

1 live alone.

2 live with your spouse.

3 live with your spouse and unmarried children.

4 live with you extended family.

5 live with others.

7.9 Have you ever been admitted to hospital in the past year and how many times?

1 Yes and how many

2 No

8.1 Have you had any type of disabilities?

1 Yes and it is

2 No

Health variables:

| | 1 Yes | 2 No | 3 Don't know / Not sure | 4 Refused |
|---|--------------|-------------|------------------------------------|------------------|
| (Ever told) you had a hypertension? | | | | |
| (Ever told) you had an angina, heart attack, or coronary heart disease? | | | | |
| (Ever told) you had a stroke? | | | | |
| (Ever told) you had asthma? | | | | |
| (Ever told) you have Chronic Obstructive Pulmonary Disease or COPD, emphysema or chronic bronchitis? | | | | |
| (Ever told) you have some form of arthritis, rheumatoid arthritis, or gout? | | | | |
| Do you have any trouble seeing, even when wearing glasses or contact lenses? | | | | |
| Do you have any hearing problem? | | | | |
| (Ever told) you have diabetes? | | | | |

APPENDIX B

THE ARABIC VERSION OF DEMOGRAPHIC/HEALTH VARIABLES

التركيبة السكانية:


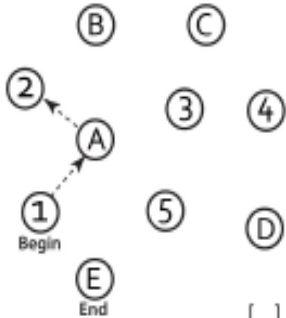

١. ما عمرك؟ سنة ٠٧ لا اعرف ٠٩ رفض/ت الاجابه
٢. الجنس؟ ٠ ذكر ١ أنثى
٣. الحالة الاجتماعيه: ١ متزوج ٢ مطلق ٣ أرمله ٤ منفصل ٥ أعزب
٤. ما عدد افراد الاسره الذين يعيشون في منزلك؟ فرد ٨٨ لا أحد ٩٩ رفض/ت الاجابه
٥. المستوى التعليمي:
 - ١ لم يلتحق بأي مدرسه
 - ٢ من الصف الاول الى الصف الثامن (الابتدائي)
 - ٣ من الصف التاسع الى الصف الحادي العشر (الاعدادي)
 - ٤ الصف الثاني العشر (التوجيهي)
 - ٥ دبلوم/ كليه
 - ٦ جامعه
 - ٩ رفض/ت الاجابه
٦. الدخل الاسري الشهري:
 - ١ اقل من ٢٥٠ دينار
 - ٢ ما بين ٢٥٠ الى ٣٥٠ دينار
 - ٣ ما بين ٣٥٠ الى ٤٥٠ دينار
 - ٤ ما بين ٤٥٠ الى ٥٥٠ دينار
 - ٥ ما بين ٥٥٠ الى ٦٥٠ دينار
 - ٦ ما بين ٦٥٠ الى ٧٥٠ دينار
 - ٧ ما بين ٧٥٠ الى ٨٥٠ دينار
 - ٨ ما بين ٨٥٠ الى ٩٥٠ دينار
 - ٩ أكثر من ٩٥٠ دينار
 - ٧٧ لا اعرف
 - ٩٩ رفض/ت الاجابه
٧. هل تعيش:
 - ١ لوحده
 - ٢ مع الزوجه/الزوج فقط
 - ٣ مع الزوجه/الزوج و الأولاد فقط.
 - ٤ مع الزوجه/الزوج و الأولاد و الأحفاد فقط.
 - ٥ مع الآخرين.
٨. هل سبقت و ان دخلت المستشفى خلال السنه الماضيه؟ ١. نعم مرات ٢ لا
٩. هل تعاني من اي اعاقه جسديه او حركيه او اي نوع من الاعاقه؟ ١. نعم و نوعها..... ٢ لا

| المتغيرات الصحيه: | ١. نعم | ٢. لا | ٣. لا اعرف | ٤. رفض/ت الاجابه |
|---|--------|-------|------------|---------------------|
| هل سبقت و ان اصبت بارتفاع الضغط الدم الشرياني؟ | | | | |
| هل سبقت و ان اصبت باحد امراض القلب (الذبحه الصدرية، النوبه القلبيه، أمراض القلب التاجيه)؟ | | | | |
| هل سبقت و ان اصبت بالسكته الدماغيه؟ | | | | |
| هل سبقت و ان اصبت بالربو؟ | | | | |
| هل سبقت و ان اصبت باحد امراض تصلب المفاصل (التهاب المفاصل، لتهاب المفاصل الروماتويد ي، النقرص)؟ | | | | |

| | | | | |
|--|--|--|--|--|
| | | | | هل تعاني من مشاكل في الرؤية او مع ارتداء النظارات أو العدسات اللاصقة؟ |
| | | | | هل انت مصاب بالسكري؟ |
| | | | | هل تعاني من مشاكل في السمع؟ |


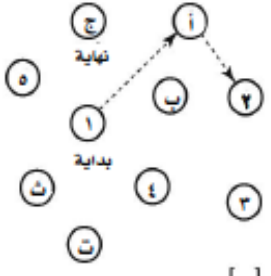
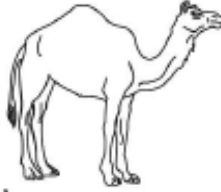


APPENDIX C

MONTREAL COGNITIVE ASSESSMENT TOOL/ENGLISH VERSION

| MONTREAL COGNITIVE ASSESSMENT (MOCA) Version 7.3 Alternative Version | | NAME : | Date of birth : | POINTS | | | | | | | | | | | | | | | | | | | |
|---|--------------------------|--|--------------------------|--|---------------------------------|-------|-----|-----|-------|------|---------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|--|--|--|--|--|-----------|
| | | Education : | DATE : | | | | | | | | | | | | | | | | | | | | |
| VISUOSPATIAL / EXECUTIVE | | Copy cylinder  | | Draw CLOCK (Ten past nine) (3 points) | | | | | | | | | | | | | | | | | | | |
|  | | <input type="checkbox"/> Contour <input type="checkbox"/> Numbers <input type="checkbox"/> Hands | | | | | | | | | | | | | | | | | | | | | |
| NAMING | |  | | | ___/3 | | | | | | | | | | | | | | | | | | |
| MEMORY | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;"></td> <td style="width: 10%;">TRAIN</td> <td style="width: 10%;">EGG</td> <td style="width: 10%;">HAT</td> <td style="width: 10%;">CHAIR</td> <td style="width: 10%;">BLUE</td> </tr> <tr> <td>1st trial</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>2nd trial</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> | | | | TRAIN | EGG | HAT | CHAIR | BLUE | 1st trial | | | | | | 2nd trial | | | | | | No points |
| | TRAIN | EGG | HAT | CHAIR | BLUE | | | | | | | | | | | | | | | | | | |
| 1st trial | | | | | | | | | | | | | | | | | | | | | | | |
| 2nd trial | | | | | | | | | | | | | | | | | | | | | | | |
| ATTENTION | | Read list of digits (1 digit/ sec). Subject has to repeat them in the forward order <input type="checkbox"/> 5 4 1 8 7 Subject has to repeat them in the backward order <input type="checkbox"/> 1 7 4 | | | ___/2 | | | | | | | | | | | | | | | | | | |
| LANGUAGE | | Repeat: She heard his lawyer was the one to sue after the accident. <input type="checkbox"/> The little girls who were given too much candy got stomach aches. <input type="checkbox"/> | | | ___/2 | | | | | | | | | | | | | | | | | | |
| ABSTRACTION | | Similarity between e.g. banana - orange = fruit <input type="checkbox"/> eye - ear <input type="checkbox"/> trumpet - piano | | | ___/2 | | | | | | | | | | | | | | | | | | |
| DELAYED RECALL | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Has to recall words WITH NO CUE</td> <td style="width: 10%;">TRAIN</td> <td style="width: 10%;">EGG</td> <td style="width: 10%;">HAT</td> <td style="width: 10%;">CHAIR</td> <td style="width: 10%;">BLUE</td> </tr> <tr> <td></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </table> | | | Has to recall words WITH NO CUE | TRAIN | EGG | HAT | CHAIR | BLUE | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ___/5 | | | | | | |
| Has to recall words WITH NO CUE | TRAIN | EGG | HAT | CHAIR | BLUE | | | | | | | | | | | | | | | | | | |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | | | | | | | | | | | | | | | | | |
| Optional | | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;">Category cue</td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td>Multiple choice cue</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table> | | | Category cue | | | | | | Multiple choice cue | | | | | | Points for UNCUED recall only | | | | | | |
| Category cue | | | | | | | | | | | | | | | | | | | | | | | |
| Multiple choice cue | | | | | | | | | | | | | | | | | | | | | | | |
| ORIENTATION | | <input type="checkbox"/> Date <input type="checkbox"/> Month <input type="checkbox"/> Year <input type="checkbox"/> Day <input type="checkbox"/> Place <input type="checkbox"/> City | | | ___/6 | | | | | | | | | | | | | | | | | | |
| Adapted by : Z. Nasreddine MD, N. Phillips PhD, H. Chertkow MD © Z. Nasreddine MD www.mocatest.org Administered by: _____ | | Normal $\geq 26 / 30$ | | TOTAL ___/30 <small>Add 1 point if ≤ 12 yr edu</small> | | | | | | | | | | | | | | | | | | | |

APPENDIX D

MONTREAL COGNITIVE ASSESSMENT TOOL/ARABIC VERSION

| التقييم العربي المتبع في مونتريال (MOCA) باللغة العربية | | الاسم، مستوى الدراسة، الجنس، | | تاريخ الولادة، التاريخ، | | | | | | | | | | | | | | |
|---|--|---|---|--|---|---------|---------|---|---|---|---|--|---|-----|-----|-----|-----|-----|
| العلامات | ارسم ساعة مائتد (الساعة الحادية عشرة وعشر دقائق) (3 علامات) | الاسم | | التاريخ | | | | | | | | | | | | | | |
| | <p>بصري فراغي / تشفياتي</p> <p>الضعف المكعب</p>  <p>نهاية</p> <p>بداية</p>  | [] | [] | [] | [] | | | | | | | | | | | | | |
| 3/ |    | [] | [] | [] | [] | | | | | | | | | | | | | |
| 4 علامات | <table border="1"> <thead> <tr> <th>الذاكرة</th> <th>الانتباه</th> <th>الكتابة</th> <th>سهولة الكلام</th> <th>التجريد</th> <th>التذكير</th> </tr> </thead> <tbody> <tr> <td>اقرأ قائمة الكلمات واكتب من اليريش ان يعيدها... اجر الاختيار مرتين. احد التذكير بعد 5 دقائق</td> <td>اقرأ سلسلة الارقام (رقم كل ثانية) يجب على اليريش ان يعيدها [] يجب على اليريش ان يعيدها بالنعكس []</td> <td>أعد، اهر يفتين دائما تحت القعد عندما يدخل الكعب القرفة [] اهر تميمب زار جاره وامان عن سخته []</td> <td>اذكر ما امكن من كلمات تبدأ بحرف (ف) خلال دقيقة [] عدد صحيح ≤ 11 كلمة</td> <td>ارجه القيد مثلا بين برنقانة - موزة - فاكهة [] قطار - دراجة [] ساعة - مسطرة</td> <td>على اليريش ان يتذكر الاسماء دون دلائل [] الدليل المنطقي [] دليل غير الاجوبة</td> </tr> </tbody> </table> | الذاكرة | الانتباه | الكتابة | سهولة الكلام | التجريد | التذكير | اقرأ قائمة الكلمات واكتب من اليريش ان يعيدها... اجر الاختيار مرتين. احد التذكير بعد 5 دقائق | اقرأ سلسلة الارقام (رقم كل ثانية) يجب على اليريش ان يعيدها [] يجب على اليريش ان يعيدها بالنعكس [] | أعد، اهر يفتين دائما تحت القعد عندما يدخل الكعب القرفة [] اهر تميمب زار جاره وامان عن سخته [] | اذكر ما امكن من كلمات تبدأ بحرف (ف) خلال دقيقة [] عدد صحيح ≤ 11 كلمة | ارجه القيد مثلا بين برنقانة - موزة - فاكهة [] قطار - دراجة [] ساعة - مسطرة | على اليريش ان يتذكر الاسماء دون دلائل [] الدليل المنطقي [] دليل غير الاجوبة | [] | [] | [] | [] | [] |
| الذاكرة | الانتباه | الكتابة | سهولة الكلام | التجريد | التذكير | | | | | | | | | | | | | |
| اقرأ قائمة الكلمات واكتب من اليريش ان يعيدها... اجر الاختيار مرتين. احد التذكير بعد 5 دقائق | اقرأ سلسلة الارقام (رقم كل ثانية) يجب على اليريش ان يعيدها [] يجب على اليريش ان يعيدها بالنعكس [] | أعد، اهر يفتين دائما تحت القعد عندما يدخل الكعب القرفة [] اهر تميمب زار جاره وامان عن سخته [] | اذكر ما امكن من كلمات تبدأ بحرف (ف) خلال دقيقة [] عدد صحيح ≤ 11 كلمة | ارجه القيد مثلا بين برنقانة - موزة - فاكهة [] قطار - دراجة [] ساعة - مسطرة | على اليريش ان يتذكر الاسماء دون دلائل [] الدليل المنطقي [] دليل غير الاجوبة | | | | | | | | | | | | | |
| 3/ | <p>الكتابة</p> <p>أعد، اهر يفتين دائما تحت القعد عندما يدخل الكعب القرفة [] اهر تميمب زار جاره وامان عن سخته []</p> | [] | [] | [] | [] | | | | | | | | | | | | | |
| 1/ | <p>سهولة الكلام</p> <p>اذكر ما امكن من كلمات تبدأ بحرف (ف) خلال دقيقة [] عدد صحيح ≤ 11 كلمة</p> | [] | [] | [] | [] | | | | | | | | | | | | | |
| 2/ | <p>التجريد</p> <p>ارجه القيد مثلا بين برنقانة - موزة - فاكهة [] قطار - دراجة [] ساعة - مسطرة</p> | [] | [] | [] | [] | | | | | | | | | | | | | |
| 5/ | <p>التذكير</p> <p>على اليريش ان يتذكر الاسماء دون دلائل [] الدليل المنطقي [] دليل غير الاجوبة</p> | [] | [] | [] | [] | | | | | | | | | | | | | |
| 6/ | <p>الاستدلال</p> <p>التاريخ [] الشهر [] السنة [] اليوم [] المكان [] المدينة []</p> | [] | [] | [] | [] | | | | | | | | | | | | | |
| 30/ | <p>الاجموع</p> <p>أضف علامة اذا كانت ستين الدراسة > 12 سنة</p> | [] | [] | [] | [] | | | | | | | | | | | | | |

APPENDIX E

THE GERIATRIC DEPRESSION SCALE: SHORT FORM

Choose the best answer for how you have felt over the past week:

1. Are you basically satisfied with your life? YES / NO
2. Have you dropped many of your activities and interests? YES / NO
3. Do you feel that your life is empty? YES / NO
4. Do you often get bored? YES / NO
5. Are you in good spirits most of the time? YES / NO
6. Are you afraid that something bad is going to happen to you? YES / NO
7. Do you feel happy most of the time? YES / NO
8. Do you often feel helpless? YES / NO
9. Do you prefer to stay at home, rather than going out and doing new things? YES / NO
10. Do you feel you have more problems with memory than most? YES / NO
11. Do you think it is wonderful to be alive now? YES / NO
12. Do you feel pretty worthless the way you are now? YES / NO
13. Do you feel full of energy? YES / NO
14. Do you feel that your situation is hopeless? YES / NO
15. Do you think that most people are better off than you are? YES / NO

Answers in bold indicate depression. Score 1 point for each bolded answer.

A score > 5 points is suggestive of depression.

A score \geq 10 points is almost always indicative of depression.

A score > 5 points should warrant a follow-up comprehensive assessment.

Source: <http://www.stanford.edu/~yesavage/GDS.html>

This scale is in the public domain.

APPENDIX F

THE ARABIC VERSION OF THE GERIATRIC DEPRESSION SCALE

| استبيان عن الصحة العامة | | |
|---|-------|--|
| الآن ساقراً لك مجموعة من 15 سؤال إختر إجابة واحدة وضع ✓ تحت الإجابة المناسبة من فضلك. الرجاء التأكد من الإجابة على كل الأسئلة هذه الأسئلة تتعلق بشعورك خلال الأسبوع الماضي فقط | | |
| 1 لا | 0 نعم | |
| | | GDS01 هل أنت مبدئياً راضٍ عن حياتك؟ |
| | | GDS02 هل تخليت عن كثير من نشاطاتك؟ |
| | | GDS03 هل تشعر ان حياتك فارغة؟ |
| | | GDS04 هل كثيراً ما يصيبك الملل؟ |
| | | GDS05 هل معنوياتك مرتفعة معظم الوقت؟ |
| | | GDS06 هل أنت خائف من أن سوءاً ما سيحدث لك؟ |
| | | GDS07 هل تشعر بالسعادة معظم الوقت؟ |
| | | GDS08 هل غالباً ما تشعر أنك عاجز/غير قادر على تغيير وضعك؟ |
| | | GDS09 هل تفضل البقاء في البيت على الخروج وفعل أشياء جديدة؟ |
| | | GDS10 هل تشعر بأنه لديك مشكلة في الذاكرة أكثر من الآخرين؟ |
| | | GDS11 هل تعتقد بأنه من الرائع أن تكون على قيد الحياة؟ |
| | | GDS12 هل تشعر بأنك عديم القيمة في وضعك الحالي؟ |
| | | GDS13 هل تشعر بأنك في كامل نشاطك؟ |
| | | GDS14 هل تشعر بأن وضعك لا أمل فيه؟ |
| | | GDS15 هل تشعر بأن حال معظم الناس أحسن من حالك؟ |

APPENDIX G

THE HEALTH RELATED QUALITY OF LIFE (SF-36)

Your Health and Well-Being

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*

For each of the following questions, please mark an in the one box that best describes your answer.

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

| | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Excellent | Very good | Good | Fair | Poor |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 |

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

| | | | | |
|--|--|---|---|--|
| Much better now than one year ago | Somewhat better now than one year ago | About the same as one year ago | Somewhat worse now than one year ago | Much worse now than one year ago |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1 | 2 | 3 | 4 | 5 |

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

| | Yes, limited a lot | Yes, limited a little | No, not limited at all |
|---|----------------------------|-----------------------------|------------------------------|
| | 6 | 6 | 6 |
| a <u>Vigorous activities</u> , such as running, lifting heavy objects, participating in strenuous sports | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| b <u>Moderate activities</u> , such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| c <u>Lifting or carrying groceries</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| d <u>Climbing several flights of stairs</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| e <u>Climbing one flight of stairs</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| f <u>Bending, kneeling, or stooping</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| g <u>Walking more than a mile</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| h <u>Walking several hundred yards</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| i <u>Walking one hundred yards</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| j <u>Bathing or dressing yourself</u> | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

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

| | | | | |
|--------------------|---------------------|---------------------|-------------------------|---------------------|
| All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--------------------|---------------------|---------------------|-------------------------|---------------------|

- | | | | | | |
|---|---|-----|-----|-----|---|
| | □ | □ | □ | □ | □ |
| a | Cut down on the <u>amount of time</u> you spent on work or other activities..... | | | | |
| | | □ 1 | □ 2 | □ 3 | |
| b | <u>Accomplished less</u> than you would like | | | | |
| | | □ 1 | □ 2 | □ 3 | |
| c | Were limited in the <u>kind</u> of work or other activities | | | | |
| | | □ 1 | □ 2 | □ 3 | |
| d | Had <u>difficulty</u> performing the work or other activities (for example, it took extra effort) | | | | |
| | | □ 1 | □ 2 | □ 3 | |

5. During the past 4 weeks, how much of the time 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)?

| | | | | |
|--------------------|---------------------|---------------------|-------------------------|---------------------|
| All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--------------------|---------------------|---------------------|-------------------------|---------------------|

- | | | | | | |
|---|--|-----|-----|-----|---|
| | □ | □ | □ | □ | □ |
| a | Cut down on the <u>amount of time</u> you spent on work or other activities..... | | | | |
| | | □ 1 | □ 2 | □ 3 | |
| b | <u>Accomplished less</u> than you would like | | | | |
| | | □ 1 | □ 2 | □ 3 | |
| c | Did work or other activities <u>less carefully than usual</u> | | | | |
| | | □ 1 | □ 2 | □ 3 | |

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

| | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Not at all | Slightly | Moderately | Quite a bit | Extremely |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

7. How much bodily pain have you had during the past 4 weeks?

| | | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| None | Very mild | Mild | Moderate | Severe | Very severe |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 | <input type="checkbox"/> 6 |

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

| | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Not at all | A little bit | Moderately | Quite a bit | Extremely |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

9. **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...**

| | | | | |
|--------------------|---------------------|---------------------|-------------------------|---------------------|
| All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|--------------------|---------------------|---------------------|-------------------------|---------------------|

□ □ □ □ □

- a Did you feel full of life? □ 1 □ 2 □ 3 ...
- b Have you been very nervous? □ 1 □ 2 □ 3 ...
- c Have you felt so down in the dumps that nothing could cheer you up? □ 1 □ 2 □ 3 ...
- d Have you felt calm and peaceful? □ 1 □ 2 □ 3 ...
- e Did you have a lot of energy? □ 1 □ 2 □ 3 ...
- f Have you felt downhearted and depressed? □ 1 □ 2 □ 3 ...
- g Did you feel worn out? □ 1 □ 2 □ 3 ...
- h Have you been happy? □ 1 □ 2 □ 3 ...
- i Did you feel tired? □ 1 □ 2 □ 3 ...

10. 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.)?

| All of the time | Most of the time | Some of the time | A little of the time | None of the time |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | <input type="checkbox"/> 4 | <input type="checkbox"/> 5 |

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

| | Definitely true | Mostly true | Don't know | Mostly false | Definitely false |
|--|----------------------------|----------------------------|----------------------------|--------------------------|--------------------------|
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| a I seem to get sick a little easier than other people | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | | |
| b I am as healthy as anybody I know | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | | |
| c I expect my health to get worse..... | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | | |
| d My health is excellent..... | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 | | |

Thank you for completing these questions!

APPENDIX H

THE ARABIC VERSION OF THE HEALTH RELATED QUALITY OF LIFE (SF-36)

صحتك ورفاهيتك

يسأل هذا الاستطلاع عن وجهة نظرك حول صحتك. ستساعد هذه المعلومات في متابعة أحوالك الصحية والنفسية وما إذا كنت قادراً على القيام بنشاطاتك الاعتيادية بشكل جيد. شكراً لإكمالك هذا الاستطلاع!

في كل واحد من الأسئلة التالية، الرجاء وضع إشارة ☒ في المربع الذي يصف إجابتك بأفضل شكل.

1. بشكل عام، تود أن تصف صحتك بأنها...

| | | | | |
|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| رديئة | لا بأس | جيدة | جيدة جداً | ممتازة |
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 5 <input type="checkbox"/> | 4 <input type="checkbox"/> | 3 <input type="checkbox"/> | 2 <input type="checkbox"/> | 1 <input type="checkbox"/> |

2. بالمقارنة مع السنة الماضية، كيف تقيّم صحتك الآن بشكل عام؟

| | | | | |
|---|--|----------------------------|--|---|
| أفضل بكثير الآن بالمقارنة مع العام الماضي | أفضل نوعاً ما الآن بالمقارنة مع العام الماضي | تقريباً مثل العام الماضي | أفضل نوعاً ما الآن بالمقارنة مع العام الماضي | أسوأ بكثير الآن بالمقارنة مع العام الماضي |
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 <input type="checkbox"/> | 2 <input type="checkbox"/> | 3 <input type="checkbox"/> | 4 <input type="checkbox"/> | 5 <input type="checkbox"/> |

3. الأسئلة التالية تدور حول نشاطات من الممكن أن تقوم بها خلال يوم عادي. هل صحتك الآن تقيد من قدرتك على القيام بالنشاطات التالية؟ إذا كانت كذلك، فإلى أي مدى؟

| | | |
|------------------------------|-----------------------|-----------------------|
| لا، لا تقيدني على الإطلاق | نعم، تقيدني قليلاً | نعم، تقيدني كثيراً |
| ▼ | ▼ | ▼ |

- ا. النشاطات المتعبة، مثل الركض، رفع أشياء ثقيلة، المشاركة في رياضات مرهقة.....1 2 3
- ب. النشاطات المعتدلة الشدة، مثل تحريك طاولة، دفع مكنسة كهربائية أو السباحة أو ركوب الدراجة.....1 2 3
- ج. رفع أو حمل مواد البقالة.....1 2 3
- د. صعود الدرج عدة طوابق.....1 2 3
- هـ. صعود الدرج طابق واحد.....1 2 3
- و. الانحناء، الركوع، أو طاعة الرأس والكتفين.....1 2 3
- ز. المشي أكثر من كيلومتر واحد.....1 2 3
- ح. المشي عدة مئات من الأمتار.....1 2 3
- ط. المشي مئة متر.....1 2 3
- ي. الاستحمام أو ارتداء الملابس.....1 2 3

4. خلال الأسابيع الأربعة الماضية، كم من الوقت واجهت أيا من المشاكل التالية في عملك أو نشاطاتك اليومية الاعتيادية الأخرى نتيجة لصحتك الجسدية؟

| كلّ الوقت | معظم الوقت | بعض الوقت | قليل من الوقت | ولا في أي وقت |
|-----------|------------|-----------|---------------|---------------|
| ▼ | ▼ | ▼ | ▼ | ▼ |

- ا. انخفاض في مقدار الوقت الذي قضيته في العمل أو النشاطات الأخرى.....1□.....2□.....3□.....4□.....5□
- ب. أنجزت أقل مما تريد.....1□.....2□.....3□.....4□.....5□
- ج. كنت مقيداً/ة في نوع العمل أو النشاطات الأخرى.....1□.....2□.....3□.....4□.....5□
- د. واجهت صعوبة في أداء عملك أو نشاطاتك الأخرى (مثلاً، أخذت منك جهداً إضافياً).....1□.....2□.....3□.....4□.....5□

5. خلال الأسابيع الأربعة الماضية، كم من الوقت واجهت أيا من المشاكل التالية في عملك أو نشاطاتك اليومية الاعتيادية الأخرى نتيجة لأي مشاكل عاطفية (مثل الشعور بالاكئاب أو القلق)؟

| كلّ الوقت | معظم الوقت | بعض الوقت | قليل من الوقت | ولا في أي وقت |
|-----------|------------|-----------|---------------|---------------|
| ▼ | ▼ | ▼ | ▼ | ▼ |

- ا. انخفاض في مقدار الوقت الذي قضيته في العمل أو النشاطات الأخرى.....1□.....2□.....3□.....4□.....5□
- ب. أنجزت أقل مما تريد.....1□.....2□.....3□.....4□.....5□
- ج. قمت بعمل أو نشاطات أخرى بحذر أقل من المعتاد.....1□.....2□.....3□.....4□.....5□

6. خلال الأسابيع الأربعة الماضية، إلى أي مدى أثرت مشاكلك الجسدية أو العاطفية في نشاطاتك الاجتماعية الاعتيادية مع العائلة أو الأصدقاء أو الجيران أو المجموعات؟

| | | | | |
|----------------|--------|------------|--------|------|
| لا على الإطلاق | قليلًا | بشكل معتدل | كثيرًا | بشدة |
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 □ | 2 □ | 3 □ | 4 □ | 5 □ |

7. ما درجة الألم الجسدي الذي عانيت منه خلال الأسابيع الأربعة الماضية؟

| | | | | | |
|------------|-----------|------|-------|------|-----------|
| لا إطلاقًا | خفيف جدًا | خفيف | متوسط | شديد | شديد جدًا |
| ▼ | ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 □ | 2 □ | 3 □ | 4 □ | 5 □ | 6 □ |

8. خلال الأسابيع الأربعة الماضية، إلى أي مدى أثر الألم الجسدي على عملك الاعتيادي (بما فيه العمل خارج البيت أو العمل المنزلي)؟

| | | | | |
|----------------|--------|------------|--------|------|
| لا على الإطلاق | قليلًا | بشكل معتدل | كثيرًا | بشدة |
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 □ | 2 □ | 3 □ | 4 □ | 5 □ |

9. هذه الأسئلة تستفسر عن شعورك وكيف سارت الأمور معك خلال الأسابيع الأربعة الماضية. لكل سؤال، الرجاء إعطاء الجواب الأقرب للحالة التي شعرت بها. كم من الوقت خلال الأسابيع الأربعة الماضية...

| كلّ الوقت | معظم الوقت | بعض الوقت | قليل من الوقت | ولا في أي وقت |
|-----------|------------|-----------|---------------|---------------|
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |
| | | | | |

10. خلال الأسابيع الأربعة الماضية، كم من الوقت أثرت صحّتك الجسدية أو مشاكلك العاطفية في نشاطاتك الاجتماعية (مثل القيام بزيارات للأصدقاء أو الأقارب، الخ)؟

| كلّ الوقت | معظم الوقت | بعض الوقت | قليل من الوقت | ولا في أي وقت |
|-----------|------------|-----------|---------------|---------------|
| ▼ | ▼ | ▼ | ▼ | ▼ |
| 1 | 2 | 3 | 4 | 5 |
| □ | □ | □ | □ | □ |

11. ما مدى صحة أو خطأ كل من العبارات الآتية بالنسبة لك؟

| بشكل مطلق خاطئة | على الأغلب خاطئة | لا أعرف | على الأغلب صحيحة | بشكل مطلق صحيحة |
|--------------------|---------------------|---------|---------------------|--------------------|
| ▼ | ▼ | ▼ | ▼ | ▼ |

- ا. يبدو أنني أمرض بسهولة أكثر بقليل من الآخرين 1 2 3 4 5
- ب. أنا سليم/ة بنفس قدر السلامة التي يتمتع بها أي شخص أعرفه 1 2 3 4 5
- ج. أتوقع أن تزداد صحتي سوءا 1 2 3 4 5
- د. صحتي ممتازة 1 2 3 4 5

شكرا لإجابتك على هذه الأسئلة!

APPENDIX I

THE TILBURG FRAILTY INDICATOR (TFI)

Part B Components of frailty

B1 Physical components

- | | | | |
|-----|---|-------|------|
| 11. | Do you feel physically healthy? | 0 yes | 0 no |
| 12. | Have you lost a lot of weight recently without wishing to do so? <i>('a lot' is: 6 kg or more during the last six months, or 3 kg or more during the last month)</i> | 0 yes | 0 no |

Do you experience problems in your daily life due to:

- | | | | |
|-----|---|-------|------|
| 13. |difficulty in walking? | 0 yes | 0 no |
| 14. |difficulty maintaining your balance? | 0 yes | 0 no |
| 15. |poor hearing? | 0 yes | 0 no |
| 16. |poor vision? | 0 yes | 0 no |
| 17. |lack of strength in your hands? | 0 yes | 0 no |
| 18. |physical tiredness? | 0 yes | 0 no |

B2 Psychological components

- | | | | | |
|-----|---|-------|-------------|------|
| 19. | Do you have problems with your memory? | 0 yes | 0 sometimes | 0 no |
| 20. | Have you felt down during the last month? | 0 yes | 0 sometimes | 0 no |
| 21. | Have you felt nervous or anxious during the last month? | 0 yes | 0 sometimes | 0 no |
| 22. | Are you able to cope with problems well? | 0 yes | | 0 no |

B3 Social components

- | | | | | |
|-----|--|-------|-------------|------|
| 23. | Do you live alone? | 0 yes | | 0 no |
| 24. | Do you sometimes miss having people around you? | 0 yes | 0 sometimes | 0 no |
| 25. | Do you receive enough support from other people? | 0 yes | | 0 no |