MEASURING THE PHYSICAL ACTIVITY OF OLDER ADULTS
RESIDING IN ASSISTED LIVING FACILITIES

by

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Abstract

Extensive research has shown that physical activity can protect against health problems including cardiovascular disease and osteoporosis, and may reduce the risk or delay the onset of Alzheimer’s disease and dementia in older adults. Self-report questionnaires have been valuable in assessing physical activity levels and in determining the effectiveness of activity interventions for older adults in community settings and long-term care facilities. However, little research has examined the accuracy of these questionnaires for people in assisted living facilities. This study examined the validity of the Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire and the Physical Activity Scale for the Elderly (PASE) in an assisted living population. Four instruments were used to validate these questionnaires: the SF-12® Health Survey, Six-Minute Walk Test, Short Physical Performance Battery, and pedometers.

This study was conducted over a period of three months. Despite significant effort, during that time only four participants completed the study. Due to this small sample size, it was only possible to examine patterns in the data; the validity of the CHAMPS and the PASE in assisted living could not be evaluated. The more important findings from this study relate to the question of feasibility of conducting research in assisted living environments. While it was possible to gather data about physical activity of assisted living residents using questionnaire and performance measures, recruitment proved to be a significant challenge. Key barriers to participant recruitment are identified as wearing a pedometer, using a walker and how walkers are perceived by assisted living residents. These barriers are discussed with respect to future research about physical activity assessment in the assisted living population.
Preface

Ethical approval for this study was obtained from the Behavioural Research Ethics Board (BREB) of the University of British Columbia (certificate number: H11-01839).

The Vancouver Coastal Health Research Institute also approved this study (#V11-01839).

Permission was obtained to use the following copyrighted materials: Physical Activity Scale for the Elderly (PASE) (Appendix A), SF-12 (Appendix B), and Mini-Mental State Exam (Appendix C).
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I would like to acknowledge and thank the Helen Shore Endowment Fund and the School of Nursing at the University of British Columbia for their generous financial support of this study.

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Finally, thank you to my research assistant Tamas Ungar. Your background as a medical student made this project truly multidisciplinary.
Chapter One: Introduction

In Canada, the overall population is aging with the percentage of individuals aged 65 years and older increasing from 8% in 1960 to 14% in 2009 (Marte, Dion, Chagnon, & Morency, 2010). Statistics Canada projects that the percentage of the population over age 65 will increase to between 23% and 25% in 2036, and to between 24% and 28% in 2061 (Marte et al., 2010). Canada’s aging population presents unique challenges for the health care system, not the least of which is how to best meet the needs of older people who are at increased risk of developing a variety of chronic health conditions.

Lifestyle interventions are thought to be an important strategy for mitigating the effects of chronic disease in this population. Extensive research has established the protective effects of physical activity against common health problems, such as cardiovascular disease, cancer, osteoporosis, obesity, and depression (Centres for Disease Control and Prevention, 2011). Researchers also have shown that physical activity has beneficial effects for cognitive functioning in the elderly (age 65 years and older), and may delay the onset, or reduce the risk, of Alzheimer’s disease and other dementias (Colcombe et al., 2006; Larson et al., 2006; Lautenschlager et al., 2008; Liu-Ambrose et al., 2010; Weuve et al., 2004).

Valid measures are necessary for evaluating physical activity status, in addition to measuring the effectiveness of interventions designed to promote physical activity in older adults. There is consensus in the literature that objective instruments, such as activity monitors are useful for measuring the quantity and intensity of activity. However, self-report tools are also needed to identify the types, frequency, intensity and duration of physical activities. Several self-report questionnaires have been developed to measure physical activity in older adults. The Community Healthy Activities Model Program for Seniors (CHAMPS) questionnaire (Stewart et al., 2001), the Physical Activity Scale for the Elderly (PASE) (Washburn, Smith, Jette, & Janney, 1993),
and the Yale Physical Activity Survey (YPAS) (Dipietro, Caspersen, Ostfeld, & Nadel, 1993) are widely used self-report measures that have been validated in older adults residing in the community and in retirement homes (Harada, Chiu, King, & Stewart, 2001; Martin et al., 1999; Stewart et al.; Washburn et al., 1993; Washburn, McAuley, Katula, Mihalko, & Boileau, 1999). Similarly, in long-term care, self-report questionnaires such as the Physical Activity Survey in Long Term Care (PAS-LTC) have been developed and validated, especially for this population (Resnick & Galik, 2007).

In contrast with the community-based, retirement home, and long-term care populations, no researcher has examined the validity of physical activity assessment tools for use in the assisted-living population. Briefly, assisted living facilities provide residents with help or supervision with one or two activities of daily living (British Columbia Ministry of Health, 2011; Mihalko & Wickley, 2003; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2010a). Research examining how physical activity is assessed in assisted living facilities is important for two reasons. First, it has been found that assisted living residents have less cognitive and functional impairment compared with older adults in long-term care facilities, but significantly more compared with older adults residing in the community (Burdick et al., 2005; Golant, 2004; Krol-Zielinska, Kusy, Zielinski, & Osinski, 2011; Sloane et al., 2005; Zimmerman et al., 2005). Thus, the uniqueness of the assisted living population warrants population-specific validation of physical activity assessment tools. The second reason that examining physical activity assessment in assisted living is important is that assisted living facilities are a popular intermediate alternative to independent community living and institutionalized care. Consequently, an increasing number of older adults will be residing in assisted living as Canada’s population ages.

Relatively few statistics for assisted living in Canada are available. Furthermore, Statistics Canada publications, such as Cranswick and Dosman (2008), categorize older adults residing in
assisted living as seniors living in care facilities. This category however, consists of both nursing home and assisted living residents and fails to differentiate between the two. Assisted living is becoming increasingly popular. In the United States, more than 900,000 people reside in assisted living residences, with the average age being 86.9 years (National Centre for Assisted Living, 2009). In British Columbia alone, there are 194 assisted living facilities listed with the Office of the Assisted Living Registrar (British Columbia Ministry of Health, 2011), and Industry Canada (2010) reports that the number of assisted care facilities is continuing to grow.

To review, there has been a significant lack of research validating physical activity assessment measures for use in assisted living facilities. It is evident that a growing number of older adults in North America are residing in assisted living. Consequently valid instruments are required to accurately assess physical activity levels, a first step toward effectively implementing physical activity interventions.

**Purpose Statement**

The purpose of this study was to provide evidence of the concurrent validity of the CHAMPS and PASE questionnaires in older adults residing in assisted living facilities. Valid measures are needed to both assess physical activity status, and to evaluate the effectiveness of activity interventions in this population.

**Research Hypotheses**

1. It is predicted that scores on the CHAMPS and PASE questionnaires will be positively correlated with the scores of three selected validation measures (i.e., pedometers, the Short Physical Performance Battery, and the Six-Minute Walk Test).
2. Based on past studies, weaker positive correlations between the scores on the CHAMPS and PASE questionnaires and the physical functioning, general health perceptions, mental health, and pain domains of the SF-12 are expected.
3. There will be a significant positive correlation between the scores of the CHAMPS and PASE questionnaires.
Chapter Two: Review of the Literature

This literature review begins with defining the concept of physical activity. Research examining how physical activity is assessed in older adults living in the community, retirement homes, and assisted living facilities is then explored. The search strategy used is described in detail below.

Description of Search Strategy

The major databases of the Cochrane Database of Systematic Reviews (CDSR), PubMed, the Cumulative Index to Nursing and Allied Health Literature (CINAHL), ProQuest Dissertations and Theses, Google Scholar, and the Excerpta Medica Database (EMBASE) were searched. The target population was older adults (aged 65 years and over), however relevant studies with samples aged 50 years and older were also included. Initially searches were done in April and May of 2011, and were then updated in May of 2012. The database searches focused on works completed between 2000 and 2012. Lastly, North American and international studies translated into English were included. The following keywords and combinations thereof were used to search all of the aforementioned databases: physical activity, motor activity, exercise, fitness, physical activity assessment, Community Healthy Activities Model Program for Seniors, CHAMPS, Physical Activity Scale for the Elderly, PASE, assisted living facilities, aged, elderly, older adults, seniors, validity, and reliability.

Physical Activity

For the purposes of this study, physical activity was defined in its broadest sense as any movement of the body caused by skeletal muscles resulting in energy expenditure (Caspersen, Powell, & Christensen, 1985). This definition was chosen in an attempt to encompass as many related physical activities as possible, such as exercise, fitness, resistance training, yoga, and so forth. The theoretical underpinnings of physical activity in relation to health and aging are well
established. There are a number of biological mechanisms through which physical activity enhances health and prevents disease. Specifically, physical activity decreases heart rate, systolic blood pressure and myocardial oxygen requirements (Ignarro, Balestrieri, & Napoli, 2007), while enhancing the endothelial function of blood vessels (Hambrecht et al., 2003). High impact physical activity has been found to increase bone density and consequently decrease the risk of osteoporosis (Gunter et al., 2008). Evidence from the field of behavioural neurology suggests that physical activity affects cognition by causing physiological changes, such as increases in cerebral blood flow (Rogers, Meyer, & Mortel, 1990) as well as fibroblast growth factors, in areas such as the hippocampus (Gomez-Pinilla, So, & Kesslak, 1998). In addition, Colcombe et al. (2006) demonstrated that physical activity reduces brain volume loss in older people.

Assessment of Physical Activity in Older Adults

Paramount to examining physical activity in the elderly is the accuracy of physical activity assessment. As stated earlier, a combination of objective monitors and self-report measures is optimal for accurate assessment. The literature on the use of the CHAMPS and the PASE, in addition to the validity of these tools in older adults is now reviewed.

The CHAMPS self-report measure was designed to assess physical activity levels in under active older adults living in the community (Stewart, 2001). The questionnaire attempts to minimize sources of bias, such as socially desirable responding, by including social activities, such as volunteering and hobbies for less physically active seniors to report. To facilitate a relatively accurate evaluation of physical activity interventions, the CHAMPS includes lower intensity activities such as leisurely walking as well as moderate and high intensity activities including brisk walking, jogging, swimming, aerobic exercise, housework, and gardening. The CHAMPS questionnaire yields four measurements: kilocalories per week for moderate and high intensity activities, kilocalories per week for “all” activities (which includes light, moderate and
high intensity), frequency of activity per week in moderate and high intensity activities, and frequency per week in “all” activities.

Stewart et al. (2001) assessed the validity and reliability of the CHAMPS questionnaire in 249 community dwelling older adults ranging in age from 65 to 90 years. The validation measures included the body mass index (BMI), the Short Physical Performance Battery (Guralnik et al., 1994) (a measure of lower body functioning), the Six-Minute Walk Test (Lipkin, Scriven, Crake, Poole-Wilson, 1986), as well as the physical functioning, general health perceptions, pain, and psychological well-being subscales of the SF-36 (Ware & Sherbourne, 1992). Table 1 displays the correlations between the four CHAMPS measurements and the 6-minute walk test, the Short Physical Performance Battery, and the four aforementioned domains of the SF-36.
Table 1.

*Correlations of the CHAMPS with an Activity Monitor, Performance-Based Physical Activity Measures and the SF-36*

<table>
<thead>
<tr>
<th>CHAMPS Measure</th>
<th>6-Minute Walk</th>
<th>SPPB</th>
<th>GH</th>
<th>MH</th>
<th>Pain</th>
<th>PF</th>
<th>Mini-Log waist</th>
<th>Mini-Log ankle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate and higher intensity activities</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Kilocalories per week</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harada et al. (2001)</td>
<td>.54**</td>
<td>.44**</td>
<td>.42**</td>
<td>.28**</td>
<td>.28**</td>
<td>.41**</td>
<td>.48***</td>
<td>.42**</td>
</tr>
<tr>
<td>Stewart et al. (2001)</td>
<td>.27***</td>
<td>.28***</td>
<td>.20**</td>
<td>.09</td>
<td>.11</td>
<td>.30***</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stewart et al.</td>
<td>.21***</td>
<td>.20**</td>
<td>.23***</td>
<td>.14*</td>
<td>.17**</td>
<td>.30***</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>All activities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Kilocalories per week</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harada et al.</td>
<td>.46**</td>
<td>.46**</td>
<td>.35**</td>
<td>.25**</td>
<td>.26**</td>
<td>.39**</td>
<td>.42***</td>
<td>.36**</td>
</tr>
<tr>
<td>Stewart et al.</td>
<td>.22***</td>
<td>.27**</td>
<td>.17**</td>
<td>.05</td>
<td>.07</td>
<td>.27***</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stewart et al.</td>
<td>.10</td>
<td>.15*</td>
<td>.14*</td>
<td>.02</td>
<td>.08</td>
<td>.23***</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Note. Adapted from Harada, Chiu, King, and Stewart. (2001) and Stewart et al. (2001). SFPB = Short Physical Performance Battery; GH = general health perceptions; MH = mental health; PF = physical functioning. *p < .05, **p < .01, ***p < .001.*

There are a number of significant correlations between the CHAMPS scores and the four validation measures. The correlations for kilocalories per week are almost identical for both the moderate and higher intensity activities and the “all” activities. Furthermore, the correlations between the frequency of physical activity for the moderate and higher activities with the validation measures appear larger than those for the “all” activities. However, all of Stewart et al.’s (2001) correlations yielded small to moderate effect sizes (Cohen, 1988). In addition, known-groups validity was examined in three sub-groups (sedentary, somewhat active and active
people) based on previously established physical activity levels. All were significant at the $p < .001$ level. Finally, the correlation between the caloric expenditure measure and the activity frequency measure was .73 for moderate and higher intensity activities, and .55 for “all” activities.

There is evidence to support the reliability of the CHAMPS tool. The 6-month stability intraclass correlation coefficients for moderate and high intensity activity energy expenditure were reported to be .67 and .66 for “all” activities, respectively. For the frequency of activity, the 6-month stability intraclass correlations were .58 for moderate and higher intensity activity, and .62 for “all” types of activity. The corresponding Pearson’s coefficients were almost identical, indicating moderate reliability for the CHAMPS questionnaire. Overall, these findings provide support for the validity and reliability of the CHAMPS self-report measure in older adults residing in the community.

The PASE (Washburn et al., 1993) is a self-report instrument developed to assess physical activity in older adults over a seven-day period. Specifically, this instrument assesses activities such as walking, light to strenuous sports, yard work, house work, and paid and volunteer work, as well as muscle strength. Both activity frequency and duration are assessed. Washburn et al. originally validated this instrument in a sample of 193 community-dwelling adults, aged 65 years and older. The validation measures included heart rate, body mass index (BMI), balance, grip and leg strength, as well as a single-item for self-reported health status, the Sickness Impact Profile (SIP) (Gilson et al., 1975) score, and the presence of selected acute and chronic health conditions such as heart disease, cancer, hypertension and arthritis. The authors reported statistically significant, positive correlations between the PASE and grip strength ($r = .37$), balance ($r = .33$), and leg strength ($r = .25$), as well as negative associations with age ($r = -.34$) and the SIP ($r = -.42$). Lastly, the test-retest reliability coefficient was .75 (95% confidence interval: .69-.80)
when subjects completed the PASE three to seven weeks later by mail.

Subsequent research has validated the use of both the CHAMPS and PASE questionnaires in other populations of older adults living in retirement homes and the community. First, Martin et al. (1999) provided evidence of the validity of the PASE in a study of 471 adults, aged 65 years and older, with chronic knee pain and physical disability. Washburn et al. (1999) subsequently found the PASE to be a valid measure of physical activity in 190 sedentary adults, aged 55 years and older. Lastly, the PASE has been used as a measure of physical activity in research examining the relationship between physical activity and quality of life in adults aged 60 to 75 years old (Elavsky et al., 2005). This study concluded that physical activity had long-term positive effects on quality of life in older adults.

Harada et al. (2001) evaluated the CHAMPS and the PASE in a sample of 87 older adults from two community centres (N = 51) and three retirement homes (N = 36). They employed the same validation measures as employed by Stewart et al. (2001): the BMI, the Short Physical Performance Battery, the Six-Minute Walk Test, as well as the physical functioning, general health perceptions, pain, and psychological well-being subscales of the SF-36. However, Mini-Logger activity monitors (worn on both the waist and the ankle) were added as measures of physical activity. The Mini-Logger provides an activity count, based on the number of mercury switch closures, over a specified length of time. Table 1 displays the correlations between the CHAMPS questionnaire’s assessments of expended kilocalories per week for moderate and higher activities and for “all” activities. Overall, the validity correlations reported by Harada et al. are greater than those obtained by Stewart et al. (2001), with mostly moderate effect sizes. Table 2 shows the correlations between the PASE scores and the validity measures. Here the Six-Minute Walk Test, the Mini-Logger waist and ankle, and the Short Physical Performance Battery all yielded large correlations, with the correlations for the four subscales of the SF-36 being small.
to moderate in magnitude.

Table 2.

*Correlations of PASE with an Activity Monitor, Performance-Based Physical Activity Measures and the SF-36*

<table>
<thead>
<tr>
<th>SF-36</th>
<th>Six-Minute Walk</th>
<th>SFPB</th>
<th>GH</th>
<th>MH</th>
<th>Pain</th>
<th>PF</th>
<th>Mini-Log waist</th>
<th>Mini-Log ankle</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASE Total Score</td>
<td>.68**</td>
<td>.57**</td>
<td>.26*</td>
<td>.23*</td>
<td>.17</td>
<td>.30**</td>
<td>.52***</td>
<td>.59***</td>
</tr>
</tbody>
</table>

*Note.* Adapted from Harada, Chiu, King, and Stewart, A.L. (2001). SFPB = Short Physical Performance Battery; GH = general health perceptions; MH = mental health; PF = physical functioning.

* *p < .05, ** *p < .01, *** *p < .001.

The validity correlations for the CHAMPS and the PASE questionnaires for adults residing in the community are compared with those for adults living in retirement homes in Table 3. It is important to note that the term “retirement home” is not well-defined in Harada et al. (2001) and is therefore problematic in generalizing to specific populations. The research was conducted in California where a retirement home typically refers to a community for older adults that offers independent living, as well as assisted living options (Government of California, 2011). However, Harada et al. failed to specify whether their subjects were independent or assisted living residents.

There does not appear to be any systematic differences between the Mini-logger waist and ankle monitors in terms of correlations with the CHAMPS and PASE questionnaires. Specifically, Harada et al. (2001) found that the correlations between the PASE and the Mini-Logger waist monitor resulted in no effect and a small effect size for community centre and retirement home participants respectively (see Table 3). In comparison, the correlations between
the PASE and the Mini-Logger ankle monitor yielded medium and large effect sizes for community centre and retirement home participants respectively. Yet, Harada et al. found the reverse pattern with the CHAMPS; the correlations between the CHAMPS scores for kilocalories per week for all activities with the Mini-logger resulted in a large effect size for the waist monitor and only a small effect size for the ankle monitor (see Table 1).
Table 3.

*Correlations of CHAMPS and PASE Scores with Validation Measures in Both Community Centre and Retirement Home Subgroups.*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Community Centre (n = 51)</th>
<th>Retirement Home (n = 36)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAMPS kilocalories per week in moderate and greater activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six-Minute Walk</td>
<td>.25</td>
<td>.30</td>
</tr>
<tr>
<td>Mini-Log waist</td>
<td>.11</td>
<td>.30</td>
</tr>
<tr>
<td>Mini-Log ankle</td>
<td>.20</td>
<td>.36</td>
</tr>
<tr>
<td>SPPB</td>
<td>.37**</td>
<td>.32</td>
</tr>
<tr>
<td>SF-36: GH</td>
<td>.26</td>
<td>.34*</td>
</tr>
<tr>
<td>SF-36: MH</td>
<td>.14</td>
<td>.17</td>
</tr>
<tr>
<td>SF-36: Pain</td>
<td>.18</td>
<td>.25</td>
</tr>
<tr>
<td>SF-36: PF</td>
<td>.26</td>
<td>.34*</td>
</tr>
<tr>
<td>CHAMPS kilocalories per week in all activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six-Minute Walk</td>
<td>.20</td>
<td>.26</td>
</tr>
<tr>
<td>Mini-Log waist</td>
<td>.10</td>
<td>.21</td>
</tr>
<tr>
<td>Mini-Log ankle</td>
<td>.16</td>
<td>.16</td>
</tr>
<tr>
<td>SPPB</td>
<td>.32*</td>
<td>.38*</td>
</tr>
<tr>
<td>SF-36: GH</td>
<td>.24</td>
<td>.19</td>
</tr>
<tr>
<td>SF-36: MH</td>
<td>.12</td>
<td>.15</td>
</tr>
<tr>
<td>SF-36: Pain</td>
<td>.17</td>
<td>.19</td>
</tr>
<tr>
<td>SF-36: PF</td>
<td>.25</td>
<td>.29</td>
</tr>
<tr>
<td>PASE total score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Six-Minute Walk</td>
<td>.27</td>
<td>.54**</td>
</tr>
<tr>
<td>Mini-Log waist</td>
<td>.05</td>
<td>.24</td>
</tr>
<tr>
<td>Mini-Log ankle</td>
<td>.38*</td>
<td>.55*</td>
</tr>
<tr>
<td>SPPB</td>
<td>.29*</td>
<td>.57**</td>
</tr>
<tr>
<td>SF-36: GH</td>
<td>-.07</td>
<td>-.01</td>
</tr>
<tr>
<td>SF-36: MH</td>
<td>.03</td>
<td>.01</td>
</tr>
<tr>
<td>SF-36: Pain</td>
<td>-.08</td>
<td>.11</td>
</tr>
<tr>
<td>SF-36: PF</td>
<td>-.03</td>
<td>.16</td>
</tr>
</tbody>
</table>

*Note.* Adapted from Harada, Chiu, King, and Stewart (2001).

SPPB = Short Physical Performance Battery; GH = general health perceptions; MH = mental health; PF = physical functioning.

*p < .05, **p < .01, ***p < .001.*
Harada et al. (2001) found evidence to support the test-retest reliability of the CHAMPS questionnaire, which was mailed to the research participants, who were instructed to complete it two weeks after the initial assessment. The intraclass and Pearson’s correlation test-retest reliability coefficients for the “all” physical activities measure were .62, and .76 for the moderate and higher activities group. Lastly, there was a strong positive association between the CHAMPS and PASE questionnaires. The intercorrelation between the PASE and CHAMPS moderate and higher intensity activities was .64, and .58 between the PASE and CHAMPS “all” activities.

More recent research provides compelling evidence that CHAMPS may be one of the most valid self-report measures of physical activity in older adults who reside in the community. Colbert, Matthews, Havighurst, Kim, and Schoeller (2010) examined the validity of the CHAMPS, the PASE and the YPAS in 56 community-dwelling older adults through the use of the doubly labelled water method\(^1\) and indirect calorimetry\(^2\) to calculate energy expenditure. Of the three instruments, only the CHAMPS questionnaire was shown to significantly correlate with physical activity energy expenditure.

In summary, there is substantial evidence to support the validity and reliability of the CHAMPS and PASE tools in older adults living in the community and in retirement homes. Consequently, the CHAMPS and the PASE were the two self-report measures selected for this validation study of older adults residing in assisted living. The literature on the assessment of physical activity in assisted living is now discussed.

\(^1\) The doubly labelled water method generates a measurement of metabolic rate, in which the average metabolic rate of a person is measured over a period of time. The technique measures a person’s carbon dioxide production (Speakman, 1998).

\(^2\) Indirect calorimetry calculates heat energy that people produce from their production of carbon dioxide and their consumption of oxygen (Haugen, Chan, & Li, 2007).
Assisted Living

In North America, the definition of assisted living varies by province and by state. In the literature, assisted living facilities are typically defined as those providing services to help or supervise residents with activities of daily living, while promoting their autonomy (Mihalko & Wickley, 2003; Resnick et al., 2010a). According to the Office of the Assisted Living Registrar (British Columbia Ministry of Health, 2011), assisted living facilities provide housing, hospitality services and personal assistance services for adults who require some support with their activities of daily living. The Community Care and Assisted Living Act of British Columbia defines assisted living as “a premises or part of a premises, other than a community care facility, (a) in which housing, hospitality services and at least one but not more than 2 prescribed services are provided by or through the operator to 3 or more adults who are not related by blood or marriage to the operator of the premises, or (b) designated by the Lieutenant Governor in Council to be an assisted living residence” (Government of British Columbia, 2011, p. 1). The two major prescribed services in British Columbia are assistance with activities of daily living such as bathing or dressing, and medication administration.

Previous studies have attempted to examine physical activity in assisted living. Krol-Zielinska et al. (2011) compared energy expenditure from physical activity in a sample of 23 assisted living residents to that of two groups of seniors living in the community. Thirty-nine of the community seniors attended adult day care, and 79 were members of community senior centres. The sample ranged in age from 70 to 80 years and the YPAS was used to measure physical activity. It was concluded that energy expenditure was significantly lower in seniors who resided in assisted living facilities or attended adult day care compared with those who were members of community centres. Additionally, Zalewski, Smith, Malzahn, VanHart, and O’Connell (2009) explored the relationship between physical ability, physical activity, and self-
reported physical activity in 59 adults (aged 55 years and older) from independent (n = 55) and assisted living apartments (n = 4), in five retirement communities. Thus, this was a largely independent living sample. Here the PASE measured self-reported physical activity and was compared with ankle mounted accelerometer readings and measures of physical function. No significant relationships between physical ability and physical activity were found. Furthermore, the authors indicated that light housework, heavy housework, outdoor gardening, home repair, and lawn and yard care contributed to 30.4% of the variance in the total PASE scores, compared with 60% of the variability in the total PASE scores of community dwelling seniors reported by Washburn et al. (1993).

Long-term care physical activity assessment tools also have been used with the assisted living population. Using data from an assisted living care intervention study, Resnick et al. (2010a) examined assisted living residents’ perceptions of their physical functioning and physical activity, while Resnick, Galik, Gruber-Baldini, & Zimmerman (2010b) examined how physical activity was related to residents’ satisfaction with their assisted living facility. Both studies used a long-term care activity measure, the PAS-LTC to evaluate physical activity. It was found that assisted living residents participated in relatively little physical activity and that physical activity, along with social support, depression and fear of falling affected residents’ overall satisfaction in assisted living.

Overall, the measurement of physical activity in the assisted living population has been inconsistent. Furthermore, there is no evidence to support the validity or reliability of using the PASE, the PASE-LTC, or the YPAS in the above studies (Krol-Zielinska et al., 2011; Resnick et al., 2010a; Resnick et al., 2010b; Zalewski et al., 2009). Therefore, it is evident that the validity of self-report physical activity assessment tools for older adults residing in assisted living should be established.
Summary

To review, there has been a significant lack of research validating the tools used to assess physical activity levels of people living in assisted living facilities. Because of the growing number of older Canadians residing in these facilities, valid measures are required to fully assess the physical activity of this population and to aid in the implementation of requisite physical activity interventions. Physical activity is vitally important to this population’s health and continued independence; providing appropriate means to foster its uptake rests solidly on accurate assessment. Based on the established validity of the CHAMPS and PASE questionnaires for use in people residing in the community and in retirement homes, these self-administered questionnaires, if established to be valid and reliable, can provide accurate and efficient measurements of physical activity in the assisted living population.
Chapter 3: Methods

Research Design

This study employed a measurement validation design to determine the extent to which the CHAMPS and PASE questionnaires are valid measures of physical activity in older adults residing in assisted living facilities. The four validation measures used are discussed in detail below.

Determining sample size

An a priori power analysis was conducted using G* Power. For a two-tailed test (Myers, Well, & Lorch, 2010), with a minimum correlation coefficient of .50, and an alpha of .05, a sample size of 29 was needed to achieve statistical power of 80%. A minimum correlation of .50 represents a medium to large effect size (Cohen, 1988) and was chosen to facilitate practicality as well as feasibility.

Study setting and sampling criteria

The study participants were recruited from an assisted living residence in an urban area of British Columbia. There were 110 adults over the age of 65 years living in the participating assisted living residence at the time of data collection, 80 of whom met the established provincial criteria for assisted living (as defined earlier). The other 30 residents were considered to be living independently in that they required no assistance with activities of daily living. Initially, I specified that the participants had to be neither wheelchair bound nor dependent on a walker for ambulation. These exclusion criteria were based on past research that demonstrated that slow walking speed and gait disorders impeded the accuracy of pedometers for physical activity measurement in frail seniors (Cyarto, Myers, & Tudor-Locke, 2004). However, it quickly became evident that approximately three quarters of the assisted living residents used walkers (reportedly with encouragement from the facility who viewed this as a means of falls prevention). As a
result, individuals with walkers were included in this study providing that the 100 manual step test (described in detail later) was accurate within five steps.

The Mini-Mental Status Exam (MMSE) (Folstein, Folstein, & McHugh, 1975) was used as a screening tool to ensure that the prospective subjects’ level of cognitive functioning was adequate for participation in this study. Only subjects with a score of 21 or higher on the MMSE were included. This cut off criterion was derived from population-based norms for the MMSE (Crum, Anthony, Bassett, & Folstein, 1993; Vertesi et al., 2001). Lastly, subjects were required to be fluent in both written and spoken English.

**Recruitment and participation**

In November 2011, two general information sessions about the study were held at the assisted living residence. Posters advertising these information sessions were posted one week in advance of the planned sessions. At these sessions, information about the study was provided along with a sign-up sheet so that residents who were interested in participating could provide their contact information. This sign-up sheet was available to participants only during the information sessions and was monitored by a researcher. Flyers with information about the study, including a contact phone number for the primary investigator, were posted throughout the building. Information packages containing a letter of initial contact and a consent form were distributed to interested potential participants. Due to the slow pace of recruitment in November 2011, the study protocol was re-evaluated, modified and resumed in January 2012. The study information poster was redesigned with more colour and pictures and the facility’s management placed the revised posters in each resident’s mailbox. A drop box was placed in the main recreation room where interested residents could place post cards with their contact information if they wanted more information. Also, an advertisement about the study was placed in the facility’s monthly newsletter. Finally, two more information sessions were conducted.
Figure 1 shows that 21 residents sought information about the study. After the study was explained to them 47.6% (n = 10) were excluded due to the fact that they were classified as independent living. Of the remaining residents, 33.3% (n = 7) consented while 19% (n = 4) declined to participate. After consenting to participate, a further 28.6 % (n = 2) were excluded. One failed to achieve the minimum MMSE score and the other had a shuffle gait and failed the 100 manual step test. Of the five residents who consented, four actually participated, while one withdrew due to a hospital admission.
Figure 1

Flowchart of Participant Recruitment

Total Number of Residents (80 assisted living and 30 independent living) (n=110)

Residents who sought information (n=21)

- Initially excluded as independent living (n=10)
  - 47.6% initially excluded
- Declined to participate (n=4)
  - 19% declined
- Consented (n=7)
  - 33.3% consented
- Excluded (n=2)
  - 28.6% excluded
- Participants (n=5)
  - 71.4% participated

Participants with incomplete data (n=1)
Participants with complete data (n=3)

Withdrawals (n=1)
Studied (n=4)
The final sample consisted exclusively of women with a mean age of 90.3 (SD = 0.96) years. Although the goal was to recruit at least 29 participants, time and resources were limiting factors in participant recruitment. Given the human resources available, data could only be collected at one facility at a time, and given the limitations of this as a thesis project, the decision was made to not extend the study any further.

**Measures**

**Physical activity questionnaires**

The CHAMPS Physical Activity Questionnaire for Older Adults (Stewart et al., 2001) consists of 41 items pertaining to a typical week in the past month. Respondents are instructed to indicate both the frequency and duration of their engagement in moderate and high intensity activities, such as square dancing, brisk walking or jogging, as well as lighter activities such as visiting with friends or family and using a computer. There are six response options for the duration of the activity (less than one hour to nine or more hours) to allow for ease in reporting. The CHAMPS provides estimated measures for kilocalories of energy expended in physical activity, and frequency of moderate and high intensity activities per week, as well as kilocalories of energy expended and frequency of “all” activities per week. To calculate caloric expenditure, the duration of each activity is multiplied by the metabolic equivalent task value. These values are then summed across activities. Frequency is calculated by summing the frequencies of activities per week for all relevant activities.

The PASE scale (Washburn et al., 1993) (see Appendix A) consists of 11 items that assess the frequency of various activities undertaken over the past seven days, with the possible response options being: “never,” “seldom (1-2 days a week),” “sometimes (3-4 days a week),” and “often (5-7 days a week).” The duration spent engaged in these activities per day is recorded as “less than an hour,” “1-2 hours,” “2-4 hours,” or “greater than 4 hours.” The instrument can
either be self-administered or researcher-administered. To calculate the total PASE score for each subject, the amount of time spent engaged in each activity (hours or weeks), or participation in activities (yes or no) is multiplied by the corresponding item weight, provided by the developer. The PASE total for all activities is then computed by summation. The item weights are based on a linear regression of previously obtained physical activity principal component scores, on responses to the PASE (Washburn et al., 1993).

**Validation measures**

The four validation measures were selected based on past validation research of the CHAMPS and PASE questionnaires, which focused primarily on older adults in the community and in retirement homes (Colbert et al., 2010; Harada et al., 2001; Stewart et al., 2001). One validation measure to be considered was an activity monitor. Pedometers are inexpensive and have been shown to provide valid assessments of physical activity in older community-dwelling adults (Colbert et al.; Cyarto et al., 2004). They have been found to be as valid as more expensive accelerometers and metabolic activity monitors, when determining the physical activity levels of the elderly (Colbert et al.).

In contrast, there is past research that does not support the use of pedometers in older adults who do not reside in the community. To illustrate, Cyarto et al. (2004) found that waist mounted pedometers were not accurate measures of physical activity in nursing home residents. In addition, Bergman, Basset, and Klein (2008) examined the validity of both a waist-mounted pedometer and an ankle-mounted accelerometer in older adults residing in assisted living. In phase one of the study, 21 subjects walked a distance of 161 meters. Phase two consisted of 13 subjects wearing the devices for a 24-hour period. The findings indicated that the ankle-mounted accelerometer was more accurate than the waist-mounted pedometer.

The main disadvantage of accelerometers is that their cost is significantly greater than that
of pedometers. Cost was a factor at the time this study was proposed, as funding had not yet been obtained. Furthermore, the ankle-mounted accelerometers used by Bergman et al. (2008) required the help of staff at the assisted living residence to put on and remove the ankle accelerometers. In the current study, the facility staff was not available to assist the study participants. Therefore, an activity monitor that was worn at the waist was thought to require less mobility for the participants and no assistance by staff. Lastly, the majority of studies validating activity monitors used larger sample sizes and a minimum duration of 7 days, as opposed to 24 hours, the time frame used in Bergman et al. For these reasons the Omron Model HJ-105 pedometer was selected as the physical activity monitor for this study.

Omron Model HJ-105 pedometers were worn by subjects on fitted belts, during waking hours, to record the number of steps taken in a seven-day period. The Omron HJ-105 has a step count precision of plus or minus 5%, a seven-day memory capability and requires re-calibration approximately every two weeks. From the pedometer data, the average number of steps per day for each participant was calculated. To help ensure the accuracy of the pedometers, a 100-step manual step test was conducted before the study to check the accuracy of the pedometer for each participant. The pedometer’s estimation of the number of steps taken was required to be within five steps of 100 manually counted steps. Each pedometer was 5.1 cm thick, 11.7 cm wide, and 19.6 cm long, weighing approximately 24 g.

The Short Physical Performance Battery (Guralnik et al., 1994) measures older persons’ lower extremity functioning and consists of three tasks, which take 10 to 15 minutes to complete. First, the test to assess a person’s ability to rise from a chair (a chair stand) measures lower body strength and requires participants to stand up from a chair and sit down, arms folded across the chest, five times and as quickly as possible. The participants were timed from when they first started to rise from the chair to when they stood for the fifth time and were instructed to be
completely still. The number of chair stands completed was recorded, in addition to time, which was converted into an ordinal score (from 0 = not completed to 4 = the fastest quartile). These quartiles are predetermined and standardized. Next, the participants were assessed with a series of standing balance tests: they were timed standing with their feet side-by-side, semi-tandem, and tandem. The timer was stopped when the participants lost their balance or when 10 seconds had passed. The balance tests were also scored using an ordinal scale (0 = not attempted, 1 = held for less than 10 seconds, 2 = held for 10 seconds). Lastly, as an assessment of walking speed, the participants were asked to complete an 8-foot walk at their regular speed; they were timed as they completed two walks and the fastest of the two trials was recorded. A gait ordinal scale (from 0 = not completed to 4 = the fastest quartile) was recorded for the 8-foot walk. The Short Physical Performance Battery was scored by summing the ordinal scores for all of the tests. Guralnik et al. (1994) established this battery as a valid and reliable measure of lower body function in older adults.

The Six-Minute Walk Test evaluates how far subjects can ambulate over six minutes (Lipkin et al., 1986). The participants were instructed to walk in a designated circular path, covering as much distance as possible, at a speed at which they were able to talk without becoming short of breath. The distance walked in feet was recorded at the end of six minutes. Validity and test re-test reliability were reported by Lipkin et al. The Six-Minute Walk Test also has been used in older adults who use ambulatory devices such as walkers or canes (Hamilton & Haennel, 2000; Mossberg, 2003).

Although the SF-36 has been used in past studies to validate the CHAMPS and PASE surveys, the SF-12 (see Appendix B) was chosen as a validation measure for this study. As with the SF-36 (Ware & Sherbourne, 1992), the SF-12 (Ware, Kosinski, & Keller, 1996) health status survey assesses eight domains of health, and consists of a combination of five-
choice response scales, three-choice response scales, and ‘yes’ or ‘no’ responses. For the purposes of this study, the SF-12 was used to assess physical functioning, general health perceptions, mental health, and pain. General health perceptions capture an individual’s personal beliefs regarding his or her own health. Pain is addressed in terms of how limiting it is. The mental health concept includes feelings of anxiety, depression, happiness and peacefulness. Lastly, physical functioning pertains to limitations in any physical activities, including activities of daily living. The SF-12 was scored using software provided by the publisher. In addition, scores are calibrated so that 50 is the average score or norm. The main reason for using the SF-12, rather than the SF-36, is that recent research has been done to support the use of the SF-12 in older adults. Specifically, the SF-12 requires relatively less time to complete and therefore poses less of a burden on participants. Using the SF-12 (as opposed to other measures) also allowed the results of this study to be compared with similar past validation studies including those of Harada et al. (2001) and Stewart et al. (2001). Finally, validity and test-retest reliability evidence has been provided for the administration of SF-12 in older adults residing in the community (Ware et al., 1996) and in retirement homes (Resnick & Nahm, 2001).

**Screening and sample description tools**

The MMSE (Folstein et al., 1975) (see Appendix C) is a brief 30-item questionnaire that assesses cognition and is used to screen for cognitive impairment. Items on the MMSE measure orientation, recall, attention, language, calculation and visual-construction. The MMSE was used as a screening tool to ensure that the prospective participants’ levels of cognitive function were adequate to participate in this study. Scores less than 27 are indicative of impairment; however, only individuals with scores less than 21 were excluded from the study. As indicated earlier, this cut off criterion was derived from population-based norms for the MMSE (Crum et al., 1993; Vertesi et al., 2001). Next, a demographic form (see Appendix D) was used to collect information
about the participants’ age, sex, education level and marital status. These demographic factors have been used in past studies on physical activity assessment in older adults to describe the sample. Finally, subjects were asked to complete a standard medical history form (see Appendix E). This form consisted of a checklist of common health conditions, such as heart problems, diabetes and kidney disease.

Procedures

Approval for this study was obtained from the Behavioural Research Ethics Board (BREB) of the University of British Columbia as well as from the Vancouver Coastal Health Research Institute. Permission was then obtained from the assisted living residence itself. The primary investigator prepared and facilitated a one-hour training session with the research assistant on how to facilitate a sensitive and non-judgmental research environment. Residents who were willing and eligible to participate were scheduled for an initial study visit of one half hour. This visit (located in a private room at the assisted living facility) began with a review of the consent form (see Appendix F) to ensure that the participant was providing fully informed consent. The MMSE was administered next to determine if the participant met the eligibility requirements. Also, a 100-step manual count was performed to determine if the pedometer was able to accurately measure the individual’s steps. If so, the participant was given the demographic and medical forms, along with the SF-12 questionnaire to be completed at home.

The participants returned the following day for a 90-minute appointment and were given a copy of their signed informed consent form and advised to keep it for their records. They submitted their completed questionnaires, and then completed the CHAMPS questionnaire, the PASE questionnaire, the Short Physical Performance Battery, the Six-Minute Walk Test, and were fitted with a pedometer. The participants were given careful instructions about wearing the pedometer for the full week and were given a phone number to call if they had any questions or
concerns. One week later, the researchers returned to the facility to retrieve the pedometers and to record the pedometer data. The participants were thanked for their participation and asked if they wanted to receive a final research report of the study findings.
Chapter 4: Results and Discussion

To begin, the sample is described in terms of its demographic and medical characteristics, and patterns in the data are examined through the use of scatter plots (the sample size was not sufficient to conduct inferential statistical analyses). Several significant barriers to participant recruitment were encountered throughout this study. These factors are discussed, in addition to some information that was gleaned about what was effective and successful in the study of physical activity in an assisted living setting.

Sample Characteristics

The sample consisted of older adults residing in an assisted living residence in either November 2011 or January 2012. Due to a number of barriers, only four participants were successfully recruited for this study. These barriers are discussed in detail in the discussion section below. The demographic and medical characteristics of the sample are presented in Table 4. The sample consisted of “white” women with an average age of 90.3 years (SD = 0.96, range 89-91). All of the participants were widowed and were well educated, having at least a high school diploma. Two of the participants reported having heart problems, two had diabetes, three reported some form of cancer and only one reported having depression.
### Table 4.

**Participant Demographic and Medical Characteristics**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Characteristic</strong></td>
<td><strong>Frequency</strong> (N = 4)</td>
</tr>
<tr>
<td><strong>Age (Years, Mean ± SD)</strong></td>
<td>90.3 ± 0.96</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4</td>
</tr>
<tr>
<td>Male</td>
<td>0</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>4</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>4</td>
</tr>
<tr>
<td><strong>Education Level</strong></td>
<td></td>
</tr>
<tr>
<td>High School Certificate or diploma</td>
<td>2</td>
</tr>
<tr>
<td>Trade or professional Certificate Diploma</td>
<td>1</td>
</tr>
<tr>
<td>University Certificate or Diploma</td>
<td>1</td>
</tr>
<tr>
<td><strong>Ambulatory Aid</strong></td>
<td></td>
</tr>
<tr>
<td>Cane</td>
<td>1</td>
</tr>
<tr>
<td>Walker</td>
<td>3</td>
</tr>
<tr>
<td><strong>Heart Problems</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Pacemaker/Defibrillator</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>High Blood Pressure</strong></td>
<td>2</td>
</tr>
<tr>
<td>Stroke</td>
<td>0</td>
</tr>
<tr>
<td><strong>Anemia/Blood Disorders</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Breathing Problems</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Kidney Disease</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Liver Disease</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Thyroid Disease</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>High Cholesterol</strong></td>
<td>4</td>
</tr>
<tr>
<td>Diabetes</td>
<td>2</td>
</tr>
<tr>
<td><strong>Digestive Disorders</strong></td>
<td>0</td>
</tr>
<tr>
<td>Osteoporosis/Osteopenia</td>
<td>1</td>
</tr>
<tr>
<td><strong>Arthritis</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Back Problems</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Glaucoma</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Epilepsy</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Hepatitis</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Cancer</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Depression</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Chronic Pain</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Alcohol/Drug Dependency</strong></td>
<td>0</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td>0</td>
</tr>
</tbody>
</table>
It is important to note that there was one instance of missing data in the study. The pedometer for one participant did not record any steps over the seven-day duration, despite the resident having passed a 100-step manual test. All of the participants were able to complete the self-report physical activity questionnaires, although two of the participants requested that the research assistant administer some or all of the CHAMPS and the PASE.

**Data Patterns**

The average scores for the CHAMPS, PASE, SF-12, pedometer, Six-Minute Walk Test, and the Short Physical Performance Battery are presented in Table 5.

Table 5

*Average Scores for the CHAMPS, PASE, SF-12, Pedometer, Six-Minute Walk Test, and the Short Physical Performance Battery*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>CHAMPS kilocalories/wk in all activities</td>
<td>739.4 (674.6)</td>
</tr>
<tr>
<td>CHAMPS kilocaloriesl/wk in moderate activities</td>
<td>271.2 (222.2)</td>
</tr>
<tr>
<td>CHAMPS frequency/wk all activities</td>
<td>8.3 (1.3)</td>
</tr>
<tr>
<td>CHAMPS frequency/wk moderate activities</td>
<td>3.0 (2.9)</td>
</tr>
<tr>
<td>PASE</td>
<td>40.4 (11.0)</td>
</tr>
<tr>
<td>SF-12: PF</td>
<td>37.5 (14.4)</td>
</tr>
<tr>
<td>SF-12: GH</td>
<td>72.5 (14.4)</td>
</tr>
<tr>
<td>SF-12: MH</td>
<td>65.6 (12.0)</td>
</tr>
<tr>
<td>SF-12: Pain</td>
<td>87.5 (14.4)</td>
</tr>
<tr>
<td>Pedometer (average number of steps per day)</td>
<td>2643.1 (1920)</td>
</tr>
<tr>
<td>Short Physical Performance Battery</td>
<td>5.3 (2.0)</td>
</tr>
<tr>
<td>Six-Minute Walk Test (distance in feet)</td>
<td>725.4 (56.3)</td>
</tr>
</tbody>
</table>

Specific patterns in the data are shown through the use of scatter plot graphs. Although we had insufficient data to test our hypotheses, the associations are presented as they relate to our predictions.

First, it was hypothesized that scores on the CHAMPS and PASE questionnaires would
positively correlate with the scores of the three selected validation measures (i.e., pedometers, the Short Physical Performance Battery, and the Six-Minute Walk Test). The CHAMPS frequency per week for moderate and high intensity activity scores and the Short Physical Performance Battery scores displayed a linear pattern (see Figure 2). However, it is apparent that one participant had a much higher score on the CHAMPS frequency per week of moderate and high intensity activities and on the Short Physical Performance Battery, compared with the other three participants.

Figure 2

If this outlier were removed the linear association between this CHAMPS frequency score and the Short Physical Performance Battery would not be present. That is to say that, without this outlier, there would be no clear pattern in the data.
In contrast to what was predicted, scores on both the CHAMPS kilocalories per week for moderate activities and high intensity activities (see Figure 3) and frequency per week for all activities (see Figure 4) suggested inverse relationships with the average number of steps taken per day. The data also suggested inverse patterns between the distance walked in the Six-Minute Walk Test and the CHAMPS kilocalories per week for all activities (see Figure 5), and with the CHAMPS frequency per week for all activities (see Figure 6). Similarly, Figure 7 depicts an inverse pattern between the PASE scores and the distance walked for the Six-Minute Walk Test.

Figure 3
Participant Scores from the CHAMPS assessment of Kilocalories Per Week of Moderate and High Intensity Activities Compared with the Average Number of Steps Per Day
As in Figure 2, outliers are present in Figures 5, 6 and 7. Specifically, in Figure 5 one participant’s score on the CHAMPS kilocalories per week for all activities was significantly higher than that for the other participants. Also, the distance walked in six minutes was much lower than that for the rest of the sample. The outlier in Figure 6, similar to that in Figure 5, is the result of one participant’s score on the CHAMPS frequency per week for all activities being much greater than the scores for the rest of the sample. Also, the participant’s distance walked in six minutes was much smaller that for the other participants. Lastly, Figure 7 shows the outlier resulting from a participant having a much higher score of the PASE and a much smaller distance walked in six minutes that the other participants. Overall, if the outliers in Figures 5, 6 and 7 were removed, the inverse associations in the data would no longer be present.
Figure 5

Participant Scores from the CHAMPS assessment of Kilocalories Per Week of All Activities Compared with the Distance Walked in 6 Minutes
Figure 6

Participant Scores from the CHAMPS assessment of Frequency Per Week of All Activities Compared with the Distance Walked in 6 Minutes

\[ R^2 \text{ linear} = 0.854 \]
In regards to the second and third hypotheses, weaker positive correlations between the scores on the CHAMPS and PASE questionnaires and the physical functioning, general health perceptions, mental health, and pain domains of the SF-12 were predicted. No patterns between the CHAMPS or the PASE and the SF-12 domains emerged from the data. Finally, it was hypothesized that scores on the CHAMPS would have a significant positive correlation with scores on the PASE questionnaire. The data in Figure 8 resemble a linear pattern with the participant with the highest score on the CHAMPS kilocalories per week for all activities assessment also having the highest score on the PASE. However, one participant exhibited a very high score on the PASE and on the CHAMPS kilocalories per week for all activities compared to the other participants. Without this outlier, the linear relationship between the PASE and
CHAMPS kilocalories per week for all activities would not be present. No other patterns in the data were found.

Figure 8
Participant Scores from the PASE assessment Compared with Scores from the CHAMPS assessment of Kilocalories Per Week of All Activities

To review, this study’s sample size was insufficient to determine the validity of the CHAMPS and PASE physical activity questionnaires in assisted living. Furthermore, the presence of two outliers in this small sample limited the strength of any associations identified in the data. Due to the very small sample size, it is likely that the outliers exerted a strong influence on the data distribution. At the same time, if a larger sample had been obtained, it is possible that these scores may not have been outliers at all. Further implications of these outliers will be discussed in the final chapter. In light of these limitations, perhaps the most significant contribution that this study can make is the identification of both the challenges and successes of conducting research about physical activity in the assisted living setting, which remains an
emerging area of research. The implications of these observations are discussed in the final chapter.

**Barriers to Recruitment**

As indicated earlier, a number of barriers to participant recruitment arose during the study. It was evident after the first round of data collection in November 2011 that the number of assisted living residents able and willing to participate was significantly smaller than what was anticipated. The first barrier examined is related to the wearing of the pedometers.

**Wearing of the pedometer**

There were two issues related to the wearing of a pedometer. The first was that the assisted residents’ limited vision created problems putting on and taking off the pedometers. Specifically, three residents who attended one of the four information sessions indicated that they believed that their vision was too poor to allow them to put on and remove a pedometer without assistance. The primary investigator and research assistant explained to all of the potential participants that the pedometers could remain on a belt, with a large arrow indicating which way the pedometer should face (up). However, as stated earlier, the staff members at this facility were unable to assist the residents with the pedometers.

The length of time that the residents were required to wear the pedometer was also a significant barrier. Specifically, there was feedback from both the participants and the staff that the duration of time the participants were required to wear the pedometer was too long. First, a number of residents who came to the information sessions expressed that seven days was a long time to wear a pedometer. Second, after the study, two of the four participants reported that they believed that seven days was too long. Third, at the beginning of the recruitment phase, two staff members indicated that they believed that seven days was too long. Lastly, throughout the study, I observed that factors such as the participants remembering to wear the pedometer, putting on
and removing the pedometer, and maneuvering the pedometer and belt around clothing during toileting, were significant challenges. These factors may have resulted in the pedometer not being worn correctly, which may have accounted for the missing data. Alternatively, the missing data may have resulted because the participant simply failed to remember to wear the pedometer. The implications of these findings are discussed in the next chapter.

**Walkers**

A second major barrier was the unexpected high prevalence of walker use in the assisted living residence. We had to modify our initial exclusion criteria because 75% of the residents used walkers all the time. In our sample, three of the participants used a walker and one used a cane. The three participants who used walkers told researchers during data collection that they did not need a walker, but were told that they had to use a walker so that they “did not fall”. The researchers interpreted this observation to mean that these residents perceived their walkers as nuisance and unnecessary. The assisted living staff also reiterated that walkers were used by residents as a form of fall prevention.

**Successful Strategies and Techniques in Recruitment and Data Collection**

Complete data was successfully collected from three assisted living participants during this study and partial data was collected from one participant. From this it was possible to determine a number of effective strategies and techniques for studying older adults in assisted living. In terms of recruitment, it was observed that the assisted living residents seemed to respond best to the information sessions compared with the other methods of recruitment, such as information flyers or an advertisement in the facility’s newsletter. Specifically, of the 21 residents who came forward and expressed an interest in participating, 16 attended an information session. The second most effective method of recruitment was the postcard drop-box, which yielded three interested residents. The letters placed in the residents’ mailboxes by the facility staff and the
study information posters were the least effective strategies, resulting in a total of two interested residents.

During data collection, as mentioned above, the participants reported that it was helpful to keep the pedometer attached to a belt because then they only had to worry about handling the belt each day. In addition, placing a sticker with an arrow pointing upward was observed to prevent the participants from wearing the pedometer upside down (in which case the pedometer did not accurately record the number of steps taken). Second, a technique that proved to be useful for helping the participants to remember to put their pedometers on in the morning was a yellow fluorescent sign placed in plain view in the residents’ bedrooms. Next, the participants with vision problems appreciated the co-investigator and research assistant verbally administering the CHAMPS and PASE questionnaires, instead of taking them home to complete. Finally, all the participants were given the primary investigator’s cell phone number and told to call at any time if they had concerns. Throughout the study, the only phone call received from a participant was to confirm an appointment time with the research assistant. The primary investigator also called and checked on each participant half way through the seven-day study period. Both of these actions seemed to help put the participants at ease about being part of the study.
Chapter 5: Conclusion

The purpose of this study was to examine the concurrent validity of the CHAMPS and PASE questionnaires in older adults residing in assisted living facilities. The sample consisted of white women with a mean age of 90.3 years, and at least a high school diploma. Unfortunately, the research hypotheses could not be clearly supported or refuted because a sufficient number of participants could not be recruited. Associations in the data related to the CHAMPS, PASE and the validation measures were found. However, the strength of these relationships is limited due to the presence of outliers. More importantly, difficulties related to the daily wearing of pedometers, and the use of walkers and older adults’ perceptions of walkers, were identified as potential key barriers to participant recruitment. At the same time, information sessions, reminder signs for enrolled participants, and researcher-administration of the study questionnaires were found to be successful techniques in conducting research in this assisted living sample. The implications of these findings are now discussed.

Data Patterns

With respect to the first hypothesis, the linear association between the CHAMPS assessment of the frequency per week of moderate and high intensity activity and the Short Physical Performance Battery scores is similar to Stewart et al.’s (2001) results. As indicated in Chapter 4, the strength of the association between this CHAMPS frequency score and the Short Physical Performance Battery score in this study is limited due to the presence of an outlier in the data. The participant associated with this outlier clearly met all the study inclusion criteria. Although she does have the highest level of education (a university certificate or degree) in the sample, she has no other distinguishing characteristics, which suggests she may be representative of the target assisted living population. However, given the sample size, it is not possible to be sure.
The inverse relationships between the CHAMPS scores and the pedometer readings, as well as between the Six-Minute Walk Test and both the CHAMPS and the PASE were unexpected. Specifically, Harada et al. (2001) and Stewart et al. found a significant positive correlation between the Six-Minute Walk Test and all four CHAMPS scores (i.e., kilocalories per week for all activities, kilocalories per week for moderate and high intensity activities, frequency per week for all activities, and frequency per week for moderate and high intensity activities). As well, a significant positive relationship was reported between the Six-Minute Walk Test and the PASE (Harada et al.).

For the second hypothesis, no prominent patterns between the CHAMPS or the PASE and the SF-12 domains were found. This is incongruent with Harada et al. (2001) who reported significant positive correlations between both the CHAMPS assessment of kilocalories expended per week in moderate and high intensity activities and the general health and physical function domains of the SF-36. Harada et al. also reported significant positive relationships between the PASE and the general health, mental health and physical function domains of the SF-36. Finally, it was predicted that scores on the CHAMPS would have a significant positive correlation with scores on the PASE questionnaire. The linear pattern between CHAMPS kilocalories per week for all activities and PASE scores was supported by Harada et al.’s findings.

As mentioned in Chapter 4, the strength of the inverse relationships between the CHAMPS scores and the pedometer readings, as well as between the Six-Minute Walk Test and both the CHAMPS and the PASE, are limited by outlier scores of one participant. The positive association found between the CHAMPS kilocalories per week for all activities and PASE scores was also limited by an outlier score from the same participant. This participant did meet the inclusion criteria. However, unlike the rest of the sample, she reported having hepatitis and depression. It is possible that one or both of these characteristics may have been a factor in the resulting outlier

43
scores. Such characteristics should potentially be considered for future research examining physical activity in assisted living. Yet it is also possible that she is not representative of the target population based on some other unknown factors.

Overall, this study cannot offer a definitive interpretation or explanation for the data patterns identified. In addition to the small sample size and the presence of outliers, the possibility exists that older adults residing in assisted living may differ from their community dwelling and independent living counterparts to such an extent that the CHAMPS and the PASE are not valid assessment tools of physical activity. The participants may not have accurately completed these physical activity questionnaires. For example, they may have underestimated their activity. Another explanation is that the CHAMPS and PASE are simply not able to accurately capture the types of activity that older adults residing assisted living engage in. Further exploration is required to identify if valid tools exist for assessing physical activity in assisted living or if such tools need to be developed. A final possibility is that waist mounted pedometers are not the most accurate activity monitor for assisted living residents. As indicated above, past studies have suggested that waist mounted pedometers may not be optimal measures of physical activity in assisted living residents (Bergman et al., 2008) or in nursing home residents (Cyarto et al., 2004). Future studies may benefit from using accelerometers that mount on the ankle or the ankle and the waist as used by Harada et al. (2001).

**Barriers to Recruitment**

**Pedometers**

To review, vision problems as well as the duration of time participants were required to wear their pedometers were identified as potential barriers to recruitment in this study. Specific published findings on vision deterring the participation of older adults in studies with activity monitors could not be found. This is likely because the majority of the studies have sufficient
funding for research assistants to help participants with the wearing of the activity monitors. With respect to the length of time the pedometers were specified to be worn, it is apparent from the literature that the majority of studies using activity monitors in older adults have ranged from 7 days (Harada et al., 2001; Lautenschlager et al., 2008), to 10 days (Colbert et al., 2010), to 6 months (Engel & Linder, 2006) in duration. Only two studies were found to have required durations of less than seven days. Talbot, Gaines, Huynh, and Metter (2003) specified a three-day monitoring duration to examine a pedometer-driven walking program in older adults with osteoarthritis of the knee. Also, Bergman et al. (2008) used a 24-hour period to examine the validity of ankle and waist activity monitors.

Thus, it is possible that decreasing the length of time participants are required to wear a pedometer or activity monitor may increase participation in future studies of the assisted living population. Another solution is to have research assistants aid residents with putting on and removing the pedometers. This could serve to reduce the burden for participants. Another consideration is the use of an ankle accelerometer (Bergman et al., 2008) instead of a waist-mounted pedometer. These are more expensive and require more assistance to put on, but may not interrupt activities of daily living, such as toileting, to the same extent as do waist-mounted monitors.

**Walkers**

In this study, it was observed that assisted living residents use walkers as a form of fall prevention. According to past research, many older adults view walkers as a very visible sign of decreasing physical function (Thomas, Connelly, & Laliberte-Rudman, 2008). Furthermore, recent studies have shown that the use of four-wheeled walkers can lead to falls in older adults (Liu, 2009; Stevens, Thomas, Teh, & Greenspan, 2009). In fact, Stevens et al. found that older adults who used walkers were seven times more likely to fall than were those who used canes.
Thus, it can be questioned whether the use of walkers in this assisted living residence was appropriate. Consequently, it could be argued that the use of walkers in assisted living, particularly if inappropriate, could negatively affect residents’ self-image and independence, in addition to their confidence and motivation to participate in studies about physical activity. Additional research in this area is needed to determine how walkers affect physical activity and self-image in assisted living residents. Furthermore, the prevalence of walkers in the assisted living community is a factor that needs to be carefully considered both in the recruitment and in the measurement of physical activity in future studies.

Finally, it is important to note that there is evidence to suggest that other researchers also have had difficulty recruiting adequate numbers of older adults who reside in assisted living. As discussed above, Krol-Zielinska et al. (2011) examined energy expenditure from physical activity in three groups of seniors. Specifically, 79 participants were recruited from seniors’ community centres, 39 from adult day care facilities and only 23 from assisted living residences. Furthermore, Zalewski et al. (2009) recruited a sample of 59 adults (aged 55 years and older, mean age 83.8 years) from independent living and assisted living residences to explore the relationship between physical ability, physical activity, and self-reported physical activity. Notably, only four of their participants were classified as assisted living residents. This is comparable to the sample of four in the current study. Therefore, this study lends further support to the possibility that recruitment may be particularly challenging in the assisted living setting.

**Strategies and Techniques for Successful Recruitment and Data Collection**

In this study I was able to successfully collect complete data from three participants and partial data from one participant. Based on this experience, several effective strategies and techniques for conducting research are proposed. Ultimately, it was difficult to compare the specific recruitment and data collection methods from this study to those used in past research.
because of the lack of detail provided in the published literature. However, there is some literature to support the strategies and techniques used here. For example, Resnick et al. (2003) concluded that face-to-face contact was the most effective recruitment method for older women because it facilitates easier communication. This is congruent with the current study’s finding that information sessions were the most effective means of participant recruitment. Lastly, we found that administering both the CHAMPS and PASE questionnaires verbally to those who had vision impairments was effective during both recruitment and data collection. This is supported by past research validating the use of CHAMPS (Stewart et al., 2001) and the PASE (Washburn et al., 1993) as self-administered or researcher-administered tools. Consequently, two further recommendations for future research are: (a) focus on face-to-face forms of recruitment and (b) ensure that any study questionnaires used can be either self-administered or administrated by the researcher.

To date, older adults who reside in assisted living have been under-represented in the geriatric literature. As Canada’s population ages, the assisted living sector continues to grow at a rapid rate. This study was unable to contribute to the establishment of validated self-report measures of physical activity in assisted living. However, the barriers to recruitment identified here can provide valuable insights into the factors that may influence the participation of assisted living older adults in physical activity research. Indeed, this study was not the first to record small numbers of assisted living participants. The practical significance of these findings is that physical activity assessment in assisted living must take into account how ambulatory aids are being used and how this in turn may affect participation in physical activity and in physical activity research. Similarly, the activities of daily living of assisted living residents are an important consideration in the use of activity monitors. Theoretically, this study has illuminated the need for a more concise and uniform definition of assisted living in Canada that reflects the
uniqueness of this sector from older adults in the community or in long-term care. Currently, the
definition of assisted living differs by province and even by health district. In conclusion, further
research is needed to better delineate the assisted living population and to establish valid
measures that will facilitate the accurate assessment of physical activity.
References


Appendix A

PHYSICAL ACTIVITY SCALE FOR THE ELDERLY (PASE)

© 1991 New England Research Institutes, Inc.
New England Research Institutes, Inc.

9 Galen Street
Watertown, MA 02472
(617) 923-7747
INSTRUCTIONS:

Please complete this questionnaire by either circling the correct response or filling in the blank. Here is an example:

During the past 7 days, how often have you seen the sun?

[0.] NEVER  [1.] SELDOM  [2.] SOMETIMES  [3.] OFTEN
   (1-2 DAYS)       (3-4 DAYS)       (5-7 DAYS)

Answer all items as accurately as possible. All information is strictly confidential.
**LEISURE TIME ACTIVITY**

1. Over the past 7 days, how often did you participate in sitting activities such as reading, watching TV or doing handcrafts?

   - [0.] NEVER
   - [1.] SELDOM (1-2 DAYS)
   - [2.] SOMETIMES (3-4 DAYS)
   - [3.] OFTEN (5-7 DAYS)

   GO TO Q.#2

   1a. What were these activities?

   1b. On average, how many hours per day did you engage in these sitting activities?

      - [1.] LESS THAN 1 HOUR
      - [2.] 1 BUT LESS THAN 2 HOURS
      - [3.] 2-4 HOURS
      - [4.] MORE THAN 4 HOURS

2. Over the past 7 days, how often did you take a walk outside your home or yard for any reason? For example, for fun or exercise, walking to work, walking the dog, etc.?

   - [0.] NEVER
   - [1.] SELDOM (1-2 DAYS)
   - [2.] SOMETIMES (3-4 DAYS)
   - [3.] OFTEN (5-7 DAYS)

   GO TO Q.#3

   2a. On average, how many hours per day did you spend walking?

      - [1.] LESS THAN 1 HOUR
      - [2.] 1 BUT LESS THAN 2 HOURS
      - [3.] 2-4 HOURS
      - [4.] MORE THAN 4 HOURS
3. Over the past 7 days, how often did you engage in light sport or recreational activities such as bowling, golf with a cart, shuffleboard, fishing from a boat or pier or other similar activities?

   [0.] NEVER  [1.] SELDOM  [2.] SOMETIMES  [3.] OFTEN
   ↓ (1-2 DAYS)  ↓ (3-4 DAYS)  ↓ (5-7 DAYS)
   GO TO Q.#4

3a. What were these activities?  
___________________________________________

3b. On average, how many hours per day did you engage in these light sport or recreational activities?

   [1.] LESS THAN 1 HOUR  [2.] 1 BUT LESS THAN 2 HOURS 
   [3.] 2-4 HOURS  [4.] MORE THAN 4 HOURS

4. Over the past 7 days, how often did you engage in moderate sport and recreational activities such as doubles tennis, ballroom dancing, hunting, ice skating, golf without a cart, softball or other similar activities?

   [0.] NEVER  [1.] SELDOM  [2.] SOMETIMES  [3.] OFTEN
   ↓ (1-2 DAYS)  ↓ (3-4 DAYS)  ↓ (5-7 DAYS)
   GO TO Q.#5

4a. What were these activities?  
___________________________________________

4b. On average, how many hours per day did you engage in these moderate sport and recreational activities?

   [1.] LESS THAN 1 HOUR  [2.] 1 BUT LESS THAN 2 HOURS 
   [3.] 2-4 HOURS  [4.] MORE THAN 4 HOURS
5. Over the past 7 days, how often did you engage in strenuous sport and recreational activities such as jogging, swimming, cycling, singles tennis, aerobic dance, skiing (downhill or cross-country) or other similar activities?

[0.] NEVER
[1.] SELDOM (1-2 DAYS)
[2.] SOMETIMES (3-4 DAYS)
[3.] OFTEN (5-7 DAYS)
GO TO Q.#6

5a. What were these activities?

5b. On average, how many hours per day did you engage in these strenuous sport and recreational activities?

[1.] LESS THAN 1 HOUR  [2.] 1 BUT LESS THAN 2 HOURS
[3.] 2-4 HOURS  [4.] MORE THAN 4 HOURS

6. Over the past 7 days, how often did you do any exercises specifically to increase muscle strength and endurance, such as lifting weights or pushups, etc.?

[0.] NEVER
[1.] SELDOM (1-2 DAYS)
[2.] SOMETIMES (3-4 DAYS)
[3.] OFTEN (5-7 DAYS)
GO TO Q.#7

6a. What were these activities?

6b. On average, how many hours per day did you engage in exercises to increase muscle strength and endurance?

[1.] LESS THAN 1 HOUR  [2.] 1 BUT LESS THAN 2 HOURS
[3.] 2-4 HOURS  [4.] MORE THAN 4 HOURS
HOUSEHOLD ACTIVITY

7. During the past 7 days, have you done any light housework, such as dusting or washing dishes?

   [1.] NO   [2.] YES

8. During the past 7 days, have you done any heavy housework or chores, such as vacuuming, scrubbing floors, washing windows, or carrying wood?

   [1.] NO   [2.] YES

9. During the past 7 days, did you engage in any of the following activities?

   Please answer YES or NO for each item.

   a. Home repairs like painting, wallpapering, electrical work, etc.  
      NO  YES
      1  2

   b. Lawn work or yard care, including snow or leaf removal, wood chopping, etc.
      NO  YES
      1  2

   c. Outdoor gardening
      NO  YES
      1  2

   d. Caring for an other person, such as children, dependent spouse, or an other adult
      NO  YES
      1  2
WORK-RELATED ACTIVITY

10. During the past 7 days, did you work for pay or as a volunteer?

[1.] NO  [2.] YES

10a. How many hours per week did you work for pay and/or as a volunteer?

_____________________ HOURS

10b. Which of the following categories best describes the amount of physical activity required on your job and/or volunteer work?

[Examples: office worker, watchmaker, seated assembly line worker, bus driver, etc.]

[2] Sitting or standing with some walking.  
[Examples: cashier, general office worker, light tool and machinery worker.]

[3] Walking, with some handling of materials generally weighing less than 50 pounds.  
[Examples: mailman, waiter/waitress, construction worker, heavy tool and machinery worker.]

[Examples: lumberjack, stone mason, farm or general laborer.]
THANK YOU FOR TAKING THE TIME AND EFFORT TO COMPLETE THIS QUESTIONNAIRE!
Appendix B

Your Health and Well-Being

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

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

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

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Yes, limited a lot</th>
<th>Yes, limited a little</th>
<th>No, not limited at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
</tr>
</tbody>
</table>

   a. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf

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

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

- Accomplished less than you would like ........................................ 1 ........... 2 ........... 3 ........... 4 ........... 5
- Were limited in the kind of work or other activities .................. 1 ........... 2 ........... 3 ........... 4 ........... 5

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

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

- Accomplished less than you would like ........................................ 1 ........... 2 ........... 3 ........... 4 ........... 5
- Did work or other activities less carefully than usual .................. 1 ........... 2 ........... 3 ........... 4 ........... 5

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

<table>
<thead>
<tr>
<th>Not at all</th>
<th>A little bit</th>
<th>Moderately</th>
<th>Quite a bit</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
</tr>
</tbody>
</table>

- 1, 2, 3, 4, 5
6. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks…

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>

- Have you felt calm and peaceful?  □ 1 □ 2 □ 3 □ 4 □ 5
- Did you have a lot of energy?     □ 1 □ 2 □ 3 □ 4 □ 5
- Have you felt downhearted and depressed? □ 1 □ 2 □ 3 □ 4 □ 5

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

<table>
<thead>
<tr>
<th>All of the time</th>
<th>Most of the time</th>
<th>Some of the time</th>
<th>A little of the time</th>
<th>None of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ 1</td>
<td>□ 2</td>
<td>□ 3</td>
<td>□ 4</td>
<td>□ 5</td>
</tr>
</tbody>
</table>

Thank you for completing these questions!

Page 3
Appendix C

Name: ____________________________ Age: ____________________________

Place Seen: ____________________________ Date: ____________________________

Time: ____________________________

Ask Client his/her:

Name: ____________________________ D.O.B. ____________________________

Completed by: ____________________________

<table>
<thead>
<tr>
<th>Maxumum</th>
<th>Correct</th>
<th>Score</th>
<th>Client's</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORIENTATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1)</td>
<td>5 ( )</td>
<td>What is the – date __________, day of week __________, month __________, season __________, year __________?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2)</td>
<td>5 ( )</td>
<td>Where are we – name of country ________________, province __________, city ________________, place __________, floor __________, (Street) (House # / Apt #)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REGISTRATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3)</td>
<td>3 ( )</td>
<td>Name 3 objects (HOUSE, TREE, CAR). Take 1 second to say each. Then ask the client all 3 after you have said them. Give 1 point for each correct answer. Then repeat them until he learns all 3. Count trials and record.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TRIALS ____________

ATTENTION AND CALCULATION |

4) | 5 ( ) | Serial 7's |
| 100 – 7 = ( ), 93 = ( ), 86 = ( ), 79 = ( ), 72 = ( ), 65 |
| One point for each correct answer. (Alternately spell "WORLD" backwards). |

RECALL |

5) | 3 ( ) | Ask for 3 objects – HOUSE ( ), TREE ( ), CAR ( ) |

LANGUAGE |

6) | 9 ( ) | Name a pencil, and watch ( ) 2 points |
| Repeat the following – "NO IFS, ANDS OR BUTS" ( ) 1 point |
| Follow a 3 – stage command: "Take the paper in your right hand, fold it in half, and put it on the floor." ( ) 3 points |
| Read and obey the following: CLOSE YOUR EYES ( ) 1 point |

Over...
Write a sentence (1 point)

Copy design (1 point)

Comments: 

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Appendix D

Demographic Information

Study ID: ____________

Birthdate: ________/______/___________

   Month       Date       Year

Gender:  M____ F____

Marital Status:  Single____

             Married/Partnered____

             Divorced____

             Widowed____

Highest level of education achieved

             No high school ___

             Grades 9-12 without certificate or diploma ____

             High school certificate or diploma ____

             Trade or professional certificate or diploma ____

             University certificate or diploma ____

             University degree ___

Are you fluent in both written and spoken English? (circle)

YES       NO

Do you use a cane, a walker or a wheel chair? (circle)   YES       NO

   If yes, please specify _______________________________

   How often, and where do you use this device?  __________________________
## Appendix E

**Study ID: _________________**  **Medical History Form**

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Heart problems (specify)</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Pacemaker or implantable defibrillator</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>High or low blood pressure (specify)</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Stroke</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Anemia or other blood disorder</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Breathing problems (specify)</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Kidney disease</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Liver disease</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Thyroid, parathyroid disease, or calcium deficiency</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>High cholesterol</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Digestive disorders</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Osteoporosis/osteopenia</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Arthritis (specify)</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Back problems</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Glaucoma</td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Epilepsy, convulsions/ seizures</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Hepatitis (indicate type)</td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Cancer (indicate type)</td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Depression</td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Chronic pain</td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Alcohol / drug dependency</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Smoking</td>
<td></td>
</tr>
</tbody>
</table>
Consent Form

Validity of Two Self-Report Physical Activity Assessment Tools For Assisted Living Residents

Principal Investigator: Alison Phinney, Ph.D., R.N.
School of Nursing
University of British Columbia

Co-Investigator(s): Jill Snyder, B.A., B.Sc.N., R.N.
Graduate Student
School of Nursing
University of British Columbia

Pam Ratner, Ph.D., R.N.
School of Nursing
University of British Columbia

Teresa Liu-Ambrose, Ph.D., P.T.
Center for Hip Health and Mobility
Department of Physical Therapy
University of British Columbia

This research project will be submitted in partial fulfillment of the requirements for the degree of Master of Science in Nursing.

Who is funding this study?
This study is being conducted and funded by the School of Nursing at the University of British Columbia.

Why should you take part in this study? Why are we doing this study?
You are being invited to partake in this research study because you are an older adult living in an assisted living residence. The purpose of this study is to determine if questionnaires are an accurate way to measure levels of physical activity for older adults living in assisted living residences.

What happens to you in the study? How is the study done?
If you agree to take part in this study, the procedures and visits you can expect will include the following:
Before the Study
You will be given this informed consent form and an information letter about the study. You will have more than 24 hours to review the informed consent form before the screening visit.

Visit 1
An investigator will review the informed consent form with you and answer any questions you have about the study. If you wish to participate in this study you will be asked to sign this informed consent form and you will be given a copy, which you should retain for your records.

A short cognition test called the Mini-Mental Status exam (MMSE) will be administered. You will also do some walking with the pedometer to check that it is able to correctly count your steps. If you meet the eligibility requirements, you will be given three brief forms to be completed at home asking about your personal background and health history. Visit 1 will take approximately 30 minutes. The two forms and the survey will take about 20 minutes to complete at home.

Visit 2
You will return the following day for a 1 hour and 15 minute scheduled appointment. During this time you will be asked to complete one questionnaire asking about your recent levels of physical activity. You will also complete four physical performance tasks to measure walking speed, balance and lower body strength.

A second physical activity questionnaire will be given to you to complete at home, which should take about 15 minutes.

Finally, you will be given a pedometer to wear while you are awake for the next seven days. It is a small device that measures the number of steps you take. We will explain how to wear it at your waist so it will not interfere with your usual activities.

Visit 3
A week later the investigator will return to retrieve the pedometer and the physical activity questionnaire that was completed at home.

Study Results
The results of this study will be reported in a graduate thesis and may also be published in journal articles and books.

If you would like to request a copy of the final research report, please provide a name and mailing address below.

_____________________________________________________________
_____________________________________________________________

Is there any way being in this study could be bad for you?
There is a minimal risk of physical harm. If any of the performance measures are too difficult for you, you can stop participation immediately. There is a minimal risk of emotional harm. Some of the items on the forms or questionnaires might be upsetting. Please let one of the study staff know if you have any concerns.

Will being in this study help you in any way?
We do not anticipate direct benefits to you from taking part in this study. We hope that the information learned from this study can be used in the future to benefit other people residing in assisted living facilities.

How will your identity be protected? How will your privacy be maintained?
Your confidentiality will be respected. No information or records that disclose your identity will be released without your consent unless required by law.

All documents will be identified only by code number and kept in a locked filing cabinet. Participants will not be identified by name in any reports of the completed study. All computer data will be stored on a secure computer, where the files will be password protected and encrypted.

At any point in the study, if you reveal that there has been an incident that involves abuse and/or neglect of an elderly person (or that there is a risk of such occurring) please be advised that the researcher must, by law, report this information to the appropriate authorities.

**Will you be paid for taking part in this study?**
We will not pay you for the time you take to be in this study.

**Who can you contact if you have any questions about the study?**
If you have any questions or concerns about what we are asking of you, please contact the study leader or one of the study staff. The names and telephone numbers are listed at the top of the first page of this form.

**Who can you contact if you have complaints or concerns about the study?**
If you have any concerns about your rights as a research subject and/or your experiences while participating in this study, you may contact the Research Subject Information Line in the UBC Office of Research Services at [RSIL@ors.ubc.ca](mailto:RSIL@ors.ubc.ca) or call toll free 1-877-822-8598.

**Participant Consent and Signature**
Taking part in this study is entirely up to you. You have the right to refuse to participate in this study. If you decide to take part, you may choose to pull out of the study at any time without giving a reason and without any negative impact on your access to further services from the assisted living facility or health care system.

- Your signature below indicates that you have received a copy of this consent form for your own records.
- Your signature indicates that you consent to participate in this study.

_______________________________________________________________
Participant Signature     Date

_______________________________________________________________
Printed Name of the Participant signing above