Profiling Frailty in a Population of Older Adults Living With Human Immunodeficiency Virus (HIV) In Ireland

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PROFILING FRAILTY IN A POPULATION OF OLDER ADULTS LIVING WITH HUMAN IMMUNODEFICIENCY VIRUS (HIV) IN IRELAND

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A dissertation submitted in partial fulfilment of the requirements for the degree of MSc in Neurology & Gerontology.

School of Physiotherapy

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Royal College of Surgeons in Ireland.

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DECLARATION

I declare that this thesis, which I submit to RCSI for examination in consideration of the award of a higher degree of MSc. in Neurology & Gerontology is my own personal effort. Where any of the content presented is the result of input or data from a related collaborative research programme this is duly acknowledged in the text such that it is possible to ascertain how much of the work is my own. I have not already obtained a degree in RCSI or elsewhere on the basis of this work. Furthermore, I took reasonable care to ensure that the work is original, and, to the best of my knowledge, does not breach copyright law, and has not been taken from other sources except where such work has been cited and acknowledged within the text.

Signed: *Chiara Reddin*

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Date: 29/08/2018

SUMMARY

Introduction

Due to advances in healthcare in recent years, people living with Human Immunodeficiency Virus (PLWH) are for the first time reaching older age since the HIV epidemic began in the 1980s. It is known that PLWH suffer from premature ageing syndromes, such as frailty, younger than the general population (Bhatia et al., 2012). This presents new challenges for healthcare professionals in facilitating older PLWH to live better for longer into older age and in minimising the impact of disability.

Aims & Objectives

The aim and primary objective of this study was to profile frailty in a cohort of older PLWH in Ireland. Secondary objectives were to investigate their levels of social connectedness, quality of life and perceptions about ageing.

Methods

A cross-sectional study design was employed using a sample of convenience. Seventeen participants aged 50 years and older were assessed for frailty using the Fried frailty phenotype. Levels of social connectedness, quality of life and perceptions about ageing were assessed using self-report questionnaires. Ethical approval was obtained from the Royal College of Surgeons in Ireland (RCSI) and St. James Hospital/ Tallaght Research Ethics Committees.

Results

Seventeen participants were included in the final analysis. The prevalence of frailty was 6% in the sample (n=1). Pre-frailty was highly prevalent at 71% (n=12). Levels of social connectedness

indicated moderate connection and increased reliance on familiar relationships rather than friendships with a median score of 16 on the Lubben Social Network Scale-6 (LSNS-6) and an IQR or 10. Low levels of physical activity were observed in over half of participants (n=9). Quality of life was measured using the Control, Autonomy, Social and Pleasure Scale-19 (CASP-19) and showed moderate quality of life with a median score of 39 and an IQR of 11. Perceptions about aging as reported on the Ageing Perceptions Questionnaire (APQ) were found to be largely positive with median scores of 22.7 and an IQR of 3.4.

Conclusion

Older people living with HIV in Ireland present with high levels of pre-frailty, moderate levels of social connection, low levels of physical activity, moderate quality of life and largely positive perceptions about ageing.

Implications of Findings

Further longitudinal cohort studies should be carried out further investigating the impact of ageing on the health and wellbeing of people living with HIV, particularly investigating the presence or development of frailty over time.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
APQ	Ageing Perceptions Questionnaire
ART	Antiretroviral Therapy
BMI	Body Mass Index
CASP-19	Control, Self-Autonomy, Realisation & Pleasure-Scale 19
CD4	Cluster of Differentiation 4
CES-D	Centre for Epidemiological Studies-Depression Scale
CIDR	Computerised Infectious Diseases Reporting System
CRP	C-Reactive Protein
HANA	HIV-Associated Non-AIDS
HIV	Human Immunodeficiency Virus
HPSC	Health Protection Surveillance Centre
HSE	Health Service Executive
IPAQ	International Physical Activity Questionnaire
IQR	Interquartile Range
LSNS-6	Lubben Social Network Scale-6
PLWH	People Living with HIV
QOL	Quality of Life
REC	Research Ethics Committee
RCSI	Royal College of Surgeons in Ireland
SD	Standard Deviation
SPSS	Statistical Package for the Social Sciences
TILDA	The Irish Longitudinal Study on Ageing

INTRODUCTION

Human Immunodeficiency Virus (HIV) remains a major health issue worldwide with almost 40 million people living with the virus and 35 million HIV-related deaths since the start of the epidemic. With the introduction of Antiretroviral Therapy (ART) people with HIV are now living longer to the extent that the life expectancy of people living with HIV (PLWH) is near normal compared to those living without HIV (Althoff et al., 2016). As research into a cure for HIV continues, ART continues to be the cornerstone of HIV management and ART is now recommended for all people living with HIV (PLWH) regardless of immune status i.e. CD4 counts and viral load (WHO, 2015, HSE, 2017, Pham and Mesplede, 2018). As PLWH continue to have better survival rates and reach older age they will face new and unique challenges across a variety of domains (Abele, 2018). This in turn will pose new challenges for healthcare policy makes and providers alike.

Since ART was introduced in Ireland in the 1990s much progress has been made in the treatment of PLWH such that life expectancy is now similar to that of the general population living without HIV. Almost 8,500 people in Ireland have been diagnosed with HIV since the 1980s when the HIV epidemic first began. HIV has been officially classified as a notifiable disease in Ireland since September 2011 with data being gathered by the Health Protection Surveillance Centre (HPSC) through the Computerised Infectious Diseases Reporting System (CIDR). Trends in new diagnoses have fluctuated over time but nevertheless have been increasing since 2011. A report published by the Health Service Executive (HSE) in 2016 detailing HIV in Ireland reported that 508 new diagnoses of HIV in Ireland were made in 2016 representing a rate of 10.7 per 100,000 population (HSE, 2016). This was a 5% increase in new diagnoses on the same period of 2015. Nine percent of those newly diagnosed were aged >50 years. This report further detailed that over 80% of these new diagnoses were in people aged

>30 years with the most common decade for new diagnoses being those aged 30-39 years. As those newly diagnosed with HIV reach their fifth and sixth decades in 10-20 years there will be new challenges faced by healthcare systems to deliver care to this vulnerable population. Another challenge faced by the Irish healthcare system is the transfer of care of people diagnosed with HIV in other countries to Ireland. This sub-group was reported to represent over one third of all new diagnoses of HIV in Ireland in 2016 (HSE, 2016). Of those not diagnosed abroad, almost half of new diagnoses were late presenters to HIV services in Ireland and almost one quarter presented with an advanced stage of HIV infection. At the time of writing there are almost 500 PLWH aged 50 years or older attending the Infectious Diseases Services in St. James Hospital.

Research into the ageing population of PLWH has begun to increase in recent years. This is the first time, due to advances in healthcare, that people first diagnosed with HIV in the 1980s have reached older age and there is a growing body of literature detailing the unique challenges they face (Guaraldi and Palella, 2017, Guaraldi, 2016). It has been shown that PLWH become frailer earlier than their non-HIV counter-parts (Greene et al., 2015). Frailty, as a geriatric syndrome, has been shown to be associated with increased healthcare utilisation and costs (Hajek et al., 2018). It has also been shown to be associated with higher levels of mortality, reduced quality of life and poorer health outcomes (Evans et al., 2014, Theou O., 2015). Frailty has been shown to be reversible with exercise being one the main interventions shown to be effective in the management of frailty syndromes (Chen et al., 2014). The cross-roads of frailty and HIV will present new challenges in the respective fields of Gerontology and Infectious Diseases (Tamez-Rivera et al., 2014).

The present research being carried out is the first of its kind to explore frailty in older PLWH in Ireland and to explore other constructs of ageing such as quality of life, social connectedness and perceptions about ageing. This research is highly relevant as little has been investigated on

the topic in Ireland to date and data related to frailty in HIV in Ireland is under-represented in the international literature. Similar studies have been carried out in other countries and many reviews investigating the prevalence of frailty in older PLWH in international populations have been published (Willig et al., 2016, Piggott et al., 2016, Kooij et al., 2016). It is hoped that the current research will further add to this body of evidence and will answer some questions about the population of older PLWH in Ireland while providing insight into their experiences of growing older with HIV. It is also hoped that the findings of this study will contribute towards service provision and policy making for older PLWH in Ireland including access to rehabilitation services which have been shown to have an important role in the reversal of frailty and the long-term management of chronic disease burden. The outline of this body of work is as follows: a literature review is provided critically appraising the evidence on the topic to date, the methodology for the present study is outlined, results are reported, and findings discussed. Implications for clinical practice, directions for future research and conclusive remarks are provided along with references and relevant appendices.

CHAPTER 1: LITERATURE REVIEW

The first section of this literature review will discuss the concept of frailty, the various models used to classify frailty and the various frailty states. It will also critically appraise the literature to date and discuss frailty as an important measure of health status for clinicians and researchers. In section two the literature review will discuss the evidence regarding Human Immunodeficiency Virus (HIV) including the role of inflammation in HIV pathogenesis and why this is relevant for ageing the changing model of the management of HIV that moved away from a medial model and towards a more biopsychosocial model and the implications of frailty in the context of HIV.

1.1 Frailty

1.1.1 What is frailty?

Frailty is a term used clinically and in research to refer to a state of decreased physiologic reserve usually in the context of aging. This decrease in reserve can in turn lead to a reduction in a person's ability to maintain homeostasis in the face of various stressors such as falls, hospitalisation and illness (Cesari et al., 2017). Research in recent years has led to further understanding of the biologic component of frailty and it is now considered a clinical syndrome most often associated with older age (Fried et al., 2001). Fried et al. (2001) described frailty in relation to co-morbidity and disability and said;

"comorbidity is an etiologic risk factor for, and disability is an outcome of, frailty"

It is estimated that approximately 10% of individuals over the age of 65 are frail, with the numbers increasing to between 25-50% with individuals ages 85 years or older (Clegg et al., 2013). While no single agreed definition for frailty exists at present, the Frailty Operative Definition-Consensus (Rodriguez-Manas et al., 2013) attempted to move beyond the purely theoretical definition of frailty. It was established that frailty is a multidimensional syndrome

and that there are six agreed domains of frailty; physical function incorporating gait speed and mobility, nutritional status, mental health and cognition.

1.1.2 Models of frailty

Despite the lack of a consensus definition, there is a common language used internationally and several proposed models or frameworks used to describe frailty. These models are derived from the different theories about how frailty develops and presents clinically in older adults. The most popular in research are the biologic syndrome or phenotype model (Fried et al., 2001), the cumulative deficit or "health burden" model (Rockwood et al., 2007) and the functional domain deficiency model (Strawbridge et al., 1998). The phenotypic model is commonly employed in research in gerontology and HIV infection (Willig et al., 2016), however, no one model has yet been found to be superior to another. Rather than measuring different things, Cigolle et al. (2009) describe these various models as each representing different pathways to frailty and trajectories which can be used to predict morbidity and mortality.

1.1.3 Frailty transitions

It is important to note that frailty is clinically reversible and that individuals can transition between being classified as "frail", "pre-frail" and "robust" (Chen et al., 2014). Individuals often transition toward a state of further frailty once a threshold of physiological disturbance is exceeded and the physiological reserve is not present to sustain homeostasis (Lee et al., 2014). To reverse frailty, it must first be identified, and then appropriate interventions applied. Because frailty is variable, it can be reversed with the introduction of interventions such as exercise, vitamin D supplementation, the management of polypharmacy and nutritional supplementation (Morley et al., 2013). A recent systematic review of 16 papers by Lopez et al. (2017) demonstrated the beneficial effects that exercise interventions in particular can have in the reversal of frailty in elderly populations. This is in keeping with the research of Cesari et al.

(2015) who found that regular physical activity was found to reduce frailty particularly in older individuals at higher risk of disability. Several tools have been developed to assist clinicians in the identification of frailty in individuals and thus direct interventions towards those vulnerable persons who may benefit most (Fried et al., 2001, Rolfson et al., 2006).

1.1.4 Why is frailty important?

Frailty has been shown to be associated with poorer health outcomes and the development of geriatric syndromes in older adults (Walston et al., 2018). Akgün et al. (2014) reported that frailty is associated with poorer health status. It has also been shown to be independently associated with increased healthcare costs (Sirven and Rapp, 2017) and nursing home admission (Puts et al., 2005). Numerous large-scale cohort studies have demonstrated the role frailty plays in the development of adverse health outcomes (Rockwood et al., 2004, Ensrud et al., 2007, Walston et al., 2002). Frailty has also been shown to be predictive of hospital in-patient costs (Robinson et al., 2011) and inappropriate medication prescription with resultant additional costs (Recoche et al., 2017). It has also been shown from The Irish Longitudinal Study on Aging (TILDA) that frailty has been associated with increased health service utilisation across different types of healthcare services including GP visits, out-patient hospital clinics and community support services (Roe et al., 2017). For these reasons it is predicted that frailty will continue to pose increasing challenges for healthcare systems as the population ages.

1.2: Human Immunodeficiency Virus (HIV)

1.2.1 Aging with HIV: why is this novel?

For the first time since the HIV epidemic began in the 1980s, PLWH are reaching older age. It is estimated that there are approximately 34.5 million HIV-positive individuals worldwide, 10% of whom are over the age of 50 years with the average age increasing every year (Hardnett and Rose, 2015). By 2030, 75% of PLWH are predicted to be aged 50 years or older

in many countries, while 4 out of 5 will have at least 1 age-related disease, and approximately one third will have 3 age-related diseases (Serrano-Villar et al., 2016). This relatively new phenomenon is due to a combination of advances in healthcare coupled with the growing number of newly diagnosed cases of HIV in adults 50 years old or over (Jimenez et al., 2017). As those patients who first accessed ART age into later life, the effects of chronic HIV infection on health have become an area of important research in recent years (Hawkins et al., 2017, Young et al., 2016, Gustafson et al., 2016, Hoy and Young, 2016). Contemporary care of HIV-infected patients is therefore evolving, and questions now arise about how to best monitor and manage HIV-infection in older adults (Serrano-Villar et al., 2016).

1.2.2 HIV, frailty and inflammation

It is known that PLWH experience an accelerated aging process as a result of persistent and chronic immune system activation (Jimenez et al., 2017). This process appears to lead to overall immune exhaustion, even when patients are being managed with an optimal immuno-virology control regime (Althoff et al., 2016). The role of immune function has become an important area for research in frailty in recent years. A study by Baylis et al. (2013) found a significant association between white cell counts and frailty as part of a ten-year follow-up study of women aged 65 to 70 years. They proposed that there may be a role for the implementation of anti-inflammatory strategies in this cohort to deter the development of frailty. This theory is supported by Brothers et al. (2014), who reported that the clinical consequence of this repeated activation of the immune system is an increased prevalence of aging-related co-morbidities and a climbing prevalence of frailty occurring earlier in this cohort than in the general ageing population. Systemic immune activation (resulting in inflammation) combined with the gradual age-related deterioration in the immune system (immunosenescence) form a process known as "inflamm-aging,", which Wallet et al. (2015) reported is associated with physical frailty. In PLWH this premature ageing may also be in

combination with high-risk behaviours (such as smoking and substance misuse) and factors directly related to anti-retroviral therapy (Hawkins et al., 2017) which further advance the ageing process. However, Thurn and Gustafson (2017) reported that even at lower viral loads, chronic HIV infection appears to have consequences on the aging process, including the development of frailty. Therefore, HIV-infected patients are biologically older than their chronological age and as a result they suffer from aging-related problems at a younger age than their non-HIV positive counterparts (Greene et al., 2015). This is supported by Wing (2016) who reported that heightened inflammation rates seen in PLWH, even when their HIV is optimally managed, are directly associated with greater rates of cardiovascular, osteoporotic, oncological, renal and neurocognitive disease. It is already known that these conditions increase exponentially in ageing in the absence of HIV and therefore they will represent an even greater challenge for PLWH as they age. Chronic and repetitive inflammation can cause oxidative stress within cells and mitochondrial damage, while C-reactive protein (CRP) – a measure of inflammation – has also been found to be associated with frailty (Willig et al., 2016).

1.2.3 Why is frailty important in the context of HIV?

Leng and Margolick (2015) reported that in recent years frailty has become increasingly recognised as a common HIV-associated non-AIDS (HANA) condition, while Willig et al. (2016), in their review, reported that while there is no single definition or diagnostic criteria for frailty, it is generally recognized as an "accumulation of deficits in functional capacity and ability to perform activities of daily living". Thurn and Gustafson (2017) reported that frailty may be present in as many as 1 in 2 older adults living with HIV and is associated with significant morbidity and mortality risk in this group. Frailty can either be transiently linked to the status of HIV infection, or it may appear as a general gradual decline in functional capacity. Although many tools have been developed to assess the various domains of frailty, the medical management of this syndrome remains complex. The management of

polypharmacy in combination with lifestyle interventions such as addressing nutritional status and exercise therapy should be included, however, few validated strategies have been developed to prevent or manage frailty in the HIV positive population (Levett and Wright, 2017). Johs et al. (2017) reported that recognition of PLWH at greater risk for disability can facilitate early intervention which may help preserve independence and prevent functional decline. Brothers et al. (2014) suggested that the identifying frailty could be a useful marker of multisystem vulnerability, could facilitate care planning and could be used as a comprehensive measure of the impact of illness and treatment on health status. It is recommended that frailty measures should be routinely employed by health professionals to evaluate health and future risks for adverse events. Frailty prevention efforts, especially among PLWH, appear to be essential for "successful ageing" or aging without disability or loss of independence. Taking care of an ageing population is one of the biggest challenges of this century, and healthcare professionals must anticipate and be prepared for an increase in the number of older adults seeking care, many of whom will present with co-morbidities including HIV infection (Thurn and Gustafson, 2017). Guaraldi et al. (2014) proposed that measures to meet this challenge might include the refinement of existing ART regimens and an increased focus on a holistic approach to care, acknowledging the importance of the overall "health picture" and of effective communication and cooperation between multidisciplinary healthcare professionals treating PLWH.

1.2.4 A change in focus in HIV care: multidisciplinary involvement

Serrano-Villar et al. (2016) reported that the clinical focus in HIV care has dramatically shifted in the last 30 years from treatment and prevention of opportunistic infections and palliative care to new scenarios in which many HIV specialists focus on primary care, i.e., routine follow up of patients who are clinically stable, monitoring of long-term regimes, and the screening and prevention of age-related conditions. This is in agreement with Guaraldi and Palella (2017) who reported that the provision of contemporary HIV care should extend beyond virologic

suppression alone and should include recognition of geriatric syndromes based on functional capacity and levels of disability. The authors reported that;

"*screening for geriatric syndromes is both a multidisciplinary and multidimensional process, designed to evaluate an older person's functional ability, physical health, cognition, overall mental health, and socio-environmental circumstances".*

The authors also reported that to maximise the efficiency of routine care visits for older PLWH, these visits should include encounters with multiple care providers, including primary care clinicians, allied health professionals, and geriatricians to name a few. Challenges may exist in the routine provision of these assessments for older PLWH, but the literature shows that this multi-disciplinary collaboration can greatly enhance the care of the aging HIV population and may also constitute a model of successful healthcare management that can be applied to all aging persons with fluctuating healthcare needs. The role of Health and Social Care Professionals will likely increase in the future as older PLWH present with higher levels of multimorbidity and disability.

1.2.5 Factors associated with frailty in people living with HIV

Following on from this, further research is needed to identify the factors that are predictive of premature frailty development among PLWH along with optimal prevention and management strategies (Onen and Overton, 2011). Erlandson et al. (2017) reported that frailty in people aged 40 years or older living with HIV was found to be associated with lower educational status, older age, smoking, obesity, and neurocognitive impairment while physical activity and alcohol use were found to be protective factors against frailty. This is in keeping with research by Ding et al. (2017) who found that neurocognitive impairment and depressive and/or insomnia symptoms may account for a higher prevalence of frailty in PLWH, but that further longitudinal studies are required to confirm this hypothesis. Kallianpur et al. (2016) reported that changes in the matter of brain regions involved in motor control and cognition may be

connected to frailty development in well-controlled HIV. The researchers, therefore, suggest that gait speed (which is particularly sensitive to white matter changes) should be investigated as a predictor of frailty in PLWH. Piggott et al. (2017) reported that the frailty phenotype predicts vulnerability to chronic and infectious disease-related hospitalization while Rees et al. (2016) concluded that frailty in PLWH is potentially reversible and strongly associated with depression and low physical activity. Frailty-targeted interventions may therefore mitigate the substantial burden of infectious and chronic disease-related morbidity and health care utilisation in older PLWH. The Fried frailty phenotype developed by Fried et al. (2001) takes approximately 10-15 min to complete and can be performed easily during routine clinic visits. It considers gait speed, grip strength, weight loss, fatigue and physical activity levels. Understanding which of these five components may be potentially contributing to frailty in an individual can allow healthcare providers to address relevant underlying problems, many of which, Rees et al. (2013) reported may not be immediately evident in routine HIV clinic visits. In a review carried out by Levett et al. (2016) several predictors of frailty in PLWH were identified and included older age, comorbidities, a diagnosis of Acquired Immune Deficiency Syndrome (AIDS) and lower CD4 cell counts. Infection with HIV itself was also identified as a risk factor for frailty. Some patients with HIV may not have been diagnosed with HIV until after the age of 50 which often means they aren't started on appropriate anti-retroviral regimes until the virus is at an advanced stage. This can have an impact on the development of frailty.

1.2.6 The prevalence of frailty in people living with HIV

The prevalence of frailty in people living with HIV has been investigated in the international research to date. One of the first studies to investigate frailty prevalence in this population was a retrospective analysis carried out by Desquilbet et al. (2007) who reported a frailty prevalence in a population of people living with HIV of 4.4%. A study by Branas et al. (2017) investigated the prevalence of frailty in a population of people living with HIV aged 55 years or older attending out-patient clinics in Madrid, Spain. They applied the phenotype criteria

(Fried et al., 2001) and found a prevalence of frailty of 15.4% and pre-frailty of 52.1%. They also found a high level of functional impairment and an association between CD4 cell counts and depressive symptoms with frailty. Another Australian study by Yeoh et al. (2017) investigated the prevalence of frailty in older men living with HIV and found a prevalence of 10.8% also using the phenotype criteria. This was in keeping with Onen et al. (2009) and (Onen et al., 2014) who reported frailty prevalence of 9% and 5% respectively. The variations reported in the literature are summarised in the review by Levett et al. (2016). They carried out a review of 322 papers investigating the prevalence of frailty in people living with HIV and found the prevalence's reported to range from 5% to 28% depending on the population being studied. In their study, Kooij et al. (2016) compared frailty in in those who were infected with HIV and those without. They determined that HIV had a statistically significant association with frailty even when adjusting for numerous variables such as gender, age, smoking, co-morbidities and depression.

1.3 Conclusion

In conclusion, the spectrum of disease experienced by those aging with HIV remains strongly influenced by HIV pathological processes themselves, virologic management, and the behaviours, conditions, and demographics associated with HIV infection (Justice, 2010). Henry (2009) acknowledged that the aging of PLWH will pose challenges to healthcare providers and policy makers now and in the future. Calcagno et al. (2015) concluded by suggesting that the combined use of drugs and the promotion of healthy behaviours including exercise programmes, might be the best practice for facilitating better ageing in PLWH and mitigating the risks associated with frailty in an already vulnerable population. Little is reported to date on levels of frailty in the population of older PLWH in Ireland. There is a role for Health and Social Care professionals such as physiotherapists in the delivery of

interventions that may assist people living with HIV to better manage their healthcare into older age.

CHAPTER 2: METHODOLOGY

2.1 Aims & Objectives

The aim of this study was to profile the prevalence of frailty is a population of older PLWH in Ireland and to ascertain any associations between various other personal factors and frailty prevalence.

The objectives of this study were;

1. To ascertain the prevalence of frailty in a population of people ≥50 years of age living with HIV who are attending Infectious Diseases Services, St. James Hospital using the Fried Phenotype Frailty Criteria.
2. To profile this population's demographics, levels of physical activity, quality of life, perceptions regarding ageing and social connectedness.
3. To determine any relationship with frailty prevalence and these variables.

2.2 Study Design

The proposed study design is a quantitative cross-sectional study. The study will adhere to STROBE reporting (von Elm et al., 2008).

2.3 Participants

Individuals ages 50 years of age or older and with a diagnosis of HIV who were attending St. James Hospital Infectious Diseases out-patient services were invited to participate in this study.

2.4 Recruitment

Recruitment was from the out-patient HIV clinics in the Infectious Diseases Services at St. James Hospital. Any patients who met the inclusion criteria were invited to attend for assessment. Potential participants were screened for their interest in participation by the

healthcare staff in the Infectious Diseases Department during routine out-patient clinic appointments.

2.5 Inclusion & Exclusion Criteria

Inclusion criteria for participation in the study was as follows; aged 50 years of age or older, a diagnosis of HIV, under the care of the Infectious Diseases services in St. James Hospital and consent to participate in the study.

2.6 Sample Size

A sample size of 51 participants was calculated resulting in a power of 0.8. Allowing for a 20% attrition rate the researcher will aim to collect data from 62 participants. This is based on a frailty prevalence of 3.1% in the general population aged 50 years or older (TILDA, 2011).

2.7 Ethical Considerations

Ethical approval was sought from both St. James Hospital & Tallaght Research Ethics Committee and the RCSI Ethics Committee (See Ethics Application Form and Approval Letters in APPENDICES A & B respectively). Informed consent was sought from participants (see Participant Letter, Information Leaflet and Consent Form in APPENDICES C, D & E respectively). Participants were informed that their participation in the study was voluntary and that they could withdraw at any time and without it affecting their current or future treatment. Participants were also informed that all information received about them would remain confidential. All data was treated confidentiality and stored in a secure location with access only by the lead researcher. Permission to undertake the study was also be obtained from the Physiotherapy Manager, Ms. Niamh Murphy.

2.8 Procedure

- Eligible patients under the care of the Infectious Diseases services were pre-screened for interest in participating in the study by the nursing and healthcare staff in Infectious Diseases during routine out-patient HIV clinic appointments.
- Any suitable patients interested in participating were added to a "contact short-list" for future reference by the researcher during the recruitment phase.
- During the recruitment phase, patients were contacted directly from this list by the researcher to determine their interest in participating in this study. The research process was outlined, and any questions were answered.
- If agreeable, a formal invitation to participate in the study and a participant information leaflet were sent by the researcher detailing further information about the study (APPENDICES C & D).
- Following a cooling off period of 7 days, the researcher followed up with the potential participant to clarify the potential participant's interest in participating in the study
- Participants who consented to participate were invited to attend for assessment with the researcher (APPENDIX D).
- This process is represented in the flow diagram presented in Figure 2.1

Assessments were carried out in the Physiotherapy Department of St. James Hospital. Baseline demographic data of participants was collected (APPENDIX L). Assessments were carried out using the below instruments.

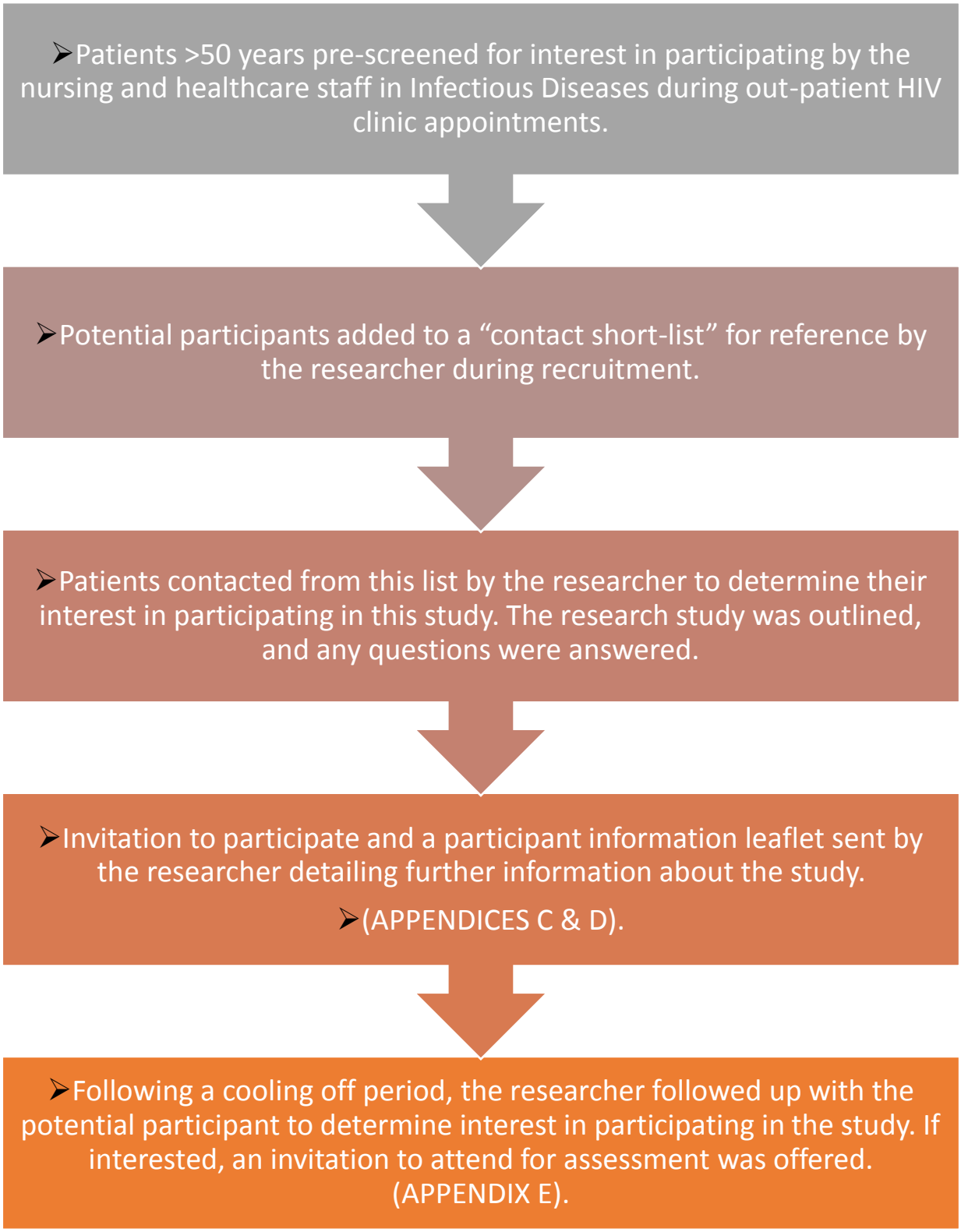

Figure 2. 1 Flow of Recruitment Process

2.9 Instruments

2.9.1 Primary outcome measure: frailty

Frailty was assessed using the Fried Frailty Phenotype (Fried et al., 2001). An impairment in 3 or more of the following components of the phenotype classifies older adults as frail; between 1 and 2 as pre-frail; and none as non-frail or "robust" (Fried et al., 2001).

- Grip strength was assessed using hydraulic hand-held dynamometry (Jamar Hand Dynamometer Plus + Digital) and in accordance with the American Society of Hand Therapists recommendations, with three measurements and their average. The cut-off points proposed by Fried et al. (2001) were adopted.
- Gait speed was assessed using the 10 Metre Walk Test (Perera et al., 2006). Participants with a gait speed in the lowest quintile from this dataset were given a positive score for frailty.
- Physical activity levels were measured using the International Physical Activity Questionnaire (IPAQ) (Tomioka et al., 2011, Sylvia et al., 2014) (APPENDIX F). The responses to the IPAQ are categorised into "low", "moderate" and "high" activity categories:
    i. Those in the "high" category engage in more activity than those in the "moderate" category
    ii. Those in the "moderate" category engage in 3 or more days of vigorous-intensity activity of at least 20 minutes per day OR 5 or more days of moderate-intensity activity and/or walking of at least 30 minutes per day
    iii. Those in the "low" activity category do not meet the criteria for either the "moderate" or "high" categories.
- Those in the lowest quintile for physical activity levels within the dataset were given a positive score for frailty.

- Weight loss was assessed using self-report and evaluated by asking the following question; "In the last year have you unintentionally lost more ≥4.5kg (meaning without diet or exercising)?"
- Self-reported exhaustion/ fatigue was assessed using the following two questions from the Center for Epidemiologic Studies Depression Scale (CES-D) (Boey, 1999, Lyness et al., 1997, Irwin et al., 1999) (APPENDIX G)
  i. *"I felt that everything I did was an effort"*
  ii. *"I could not "get going"*

  The criterion was considered positive if at least one condition was present for 3 days or more during the last week.

2.9.2 Secondary outcome measures: quality of life, perceptions of ageing & social connectedness

- Quality of Life was measured using the CASP-19 (Hyde et al., 2003, Netuveli et al., 2006, Webb et al., 2011) (APPENDIX H). The CASP-19 domains are represented by 19 statements, which are presented to participants as part of the self-completion questionnaire. Participants are asked to indicate how often (often, sometimes, not often, or never) each statement applies to them. Responses are scored from 0 to 3 and the mean scores for each domain and a total mean score are calculated. The total score could range from 0, representing a complete absence of quality of life, to 57, representing total satisfaction. The maximum score on the control domain is 12; on the three other domains, it is 15.
- Perceptions of Ageing was assessed using the Ageing Perceptions Questionnaire (APQ) (Barker et al., 2007) (APPENDIX I). The APQ captures four dimensions in 32 statements about ageing. Participants are asked to indicate the extent to which they agree or disagree with each statement (strongly disagree, disagree, neither agree nor

disagree, agree or strongly agree). Responses are scored from 1 to 5 and the mean score for each domain is calculated. The centre of each scale is therefore 3, indicating neither agreeing nor disagreeing with the statements. Higher scores indicate greater endorsement of the specific perception.

- Social Connectedness was measured using the Lubben Social Network Scale-6 (LSNS-6) (APPENDIX J). The Lubben Social Network Scale-6 is a self-reported questionnaire measuring social connectedness/ inclusion. The total score is the sum of 6 equally weighted items categorised into family and friendship sub-scales. Scores range from 0 to 30 with a cut-off of 12 or less defining a participant as at risk of social isolation or of being socially isolated (Rubinstein et al., 1994; Lubben et al., 2006). The validity and reliability of the LSNS has been demonstrated in a population of community-dwelling older adults. (Lubben et al., 2006).

All the above instruments have been validated for use in an older population (see references). These measures were also selected as they are the current measures being used in data collection in TILDA. Using the same measures would allow for easier comparison between groups at a later stage of data analysis.

2.10 Data Collection

- Data was continuous, ordinal and nominal in nature.
- Data was collected following each assessment using a standard data collection form (APPENDIX L).
- All participant data was stored securely on a password protected excel spreadsheet on the drive of a computer in the Physiotherapy Department at St. James Hospital.
- All data was coded and encrypted. The coding key was stored in a separate secure location within the Physiotherapy Department.

- Data was statistically analysed, and results compiled (see statistical analysis description below for details of analysis).

2.11 Statistical Analysis

Statistical Package for the Social Sciences (SPSS) version 22.0 was used for statistical analysis. Descriptive statistics, including graphs and tables, were employed to describe the population characteristics with median and interquartile ranges reported for data i.e. age, gender. Data was tested for normality using a Shapiro-Wilke test and normal probability plots. Regardless of data normality non-parametric statistical tests were employed due to the small sample size recruited. Spearman's rank-order correlation was used to determine correlations between any variable. Logistic regression was initially considered but given the small sample size it was determined that the study was underpowered and logistic regression was not performed in final analysis. Only significant results will be presented while others will be attached as an appendix (APPENDIX M).

2.12 Time Scale

This study was carried out over the course of the second year of the Masters in Neurology & Gerontology programme in the Royal College of Surgeons in Ireland (RCSI). A Gantt chart is attached detailing the time frame for the various phases of the study (APPENDIX L).

2.13 Resources & Costs

- Financial – there were no financial cost involved for patients to participate in the study. Where feasible assessments were carried out on the same day as other out-patient clinic appointments on the hospital campus for participant.
- Premises – the St. James Hospital Physiotherapy Department was the premises used for participant assessments.

- Equipment – all necessary equipment was located on site in the Physiotherapy. Department. All instruments/ questionnaires chosen were freely available online and required no licencing fee.
- Time – protected time was agreed with the support of Physiotherapy Management.

CHAPTER 3: RESULTS

3.1 Participant Flow

Recruitment for this study took place at St. James Hospital between November 2017 and February 2018. A total number of 48 participants were screened for suitability for inclusion and of those screened 17 participants were available to attend for assessment during the recruitment period. A flowchart detailing the flow of participants throughout the study is provided in Figure 3.1.

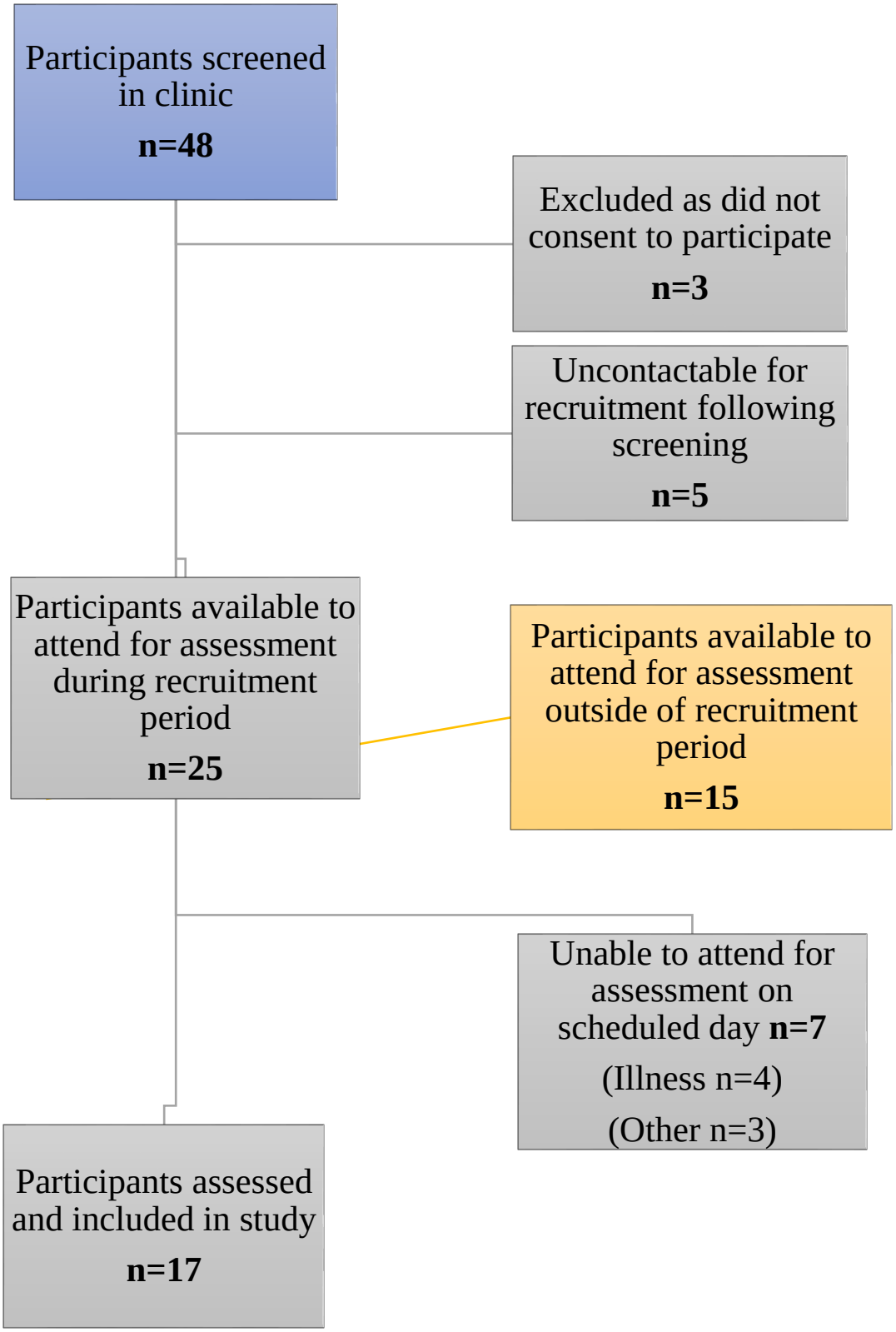

Figure 3. 1 Flow of participants through study

3.2 Normality of Data

Data was tested for normality using a Shapiro-Wilk test with normality achieved at $P>0.05$. (APPENDIX M). Despite several variables having a statistically normal distribution, non-parametric tests were used due to the overall small sample size recruited.

3.3 Demographic Data

There were 17 participants included in data analysis. The median age of the participants was 55 years with an interquartile range (IQR) of 11 years and ranging from 50 to 72 years. Males accounted for 65% of the participants (n=11). A summary of demographic data is presented in Table 3.1. 71% of participants presented with >2 comorbidities (n=12). The most frequently observed comorbidities were those that were musculoskeletal (n=8) and cardiovascular (n=7) in nature. A breakdown of co-morbidities is presented in Figure 3.2.

Table 3. 1 Demographic Data

Baseline Characteristics		
Age (years)	Median (IQR)	55 (11)
Gender: Male	%(n)	65% (n=11)
Female		35% (n=6)
Height (cm)	Median (IQR)	170 (9.3)
Weight (kg)	Median (IQR)	83 (22)
BMI	Median (IQR)	28.7 (4.8)
Time since HIV Diagnosis (years)	Median (IQR)	9 (15)
Number of Comorbidities	Median (IQR)	2 (4)
Grip Strength (lbs)	Median (IQR)	75 (21)
Gait Speed (m/s)	Median (IQR)	1.39 (0.32)
CASP-19	Median (IQR)	39 (11)
LSNS-6	Median (IQR)	16 (10)
LSNS-6 Family Subscale	Median (IQR)	9 (4)
LSNS-6 Friends Subscale	Median (IQR)	7 (6)

n=number, IQR=interquartile range, BMI=Body Mass Index, CASP-19=Control, Autonomy Social Please Scale-19, LSNI-6=Lubben Social Network Scale-6

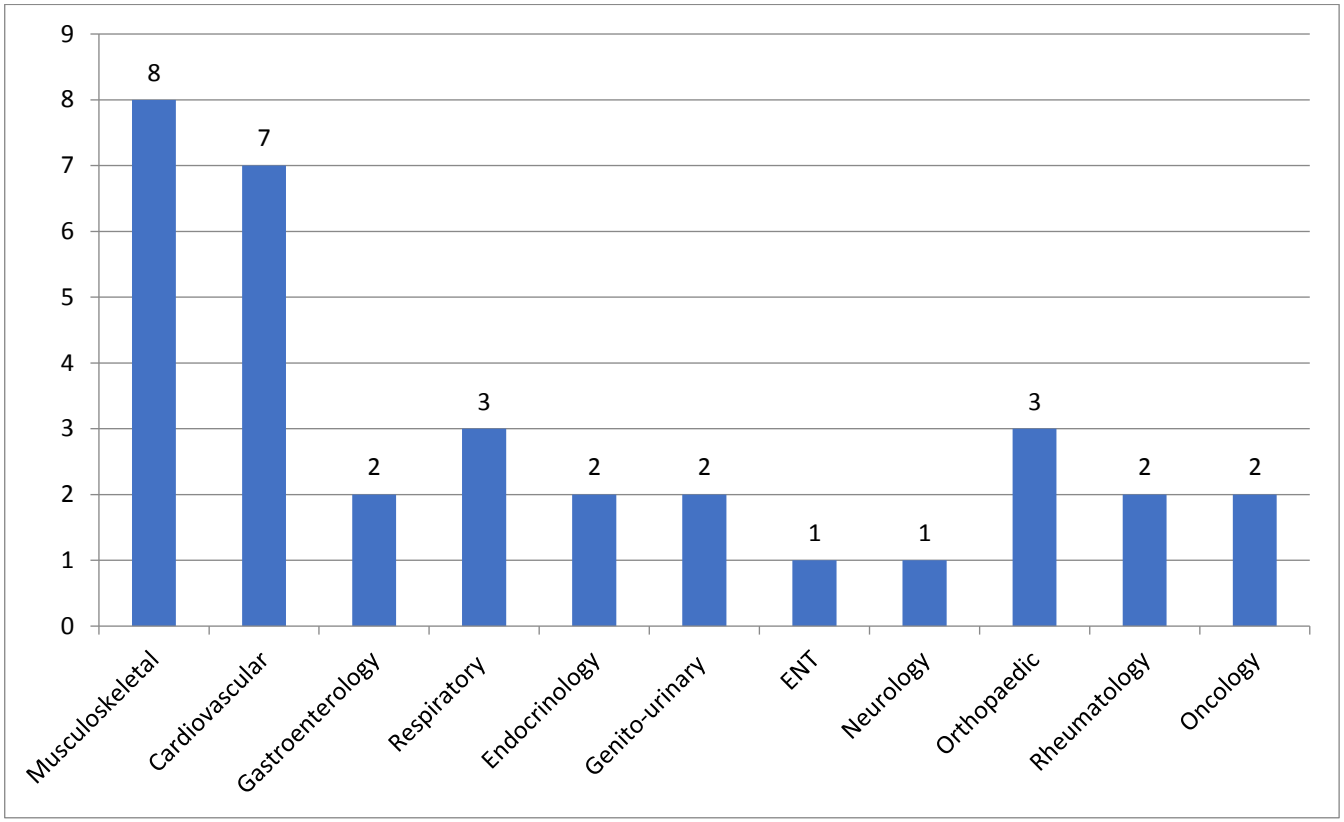

Figure 3. 2 Comorbidities present in Sample

3.4 Prevalence of Frailty

The presence of frailty was assessed using the Fried frailty phenotype criteria. The presence of frailty was confirmed when 3 of the 5 frailty-phenotype criteria were present; slow gait speed, low hand grip strength, low levels of physical activity, unintentional weight loss >4.5kg in the preceding 12 months and self-reported fatigue. In this cohort the presence of frailty was 6% (n=1). The presence of pre-frailty was established if 1 or 2 of the frailty-defining criteria were present. The prevalence of pre-frailty was high in this cohort at 71% (n=12). The remaining 24% of participants were classified as "robust" in that they had none of the frailty-defining criteria (n=4). The median number of frailty criteria present in the sample was 1 with and IQR of 2 and ranging from 0 to 2. Of those who were pre-frail, 66% of them were male (n= 8) and in those who were robust 75% of them were male (n=3). Frailty was not found to correlate

with any other variable (P<0.05). A breakdown of frailty prevalence by gender is provided in Figure 3.3. A breakdown of Fried frailty criteria is provided in Table 3.2.

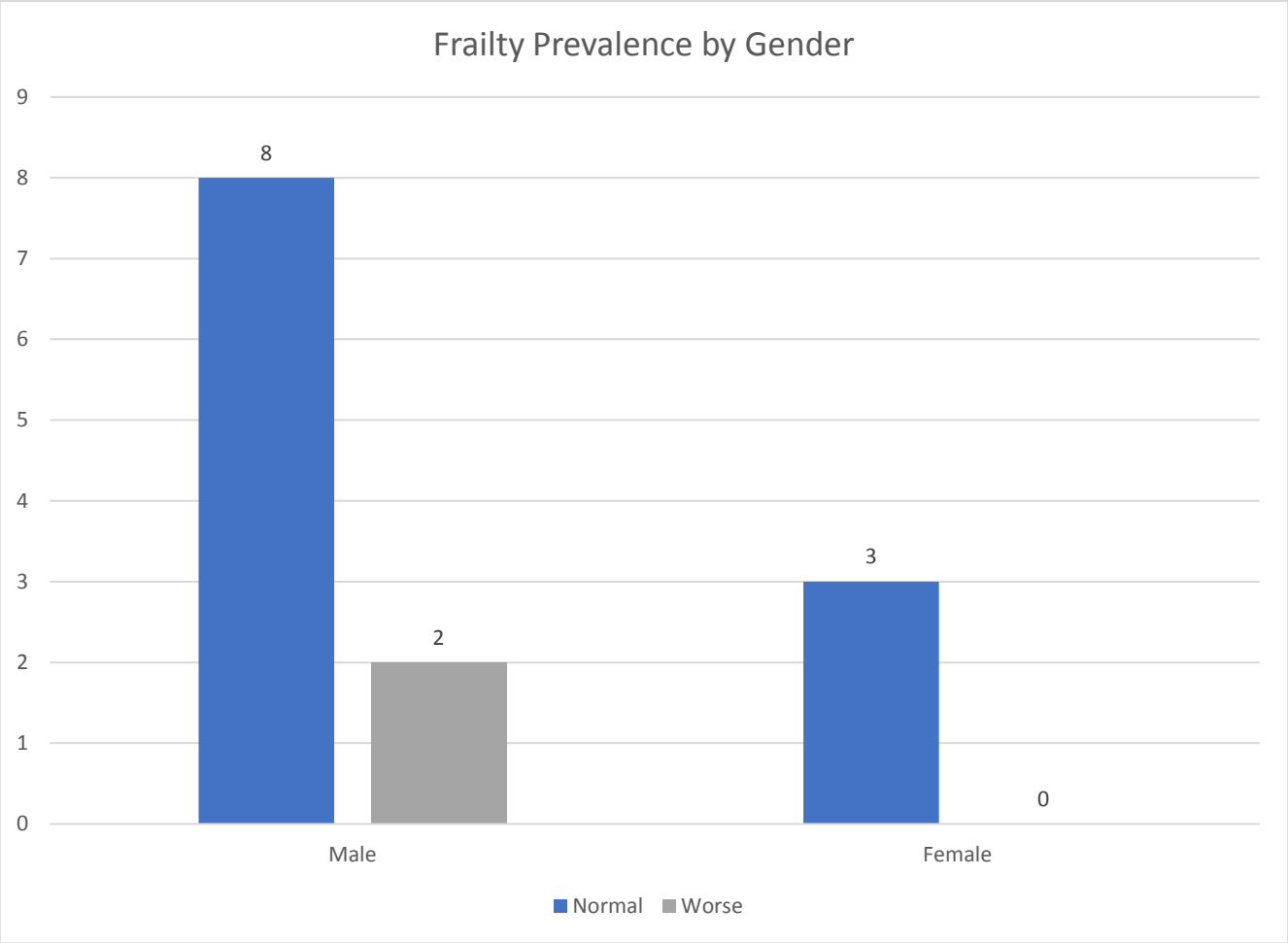

Figure 3. 3 Frailty prevalence by Gender

Table 3. 2 Breakdown of Fried Criteria in Sample

Fried Frailty Criteria

Gait Speed (m/s)	Median (IQR)	1.39 (0.32)
Grip Strength (lbs) below age, gender and BMI control	% (n)	18% (n=3)
Unintentional Weight Loss ≥4.5kg in previous year	% (n)	12% (n=2)
Self-Reported Fatigue	% (n)	29% (n=5)
Low Levels of Physical Activity	% (n)	53% (n=9)

IQR=interquartile range, BMI=Body Mass Index

3.4.1 Frailty: gait speed

The median gait speed observed was 1.39 m/s with an IQR of 0.32 and ranging from 1 m/s to 1.75 m/s. Those participants in the lowest quintile for gait speed were given a positive score in the frailty phenotype criteria. In this sample those in the lowest quintile had a gait speed slower than 1.14 m/s. Gait speed was found to significantly correlate with the Control Negative Domain on the Ageing Perceptions Questionnaire (P=0.02). Table 3.3 outlines Gait Speed correlations ($p<0.05$).

Table 3. 3 Correlations with Gait Speed

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
Control Negative Domain APQ	0.57	*0.02	Moderate Positive

*Correlation is significant at the 0.05 level (2-tailed)

APQ=Ageing Perceptions Questionnaire,

3.4.2 Frailty: physical activity levels

Participants levels of physical activity were analysed using the International Physical Activity Questionnaire (IPAQ). Fifty-three percent (n=9) of participants were found to have "low physical activity levels. Low levels of physical activity were the most frequently observed frailty-defining criterion (n=9). Those participants in the lowest quintile for physical activity were attributed a positive frailty phenotype score. Those with a positive frailty score had scores on the IPAQ indicating extremely low levels of all types of physical activity and significant amounts of time spent sitting. Eighteen percent (n=3) of participants were found to be "moderately" active. Only 29% (n=5) of participants were found to have physical activity levels that were classified as "high". There were no significant correlations found between IPAQ scores and any other variables ($P<0.05$). A breakdown of IPAQ scored by gender is provided in Figure 3.4. A breakdown of IPAQ scored by age is provided in Figure 3.5.

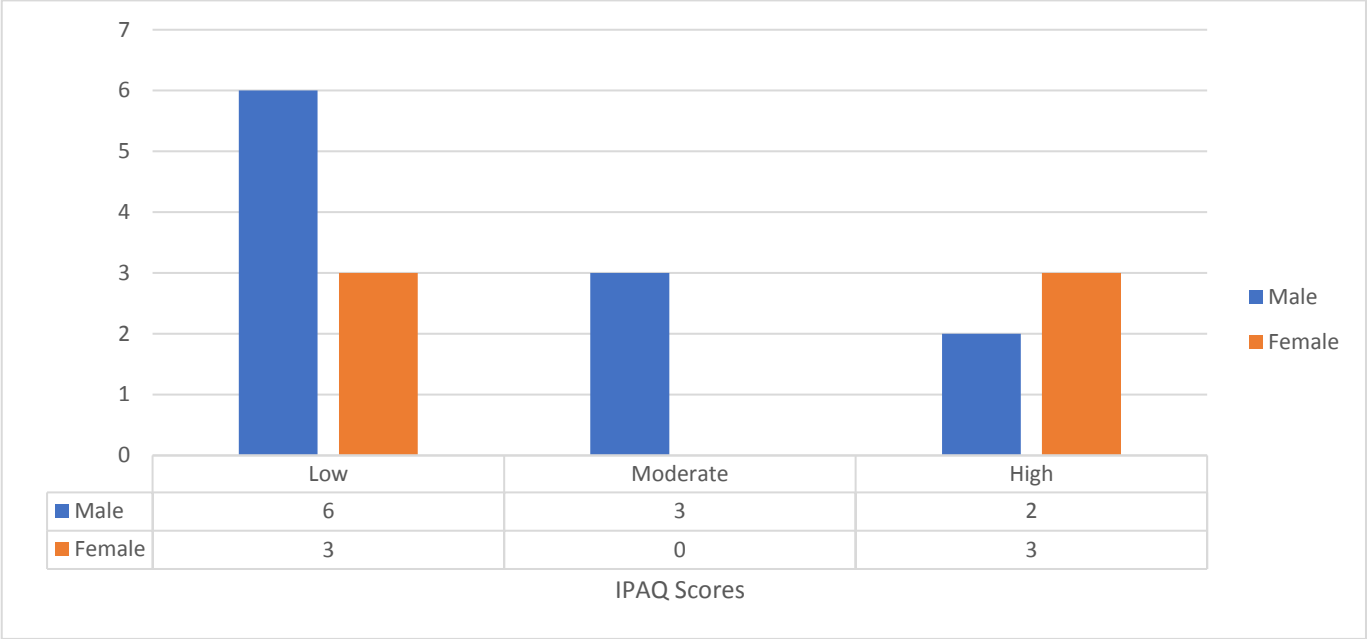

Figure 3. 4 Breakdown of IPAQ scores by Gender

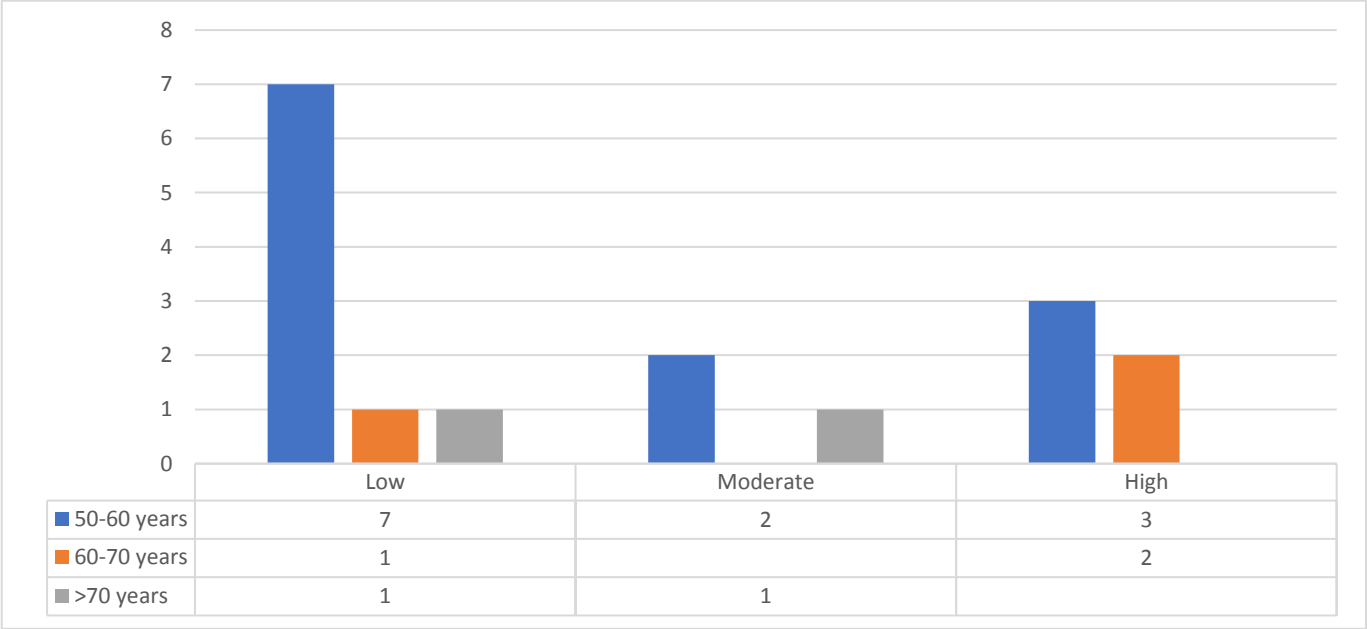

Figure 3. 5 Breakdown of IPAQ scores by Age

3.4.3 Frailty: grip strength

The median grip strength observed was 75lbs with an IQR of 21 and ranging from 38 lbs to 96 lbs. Participants were given a positive score for frailty if their grip strength fell below the pre-specified cut-offs for gender and BMI (Fried et al., 2001). When compared with normative data for age and gender, 24% of participants were founds to have better grip strength (n=4), 65% of participants were found to be on par with normative data (n=11) and 12% of participants were found to have a grip strength that was lower than average for their age and gender (n=2). Grip strength was found to have a statistically significant correlation with years since HIV diagnosis (P=.01), with the Emotional Representations Scale of the APQ (P=0.31) and with employment status (P=.04). Correlations with Grip Strength are presented in Table 3.4. Data for grip strength in relation to gender and normative values are presented in Figure 3.6.

Table 3. 4 Correlations with Grip Strength

Correlation	**Correlation Coefficient**	**Sig. (2-tailed)**	**Strength of Correlation**
Emotional Representations Domain APQ	-0.52	*0.03	Weak Negative
Time Since HIV Diagnosis	-0.60	*0.01	Moderate Negative
Employment Status	-0.51	*0.04	Weak Negative

*Correlation is significant at the 0.05 level (2-tailed)

APQ=Ageing Perceptions Questionnaire, HIV=Human Immunodeficiency Virus

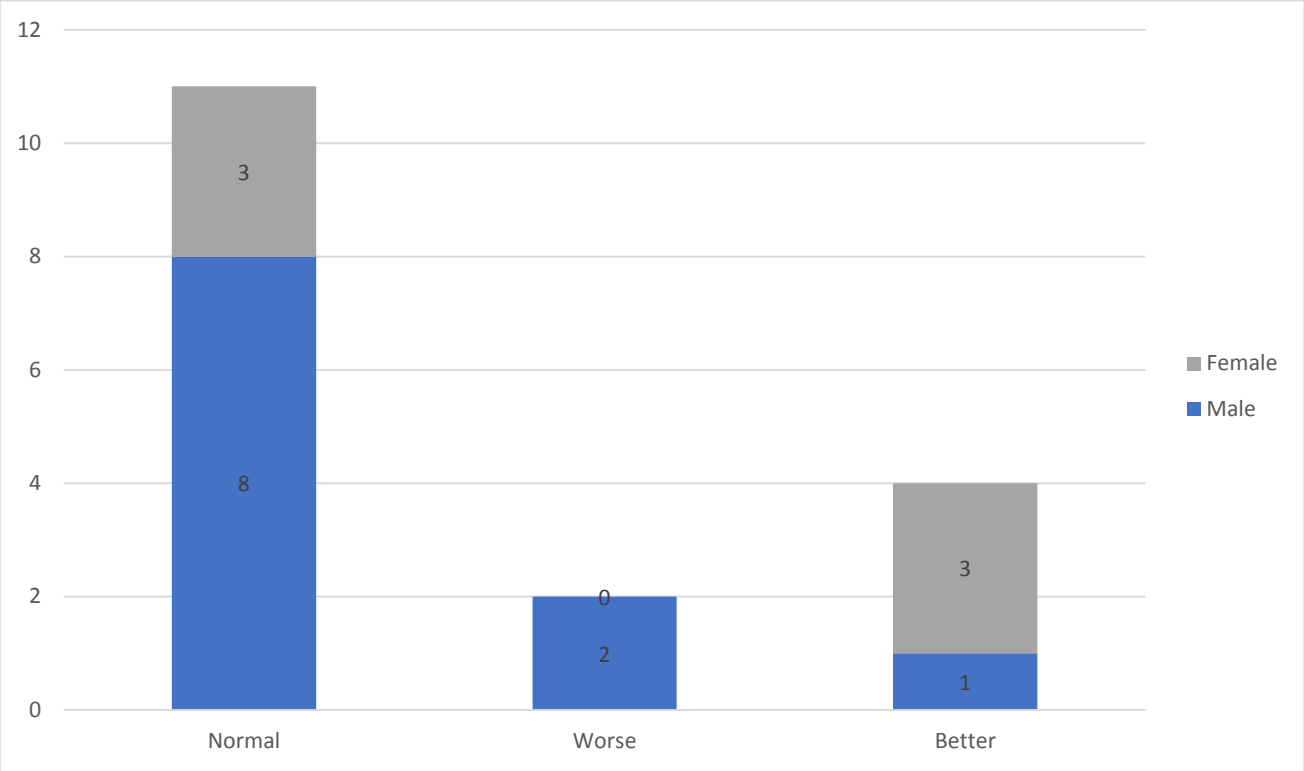

Figure 3. 6 Grip Strength in relation to Normative Values

3.4.4 Frailty: unintentional weight loss

Participants were asked if they had experienced any unintentional weight loss >4.5kg in the preceding twelve months i.e. not related to diet or exercise. An answer of "yes" was a positive frailty criterion. Twelve percent of participants answered yes to this question (n=2). Unexpected weight loss was found to be significantly correlated with social connectedness (P=0.47), self-reported QOL (P=0.48), the LSNI-6 total and Friendship subscale (P=0.02) and the Consequences Negative Subscale of the APQ (P=0.02). Correlations with Unintentional Weight loss are presented in Table 3.5.

Table 3. 5 Correlations with Unintentional Weight Loss

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
CASP-19 Score	-0.49	*0.048	Weak Negative
LSNS-6	-0.49	*0.047	Weak Negative
LSNS-6 Friendship Subscale	-0.56	*0.02	Moderate Negative
Consequences Negative Subscale of APQ	-0.57	*0.02	Moderate Negative

*Correlation is significant at the 0.05 level (2-tailed)

CASP-19=Control, Autonomy, Social & Pleasure Scale-19, LSNS-6=Lubben Social Network Index-6, APQ=Ageing Perceptions Questionnaire

3.4.5 Frailty: self-reported fatigue

The presence of self-reported fatigue was assessed using two questions from the CES-D. A response of either "some of the time" or "all of the time" in response to either statement was considered a positive frailty criterion. Self-reported fatigue was present in 33% of participants in the sample (n=5). Self-reported fatigue was found to significantly correlate with weight (p=0.04). Correlations with Self-Reported Fatigue are presented in Table 3.6.

Table 3. 6 Correlations with Self-Reported Fatigue

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
Weight	-0.50	*0.04	Weak Negative

*Correlation is significant at the 0.05 level (2-tailed)

3.5 Body Mass Index (BMI)

BMI was calculated using the formula of the participants weight in kilograms divided by the square of the height in metres (kg/m^2). The median BMI observed was 28.7 which is categorised as overweight. The IQR for BMI was 5.5 and ranged from 24.3 (normal) to 35.4 (obese class 2). In total 60% of participants were overweight (n=9), while 27% of participants were obese (n=4), and only 13% of participants had a normal BMI (n=2).). No participants were underweight.

BMI was found to have a highly statistically significant correlation with years since HIV diagnosis (p=.004), employment status (p=.001) and self-reported quality of life (p=0.02). It was found that 18% of those who were pre-frail had a normal BMI (n=2) while 82% of those who were pre-frail were overweight (n=9). It was also found that 83% of those who were robust were overweight (n=5). A number of variables were found to correlate with BMI. This data is presented in Table 3.7.

Table 3. 7 Correlations with BMI

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
Time since HIV Diagnosis	-.67	**0.004	Moderate Negative
CASP-19	.55	*0.02	Weak Positive
Employment Status	-.72	**0.001	Strong Negative

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is highly significant at the 0.005 level (2-tailed)

CASP-19=Control, Autonomy, Social & Pleasure Scale-19

3.6 Social Connectedness

Social connectedness was measured using the Lubben Social Network Scale–6 (LSNS-6) with a total score of 30 possible and higher scores indicating a higher level of social connectedness. The median score on the LSNS-6 was 16 with an IQR of 10 and ranging from 9 to 25. This indicates that the average participant was moderately socially connected. The sub-scales assessing friendships and family relationships were analysed in turn. The median score for each subscale were 7 with an IQR of 6 for friendships, and 9 with an IQR of 4 for family relationships, indicating that participants felt more connected socially in their relationships with family than in their relationships with friends. A statistically significant correlation was found between levels of social connectedness and the Timeline Cyclical Subscale of the APQ (P=.01) and with unintentional weight loss (P=0.05).

Fifty-nine percent of participants were employed (n=10). Thirty-five percent of those who were unemployed were aged <65 years. Employment status was found to have a highly

significant correlation with years since HIV diagnosis (P=.006, r=.64) and with Grip Strength (P=0.04, r=.64, r=-.51). Correlations with Social Connectedness are presented in Table 3.8.

Table 3. 8 Correlations with LSNS-6

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
Timeline Cyclical Domain of APQ	-0.60	*0.01	Moderate Negative
Unexpected Weight Loss	-0.5	*0.05	Weak Negative

*Correlation is significant at the 0.05 level (2-tailed).

APQ=Ageing Perceptions Questionnaire, LSNS-6=Lubben Social Network Index-6

3.7 Quality of Life

Quality of Life was assessed using the CASP-19 with higher score indicating higher self-rated quality of life out of a total of 57. The median score was 39 with an IQR of 11 and ranged from 19 to 53 points. This indicates that on average, participants self-rated quality of life was 68% of the total possible score. Statistically significant correlations were found between the CASP-19 and a number of variables. This data is presented in Table 3.9.

Table 3. 9 Correlations with CASP-19

Correlation	Correlation Coefficient	Sig. (2-tailed)	Strength of Correlation
Time Since HIV Diagnosis	-.57	*0.02	Weak Negative
Employment Status	-.55	*0.02	Weak Negative
BMI	.55	*0.02	Weak Positive
LSNS-6 Friendship Scale	.56	*0.02	Weak Positive
Timeline Cyclical Domain APQ	-.50	*0.04	Weak Negative
Emotional Representations	-.5	*0.04	Weak Negative
Control Negative Subscale of APQ	.5	*0.44	Weak Positive
Consequences Negative Subscale APQ	-.78	**.000	Strong Negative

*Correlation is significant at the 0.05 level (2-tailed). **Correlation is strongly significant at the 0.005 level (2-tailed).

APQ=Ageing Perceptions Questionnaire HIV=Human Immunodeficiency Virus, BMI=Body Mass Index, LSNS-6=Lubben Social Network Scale-6, CASP-19=Control, Autonomy, Social & Pleasure Scale-19

3.8 Perceptions about Ageing

Perceptions of ageing were assessed using the Ageing Perceptions Questionnaire (APQ). This questionnaire assesses perceptions of ageing across several domains. These are: Timeline, Emotional Representations, Control and Consequences. Each domain investigates a difference perception of ageing with higher scores indicate higher endorsement of a particular domain. The timeline domains are further sub-categorised into Timeline Acute/ Chronic and Timeline Cyclical and the Control and Consequences domains are further sub-categorised into Negative and Positive for each domain. A breakdown of APQ scores is presented in Table 3.10.

Table 3. 10 Breakdown of APQ data

Ageing Perceptions Questionnaire (APQ)		
Timeline Acute/ Chronic	Median (IQR)	3 (1.2)
Timeline Cyclical	Median (IQR)	3 (1.05)
Emotional Representations	Median (IQR)	2.6 (1.2)
Control Positive	Median (IQR)	4 (0.45)
Control Negative	Median (IQR)	3.25 (1)
Consequences Positive	Median (IQR)	4 (0.85)
Consequences Negative	Median (IQR)	3.2 (0.85)

IQR=interquartile range

3.8.1 Timeline domain

Both median scores for the Timeline domain are the neutral score of "3" indicating that in general participants did not perceive ageing to be chronic or cyclical.

3.8.2 Emotional representations domain

This median score was close to the neutral score of "3" indicating that participants did not have a strong emotional response one way or another regarding ageing.

3.8.3 Control domain

The Control domain is broken down into the sub-domains of Control Positive and Control Negative. The median scores on these domains indicate that participants felt that they had some control over the perceived negative aspects of ageing but there was less reported control over negative experiences than there was for positive experiences associated with ageing.

3.8.4 Consequences domain

The final domain investigates consequences associated with ageing, both positive and negative. The median score on the Consequences Positive domain suggests most participants acknowledge the positive consequences of growing older. While the lower score on the Consequences Negative sub-domain suggests that participants felt less strongly about the negative impacts of growing older.

3.9 Summary of Key Findings from Results

- The presence of "frailty" was 6%, of "pre-frailty" was 71% and of "non-frailty" or "robust-ness" was 23%. The median number of Fried criteria present in the sample was 1 with the most frequently observed frailty-defining criteria being low levels of physical activity which were observed in 66% of participants.
- The mean gait speed observed in participants was 1.37 m/s. Those in the lowest quintile had a gait speed of below 1.14 m/s.

- 53% of participants were found to have low physical activity levels with those in the lowest quintile engaging in no physical activity either within or outside of the household.
- 89% of participants had a grip strength that was either average or above-average for their age and gender. Grip strength was found to correlate with years since HIV diagnosis and employment status.
- 12% of participants had lost >4.5kg in the preceding 12 months that was not related to diet or exercise. Unintentional weight loss was found to correlation with both QOL and social connectedness.
- Self-reported fatigue or "exhaustion" was reported by 33% of participants.
- 87% of participants were either overweight or obese with only 13% of participants having a healthy BMI. BMI was found to correlate with employment status and years since HIV diagnosis.
- Participants felt more socially connected in their relationships with family than in their relationships with friends. This difference was statistically significant (P=. Social connectedness was found to correlate with frailty.
- Average self-reported quality of life was found to be approximately 68% amongst participants. QOL was found to correlate with BMI, employment status and years since HIV diagnosis.

CHAPTER 4: DISCUSSION

Introduction

This chapter discusses the research results in the context of the thesis objectives and in the context of the current literature. This section will discuss the significance of the research findings particularly in the context of the existing literature and will discuss implications for clinical practice. This chapter will also highlight the challenges experienced by older PLWH as they age and will discuss the emerging role of rehabilitation professionals, including physiotherapists, in the delivery of interventions to ameliorate the effects of multimorbidity. The current study identified older PLWH in Ireland as having a high prevalence of pre-frailty and highlights them as a population particularly susceptible to functional decline without intervention. They experience moderate levels of social isolation, moderate quality of life. They have predominantly low physical activity levels and are at higher risk of unemployment. Throughout the discussion it is intended to show that PLWH require support from healthcare providers to facilitate ageing well with HIV and to ameliorate the effects of geriatric syndromes such as frailty in older age.

4.1 Results in Context of Current Literature

4.1.1 Prevalence of frailty

This research set out to investigate the prevalence of frailty in a population of older people living with HIV in Ireland. The Fried frailty phenotype was the method of assessment. The prevalence of frailty in this sample was found to be 0%. This low prevalence is in keeping with Erlandson et al. (2017) and Onen et al. (2014) who reported frailty prevalence between 5-6% in larger samples. The prevalence of "pre-frailty", however, was quite high at 65%. It is well established in the literature that frailty is reversible (Chen et al., 2014, Brothers et al., 2017). It is known that PLWH experience worse health status than elderly people at risk of hospitalisation (Brown et al., 2016b). This result indicates that those individuals aged 50 years

or older living with HIV may represent an "at risk" group within society who need targeted interventions to ensure there is no further decline towards frailty.

4.1.2 Frailty: gait speed

The median gait speed observed in this sample was 1.39 m/s with those with a gait speed of below 1.14 m/s representing the lowest quintile. When dichotomised into those with a gait speed either above or below 1 m/s, it was found that 12% of participants had a gait speed ≤1 m/s. This was an unexpected finding and is significantly lower than reports of gait speed by Erlandson et al. (2017) who found that 41% of participants had a gait speed equal to or slower than 1 m/s. Reasons for this contrast are likely due to the previously described limitations regarding the validity of the current findings in the context of the small sample size recruited and also the differences in inclusion criteria in previous studies reported in the literature to date.

4.1.3 Frailty: physical activity levels

Over half of all participants assessed were found to have low levels of physical activity, while 18% of participants were "moderately active" and 29% were highly active. This is in keeping with recent research by Vancampfort et al. (2017) who reported that the time PLWH spend engaging in sedentary behaviours is among one of the highest reported in the literature. It has also been shown that cardio-respiratory fitness levels of PLWH are among the lowest in comparison to other vulnerable populations (Vancampfort et al., 2016). |This is despite the fact that both aerobic and progressive resistance exercise have been shown to be beneficial and safe for PLWH who are medically stable and has been shown to have benefits for both mental and physical health (O'Brien et al., 2017, O'Brien et al., 2016, Vancampfort et al., 2016, Aweto et al., 2016). This finding highlights the need for further promotion of physical activity and further education about the importance of remaining physically active into later life in this largely sedentary population.

The optimal route for delivering such interventions for PLWH remains under investigation in the literature (Kamitani et al., 2017). One possible route for delivery of such an intervention could be in the form of group exercise/education programmes using a chronic disease self-management model which has been shown to have success in other chronic conditions (Taylor et al., 2014). Brown et al. (2016a) reported improved quality of life and functional outcome with such a model but acknowledged that adherence with programmes might be affected by the episodic nature of disability experienced by PLWH as first described by O'Brien et al. (2008). Barriers to engagement in physical activity for PLWH are an important consideration for clinicians and have been explored in the literature to date. Barriers identified include lack of social support, social, cultural and environmental factors (Rehm and Konkle-Parker, 2016, Simonik et al., 2016, Roos et al., 2015). Special consideration should be given to these factors when providing physical activity regimes for PLWH.

4.1.4 Frailty: grip strength

When compared with normative data for age, BMI and gender,), 65% of participants were found to be on par with normative data (n=11), 24% of participants were found to have better grip strength (n=4) and 12% of participants were found to have a grip strength that was lower than average (n=2). It has already been discussed widely in the literature that grip strength can be an important predictor of mortality (Chainani et al., 2016). A reduction is grip strength in older adults has also been shown to be an important predictor of disability (Syddall et al., 2017). Grip strength is a fast and cost-effective screening tool that can be adopted in routine clinical practice. It has been proposed to be particularly useful in the context of multimorbidity as a stratifying tool for identification of patients at higher risk of adverse health outcome or who may benefit from more targeted interventions (Syddall et al., 2017).

4.1.5 Frailty: unintentional weight loss

It was found that 12% of participants had experiences of unexplained weight loss in the preceding 12 months i.e. weight loss not resulting from diet or exercise. These results are in keeping with the research in the literature to date which reports a prevalence of between 8-13% for unintentional or inorganic weight loss in older adults (Ruscin et al., 2005, Sahyoun et al., 2004). It has been established that some of the consequences of weight loss in older out-patients include loss of skin integrity, functional decline, adverse health outcomes, exacerbation of mood disorders and increased healthcare utilisation (Wallace et al., 1995). It has also been shown that even small weight loss e.g. 1kg, can have significant consequences in frail older adults. Weight loss can be indicative of underlying disease severity, infectious processes and is predictive of mortality (Newman et al., 2001).. Unintentional or unexplained weight loss can have serious consequences and should be viewed as an adverse health indicator and weight should be closely monitored in frail older individuals in clinical environments.

4.1.6 Frailty: self-reported fatigue

Fatigue has been shown to be experienced by approximately 90% of PLWH (Barroso et al., 2015). In the present study 1 in 3 participants reported fatigue which was the second most common frailty-defining criterion. This is in keeping with the literature to date where excessive fatigue has been reported as one of the most commonly reported symptoms in patients with chronic illness (Payne et al., 2012, Payette et al., 1999). Fatigue has also been shown to be associated with stress, sleep disturbance, inactivity and depression. Frequently described in the physical context of lethargy or weakness, fatigue has also been shown to have impacts in other domains including decision-making ability, judgement, motivation and awareness (Barroso et al., 2015). Fatigue can often be under-reported and subsequently underdiagnosed and can mistakenly be viewed as an inevitable consequence of chronic disease (Toye et al., 2006, Whitehead, 2009). Fatigue has been shown to impact the physical,

psychological, cognitive and social functioning of those affected (Whitehead, 2009, Benzein and Berg, 2005). People living with HIV have been identified as being at an increased risk of fatigue due to a number of exposures associated with HIV-infection, HIV treatment and overall psychological disease-burden (Perazzo et al., 2017). PLWH are more susceptible to metabolic and cardiovascular changes associated with HIV infection that can predispose them to the development of fatigue (Wibbeler et al., 2012, Redig and Berliner, 2013). It has also been shown that fatigue does not spontaneous remit in people living with HIV and therefore there is a need for targeted interventions to address fatigue (Barroso et al., 2015). Exercise is one potential intervention that has been shown to assist in the management of fatigue in HIV, as have self-management programmes (Payne et al., 2012, Webel et al., 2016). There is a role for physiotherapists as specialists in exercise prescription to deliver such interventions. Due to increased life expectancy, there may also be a role for the delivery of enhanced palliative care services to those PLWH who are experiencing fatigue to assist with symptomatic management and to advice regarding strategies than can help to ameliorate the effects of fatigue.

4.1.7 BMI

Fifty-eight percent of participants were overweight (n=10), while 24% of participants were obese (n=4), and only 18% of participants had a normal BMI (n=3). The adverse health effects of being overweight are already well established in the literature and higher BMI has been shown to be strongly associated with increased all-cause mortality (Whitlock et al., 2009, Berrington de Gonzalez et al., 2010). There is, however, some research to suggest that in the context of HIV, being overweight or obese may have a protective factor and may in fact be desirable. This was demonstrated by Shor-Posner et al. (2000) in a longitudinal study where it was found that those PLWH with higher BMIs had better HIV-related survival rates with no impairment of immune function. This was in keeping with Shuter et al. (2001) who found that there was slower disease progression in PLWH when they had a higher BMI and that a lower

or decreasing BMI was independently predictive of progression to stage-4 HIV or AIDS. It has been suggested that increased BMI may have a protective effect regarding disease progression in PLWH however larger scale clinical trials are needed to establish these findings. This hypothesis would be in keeping with the findings in the present study where it was found that 21% of participants who were overweight or obese were found to be "robust" in comparison with 33% who those had a normal BMI.

4.1.8 Social connectedness

4.1.8.1 Social connectedness: social networks

Social connectedness refers to the networks of social relationships surrounding an individual and considers the type and strength of each social relationship or "connection" with their community. In the present study, it was found that 76% participants were socially connected. The remaining 24% of participants were considered socially isolated. This is higher than the Irish population normative values for social isolation which are approximately to 6% (TILDA, 2011). Participants were found, on average, to score higher in the family subscale than in the friendship subscale. 35% of participants who were found to have only marginal friendship ties in comparison to 18% of participants were found to have only marginal family ties. This indicated that in general participants felt more socially connected in their familiar relationships rather than their friendships. Most participants reported that they would be more likely to seek advice/ assistance from family member than friends and reported that they would feel more comfortable discussing private matters with family members rather than friends. One in 4 participants assessed demonstrated levels of social isolation. Studies have shown that social integration and connectedness can have a number of important short- and long-term effects on health and can contribute towards positive or negative health outcomes (Umberson and Montez, 2010). This is an important finding as it has been shown that those who are more socially isolated are at twice as high risk of mortality than their peers who are more connected

(Berkman and Syme, 1979). The finding in this study was maintained even after adjustment for other factors which may influence mortality such as socioeconomic status and health behaviours. This was also in keeping with research by Brummett et al. (2001) who investigated the effect of social connection on people with a documented medical condition and also found that those who were socially isolated were twice as high at risk of mortality than their socially connected peers. Of particular importance for PLWH, are the findings by Kiecolt-Glaser et al. (2002) and Robles and Kiecolt-Glaser (2003) who both reported that lack of social connection or negative or turbulent social relationships can lead to impairment of immune system functioning – the cornerstone of HIV pathogenesis. There is evidence that the presence of positive social connection can enhance health behaviours (McGinnis et al., 2002, Umberson et al., 2010) and that social support can benefit both mental and physical health (Cohen, 2004, Uchino, 2006). In studies investigating social isolation in PLWH it has been found that older people with HIV are at higher risk of social isolation than their younger peers (Emlet, 2006, Crystal et al., 2003).

Emotional support has also been found to be associated with greater adherence to HIV treatment regimens (Cox, 2002). It has been proposed by Johnson Shen et al. (2018) that older PLWH can experience enhanced stigma on the basis of their older age and HIV status and they recommended increased social support for PLWH as they age. This is supported by research by Schrimshaw and Siegel (2003) who investigated barriers to social support for older PLWH and found that barriers included ageism and stigma surrounding HIV diagnosis. This highlights the importance of social inclusion for all aspects of health, particularly in populations that are ageing and who may be vulnerable to social isolation such as those ageing with HIV. There is a need for increased general public education and awareness about HIV to help combat these ongoing stigmatising and ageist views.

4.1.8.2 Social connectedness: employment

In relation to employment, only 59% of participants were employed. Of the 41% of participants who were unemployed, 35% of these were aged <65 years. Reasons for lack of employment were not investigated in the scope of this research, however, recent research by Kordovski et al. (2017) demonstrated that both older age and HIV status have been shown to be associated with unemployment. This was shown to be partly due to higher levels of disability experienced by PLWH as they age. Another important predictor of employment was age at time of HIV diagnosis. In the present study the number of years since HIV diagnosis was also found to highly correlate with employment status. The median age for new diagnoses of HIV in Ireland in 2016 was found to be 35 years (HSE, 2016). This means that most people newly diagnosed with HIV are of working age. High levels of unemployment amongst this population can have both public health and economic consequences (Robinson et al., 2015). Employment of PLWH has been shown to enhance compliance with medication treatment regimens for HIV, an importance aspect of reducing transmission of HIV infection (Cox, 2002) and it has also been shown to be associated with better cognitive reserve (Vance et al., 2015, Fazeli et al., 2014). Robinson et al. (2015) explored interventions for improving employment outcomes for PLWH and found the evidence lacking. They recommended higher quality research looking at return-to-work strategies for PLWH. Blalock et al. (2002) reported that PLWH who were engaged in employment reported overall improved quality-of-life. They also reported that employment history and patterns fluctuated in PLWH due to changing medical status and episodic disability as described by O'Brien et al. (2008). Rueda et al. (2015) added that people with HIV who work in employment with a number of adverse psychosocial aspects were as likely to experience depressive symptoms as those without employment which indicates that there is a discrepancy between the benefits gained from “good jobs” and “bad jobs”. Further longitudinal studies would allow for more detailed investigation into the role of employment on psychosocial adjustment to HIV status. These studies should take the quality

of employment into account as it has been suggested that better quality employment may offer better outcomes than poor quality employment for PLWH.

4.1.9 Quality of life

The median score on the CASP-19 quality of life (QOL) measure was 39. This represented 68% of the total possible score with higher scores indicating better QOL. PLWH experience significantly lower QOL than the general population regardless of virologic stability and immune function (Miners et al., 2014). Multiple factors have been identified in the literature as having an impact on QOL in PLWH including social connections, stigmatisation and comorbidity (Drewes et al., 2013). The presence of pre-frailty in HIV has also been shown to be significantly associated with pain (Petit et al., 2018) and pain has been shown to closely correlate with QOL (Duenas et al., 2016). The measurement of QOL remains challenging as many domains are involved in the assessment of QOL in PLWH and the choice of instrument usually depends on the clinical context in which it is being used (Cooper et al., 2017). The assessment of QOL is important to help clinicians to understand the effects of HIV as a chronic condition. Although HIV is now considered a long-term condition and no longer has such ramifications on mortality, HIV appears to continue to affect to morbidity (Miners et al., 2014). A study by Rodriguez-Penney et al. (2013) found that higher levels of co-morbidity were independently associated with poorer QOL. This study was in keeping with Balderson et al. (2013) and highlighted the importance of early detection of HIV and timely commencement of treatment regimens and interventions which can have an impact of levels of comorbidities as these are related to QOL. The role of exercise in the prevention and management has been widely discussed in the literature to date (Booth et al., 2012). There is a role for physiotherapists as experts in physical activity and exercise prescription to intervene in the amelioration of chronic diseases such as HIV to prevent or manage co-morbidity.

4.1.10 Multi-morbidity

Multimorbidity, defined as the presence of 2 or more chronic health conditions (Farmer et al., 2016), was present in 71% of the sample. Cardiovascular and Musculoskeletal comorbidities were the most frequently observed comorbidities. Kaplan-Lewis et al. (2017) report that as treatments for HIV continue to advance there is an enhanced life expectancy for PLWH. It is also know that ageing is associated with higher levels of multimorbidity (Divo et al., 2014). This means that the improved survival rates for PLWH mean that PLWH will experience higher levels of multimorbidity as they age so therefore the findings from the present study are expected and in keeping with the literature on the subject. Multimorbidity is associated with poorer health outcomes, increased medication use, the need for multiple speciality providers, increased health care costs and utilisation (Parekh et al., 2011). The presence of this multimorbidity, therefore, drives the need for a shift in management from single disease to multiple chronic condition management. As PLWH age they will continue to face challenges and the presence of multimorbidity will further enhance these challenges for both patients and healthcare providers (Slomka et al., 2017). Abele (2018) reported that these challenges were founded not only on the unmet needs of PLWH and multimorbidity today but also because of the uncertainty they posed for future healthcare. People with HIV should be offered interventions that address these different chronic health conditions. Physical activity has been shown to have an inverse dose-response relationship with multi-morbidity in longitudinal cohort studies (Dhalwani et al., 2016). There is a role for physiotherapists in the prescription of physical activity to ameliorate the effects of multimorbidity and also in the assessment and management of musculoskeletal conditions. These interventions would be best delivered in the form of specialised and dedicated services where PLWH where can have all of their healthcare needs met by a single provider using integrated and patient-centred approaches Chu and Selwyn (2011). This highlights the need for the development of specialised multidisciplinary teams with expert knowledge of HIV pathogenesis for PLWH.

4.1.11 Perceptions about ageing

Participants in this study were asked about their perceptions about ageing across several domains. It was found that participants did not have a strong positive or negative emotional response to aging. It was also found that participants perceived that they had less control over the negative experiences associated with aging than they had over the positive experiences. Participants also felt more strongly that there were positive consequences to ageing than they felt there were negative. In general, the perceptions towards ageing appeared to be positive. This is in contrast with Siegel et al. (1998) who explored perceptions about aging in older adults with HIV and found that although there were a number of positive perceptions about aging there were also some negative beliefs. Manning et al. (2017) also explored perceptions about aging in older adults with HIV and found that living with HIV was not perceived as a barrier to ageing well with the main negative perception relating to ongoing stigmatisation of PLWH. This was also in keeping with Brewer (2016) who found that older long-term survivors living with HIV perceived few issues with growing older and in fact felt that a cure for HIV would have little impact on their lives. In general, exploring older PLWH's perceptions about ageing with HIV appears to be an underexplored area in the literature. This topic would benefit from further research with larger sample sizes to continue to build on the existing evidence and to offer insights into how older people perceive growing older. Further research may highlight areas for service improvements or the need for interventions to facilitate wellbeing as PLWH grow older.

4.2 Limitations of this Study

This study is the first to explore frailty and ageing in older people living with HIV in Ireland, however, there were several limitations;

- This study was conducted in a single-centre and may not reflect the general population of older people living with HIV and therefore it may have limited generalisability.

- Those participants who were agreeable to participate may represent an overall more health conscious subgroup within the population and may have led to an element of recruitment bias.
- Only participants were who were attending out-patient hospital clinics were recruited which largely represents those older people in Ireland living with HIV who have been diagnosed with HIV and who are engaged with care. There is likely a proportion of older people living with HIV who are disengaged from clinical care or who remain undiagnosed and they are not represented in this study. This may limit the generalisability of the findings to all older people living with HIV in Ireland.
- The study did not reach the planned sample size. The small sample size limits the generalisability of the study findings and the results must be interpreted with caution in such circumstances.
- The LSNS-6 scale has primarily been shown in the literature to be valid in individuals aged >65 years which may raise questions about the validity of those results for participants outside of that age range in this present study. The small sample size means that results may not necessarily be reflective of the population.
- Self-reported fatigue was assessed using the fatigue sub-scale of the CES-D. This is a limited assessment and perhaps a more comprehensive fatigue assessment tool would have given greater insight into the levels of fatigue experienced by participants in this sample.
- This low prevalence of established frailty could possibly be explained by the small sample recruited which likely affected the validity of the result. It could also be attributed to the fact that those participants who consented to take part in the study may represent an overall more health-conscious or "robust" group within the population of interest and possibly more frail individuals did not wish to be recruited for the research. This may have introduced an element of recruitment bias.

- There are various methods of reporting frailty reported in the literature and the different methods of capturing data related to frailty may explain the variance in prevalence reported.
- Assessor bias by the researcher cannot be ruled out as the single researcher completed all assessments
- A large proportion of the assessment consisted of self-reported measures which were completed by the participant and so may be subjected to response bias.
- As the researcher was also working full-time while carrying out the research contact with participants was facilitated around core working hours which may have led to missing out on potential participants.

4.3 Implications for Clinical Practice & Health Policy

- Older people living with HIV in Ireland represent an "at risk" group within society who need targeted interventions to ensure there is no further decline towards frailty e.g. exercise prescription, lifestyle interventions
- There is a need for further promotion of physical activity and further education about the importance of remaining physically active into later life in this largely sedentary population.
- The use of grip strength as a clinical measure is a fast and cost-effective screening tool that may be useful in the stratification of older PLWH to identify those who are at higher risk of frailty and who may benefit from targeted intervention.
- There is a need for targeted interventions to address fatigue in older PLWH and a role for physiotherapists as specialists in exercise prescription to be involved in the delivery of such interventions.
- There may be a role for the delivery of enhanced palliative care services who can employ management strategies for those PLWH who experience chronic fatigue.

- Unintentional or unexplained weight loss should be viewed as an adverse health indicator and weight should be closely monitored in frail older individuals in clinical environments.
- The importance of social inclusion for all aspects of health is highlighted, particularly in populations that are ageing and who may be vulnerable to social isolation such as those ageing with HIV. Strategies to ensure older PLWH remain socially included should be employed where possible.
- Facilitating older PLWH to remain in employment where possible is encouraged as employment has been shown to be associated with better health outcomes.
- There is a role for physiotherapists as experts in exercise prescription to prescribe exercise which has been shown to have a beneficial impact on quality of life and to offset the effects of multimorbidity in PLWH.
- There may be a role for physiotherapists in exercise prescription to enhance immune system functioning in PLWH.
- There is a need for increased general public education and awareness about HIV to help combat stigmatisation and ageism.

4.4 Recommendations for Further Research

- Further studies with larger sample sizes would be warranted to support these preliminary results.
- The collection of further descriptive data including nationality, route of HIV transmission, biomarkers, reasons for lack of employment etc. would be desirable to further add to the knowledge base about this population.
- Multi-centre recruitment would help to ensure better representation of the population of older people living with HIV nationally.

- Comparison with a sample of older people without HIV would make for an interesting study to determine the effects of HIV on the various constructs of ageing e.g. using baseline data from TILDA
- Recruiting and assessing participants over warmer seasons/ months would be preferable to limit the effects of seasonal illnesses (e.g. influenza) on subject participation when recruiting from an immune-compromised population.
- The perceptions of older PLWH regarding ageing would benefit from further research with larger sample sizes to continue to build on the existing evidence. Further research may highlight areas for service improvements or the need for interventions to facilitate wellbeing as PLWH grow older.
- Future studies with larger sample sizes that are adequately powered should include logistical regression analysis to determine any variables that are predictive of frailty.
- Future studies including more in-depth analysis of bio-markers associated with ageing and HIV e.g. viral load, CD4 cell count etc. would be beneficial.

CONCLUSION

Frailty is a multi-dimensional syndrome characterised by decreased physiological reserve and increased vulnerability to stressors. The presence of frailty leaves patients at a Higher risk of adverse health outcomes, higher levels of disability and increased mortality. As people with HIV continue to live longer they will be subject to syndromes of premature ageing. The prevalence of frailty amongst older people living with HIV in Ireland remains under-reported in the literature to date.

This is the first study of its kind in Ireland and St. James Hospital is a large national centre for the treatment of people living with HIV. The present study was novel characterising frailty and various domains of disability in this population. It provided insight into the understanding of frailty in the context of HIV in an Irish cohort and will improve the understanding of the health of this population as a whole.

With regards to social gain, the results of this study will directly inform the development of a physiotherapy service at St. James Hospital for people living with HIV. Further larger scale longitudinal studies examining the impact of HIV on ageing would further add to the knowledge base on this topic and would assist with the development of health care services and policies. There is a need for healthcare systems to be prepared and to have services in place that can facilitate older people with HIV to manage high levels of multimorbidity and disability. This can include reduced quality of life, low levels of physical activity and social isolation. There is an emerging role for rehabilitation professionals such as physiotherapists in the provision of interventions such as exercise which have been shown to ameliorate the effects of frailty and have positive impacts across multiple domains of aging. As the evidence for the need and efficacy of lifestyles interventions for PLWH is continues to be explored it is hoped that the development of further services for this vulnerable population will lead to

improved patient outcomes and the development of more efficient and effective systems of healthcare delivery for older PLWH.

(13,217 words)

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APPENDICES

APPENDIX A – Sample Ethics Form (RCSI REC)

RCSI REC Application

Check List of Appendices

Protocol		Yes
Participant Consent Form	Yes	
Participant Information Sheet		Yes
GP/ Consultant Information Sheet		N/A
Questionnaire1		Yes
Lead Applicant's CV		No
Interview Theme Sheet		N/A
Additional Documents		Yes

SECTION A: GENERAL INFORMATION

Title of Study

"Investigating the prevalence of frailty in a cohort of Irish older people living with Human Immunodeficiency Virus (HIV)"

Application Date September 2017

Application Version No 1

A1 Title of the Research Study

"Investigating the prevalence of frailty in a cohort of Irish older people living with Human Immunodeficiency Virus (HIV)"

A2(a) Is this a Multi-site Study? No

A2(b) Title Ms

Name Chiara Reddin

Qualification BSc. In Physiotherapy

Department Physiotherapy Department

Organization St. James Hospital

Address James Street, Dublin 8

Telephone 01-4162503/ 085-1361979

Email creddin@stjames.ie

A2(c) For multi-site studies, please name each site where this study is proposed to take place, state the lead co-investigator for each of these sites and state if you have got an outcome from the relevant research ethics committee(s)

Site

Lead Co-Investigator for each site

Research Ethics Committee Outcome

A2(d) For multi-site studies, please provide details of the Lead Co-Investigators at each site

Co-Investigator

Title

Name

Qualifications

Position

Department

Organisation

Address

Telephone

Email

A2(e)

Title

Name

Qualification

Position

Department

Organization

Address

Telephone

Email

A2(f) For single-site studies, please name the only site where this study will take place.

Site Name St. James Hospital

A3 Details of Co-investigators:

Co-Investigator 1

Site Name St. James Hospital

Title Professor

Name Colm Bergin

Qualifications MD, FRCPI, FRCP(Ed), FIDSA

Position Consultant in Infectious Diseases

Department Genito-urinary and Infectious Diseases (GUIDe)

Organisation St. James Hospital

Address James Street, Dublin 8

Telephone 01-4162315

Email cbergin@stjames.ie

Role in Research Clinical Supervisor

Co-Investigator 2

Site Name St. James Hospital

Title Ms.

Name Niamh Murphy

Qualifications BSc. HDip. MSc.

Position Physiotherapy Manager, SCOPe Manager

Department Physiotherapy Department

Organisation St. James Hospital

Address James Street, Dublin

Telephone 01-4162503

Email nimurphy@stjames.ie

Role in Research Facilitation of clinical time/ physiotherapy department premises for research purposes

A4 Lead contact person who is to receive correspondence in relation to this application or be contacted with queries about this application.

Name Ms Chiara Reddin

Position Physiotherapist

Organization St. James Hospital

Correspondence Address Physiotherapy Department, St. James Hospital, James Street, Dublin 8

Telephone Work 01-4162503

Mobile 085-1361979

Email creddin@stjames.ie

A5(a) Is this study being undertaken as part of an academic qualification? Yes

A5(b) Academic Supervisor(s): Professor Frances Horgan Dr, Rose Galvin

Academic Supervisor

Student Name Chiara Reddin

Academic Course MSc in Neurology & Gerontology

Academic Institution Royal College of Surgeons in Ireland

A5(c) Academic Supervisor:

Name Professor Frances Horgan

Qualifications PhD, MSc (Research), MSc (LMD), BSc (Physio), Dip Stats, Dip Health Econ, PG Dip HE, MISCP

Position Associate Professor of Physiotherapy

Department School of Physiotherapy

Organisation Royal College of Surgeons in Ireland

Address Faculty of Medicine & Health Sciences, Royal College of Surgeons in Ireland, 123 St. Stephens Green, Dublin 2

Telephone 01-4022471

Email fhorgan@rcsi.ie

Academic Supervisor

Name Dr. Rose Galvin

Qualifications BSc, PGDip, PhD

Position Lecturer

Department of Clinical Therapies

Organisation University of Limerick

Address Faculty of Education & Health Science, University of Limerick, Limerick, V94 T9PX

Telephone 061 234149

Email rose.galvin@ul.ie

SECTION B: STUDY DESCRIPTORS

B1 Anticipated Start Date of this Study: September 2017

B2 Anticipated duration of this Study: 4 months

B3 Brief Lay Description

Participants will be invited to attend for assessment where they will be assessed for the presence of frailty using various tests including walking speed and grip strength. Participants will also be asked to complete questionnaires regarding physical activity levels, assessment of fatigue and weight loss. Participants will also be asked to complete questionnaires exploring social connectedness, quality of life and perceptions regarding ageing. The investigator will then analyse the results to see if there are any associations between these factors and the presence of frailty. These results will also be compared with results from another larger study known as the Longitudinal Study on Ageing.

B4 Brief Information on the study Background.

As people living with HIV age, it is imperative that healthcare professionals are equipped to help people to live better for longer. This study will provide insights into population characteristics of older people living with HIV who are attending St. James Hospital. This will assist in developing future services for these patients and will strive to improve patient outcomes.

B5 List the study Aims and Objectives.

The aim of this study is to confirm the hypothesis that frailty is highly prevalent in an Irish population of older people living with HIV and to ascertain any associations between lifestyle factors and frailty prevalence.

The objectives of this study are to;

4 To **ascertain the prevalence** of frailty in a population of people ≥50 years of age living with HIV who are attending St. James Hospital using the Fried Phenotype Frailty Criteria.
5 To **profile** this population's demographics, levels of physical activity, quality of life, perceptions of ageing and social connectedness.
6 To **determine any associations** with frailty prevalence and the aforementioned variables.

B6 List the study endpoints / Measurable Outcomes

- Frailty will be assessed using the Fried Frailty Phenotype (Fried et al., 2001)
  i. Grip strength will be assessed using hand held dynamometry
  ii. Gait speed will be assessed using the 10-metre walk test (10MWT)
  iii. Physical activity levels will be measured using the International Physical Activity Questionnaire (IPAQ)
  iv. Weight loss will be assessed using a weighing scales
  v. Self-reported exhaustion/ fatigue will be assessed using the Multidimensional Assessment of Fatigue scale (MAF)
- Quality of Life will be measured using the CASP-19
- Perceptions of Ageing will be assessed using the Brief Ageing Perceptions Questionnaire (B-APQ)
- Social Connectedness will be measured using the Berkman Social Network Index

*All the above instruments have been validated in the chosen population.

B7 Information on the Study Design.

The proposed study design is a quantitative cross-sectional study.

B8 Information on the study Methodology.

- Eligible patients under the care of the Infectious Diseases services will be pre-screened for interest in participation in research by the Consultant and Clinical Nurse Specialists in Infectious Diseases during clinic appointments.
- Any suitable patients interested in participating will be added to a "contact short-list" for future reference by the researcher during the recruitment phase.
- During the recruitment phase, patients will be contacted directly from this list by the researcher to determine their interest in participating. If the number of potential participants screened exceeds the required sample size, participants will be selected at random from the list.
- If agreeable, a participant information leaflet will be sent by the researcher detailing further information about the study.
- Following a 7-day cooling off period, the researcher will follow up with the potential participant and will clarify the participant's interest in participating in the study
- Participants who consent to participate will be invited to attend for assessment with the researcher.
- Assessments will be carried out in the Physiotherapy Department of St. James Hospital.

B9 Information on the Statistical Approach

It is proposed that SPSS will be used for statistical analysis. Descriptive statistics, including graphs and tables, will be employed to describe the population characteristics i.e. age, gender. Data will be tested for normality using a Shapiro-Wilke test. Depending on the normality of the data, either the mean and standard deviation or the median and inter-quartile range will be analysed. Logistic regression will be used to analyse the presence of any associations between variables and the primary outcome. If any results are found to be statistically significant (P value = 0.05), multivariate logistic regression will be used to look for independent association between variables. Depending on data normality, either a t-test will be used to look for differences between the study group and age-matched controls from TILDA.

B10a Proposed sample size and Details of its Calculation

A sample size of 51 participants will be needed to give a power of 0.8. Allowing for a 20% attrition rate the researcher will aim to collect data from 62 participants. This is based on a frailty prevalence of 3.1% in the general over 50s population.

B10b Where Sample size Calculation is Impossible

B11 How many research participants are to be recruited in total?

62

B12(a) How many research participants are to be recruited in each study group (where applicable)?

N/A

Please complete the following table (where applicable).

Study Group

Study Group Name

Number of Participants

Study Group Name

Number of Participants

B12b Details on the Method of Randomisation

B13 How many research participants are to be recruited at each study site (where applicable)? N/A

Please complete the following table

Study Site

Study Site Name

Number of Participants

Study Site Name

Number of Participants

SECTION C STUDY PARTICIPANTS

C1.1 How will the participants in the study are selected?

Inclusion criteria for participation in the study is as follows; aged 50 years of age or older, a diagnosis of HIV, under the care of the Infectious Diseases services in St. James Hospital and consent to participate in the study.

C1.2 How will the participants in the study are recruited?

1. Eligible patients under the care of the Infectious Diseases services will be pre-screened for interest in participation in research by the Consultant and Clinical Nurse Specialists in Infectious Diseases during clinic appointments.
2. Any suitable patients interested in participating will be added to a "contact short-list" for future reference by the researcher during the recruitment phase.
3. During the recruitment phase, patients will be contacted directly from this list by the researcher to determine their interest in participating. If the number of potential participants screened exceeds the required sample size, participants will be selected at random from the list.
4. If agreeable, a participant information leaflet will be sent by the researcher detailing further information about the study.
5. Following a 7-day cooling off period, the researcher will follow up with the potential participant and will clarify the participant's interest in participating in the study
6. Participants who consent to participate will be invited to attend for assessment with the researcher.

C1.3 Inclusion criteria for research participants

Inclusion criteria for participation in the study is as follows; aged 50 years of age or older, a diagnosis of HIV, under the care of the Infectious Diseases services in St. James Hospital and consent to participate in the study.

C1.4 Exclusion criteria for research participants

Nil

C1.5 Will any participants recruited to this research study be simultaneously involved in any other research project?

There is a possibility participants may be involved in other studies; however, this proposed study will only be a one-off assessment and should not interfere with participation in any other research projects.

C2.1(a) Will informed consent be obtained? Yes

C2.1(b) If No, why?

C2.1(c) If Yes, outline the process

Potential participants will have received the patient information leaflet at least one week in advance of giving informed consent. The lead investigator will then request written informed consent from each subject prior to initiation of any testing. The principal investigator will answer any questions. The information leaflet will outline the procedures, risks and benefits of the trial and request their voluntary participation.

C2.2(a) Will participants be informed of their right to refuse to participate and their right to withdraw from this research study?

Yes. Participants will be advised they have the right to withdraw from the study at any stage without prejudice and this will also be clearly stated in the patient information leaflet. Participants will continue to receive routine physiotherapy even if they do not want to take part in the study. Additionally, this will be repeated to the participant on the day of testing prior to beginning.

C2.2(b) If No, why?

C2.3(a) Will there be a time interval between giving information and seeking consent? Yes

C2.3(b) If Yes, outline

7 days

C2.3(c) If No, please justify

C3 ADULT PARTICIPANTS (AGED 18 OR OVER) - CAPACITY

C3.1(a) Will all adult research participants have the capacity to give informed consent?

Yes. As cognitive deficits are not uncommon, this will be established by having the participant communicate back to the researchers the protocol and that participation is voluntary, will not influence physiotherapy treatments and that they can withdraw at any time.

C3.1(b) If No, please justify

C3.2 Is this research of such a nature that it can only be carried out on adults without capacity?

No

C3.3 Is the research expected to provide direct benefit to the research participants.

No

C3.4 What arrangements are in place to ascertain the wishes of research participants

All candidates will be given an information sheet and offered time to ask any questions and to have them fully answered. There will be a period of one week or more between information distribution and participants consenting, to allow adequate time for participants to fully consider their involvement. Patients will be made fully aware that they are not under any obligation to participate in the study and that their consent to participant or not will not affect their attendance at physiotherapy. Their physiotherapy care will not be compromised or indeed suffered if they decline to take part in anyway.

SECTION D RESEARCH PROCEDURES

D1(a) What activities, procedures or interventions (if any) are research participants asked to undergo or engage in for the purposes of this research study?

Participants are being asked to attend for a one-off assessment consisting of the aforementioned assessment methods.

D1(b) What other activities (if any) are taking place for the purposes of this research study e.g. chart review, sample analysis etc.?

Chart review, access to medical records

D2 Please provide details below of any potential harm that may result from any of the activities, procedures, interventions or other activities listed above.

No potential serious harm is anticipated from the above proposed testing. However, occasionally during any physical test subjects may feel short of breath, dizzy or faint. However, the tests chosen for this study are carefully graded with the participant setting the level of effort. Patients will be instructed to alert the investigator to any feelings of weakness/dizziness throughout the exercise test. In the case of an emergency a defibrillator is in place at the St. James's Hospital, Dublin and the principal investigator is trained in first aid. An ambulance will be called from St. James's Hospital in the event of an emergency.

D3 What is the potential benefit that may occur as a result of this study?

It will add to the literature regarding ageing with HIV and will guide the development of future services and care for older people living with HIV which will improve patient outcomes.

D4(a) Will the study involve the withholding of treatment?

No

D4(b) Will there be any harms that could result from withholding treatment?

N/A

D4(c) If yes, please elaborate.

D5(a) How will the health of participants be monitored during the study, and who will be responsible for this?

Participants will be attending for a one-off assessment. Monitoring should not be required, however, if further monitoring is required based on the patients' needs it will be carried out by the researcher.

D5(b) How will the health of participants be monitored after the study, and who will be responsible for this?

As above.

D6(a) Will the interventions provided during the study be available if needed after the termination of the study?
Not applicable. Participants will be attending for a one-off assessment.

D6(b) If yes, please state the intervention you are referring to and state who will bear the cost of provision of this intervention?

N/A

D7 Please comment on how individual results will be managed.

1. Data will be collected following each assessment. Participants may receive their individual results from assessments if they wish.
2. All participant data will be stored securely on a password protected excel spreadsheet on the drive of a computer in the Physiotherapy Department at St. James Hospital.
3. All data will be coded and encrypted. The coding key will be stored in a separate location within the Physiotherapy Department.
4. Data will be statistically analysed, and results compiled (see statistical analysis plan below for details of proposed analysis).

D8 Please comment on how aggregated study results will be made available.

It is planned to submit this study as part of a Masters in Neurology & Gerontology to Royal College of Surgeons in Ireland. It is also proposed that this dissertation be at a standard that would allow its result to be published in a peer-reviewed journal and presented at national and international conferences. Analysed result will also be made available to participants through a patient presentation.

D9 Will the research participant's general practitioner be informed that the research participant is taking part in the study (if appropriate)?

No

D10 Will the research participant's hospital consultant be informed that the research participant is taking part in the study (if appropriate)?

Yes

SECTION E DATA PROTECTION

E1 DATA PROCESSING - CONSENT

E1(a) Will consent be sought for the processing of data? Yes

E1(b) If no, please elaborate.

E2 DATA PROCESSING - GENERAL

E2.1 Who will have access to the data which is collected? The researcher

E2.2 What media of data will be collected?

Data will be collected on paper and then inputted onto spreadsheets and statistical packages.

E2.3(a) Would you class the data collected in this study as anonymous, irrevocably anonymised, pseudonymised, coded or identifiable data?

Hard copies of measures will be coded, electronic data will be coded. Only the consent form will link the participants name and code, and these will be stored separately to the data.

E2.3(b) if 'coded', please confirm who will retain the 'key' to re-identify the data?

Lead Investigator.

E2.4 Where will data which is collected be stored?

Data will be stored in a secure cabinet locked with a key and in a password protected spreadsheet on a password protected and encrypted computer in the Physiotherapy Department in St. James Hospital that will not be available to anyone outside the study team.

E2.5 Please comment on security measures which have been put in place to ensure the security of collected data.

Data will be stored in a secure cabinet locked with a key and in a password protected spreadsheet on a password protected and encrypted computer that will not be available to anyone outside the study team. The consent form that has the link between name and code will be stored separately in a secure cabinet.

E2.6(a) Will data collected be at any stage leaving the site(s) of origin?

No

E2.7 Where will data analysis take place and who will perform data analysis (if known)?

Data analysis will take place in the Physiotherapy Department by the lead investigator.
.

E2.8(a) After data analysis has taken place, will data be destroyed or retained?

Retained

E2.8(b) Please elaborate

As per data protection guidelines, data will be retained for seven years

E2.8(c) If destroyed, how, when and by whom will it be destroyed?

E2.8(d) If retained, for how long, for what purpose, and where will it be retained?

Data will be retained for seven years, as raw data, on the password protected PC. Hard copies will be retained in the physiotherapy department at SJH.

E2.9 Please comment on the confidentiality of collected data.

All data sheets will be coded and only the consent form has the link between name and code and these will be stored separately. Both will be stored in a secure cabinet or password protected spreadsheet ensuring confidentially. All electronic data will be anonymised.

E2.10(a) Will any of the interview data collected consist of audio recordings / video recordings? No

E2.10(b) If yes, will participants be given the opportunity to review and amend transcripts of the tapes?

E2.11(a) Will any of the study data collected consist of photographs/ video recordings? No

E2.11(b) If yes, please elaborate.

E3 ACCESS TO HEALTHCARE RECORDS

E3.1(a) Does the study involve access to healthcare records (hard copy / electronic)?

E3.1(b) If yes, please elaborate.

It may require access to medical records to gather data in relation to medical history.

E3.1(c) Who will access these healthcare records?

The lead investigator.

E3.1(d) Will consent be sought from patients for research team members to access their healthcare records?

Yes

E3.2(a) Who or what legal entity is the data controller in respect of the healthcare records?

The hospital board at St. James's Hospital.

E3.2(b) What measures have been put in place by the data controller which may make access to healthcare records permissible without consent?

N/A consent will be obtained

SECTION J INDEMNITY AND INSURANCE

J1 Please confirm and provide evidence that appropriate insurance/indemnity is in place for this research study at each site

St. James Hospital is covered by Clinical Indemnity Insurance.

J2 Please confirm and provide evidence that appropriate insurance/indemnity is in place for this research study for each investigator.

J3.1 Please give the name and address of the organisation / or individual legally responsible for this research study?

St. James Hospital, Dublin

J3.2 Where an organisation is legally responsible, please specify if this organisation is:

A pharmaceutical company

A medical device company

A university

A registered charity

Other

If yes, please specify

J3.3 Please confirm and provide evidence of any specific additional insurance / indemnity arrangements which have been put in place, if any, by this organisation / or individual for this research

N/A

SECTION K COST AND RESOURCE IMPLICATIONS, FUNDING AND PAYMENTS

K1 COST AND RESOURCE IMPLICATIONS

K1 Please provide details of all cost / resource implications related to this study (e.g. staff time, office use, telephone / printing costs etc.)

7 Financial – there should be no financial cost involved for patients to participate in the study. Where feasible assessments will be carried out on the same day as other out-patient clinic appointments on the hospital campus for participant convenience and parking allocations will be sought for study participants. Telephone costs and stationary costs will be borne by the researcher directly.
8 Premises – the St. James Hospital Physiotherapy Department will be the premises used for participant assessments.
9 Equipment – all necessary equipment is located on site in the Physiotherapy Department. All instruments/ questionnaires chosen are freely available online and require no licencing fee.
10 Time – protected time has been agreed with the support of Physiotherapy Management.

K2 FUNDING

K2.1(a) Is funding in place to conduct this study? No

K2.1(b) If no, has funding been sought to conduct this study? From where? Please elaborate.

K2.1(c) If yes, please state the source of funding (industry, grant or other), the name of the funder, the amount of funding and duration of funding.

Source of funding (industry, grant or other)

Name of Funder:

Amount of Funding:

Duration of Funding

K2.1(d) Please provide additional details in relation to management of funds.

K2.1(e) Is the study funded by a 'for profit' organisation?

K2.2(a) Do any conflicts of interest exist in relation to funding or potential funding?

K2.2(b) If yes, please elaborate

PAYMENTS TO INVESTIGATORS

K3.1(a) Will any payments (monetary or otherwise) be made to investigators? No

K3.2(b) If yes, please provide details of payments (including amount).

K4 PAYMENTS TO PARTICIPANTS

K4.1(a) Will any payments / reimbursements (monetary or otherwise) be made to participants? No

K4.1(b) If yes, please provide details of payments / reimbursement

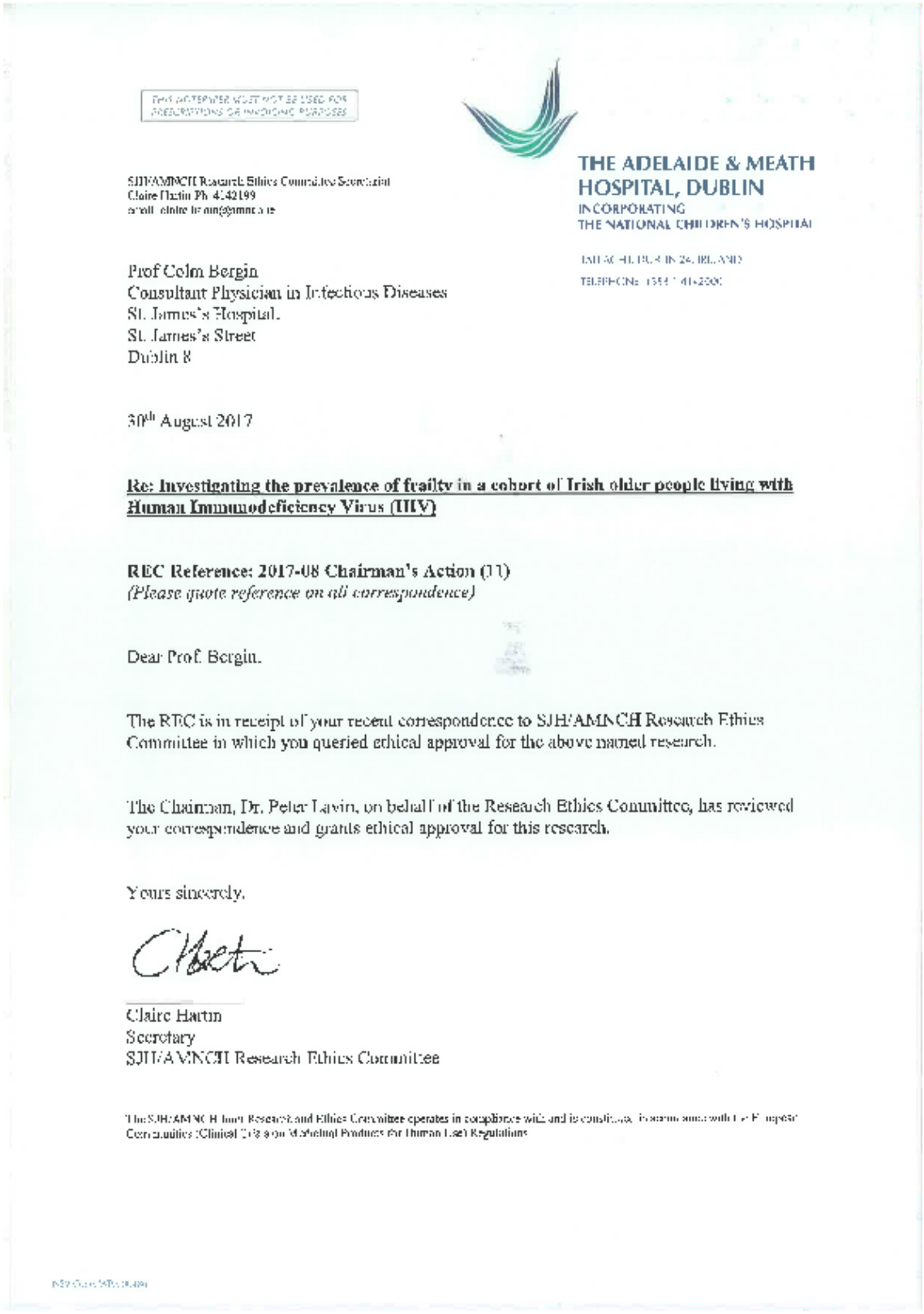
SECTION L ADDITIONAL ETHICAL ISSUES

L1(a) Does this project raise any additional ethical issues

No

L1(b) If yes, please identify any particular additional ethical

APPENDIX B – REC Approval Letter SJH/ AMNCH



THIS LETTERHEAD MUST NOT BE USED FOR PRESCRIPTIONS OR INVOICING PURPOSES

THE ADELAIDE & MEATH HOSPITAL, DUBLIN
INCORPORATING
THE NATIONAL CHILDREN'S HOSPITAL

SJH/AMNCH Research Ethics Committee Secretariat
Claire Hartin Ph 41 42199
e-mail: claire.hartin@amnch.ie

ESTABLISHED IN 26, IRELAND
TELEPHONE: (353 1) 41-2000

Prof Colm Bergin
Consultant Physician in Infectious Diseases
St. James's Hospital.
St. James's Street
Dublin 8

30th August 2017

Re: Investigating the prevalence of frailty in a cohort of Irish older people living with Human Immunodeficiency Virus (HIV)

REC Reference: 2017-08 Chairman's Action (11)
(Please quote reference on all correspondence)

Dear Prof. Bergin.

The REC is in receipt of your recent correspondence to SJH/AMNCH Research Ethics Committee in which you queried ethical approval for the above named research.

The Chairman, Dr. Peter Lavin, on behalf of the Research Ethics Committee, has reviewed your correspondence and grants ethical approval for this research.

Yours sincerely,

Claire Hartin
Secretary
SJH/AMNCH Research Ethics Committee

The SJH/AMNCH Joint Research and Ethics Committee operates in compliance with and is constituted in accordance with the European Communities (Clinical Trials on Medicinal Products for Human Use) Regulations

APPENDIX C – Participant Invitation Letter

Date: _____

Dear_____

You have been invited to partake in the following research study:

"Investigating the prevalence of frailty in a cohort of older Irish people living with Human Immunodeficiency Virus (HIV)"

As part of this study you are invited to attend for assessment on _____the _____ at _____pm.

Please find enclosed further information about this research study, your appointment card with our location and details of how to contact us. If you are unable to attend, please contact our department as soon as possible.

Yours sincerely,

_____
Chiara Reddin
Senior Physiotherapist
MISCP

APPENDIX D – Participant Information Leaflet

ST. JAMES'S HOSPITAL

James's Street, Dublin 8

"Investigating the prevalence of frailty in a cohort of older Irish adults living with Human Immunodeficiency Virus (HIV)"

Principal Investigator's Name: **Chiara Reddin**

Principal Investigator's Title: **Senior Physiotherapist (Acting)**

Telephone No. of Principal Investigator: 01 416 2503

You are being invited to take part in an optional research study. Before you decide whether or not you wish to take part, you should carefully read the information provided below, and if you wish discuss it with your family, friends or GP. Take time to ask questions. Do not feel rushed or under any obligation to decide quickly. You should clearly understand the risks and benefits of participating in this study so that you can make a decision that is right for you. This process is known as Informed Consent.

You do not have to take part in this study and if you do not take part, it will have no effect on your care now or in the future.

If you do decide to take part, you can change your mind at any time without having to give a reason and without any effect on the care you will receive from the medical staff.

WHY IS THIS STUDY BEING DONE?

Due to advances in healthcare HIV is now considered a long-term or "chronic" condition. Research around ageing with HIV has increased in recent years with many studies similar to this one being carried out in different countries around the world. This study will be the first of its kind to investigate ageing with HIV in Ireland. It will provide insights into how HIV impacts on growing older and it is hoped that the results from this study will guide future healthcare services for people living with HIV as they age.

WHO IS ORGANISING AND FUNDING THIS STUDY?

This study is being done by a physiotherapist in St. James Hospital in conjunction with Professor Colm Bergin from the Infectious Diseases Department, St. James Hospital. The project is being carried out as part of a Masters qualification.

HOW WILL IT BE CARRIED OUT?

This study will take place in St. James's Hospital in late 2017 and early 2018. People aged at least 50 years or over who have HIV and who are currently attending the Infectious Diseases Service at St. James Hospital are being invited to take part.

WHAT WILL HAPPEN TO ME IF I AGREE TO TAKE PART?

If you decide to take part in the study, you will be invited to attend for an assessment with the physiotherapist at the Physiotherapy Department. The assessment should take approximately 30 minutes during which you will be asked to;

a. complete a 10-metre timed walking test
b. have your grip strength tested
c. asked about recent weight loss (if any)
d. complete questionnaires about your physical activity levels, fatigue/ energy levels, social relationships, quality of life and perceptions about growing older

If you do agree to join the study, some of your medical details will also be recorded by the researchers such as your gender, date of birth, any health conditions you may have and the time since you were diagnosed with HIV.

There is a large study taking place in Ireland right now known as the Longitudinal Study on Ageing or "TILDA" for short. This is a very big study looking at ageing in Ireland. Some of the results gathered from this study will be compared with results from TILDA to see if or how HIV is having an impact on ageing in Ireland.

BENEFITS:

If you take part in the study, you may help healthcare professionals to understand further the process of ageing with HIV and some of the challenges experienced as people age with HIV. This may improve treatment for people living with HIV in the future.

It is important for you to realise that the research study is designed to increase knowledge and understanding of ageing with HIV, and so you yourself will not benefit directly from taking part in it.

RISKS:

The study involves attending for a one-off assessment which should take approximately 30 minutes. There are no expected risks to taking part in the assessment.

CONFIDENTIALITY ISSUES

All the questionnaires and other data collected will be coded with an identification number and will not be labelled with your name or any other information that directly identifies you. The connection between the code and you will be kept by the research team led by the physiotherapist Chiara Reddin. Any paper-based data will be kept in locked storage. Electronic (computerised) data will be stored on password-protected machines.

Anyone who works with your data will hold all of this information in confidence**.**

IF YOU REQUIRE FURTHER INFORMATION

If you have any further questions about the study or if you wish to withdraw from the study, you may do so without giving a reason and your future treatment will not be affected.

For additional information now or any future time please contact:

Chiara Reddin
Department of Physiotherapy, St. James's Hospital, Dublin 8
Telephone: 01 4162503

APPENDIX E – Consent Form

ST. JAMES'S HOSPITAL
DUBLIN . IRELAND

CONSENT FORM

Title of research study:

"Investigating the prevalence of frailty in a cohort of older Irish people living with Human Immunodeficiency Virus (HIV)"

This study and this consent form have been explained to me. The research physiotherapist has answered all my questions to my satisfaction. I believe I understand what will happen if I agree to be part of this study.

I have read, or had read to me, this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction. I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights.

PARTICIPANT'S NAME:

PARTICIPANT'S SIGNATURE:

Date:

Date on which the participant was first furnished with this form:

Where the participant is incapable of comprehending the nature, significance and scope of the consent required, the form must be signed by a person competent to give consent to his or her participation in the research study (other than a person who applied to undertake or conduct the study). If the subject is a minor (under 18 years old) the signature of parent or guardian must be obtained: -

NAME OF CONSENTOR, PARENT or GUARDIAN:

SIGNATURE:

RELATION TO PARTICIPANT:

Where the participant can comprehend the nature, significance and scope of the consent required, but is physically unable to sign written consent, signatures of two witnesses present when consent was given by the participant to a registered medical practitioner treating him or her for the illness.

NAME OF FIRST WITNESS: SIGNATURE:

NAME OF SECOND WITNESS: SIGNATURE:

Statement of investigator's responsibility: I have explained the nature, purpose, procedures, benefits, risks of, or alternatives to, this research study. I have offered to answer any questions and fully answered such questions. I believe that the participant understands my explanation and has freely given informed consent.

Investigator's signature: **Date:**

APPENDIX F – International Physical Activity Questionnaire (IPAQ)

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Think about all the **vigorous** and **moderate** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

PART 1: JOB-RELATED PHYSICAL ACTIVITY

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

1. Do you currently have a job or do any unpaid work outside your home?

☐ Yes

☐ No → ***Skip to PART 2: TRANSPORTATION***

The next questions are about all the physical activity you did in the **last 7 days** as part of your paid or unpaid work. This does not include traveling to and from work.

2. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, heavy construction, or climbing upstairs **as part of your work**? Think about only those physical activities that you did for at least 10 minutes at a time.

_____ **Days per week**

☐ No vigorous job-related physical activity → ***Skip to question 4***

3. How much time did you usually spend on one of those days doing **vigorous** physical activities as part of your work?

_____ **Hours per day**
_____ **Minutes per day**

4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads **as part of your work**? Please do not include walking.

_____ **Days per week**

☐ No moderate job-related physical activity → ***Skip to question 6***

5. How much time did you usually spend on one of those days doing **moderate** physical activities as part of your work?

_____ **Hours per day**
_____ **Minutes per day**

6. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time? **As part of your work**? Please do not count any walking you did to travel to or from work.

_____ **Days per week**

☐ No job-related walking → ***Skip to PART 2: TRANSPORTATION***

7. How much time did you usually spend on one of those days **walking** as part of your work?

_____ **Hours per day**
_____ **Minutes per day**

PART 2: TRANSPORTATION PHYSICAL ACTIVITY

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

8. During the **last 7 days**, on how many days did you **travel in a motor vehicle** like a train, bus, car, or tram?

_____ **Days per week**

☐ No traveling in a motor vehicle → ***Skip to question 10***

9. How much time did you usually spend on one of those days **traveling** in a train, bus, car, tram, or other kind of motor vehicle?

_____ **Hours per day**
_____ **Minutes per day**

Now think only about the **bicycling** and **walking** you might have done to travel to and from work, to do errands, or to go from place to place.

10. During the **last 7 days**, on how many days did you **bicycle** for at least 10 minutes at a time to go **from place to place**?

_____ **Days per week**

☐ No bicycling from place to place → ***Skip to question 12***11. How much time did you usually spend on one of those days to **bicycle** from place to place?

_____ **Hours per day**
_____ **Minutes per day**

12. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time to go **from place to place**?

_____ **Days per week**

☐ No walking from place to place → ***Skip to PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY***

13. How much time did you usually spend on one of those days **walking** from place to place?

_____ **Hours per day**
_____ **Minutes per day**

PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY

This section is about some of the physical activities you might have done in the **last 7 days** in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

14. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, chopping wood, shoveling snow, or digging **in the garden or yard**?

_____ **Days per week**

☐ No vigorous activity in garden or yard → ***Skip to question 16***

15. How much time did you usually spend on one of those days doing **vigorous** physical activities in the garden or yard?

_____ **Hours per day**
_____ **Minutes per day**

16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, sweeping, washing windows, and raking **in the garden or yard**?

_____ **Days per week**

☐ No moderate activity in garden or yard → ***Skip to question 18***17. How much time did you usually spend on one of those days doing **moderate** physical activities in the garden or yard?

_____ **Hours per day**
_____ **Minutes per day**

18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** activities like carrying light loads, washing windows, scrubbing floors and sweeping **inside your home**?

_____ **Days per week**

☐ No moderate activity inside home → ***Skip to PART 4: RECREATION, SPORT AND LEISURE-TIME PHYSICAL ACTIVITY***

19. How much time did you usually spend on one of those days doing **moderate** physical activities inside your home?

_____ **Hours per day**
_____ **Minutes per day**

PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

This section is about all the physical activities that you did in the **last 7 days** solely for recreation, sport, exercise or leisure. Please do not include any activities you have already mentioned.

20. Not counting any walking, you have already mentioned, during the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time **in your leisure time**?

_____ **Days per week**

☐ No walking in leisure time → ***Skip to question 22***

21. How much time did you usually spend on one of those days **walking** in your leisure time?

_____ **Hours per day**
_____ **Minutes per day**

22. Think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **vigorous** physical activities like aerobics, running, fast bicycling, or fast swimming **in your leisure time**?

_____ **Days per week**

☐ No vigorous activity in leisure time → ***Skip to question 24***

23. How much time did you usually spend on one of those days doing **vigorous** physical activities in your leisure time?

_____ **Hours per day**
_____ **Minutes per day**

24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the **last 7 days**, on how many days did you do **moderate** physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis **in your leisure time**?

_____ **Days per week**

☐ No moderate activity in leisure time → ***Skip to PART 5: TIME SPENT SITTING***

25. How much time did you usually spend on one of those days doing **moderate** physical activities in your leisure time?
_____ **Hours per day**
_____ **Minutes per day**

PART 5: TIME SPENT SITTING

The last questions are about the time you spend sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

26. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekday**?

_____ **Hours per day**
_____ **Minutes per day**

27. During the **last 7 days**, how much time did you usually spend **sitting** on a **weekend day**?

_____ **Hours per day**
_____ **Minutes per day**

This is the end of the questionnaire, thank you for participating.

APPENDIX G – Center for Epidemiologic Studies Depression Scale (CES-D)

Center for Epidemiologic Studies Depression Scale (CES-D Scale)

Patient Name: _____ **Date:** _____

Instructions: Please read each question carefully, and then **circle** one of the numbers to the right to indicate How you have felt or behaved **during the past week,** including today.

	RARELY OR NONE OF THE TIME (LESS THAN 1 DAY)	SOME OR A LITTLE OF THE TIME (1–2 DAYS)	OCCASIONALLY OR A MODERATE AMOUNT OF TIME (3–4 DAYS)	MOST OR ALL OF THE TIME (5–7 DAYS)
1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off The blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	0	1	2	3
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get "going."	0	1	2	3

APPENDIX H – Control, Autonomy, Social and Pleasure Scale-19 (CASP-19)

CASP 19 English language version

	Often	Sometimes	Not Often	Never
My age prevents me from doing the things I would like to				
I feel that what happens to me is out of my control				
I feel free to plan				
I feel left out of things				
I can do the things I want to do				
Family responsibilities prevent me from doing what I want to do				
I feel that I can please myself what I do				
My health stops me from doing things I want to				
Shortage of money stops me from doing the things I want to do				
I look forward to each day				
I feel that my life has meaning				
I enjoy the things that I do				
I enjoy being in the company of others				
On balance, I look back on my life with a sense of happiness				
I feel full of energy these days				
I choose to do things that I have never done before				
I am satisfied with the way my life has turned out				
I feel that life is full of opportunities				
I feel that the future looks good for me				

APPENDIX I – Ageing Perceptions Questionnaire (APQ)

PLEASE TICK ONE BOX PER LINE WHICH BEST SHOWS HOW YOU FEEL ABOUT EACH STATEMENT

1-Strongly Disagree **2-** Disagree **3-** Neither **4-**Agree **5-**Strongly Agree

	Strongly Disagree	Disagree	Neither	Agree	-Strongly Agree
1. I am conscious of getting older all of the time					
2. I am always aware of my age					
3. I always classify myself as old					
4. I am always aware of the fact that I am getting older					
5. I feel my age in everything that I do					
6. As I get older I get wiser					
7. As I get older I continue to grow as a person					
8. As I get older I appreciate things more					
9. I get depressed when I think about how ageing might affect the things that I can do					
10. The quality of my social life in later years depends on me					
11. The quality of my relationships with others in later life depends on me					
12. Whether I continue living life to the full depends on me					
13. I get depressed when I think about the effect that getting older might have on my social life					
14. As I get older there is much I can do to maintain my independence					
15. Whether getting older has positive sides to it depends on me					
16. Getting older restricts the things that I can do					
17. Getting older makes me less independent					
18. Getting older makes everything a lot harder for me					

19. As I get older I can take part in fewer activities					
20. As I get older I do not cope as well with problems that arise					
21. Slowing down with age is not something I can control					
22. How mobile I am in later life is not up to me					
23. I have no control over whether I lose vitality or zest for life as I age					
24. I have no control over the effects which getting older has on my social life					
25. I get depressed when I think about getting older					
26. I worry about the effects that getting older may have on my relationships with others					
27. I go through cycles in which my experience of ageing gets better and worse					
28. My awareness of getting older comes and goes in cycles					
29. I feel angry when I think about getting older					
30. I go through phases of feeling old					
31. My awareness of getting older changes a great deal from day to day					
32. I go through phases of viewing myself as being old					

APPENDIX J – Lubben Social Network Scale-6 (LSNS-6)

LUBBEN SOCIAL NETWORK SCALE – 6 (LSNS-6)

FAMILY: Considering the people to whom you are related by birth, marriage, adoption, etc.…

1. How many relatives do you see or hear from at least once a month?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

2. How many relatives do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

3. How many relatives do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

FRIENDSHIPS: Considering all of your friends including those who live in your Neighborhood

4. How many of your friends do you see or hear from at least once a month?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

5. How many friends do you feel at ease with that you can talk about private matters?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

6. How many friends do you feel close to such that you could call on them for help?

0 = none 1 = one 2 = two 3 = three or four 4 = five thru eight 5 = nine or more

APPENDIX K – Data Collection Form

Participant ID number	Age	Gender	No. of Co-morbidities	Time since HIV diagnosis	Grip Strength	Gait Speed	Physical Activity Level	Weight Loss > 10lbs in last year	CES-D	CASP-19	APQ	LSNS-6

APPENDIX L – Gantt Chart

Year	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April
2017												
2018												

Stages of development of research project

Preparation of protocol
Ethics application and stages of approval
Recruitment
Data collection
Data collection final stages
Data cleaning
Data entry
Data analysis
Report write-u

Dissemination

APPENDIX M – SPSS OUTPUT

Frequencies

Notes

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Statistics

		Gender	BMI Category	Employed	NormativeGripStrengh	IPAQ	Wt Loss > 4.5kg in last year (not related to diet/ exercise)	CES-D	Frailty
N	Valid	21	21	21	21	21	21	21	21
	Missing	0	0	0	0	0	0	0	0

Frequency Table

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Male	11	52.4	52.4	71.4
	Female	6	28.6	28.6	100.0
	Total	21	100.0	100.0	

BMI Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Normal	3	14.3	14.3	33.3
	Overweight	10	47.6	47.6	81.0
	Obese	4	19.0	19.0	100.0
	Total	21	100.0	100.0	

Employed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Yes	10	47.6	47.6	66.7
	No	7	33.3	33.3	100.0
	Total	21	100.0	100.0	

NormativeGripStrengh

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Better	4	19.0	19.0	38.1
	Normal	11	52.4	52.4	90.5
	Worse	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

IPAQ

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Low Physical Activity	9	42.9	42.9	61.9
	Moderate Physical Activity	3	14.3	14.3	76.2
	High Physical Activity	5	23.8	23.8	100.0

	Total	21	100.0	100.0	

Wt Loss > 4.5kg in last year (not related to diet/ exercise)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	N	15	71.4	71.4	90.5
	Y	2	9.5	9.5	100.0
	Total	21	100.0	100.0	

CES-D

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Yes	5	23.8	23.8	42.9
	No	12	57.1	57.1	100.0
	Total	21	100.0	100.0	

Frailty

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		4	19.0	19.0	19.0
	Pre-frail	11	52.4	52.4	71.4
	Robust	6	28.6	28.6	100.0
	Total	21	100.0	100.0	

Descriptives

Notes

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Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Age	17	50	72	57.06	7.084	1.014	.550	.095	1.063
BMI	17	20.6	35.4	28.206	3.7374	.091	.550	.135	1.063
No. of Co-morbidities	17	0	7	2.82	1.976	.718	.550	-.297	1.063
Years since HIV dx	17	3	34	13.18	9.295	1.136	.550	.334	1.063
Grip Strength (lbs)	17	38	96	74.76	15.433	-.755	.550	.564	1.063
Gait Speed (m/s)	17	1.00	1.75	1.3724	.21842	-.110	.550	-.570	1.063
CASP-19	17	19	53	38.82	9.723	-.745	.550	-.038	1.063
LSNI Total	17	4	25	15.71	5.861	-.093	.550	-.466	1.063
LSNIFriends	17	0	13	7.24	3.945	-.558	.550	-.464	1.063
LSNIFamily	17	1	13	8.41	3.355	-.800	.550	.150	1.063
TimelineAcuteChronic	17	1.00	4.00	2.8176	.83534	-.556	.550	-.331	1.063
TimelineCyclical	17	1.00	4.00	2.7765	.76692	-.600	.550	.270	1.063
EmotionalRepresentations	17	1.00	4.80	2.6588	.94012	.130	.550	.826	1.063
ControlPositive	17	2.60	5.00	4.0294	.50220	-.851	.550	4.147	1.063
ControlNegative	17	1.60	4.25	3.1618	.68249	-.317	.550	.233	1.063
ConsequencesPositive	17	2.60	5.00	3.9882	.60713	-.214	.550	.643	1.063
ConsequencesNegative	17	2.20	4.75	3.0971	.63602	.782	.550	1.526	1.063
No.ofFriedCriteria	17	0	2	.94	.827	.117	.550	-1.516	1.063
Valid N (listwise)	17								

Explore

Notes

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	Cases Used	Statistics are based on cases with no missing values for the dependent variable or factor(s) being analyzed.

Syntax		EXAMINE VARIABLES=Age Heightcm Weightkg BMI No.ofComorbidities YearssinceHIVdx GripStrengthlbs GaitSpeedms CASP19 LSNITotal LSNIFriends LSNIFamily APQ TimelineAcuteChronic TimelineCyclical EmotionalRepresentations ControlPositive ControlNegative ConsequencesPositive ConsequencesNegative CESDrecoded IPAQrecoded Employedrecoded WeightLossRecoded FrailtyRecoded /PLOT BOXPLOT HISTOGRAM NPPLOT /COMPARE GROUPS /STATISTICS DESCRIPTIVES /CINTERVAL 95 /MISSING PAIRWISE /NOTOTAL.
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Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Age	17	81.0%	4	19.0%	21	100.0%
Height (cm)	17	81.0%	4	19.0%	21	100.0%
Weight (kg)	17	81.0%	4	19.0%	21	100.0%
BMI	17	81.0%	4	19.0%	21	100.0%
No. of Co-morbidities	17	81.0%	4	19.0%	21	100.0%
Years since HIV dx	17	81.0%	4	19.0%	21	100.0%
Grip Strength (lbs)	17	81.0%	4	19.0%	21	100.0%
Gait Speed (m/s)	17	81.0%	4	19.0%	21	100.0%
CASP-19	17	81.0%	4	19.0%	21	100.0%
LSNI Total	17	81.0%	4	19.0%	21	100.0%
LSNIFriends	17	81.0%	4	19.0%	21	100.0%
LSNIFamily	17	81.0%	4	19.0%	21	100.0%
APQ	17	81.0%	4	19.0%	21	100.0%
TimelineAcuteChronic	17	81.0%	4	19.0%	21	100.0%
TimelineCyclical	17	81.0%	4	19.0%	21	100.0%
EmotionalRepresentations	17	81.0%	4	19.0%	21	100.0%
ControlPositive	17	81.0%	4	19.0%	21	100.0%
ControlNegative	17	81.0%	4	19.0%	21	100.0%
ConsequencesPositive	17	81.0%	4	19.0%	21	100.0%
ConsequencesNegative	17	81.0%	4	19.0%	21	100.0%
CES-D	17	81.0%	4	19.0%	21	100.0%
IPAQrecoded	17	81.0%	4	19.0%	21	100.0%

Employedrecoded	17	81.0%	4	19.0%	21	100.0%
Wt Loss > 4.5kg in last year (not related to diet/ exercise)	17	81.0%	4	19.0%	21	100.0%
FrailtyRecoded	21	100.0%	0	0.0%	21	100.0%

Descriptives

			Statistic	Std. Error
Age	Mean		57.06	1.718
	95% Confidence Interval for Mean	Lower Bound	53.42	
		Upper Bound	60.70	
	5% Trimmed Mean		56.62	
	Median		55.00	
	Variance		50.184	
	Std. Deviation		7.084	
	Minimum		50	
	Maximum		72	
	Range		22	
	Interquartile Range		11	
	Skewness		1.014	.550
	Kurtosis		.095	1.063
Height (cm)	Mean		170.735	1.9737
	95% Confidence Interval for Mean	Lower Bound	166.551	
		Upper Bound	174.919	
	5% Trimmed Mean		170.956	
	Median		170.000	
	Variance		66.222	

	Std. Deviation		8.1377	
	Minimum		154.5	
	Maximum		183.0	
	Range		28.5	
	Interquartile Range		9.3	
	Skewness		-.365	.550
	Kurtosis		-.211	1.063
Weight (kg)	Mean		82.971	3.3706
	95% Confidence Interval for Mean	Lower Bound	75.825	
		Upper Bound	90.116	
	5% Trimmed Mean		82.467	
	Median		83.000	
	Variance		193.140	
	Std. Deviation		13.8975	
	Minimum		61.0	
	Maximum		114.0	
	Range		53.0	
	Interquartile Range		22.5	
	Skewness		.342	.550
	Kurtosis		.147	1.063
BMI	Mean		28.206	.9065
	95% Confidence Interval for Mean	Lower Bound	26.284	
		Upper Bound	30.127	
	5% Trimmed Mean		28.229	
	Median		28.700	
	Variance		13.968	
	Std. Deviation		3.7374	

	Minimum		20.6	
	Maximum		35.4	
	Range		14.8	
	Interquartile Range		4.8	
	Skewness		.091	.550
	Kurtosis		.135	1.063
No. of Co-morbidities	Mean		2.82	.479
	95% Confidence Interval for Mean	Lower Bound	1.81	
		Upper Bound	3.84	
	5% Trimmed Mean		2.75	
	Median		2.00	
	Variance		3.904	
	Std. Deviation		1.976	
	Minimum		0	
	Maximum		7	
	Range		7	
	Interquartile Range		4	
	Skewness		.718	.550
	Kurtosis		-.297	1.063
Years since HIV dx	Mean		13.18	2.254
	95% Confidence Interval for Mean	Lower Bound	8.40	
		Upper Bound	17.96	
	5% Trimmed Mean		12.58	
	Median		9.00	
	Variance		86.404	
	Std. Deviation		9.295	
	Minimum		3	

	Maximum		34	
	Range		31	
	Interquartile Range		15	
	Skewness		1.136	.550
	Kurtosis		.334	1.063
Grip Strength (lbs)	Mean		74.76	3.743
	95% Confidence Interval for Mean	Lower Bound	66.83	
		Upper Bound	82.70	
	5% Trimmed Mean		75.63	
	Median		75.00	
	Variance		238.191	
	Std. Deviation		15.433	
	Minimum		38	
	Maximum		96	
	Range		58	
	Interquartile Range		21	
	Skewness		-.755	.550
	Kurtosis		.564	1.063
Gait Speed (m/s)	Mean		1.3724	.05297
	95% Confidence Interval for Mean	Lower Bound	1.2601	
		Upper Bound	1.4847	
	5% Trimmed Mean		1.3721	
	Median		1.3900	
	Variance		.048	
	Std. Deviation		.21842	
	Minimum		1.00	
	Maximum		1.75	

	Range		.75	
	Interquartile Range		.32	
	Skewness		-.110	.550
	Kurtosis		-.570	1.063
CASP-19	Mean		38.82	2.358
	95% Confidence Interval for Mean	Lower Bound	33.82	
		Upper Bound	43.82	
	5% Trimmed Mean		39.14	
	Median		39.00	
	Variance		94.529	
	Std. Deviation		9.723	
	Minimum		19	
	Maximum		53	
	Range		34	
	Interquartile Range		11	
	Skewness		-.745	.550
	Kurtosis		-.038	1.063
LSNI Total	Mean		15.71	1.421
	95% Confidence Interval for Mean	Lower Bound	12.69	
		Upper Bound	18.72	
	5% Trimmed Mean		15.84	
	Median		16.00	
	Variance		34.346	
	Std. Deviation		5.861	
	Minimum		4	
	Maximum		25	
	Range		21	

	Interquartile Range		10	
	Skewness		-.093	.550
	Kurtosis		-.466	1.063
LSNIFriends	Mean		7.24	.957
	95% Confidence Interval for Mean	Lower Bound	5.21	
		Upper Bound	9.26	
	5% Trimmed Mean		7.32	
	Median		7.00	
	Variance		15.566	
	Std. Deviation		3.945	
	Minimum		0	
	Maximum		13	
	Range		13	
	Interquartile Range		6	
	Skewness		-.558	.550
	Kurtosis		-.464	1.063
LSNIFamily	Mean		8.41	.814
	95% Confidence Interval for Mean	Lower Bound	6.69	
		Upper Bound	10.14	
	5% Trimmed Mean		8.57	
	Median		9.00	
	Variance		11.257	
	Std. Deviation		3.355	
	Minimum		1	
	Maximum		13	
	Range		12	
	Interquartile Range		4	

	Skewness		-.800	.550
	Kurtosis		.150	1.063
APQ	Mean		22.5294	.55821
	95% Confidence Interval for Mean	Lower Bound	21.3461	
		Upper Bound	23.7128	
	5% Trimmed Mean		22.5743	
	Median		22.6500	
	Variance		5.297	
	Std. Deviation		2.30157	
	Minimum		17.65	
	Maximum		26.60	
	Range		8.95	
	Interquartile Range		3.38	
	Skewness		-.127	.550
	Kurtosis		-.115	1.063
TimelineAcuteChronic	Mean		2.8176	.20260
	95% Confidence Interval for Mean	Lower Bound	2.3882	
		Upper Bound	3.2471	
	5% Trimmed Mean		2.8529	
	Median		3.0000	
	Variance		.698	
	Std. Deviation		.83534	
	Minimum		1.00	
	Maximum		4.00	
	Range		3.00	
	Interquartile Range		1.20	
	Skewness		-.556	.550

	Kurtosis		-.331	1.063
TimelineCyclical	Mean		2.7765	.18600
	95% Confidence Interval for Mean	Lower Bound	2.3822	
		Upper Bound	3.1708	
	5% Trimmed Mean		2.8072	
	Median		3.0000	
	Variance		.588	
	Std. Deviation		.76692	
	Minimum		1.00	
	Maximum		4.00	
	Range		3.00	
	Interquartile Range		1.05	
	Skewness		-.600	.550
	Kurtosis		.270	1.063
EmotionalRepresentations	Mean		2.6588	.22801
	95% Confidence Interval for Mean	Lower Bound	2.1755	
		Upper Bound	3.1422	
	5% Trimmed Mean		2.6320	
	Median		2.6000	
	Variance		.884	
	Std. Deviation		.94012	
	Minimum		1.00	
	Maximum		4.80	
	Range		3.80	
	Interquartile Range		1.20	
	Skewness		.130	.550
	Kurtosis		.826	1.063

ControlPositive	Mean		4.0294	.12180
	95% Confidence Interval for Mean	Lower Bound	3.7712	
		Upper Bound	4.2876	
	5% Trimmed Mean		4.0549	
	Median		4.0000	
	Variance		.252	
	Std. Deviation		.50220	
	Minimum		2.60	
	Maximum		5.00	
	Range		2.40	
	Interquartile Range		.45	
	Skewness		-.851	.550
	Kurtosis		4.147	1.063
ControlNegative	Mean		3.1618	.16553
	95% Confidence Interval for Mean	Lower Bound	2.8109	
		Upper Bound	3.5127	
	5% Trimmed Mean		3.1881	
	Median		3.2500	
	Variance		.466	
	Std. Deviation		.68249	
	Minimum		1.60	
	Maximum		4.25	
	Range		2.65	
	Interquartile Range		1.00	
	Skewness		-.317	.550
	Kurtosis		.233	1.063
ConsequencesPositive	Mean		3.9882	.14725

	95% Confidence Interval for Mean	Lower Bound	3.6761	
		Upper Bound	4.3004	
	5% Trimmed Mean		4.0092	
	Median		4.0000	
	Variance		.369	
	Std. Deviation		.60713	
	Minimum		2.60	
	Maximum		5.00	
	Range		2.40	
	Interquartile Range		.85	
	Skewness		-.214	.550
	Kurtosis		.643	1.063
ConsequencesNegative	Mean		3.0971	.15426
	95% Confidence Interval for Mean	Lower Bound	2.7700	
		Upper Bound	3.4241	
	5% Trimmed Mean		3.0551	
	Median		3.2000	
	Variance		.405	
	Std. Deviation		.63602	
	Minimum		2.20	
	Maximum		4.75	
	Range		2.55	
	Interquartile Range		.85	
	Skewness		.782	.550
	Kurtosis		1.526	1.063
CES-D	Mean		1.71	.114
		Lower Bound	1.46	

	95% Confidence Interval for Mean	Upper Bound	1.95	
	5% Trimmed Mean		1.73	
	Median		2.00	
	Variance		.221	
	Std. Deviation		.470	
	Minimum		1	
	Maximum		2	
	Range		1	
	Interquartile Range		1	
	Skewness		-.994	.550
	Kurtosis		-1.166	1.063
IPAQrecoded	Mean		1.76	.219
	95% Confidence Interval for Mean	Lower Bound	1.30	
		Upper Bound	2.23	
	5% Trimmed Mean		1.74	
	Median		1.00	
	Variance		.816	
	Std. Deviation		.903	
	Minimum		1	
	Maximum		3	
	Range		2	
	Interquartile Range		2	
	Skewness		.523	.550
	Kurtosis		-1.643	1.063
Employedrecoded	Mean		1.41	.123
	95% Confidence Interval for Mean	Lower Bound	1.15	
		Upper Bound	1.67	

	5% Trimmed Mean		1.40	
	Median		1.00	
	Variance		.257	
	Std. Deviation		.507	
	Minimum		1	
	Maximum		2	
	Range		1	
	Interquartile Range		1	
	Skewness		.394	.550
	Kurtosis		-2.109	1.063
Wt Loss > 4.5kg in last year (not related to diet/ exercise)	Mean		1.12	.081
	95% Confidence Interval for Mean	Lower Bound	.95	
		Upper Bound	1.29	
	5% Trimmed Mean		1.08	
	Median		1.00	
	Variance		.110	
	Std. Deviation		.332	
	Minimum		1	
	Maximum		2	
	Range		1	
	Interquartile Range		0	
	Skewness		2.610	.550
	Kurtosis		5.440	1.063
FrailtyRecoded	Mean		2.10	.153
	95% Confidence Interval for Mean	Lower Bound	1.78	
		Upper Bound	2.41	
	5% Trimmed Mean		2.11	

	Median	2.00	
	Variance	.490	
	Std. Deviation	.700	
	Minimum	1	
	Maximum	3	
	Range	2	
	Interquartile Range	1	
	Skewness	-.132	.501
	Kurtosis	-.764	.972

Tests of Normality

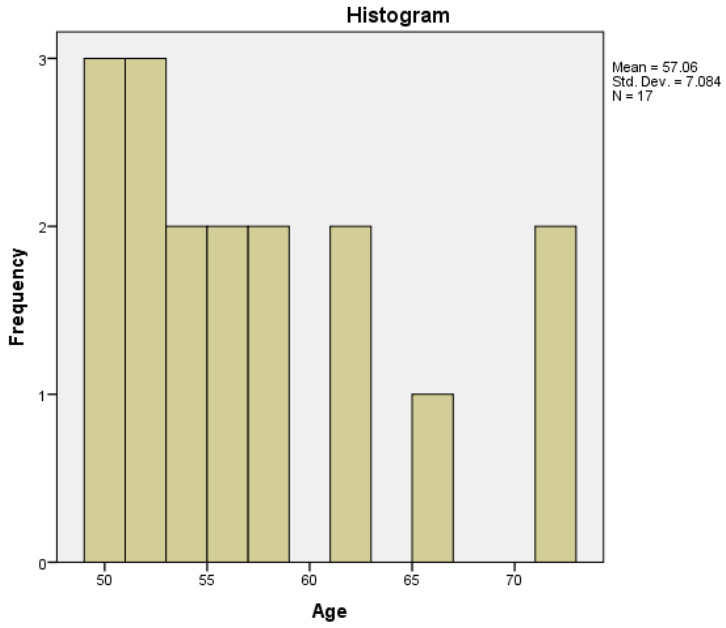
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age	.160	17	.200*	.870	17	.022
Height (cm)	.169	17	.200*	.944	17	.369
Weight (kg)	.118	17	.200*	.972	17	.860
BMI	.139	17	.200*	.981	17	.962
No. of Co-morbidities	.191	17	.100	.925	17	.179
Years since HIV dx	.262	17	.003	.853	17	.012
Grip Strength (lbs)	.127	17	.200*	.952	17	.496
Gait Speed (m/s)	.076	17	.200*	.974	17	.886
CASP-19	.171	17	.200*	.927	17	.198
LSNI Total	.186	17	.121	.954	17	.530
LSNIFriends	.142	17	.200*	.940	17	.313
LSNIFamily	.217	17	.033	.925	17	.176
APQ	.102	17	.200*	.978	17	.936
TimelineAcuteChronic	.147	17	.200*	.952	17	.481
TimelineCyclical	.144	17	.200*	.965	17	.717
EmotionalRepresentations	.100	17	.200*	.965	17	.718
ControlPositive	.265	17	.002	.832	17	.006
ControlNegative	.139	17	.200*	.948	17	.422
ConsequencesPositive	.198	17	.075	.938	17	.300
ConsequencesNegative	.156	17	.200*	.926	17	.185
CES-D	.440	17	.000	.579	17	.000
IPAQrecoded	.331	17	.000	.725	17	.000
Employedrecoded	.380	17	.000	.632	17	.000

Wt Loss > 4.5kg in last year (not related to diet/ exercise)	.521	17	.000	.385	17	.000
FrailtyRecoded	.268	21	.000	.808	21	.001

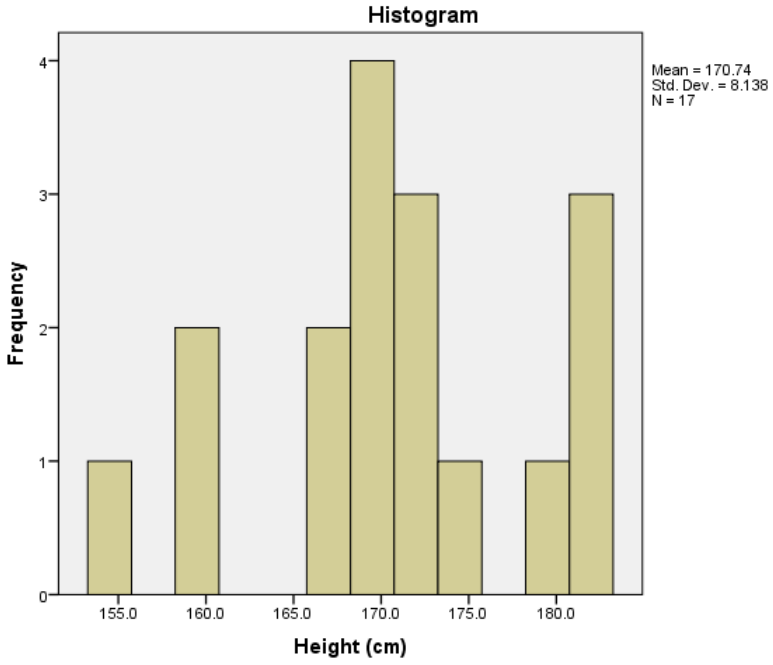
*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

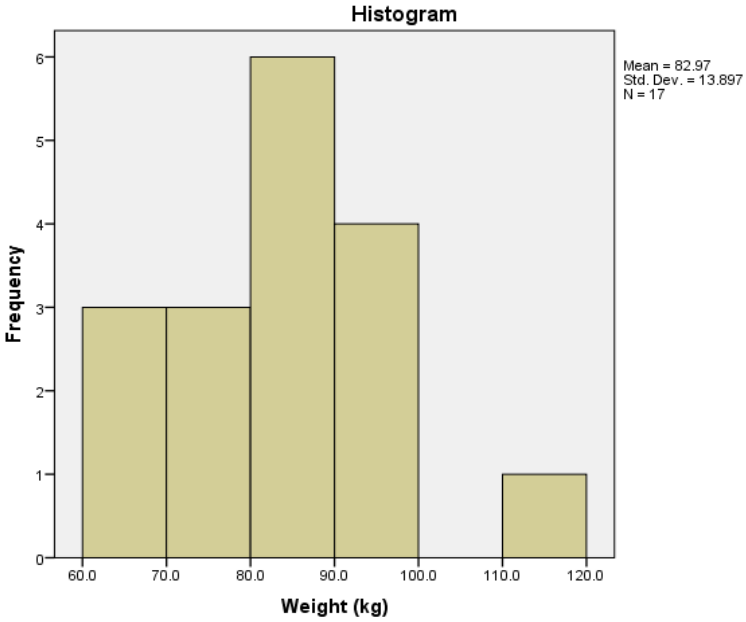
Age



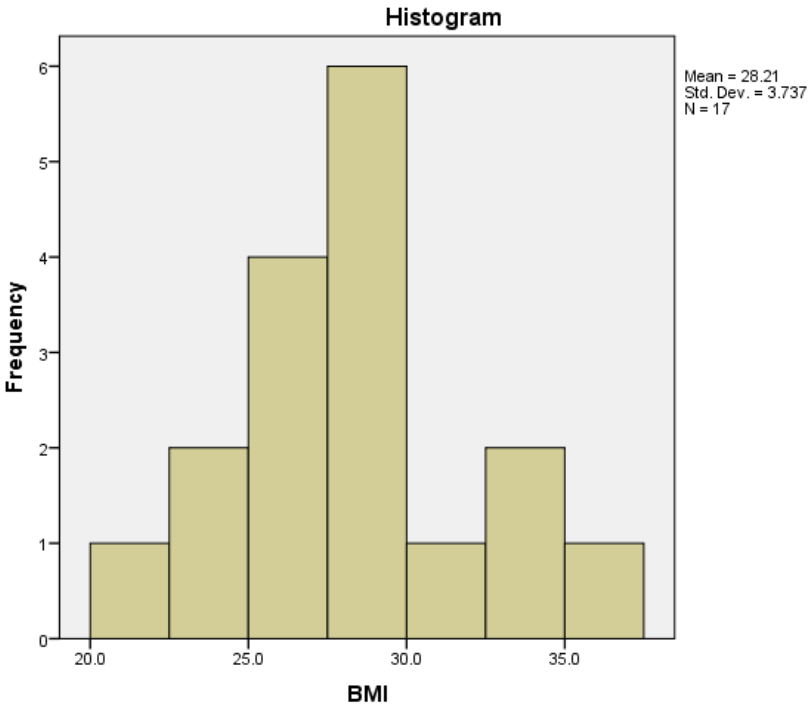
Height (cm)



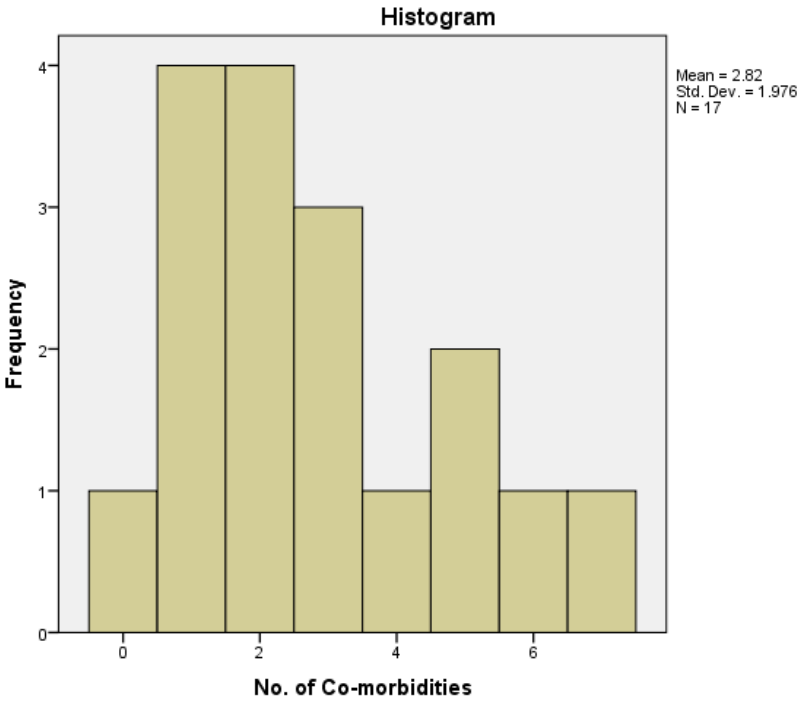
Weight (kg)



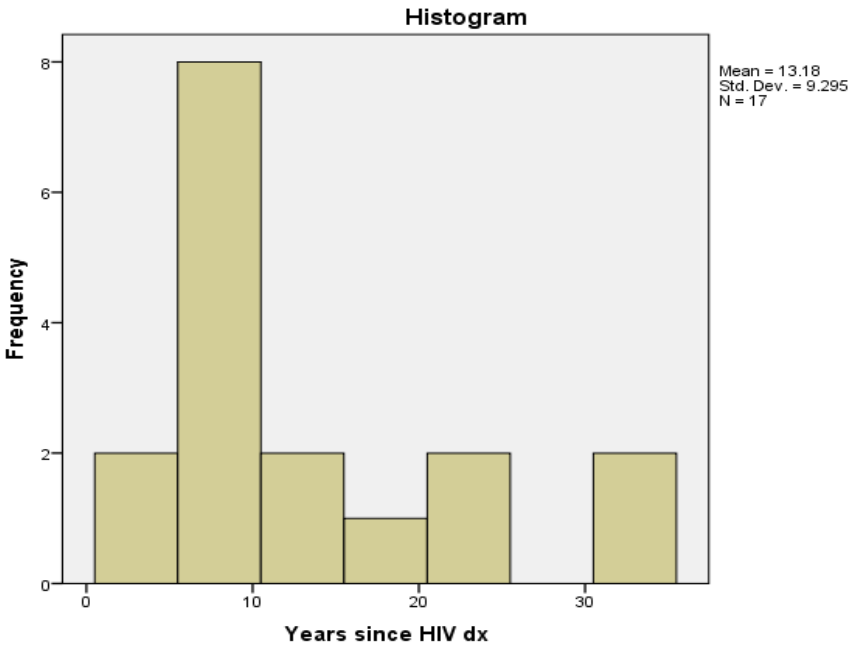
BMI



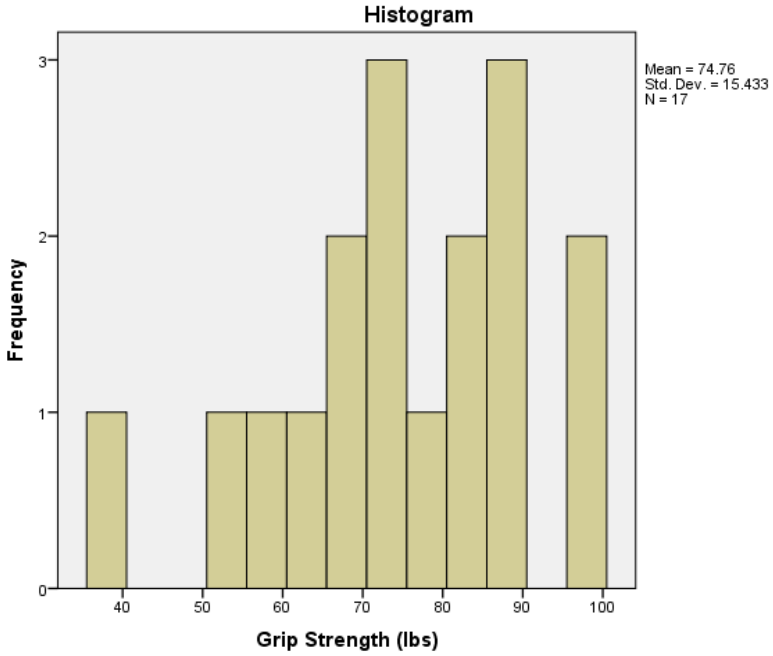
No. of Co-morbidities



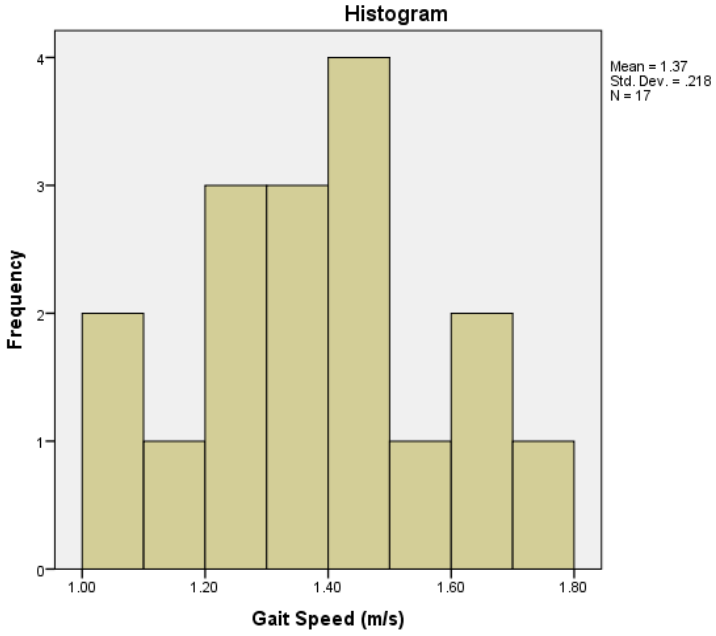
Years since HIV dx



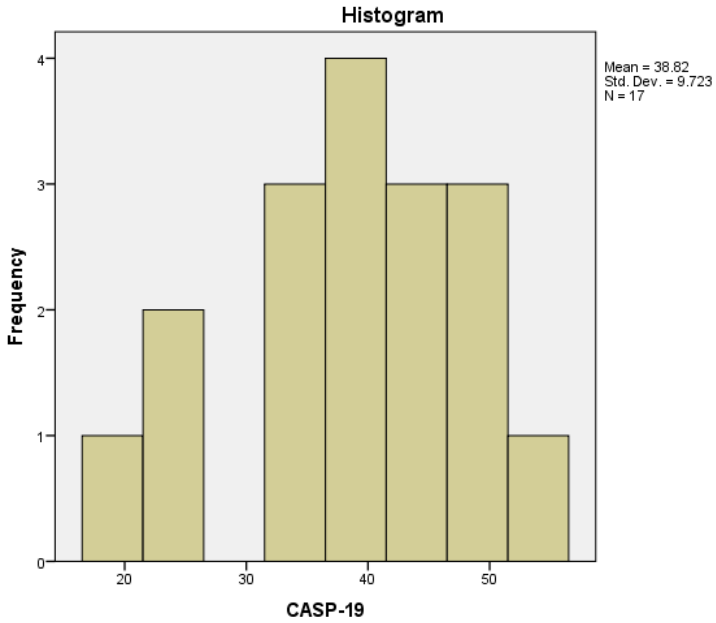
Grip Strength (lbs)



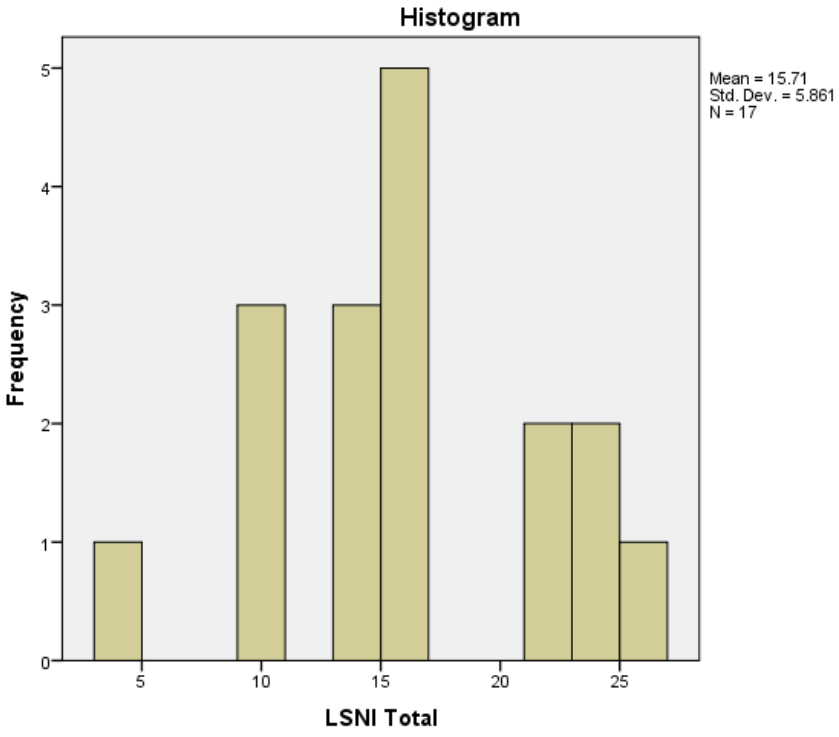
Gait Speed (m/s)



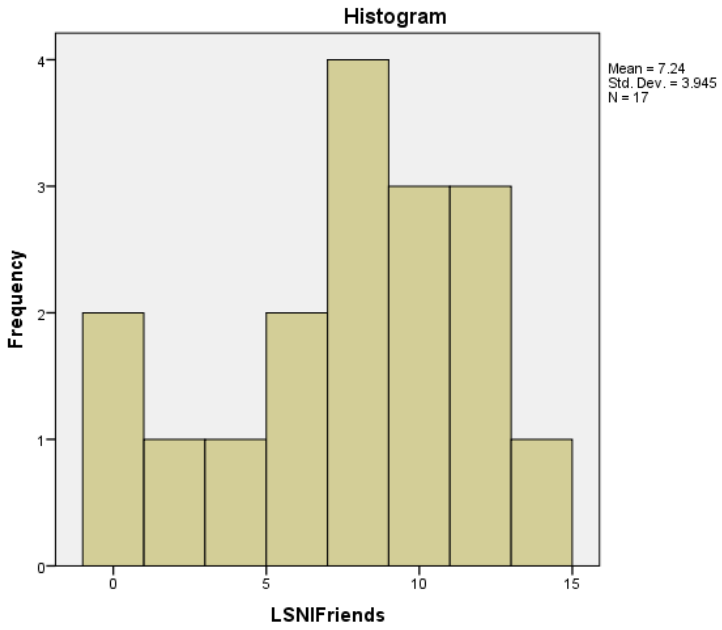
CASP-19



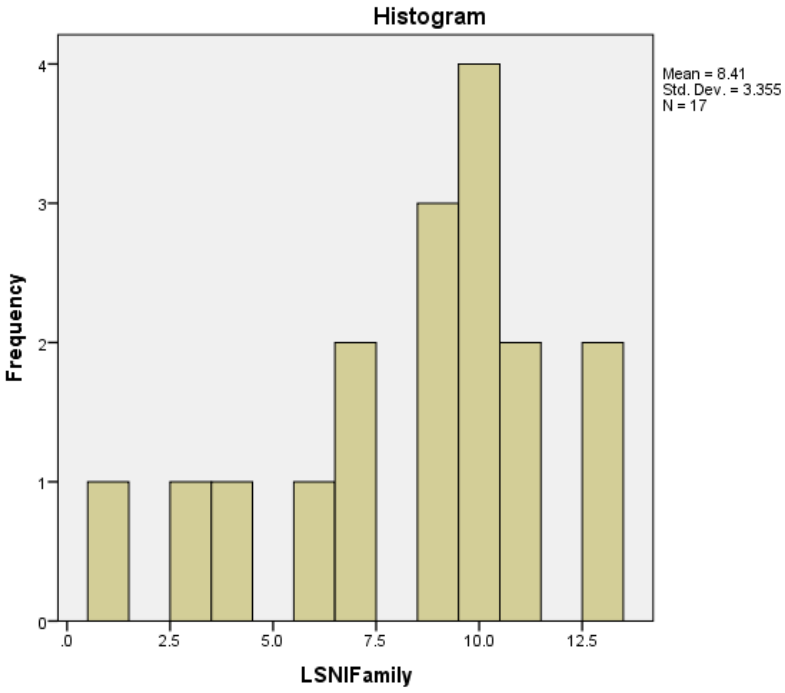
LSNI Total



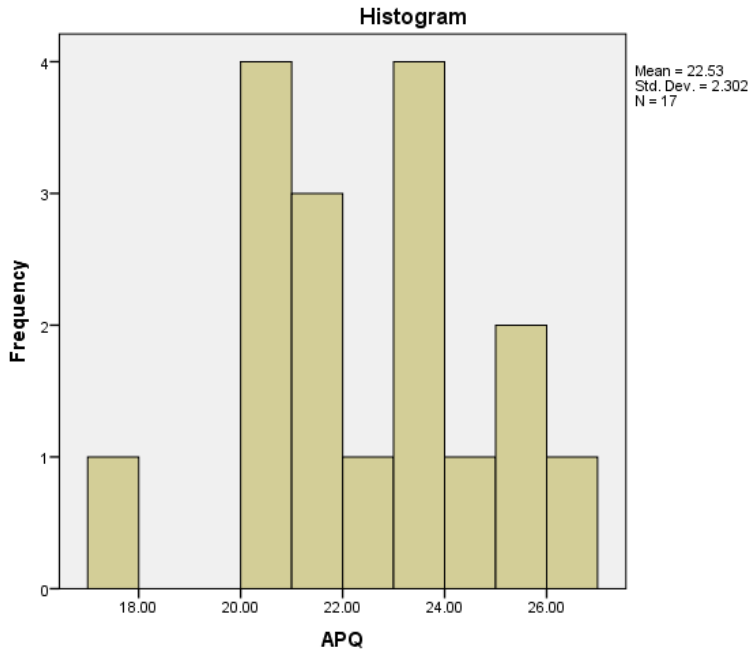
LSNIFriends



LSNIFamily



APQ



FrailtyRecoded