The relationship between movement confidence and level of physical activity in older adults

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The Relationship between Movement Confidence and Level of Physical Activity in Older Adults.

Alastair Stewart
Student Number 0970413

Edith Cowan University

Sports Science (Honours)

Supervisor
Elizabeth Rose

Date of Submission
6th of August 2002
Abstract

The movement confidence model proposed by Griffith and Keogh (1982) determined level of movement confidence by including sensations of enjoyment and fear of harm as well as perceived competence. Whilst this has been studied in children there is a paucity of research into older Australian adults. For the purposes of this study Australian older adults were defined as people over 50 years of age, permanently residing in Australia. Therefore, this study had four major purposes. The first purpose was to identify the relative contributions of (a) perceived competence (PC), (b) enjoyment (EN), and (c) fear of harm (FH) to movement confidence (MC) measured on the Movement Confidence Now (MCN) scale (O’Brien Cousins, 1997) in male and female older adults. The second purpose was to identify the relationship between level of movement confidence and level of physical activity (LPA) measured on the Older Adults Exercise Status Inventory (OA-ESI) (O’Brien Cousins, 1997). The third purpose was to identify the relationship between MC and past experience (PE). Lastly, to investigate the participant’s perceptions of MC, PC, EN, FH and PE across the 8 physical activities of curl ups (CU), push ups (PU), aquafit (AF), power walking (PW), slow stretch (SS), bike ride (BR), moderate paced swimming (MPS) and jogging (JG) measured in the MCN. The participants in this study were N = 56 (n males = 26, n females = 28) university employees, aged between 50 and 65 years. The researcher administered the questionnaire individually to all participants. To answer the first research question the data was entered into a Pearson's correlation, followed by hierarchical multiple regression with MC as the predictor dependent variable and PC, EN, and FH as the independent variables. Results indicated that for the overall population PC ($R^2_A = 0.602, p < 0.05$), EN ($R^2_A = 0.037, p < 0.05$) and FH ($R^2_A = \ldots$)
0.028, \( p < 0.05 \)) were all significant contributors to variance in the MC scores. To answer the second research question the level of MC and LPA were entered into a Pearson's correlation. The results indicated that for the overall population MC and LPA were significantly correlated (\( r = 0.302, p < 0.05 \)). This correlation dissipated when analysed separately for gender. To answer the third research question MC and PE were entered into a Pearson's correlation. The results indicated that for the overall population MC and LPA were significantly correlated (\( r = 0.705, p < 0.05 \)). This relationship was also present in males (\( r = 0.695, p < 0.05 \)) and females (\( r = 0.730, p < 0.05 \)). To answer the final research question CU, PU, AF, PW, SS, BR, MPS and JG were entered into a one way ANOVA with Tukey's HSD post hoc multiple comparisons. For the overall population results indicated that there was a significant difference in MCN scores between the eight physical activities (\( F = 16.762, p < 0.05 \)). Also PW and JG stood out as being significantly different to all the other activities (\( p < 0.05 \)). Similar results were obtained from the male and female populations when analysed separately. The findings of this study indicated that in an older population enjoyment and fear of harm play a significant role in determining their movement confidence. However, gender differences may occur in how these sensations correlate and contribute to movement confidence. Additional findings indicate that previous experience is closely related to movement confidence. Therefore the role of experience in developing confidence in older adults cannot be disregarded. Furthermore this study has determined that older adults are far more likely to power walk, and less likely to jog, than engage other activities. This study has implications for the exercise and health industry when planning regular physical activity for an aging population.
USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.
Declaration

I certify that this thesis does not, to the best of my knowledge and belief:

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Date
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CHAPTER ONE

Introduction

Recent findings from the 1999 National Activity Survey (Armstrong, Bauman, & Davies, 2000) reveal that only half of the population over the age of 45 years are exercising at sufficient levels to sustain health benefits. Furthermore Armstrong et al report that older women are 20% less likely to achieve sufficient levels of physical activity than men of the same age (p. 14). Considering the physical and psychosocial outcomes of an active lifestyle (Shephard, 1997) it is important to improve our understanding of an older adults' confidence in exercising. Processes underlying movement confidence such as enjoyment and fear of harm are likely to be closely linked to an individual's engagement in physical activity (Bandura, 1977; Griffin & Keogh, 1982; O'Brien Cousins, 1997). However, little is known about the relationship of these variables in older adults employed in a university.

According to the Movement Confidence Model (Griffin & Keogh, 1982), level of physical activity participation is directly related to an individual’s level of confidence in the motor domain. Movement confidence has been identified as a central mediating construct in a person's engagement in physical activity (Feltz, 1988; Shephard, 1997). To examine this relationship most researchers have employed measures of confidence, that are based on an individual’s perception of ability or competence in particular skills. Although closely related to Bandura's (1977) model, Griffin & Keogh (1982) provide key differences in their model of confidence. They propose three major components to movement confidence, which will influence a person’s level of engagement in physical activity. These are (a) perceived
competence, (b) enjoyment, and (c) fear of harm. While much research has examined the importance of perceived competence as a mediator in level of physical activity (Harter, 1981), the importance of the movement sensations of enjoyment and fear of harm have largely been overlooked. Although the movement confidence model has been applied to children in sport (Crawford & Griffin, 1986), it has had minimum application to research with older adults. However, it is likely that with older adults who are declining in fitness, flexibility, and coordination, that the perceptions of enjoyment and harm may be particularly relevant in understanding their participation levels. This is of particular relevance for older employees at universities. Over the last decade there have been rapid changes in workplace expectations. With funding cuts increasing the demands on staff and reliance on information technology, a lack of physical activity may make these individuals particularly vulnerable to diseases associated with high stress and sedentary work lives. The major question asked in the proposed study was; in university older employees, was the level of movement confidence related to their (a) perception of competence, (b) enjoyment, and (c) fear of physical harm?

This study had both theoretical and practical importance. Theoretically, the findings increased our understanding of the underlying cognitions influencing the older adults’ engagement in an active lifestyle. Feltz and Chase (1998, p. 75) state that there is a paucity of research based on the movement confidence model. As a result there is little evidence supporting the position that movement sensations are unique components in movement confidence. Therefore this study provides not only an understanding of the relative contributions of perceived competence, enjoyment, and fear of harm to overall movement confidence, but also how movement confidence impacts on level of physical activity. In practical terms the findings of this study will
assist sport scientists and health professionals to plan meaningful programs for our aging population. It addresses lifestyle issues of aging workers who increasingly face psychological and physiological demands in the university environment. Also by addressing issues of enjoyment, fear of harm, as well as perceptions of competence in older adults, barriers to participation in physical activity may be targeted. Too long have the emotions and feelings of people been ignored in exercise prescriptions.

Purpose of the Study

The major purpose of this study was to examine the relative contributions of 3 identified components of movement confidence. These are (a) perceived competence, (b) enjoyment, and (c) harm, to level movement confidence in male and female older adults. The second purpose of this study was to identify the relationship between level movement confidence and level of physical activity in male and female older adults. Thirdly this study sought to identify the relationship between level of movement confidence and level of previous experience in male and female older adults. Finally this study aimed to explore the variance in the eight physical activities used in the study to identify those activities that may stand out as more pertinent to male and female older adults.

Research Questions

Four research questions emanated from the purposes of this study. These questions were:
1. What are the relative contributions of (a) perceived competence, (b) perceived enjoyment, and (c) perceived fear of harm, to overall movement confidence in older adults?

2. What is the relationship between level of movement confidence and level of physical activity in male and female older adults?

3. What is the relationship between level of movement confidence and level of previous experience in male and female older adults?

4. Did any one of the eight physical activities used in the study stand out as more pertinent to male and female older adults?

Definition of Terms

Movement Confidence

Movement confidence (MC) is a construct comprising of three major components. These are (a) perceptions of competence (PC), (b) enjoyment (EN), and (c) fear of physical harm (FH) (Griffin & Keogh, 1982). According to the Griffin and Keogh model (1982, p. 214) movement confidence serves to mediate or influence variables that affect three aspects of participation (a) choice, (b) performance, and (c) persistence. Movement confidence is closely aligned to Bandura's (1977) concept of self-efficacy. Implicit in both movement confidence and self-efficacy is the individual’s belief that he or she can successfully perform a motor task.

Perceived Competence

According to Griffin and Keogh (1982, p. 214) perceived competence is the individual’s perceptions of skill level in relation to the perceived demands of a
specific task. A person is likely to feel high competence if his or her skill(s) outweighed the demands of the task. By contrast perceptions of movement competence will be low if the demands of the task outweighed the level of skill. Although strongly correlated with movement confidence, perceptions of competence are different. Movement confidence refers solely to the outcome. That is, the person asked of him or herself ‘will I succeed in this activity?’ Movement competence refers to the perceived skills of an individual. That is the person asked of him/herself ‘do I have the skills to succeed in this activity?’

**Perceived Enjoyment**

Perceived enjoyment (EN) is defined by Griffin and Keogh (1982, p. 218) as the perceived movement sensations that the individual expects, compared to the personal preference for such a movement sensation. That is, did they expect high enjoyment, and was this preferable?

**Perceived Harm**

Griffin and Keogh (1982, p. 218) define perceived harm (FH) as the identified level of potential physical harm an individual perceives in any movement situation. That is, what is the potential for injury in this activity, is it high or low?

**Level of Physical Activity**

For the purposes of this study the level of physical activity (LPA) is operationally defined according to the Older Adults Exercise Status Inventory (OA-ESI) (O’Brien Cousins, 1996). The OA-ESI measures exercise intensity in multiples of the basal metabolic rate (METS). The OA-ESI defines low intensity exercise as
below 4 METS, moderate intensity as 4.0-5.9 METS and high intensity as 6 or more METS (O'Brien Cousins, 1996). The amount of exercise engaged in is measured in kilocalories (kcals). The total weekly exercise in kcals is used to determine the level of physical activity. The original OA-ESI included work related and leisure related physical activity, this study used leisure related physical activity, as work related physical activity brought additional motivators such as money to induce physical activity.

Older Adult

For the purposes of this study an older adult is defined as any individual aged 50 years and over. This age was selected as the minimum cut off due to the specificity of the population.

Previous Experience

For the purposes of this study previous experience (PE) in an activity referred to the amount of activity engaged in by the individual in the past year. Previous experience is one variable in the Movement Confidence Now (MCN) questionnaire (O'Brien Cousins, 2001) and is measured on a Likert scale of one to four. One corresponded to no experience in the past year, two referred to trying the activity once, three was having done the activity a few times and four involved having done the activity a lot.
CHAPTER TWO

Review of Literature

Introduction

The need for maintaining independence becomes increasingly important as one advances into older adulthood. The most effective way for individuals to maintain their functional independence is to engage regularly in physical activity (Bouchard, 1997, p. 49). The physiological benefits of habitual exercise have been espoused by professionals for many years now, but not until recently have the psychological benefits of regular exercise been recognised. The U.S. Bureau of Census (1993) is reported by Van Sickle, Hersen, Simco, Melton and Van Hesselt (1996, p. 67) as estimating that the percentage of the population over the age of 55 will increase from 20% to 30% by the year 2020. With an increasingly aging population, the need for higher levels of exercise among older adults has never been more important. The fact that only half of the population over the age of 45 is exercising (Armstrong et al., 2000) indicates that there are both physical and psychological barriers to older adults’ engagement in physical activity. In the movement confidence model, Griffin and Keogh (1982), outline three components that influence an individual’s willingness to participate in physical activity. These are (a) perceived competence, (b) enjoyment and (c) fear of harm. The movement confidence model has been applied in Canadian older adults (O’Brien Cousins, 1997) and with Australian children (Rose, Larkin, Cantell & Martin, 2000). However, there is no known applied research that has used this model in Australian older adults.
This review of literature will be presented as follows (a) importance of physical activity in late adulthood, (b) movement confidence model, (c) gender, movement confidence, and level of physical activity, (d) perceptions of different types of physical activity, (e) measurement issues associated with movement confidence and physical activity, (f) limitations of the study, and (g) summary.

**Importance of Physical Activity in Late Adulthood**

With advancing age it becomes increasingly important that individuals maintain independence and psychosocial health. The physical deterioration associated with aging poses a threat to that independence. In addition there are psychosocial changes associated with declining physical ability. Thus engaging in sufficient levels of physical activity is crucial to both physical and psychosocial health in late adulthood. In the 1999 National Physical Activity Survey Armstrong et al. (2000, p. 29) report that “Thirty-seven per cent of people aged 60–75 years reported walking five or more times during the previous week, and 7% of people in this age group reported doing vigorous-intensity activity on at least three occasions during the previous week.” According to Armstrong and colleagues only 50% of people aged 45-59 and 54.1% of people aged 60-75 were maintaining a ‘sufficient’ level of activity (p. 29). Sufficient levels of activity were calculated as 150 minutes per week divided equally amongst walking, moderate activity and vigorous activity (Armstrong et al., 2000, p. 29). University staff, like staff in other large organisations, have faced increasing demands in the last decade. It is likely that cuts to funding and rapid structural changes may have made inroads into much of their leisure time and increased stress at work. At the same time much of the work revolves around the use
of personal computers therefore an increase in sedentary work practices exacerbates the lack of physical activity in their lives.

It appears from the 1999 National Physical Activity Survey that approximately half the population, above age 45 were exercising. As the bulk of the population increases in age exercise practitioners must develop programs that non-active older adults will engage in and sustain. It is also important that those currently exercising remain motivated to maintain their active lifestyles.

**Physiological Benefits**

There are many reasons why it is important to maintain an adequate level of physical activity in late adulthood. As people age their functional capacity begins to deteriorate. Bouchard (1997, p. 39) reports that more than 50% of people over the age of 65 experience some form of "chronic pain, chronic degenerative disease or reduction of personal autonomy." However, these can be greatly reduced or even avoided by engaging in regular physical activity.

Washburn (2000, p. 79) and O'Brien and Vertinsky (1991, p. 350) outlined several physiological benefits of regular physical activity. These are (a) longer life expectancy in men and women, (b) fewer years of disability prior to death, (c) decreased risk of losing mobility, (d) decreased risk of falls and hip fractures, (e) increased bone mineralisation, (f) improved muscular strength and endurance, and (g) retardation of osteoporosis.

These benefits also have socio-economic impacts. Pratt, Macera and Wang (2000, p. 63) suggested that increasing participation in regular moderate physical activity among the more than 88 million inactive Americans over the age of 15 might save approximately US$76.6 billion annually. This reduced health care cost would
then lighten the burden on the health care system, but also allow people to remain contributors to society for a much longer period of time. In Australia, baby-boomers are now in their fifties and approaching retirement age. The costs associated with aging provide us with an estimate of the cost of physical inactivity for a western society. These economic costs could be reduced by increasing the levels of physical activity amongst the general population, specifically those approaching, or in, late adulthood.

**Psychological Benefits**

Not only are there physiological benefits to physical activity, there are also psychological advantages. With increasing age an individual’s psychosocial health may decrease as a result of decreases in functional capacity.

The benefits of physical activity in late adulthood are outlined in several studies (Berger, Pargman & Weinberg, 2002; Fox, 2000; Wankel, 1997; Wilfley & Brownell, 1994). Berger et al. (2002, p. 307-308) maintain that desirable personality characteristics, enhanced self-efficacy, increased life-satisfaction, higher levels of happiness, higher perceptions of life quality and decreases in tension are benefits of physical activity. Wankel (1997, p. 112) states that reduced anxiety, decreased depression and enhanced attitudinal states are some of the outcomes of regular physical activity. Fox (2000, p. 235) asserts that promotion and enhancement of physical self-worth along with enhanced self-esteem are created through engagement in physical activities. Wilfley and Brownell (1994, p. 370) state that decreased stress is a short-term result from physical activity. These studies also stress that as one advances into late adulthood exercise becomes increasingly important to maintain and improve the quality of life. The psychological outcomes are clear. However, less is
known about the processes that underlie the confidence of older adults to be physically active. Hence, it is clearly important to understand the contributions of (a) perceived competence, (b) enjoyment, and (c) fear of harm to movement confidence in order to increase the number of people participating in regular physical activity.

Requirements of Physical Activity

According to O'Brien Cousins (1997) and Berger et al. (2002, p. 314-315) for physical activity to maximise psychological benefit, including those related to movement confidence, the mode of exercise must have certain characteristics. These include both enjoyment and practice specifications that are likely to increase perceived competence, increase enjoyment and, at the same time, decrease the fear of harm associated with regular physical activity.

Enjoyment. Berger and McInman (1993, p. 731) state that “exercise participants who are seeking the psychological benefits of mood enhancement would be well advised to seek alternative activities if some aspect of an activity is unpleasant... Activity ‘enjoyment’ clearly is an individual phenomenon.” This is of great importance to exercisers in late adulthood in that the participants would be more likely to adhere to a program, and thus reap the benefits, if they found it more enjoyable. Motl, Berger and Leuschen (2000, p. 360) emphasise that individuals who experiences positive mood changes or enjoys an activity may be much more likely to regularly include such activities in their daily lives. Buckworth (2000, p. 311) found that certain characteristics of physical activities affect the level of physical activity engaged in by an individual. These are frequency, intensity, duration and mode.
Characteristics of physical activity. The characteristics of physical activity that can affect psychological improvements associated with exercise include (a) frequency, (b) intensity, (c) duration, and (d) mode.

**Frequency.** Exercising regularly will increase the likelihood of enjoyment, although care must be taken not to overtrain (Berger et al., 2002, p. 341-343). The research of Berger et al. demonstrated that as fitness increases the discomfort of exercise abates. If exercise is habitually performed then it becomes easier to motivate the participants. In older exercisers the regularity of exercise also allows them to increase their social support network. McAuley et al. (1999) reported that in a randomised controlled trial of two physical activity modes over a 12 month period with \( N = 174 \) adults and \( M_{\text{age}} = 65.5 \) years, exercise frequency was a strong predictor of overall growth in exercise self-efficacy.

**Intensity.** Berger and Owen (1981r, 270x380) found that high intensity exercise led to increases in tension and fatigue, whereas low intensity exercise led to positive mood changes. This view was later supported by Berger and McInman (1993, p. 733) who found that "moderate exercise seems most likely to be associated with enhancing mental health." If gains can be realised as a result of low intensity exercise, then the negative sensations related to high intensity exercise can be avoided. This lack of negative sensation allows for programs to be adopted and adhered to by older exercisers.

**Duration.** In order to produce significant psychological gains approximately 20 to 30 minutes of exercise in one session is needed (Berger & McInman, 1993). Morgan et al. (1988) found that if certain thresholds are exceeded, dependent on the level of physical fitness, the exercise becomes detrimental to psychological gains. For
older exercisers the short duration of exercise means they don't have to significantly reduce the time spent on other activities they may deem as important.

**Mode.** Physical activity for older adults consists of four modal characteristics these are (a) aerobic vs anaerobic, (b) competitive vs non-competitive, (c) open vs closed activity, and (d) repetitive vs non-repetitive.

Aerobic and low intensity exercise have been shown to induce rhythmical breathing, which can in turn lead to greater psychological well being (Berger et al., 2002, p. 321). If this concept is incorporated into the design of programs for older exercisers, the programs can be tailored to the individual rather than applying a generic exercise to a group of participants. This individualising of exercise can also lead to higher retention rates. McAuley et al. (1999) found that in walking versus stretching and toning, it was walking that provided the greatest and longer lasting increases in self-efficacy among 174 adults over 60 years of age.

According to Berger and McInman (1993) non-competitive activity is more beneficial for psychological well being than competitive activity. Competition can lead individuals to overtrain which carries negative psychological consequences. This can influence the way sport and physical activity is presented to older adults. If, in sport for the older adult, emphasis is placed more on skill development, health maintenance and social interaction people may be more receptive to adopting a fitness regimen, than if it focussed more on beating each other to a certain goal. While this view has been supported in younger adults there is little empirical research in older adults. Maynard, MacDonald and Warwick-Evans (1997) found that in 19 male novice rock climbers there was a rise in cognitive anxiety and a reduction in self-confidence as they drew nearer in time to each of the three trial climbs.
Activities that are closed, predictable, or temporally and spatially certain, are associated with greater psychological benefits (Berger et al., 2002, p. 327). In relation to older adults physical activities that are considered ‘safe’ are very important, as it reduces the fear associated with harm that many may feel. Meeuwsen, Goode and Goggin (1997) found that in a study comparing 10 younger females to 10 older females in open skill activities the younger females performed with less error than older females. This decrease in ability associated with open motor skills means that activities which are closed (spatially and temporally certain) are going to have a greater chance of being regularly engaged in by older adults.

Berger et al. (2002, p. 328) also assert that movements, which are repetitive and rhythmical in nature, allow the participant’s mind to think introspectively and creatively. These movements are easily learned and performed. Therefore in older exercisers this means that learning and becoming proficient occur rapidly, which in turn contributes to feelings of mastery. Van Deusen and Harlowe (1987) found that a ROM (range of movement) dance program was more beneficial to engagement in physical activity than a traditional exercise regimen. The dance program participants (at four months follow up) perceived more benefits, more enjoyment, and had greater frequency of participation than did the control subjects and traditional exercise participants.

There are suggested activities that meet the above criteria, a selection of these are presented by Clark (1992, p. 7) they include (a) walking, (b) dancing, (c) cycling, (d) low impact aerobics, (e) aquarobics, (f) tennis and (g) badminton. These align closely with those identified by O’Brien Cousins (1997) as activities that are commonly engaged in by older adults. Such activities can be manipulated to fit with the practice specifications.
While there are clear guidelines outlining desirable physical activity for older adults it appears from Griffin and Keogh's (1982) model that movement confidence, and its components of perceived competence, enjoyment and fear of harm, may be particularly important in understanding an older persons level of engagement in physical activity. While the research findings have focussed on frequency, intensity, duration, and mode little is known about how perceived competence, enjoyment and fear of harm contribute to overall movement confidence. Furthermore, little research has linked movement confidence to level of physical activity. In order to more fully understand this relationship it is important to examine the underlying tenets of the movement confidence model.

**The Movement Confidence Model**

The movement confidence model proposed by Griffin and Keogh (1982) is particularly suitable for research into understanding exercise. Movement confidence is the feeling of adequacy that an individual experiences in a movement situation (Griffin & Keogh, 1982). For example, if an individual feels confident about performing a particular movement or activity he or she is likely to be more motivated to participate in that activity. Movement confidence can be viewed as a consequence or mediator, these are separately defined in order to build a complete view of the movement confidence model that is, in fact, cyclic. Following this, the three components to movement confidence are then examined. These are (a) perceptions of competence, (b) enjoyment, and (c) fear of harm.

The links between cognition and behaviour underlying Griffin and Keogh's (1982) movement confidence model are closely aligned to those implicit in Bandura's (1977) self-efficacy theory. In his theory Bandura proposes that when an individual
perceived his or her ability as of an equal or greater value than that needed to exert control over task demands he or she was more likely to engage in said task (Bandura, 1990, p.316). In both self-efficacy and movement confidence theories, confidence in one's ability to perform effectively is produced when an individual perceives their ability to be greater than the perceived demands of the task (Griffin & Keogh, 1982).

In both the Bandura (1977) and Griffin and Keogh (1982) models, confidence is viewed as a consequence of personal evaluation and a mediator influencing participation. Self-efficacy (Bandura, 1977) is a consequence of four factors: performance accomplishments, vicarious experience, verbal persuasion and emotional arousal (Bandura, 1977). This can be likened to the self-analysis that occurs in the process of personal evaluation that produces a state of movement confidence (Griffin & Keogh, 1982). Self-efficacy also mediates further engagement in physical activity in the same fashion movement confidence mediates the three aspects of participation. They can both determine whether or not an individual will persist with physical activities in the face of increasing adversity. The higher the strength of the self-efficacy belief the more likely an individual will continue with an activity despite adverse conditions (Bandura, 1977). Similarly, Griffin and Cough (1982) propose that the higher the movement confidence the more an individual is likely to persist with activities that present adverse conditions. It is clear that self-efficacy and movement confidence theories are very similar in that both stress the expectancy of success in performing a task. However, it is important to note that in developing the movement confidence model Griffin and Keogh (1982) have extended the notion of competence to include the importance of sensations. Not only is perceived competence important, but feelings of enjoyment and fear of harm are also proposed to influence movement confidence. The added weighting of enjoyment and fear of harm is presented in
Figure 1 that illustrates their direct impact on perceptions of competence to produce a state of movement confidence.

The model of movement confidence has been used in investigating the aspects of perceived competence, enjoyment and fear of harm in children (Crawford & Griffin, 1986; Rose, Larkin, Cantell & Martin, 2001). With the exception of the work of O'Brien Cousins who based her work on the self-efficacy theory there is no known research of the movement confidence model with older adults.

**Movement Confidence as a Consequence**

Movement confidence may be viewed as a consequence of the personal evaluation process. This process is represented in Figure 1. This figure demonstrates MOVCOMP (movement competence) being adjusted by MOVSENSE (enjoyment and fear of harm) so that for a particular movement situation a state of movement confidence is produced (Griffin & Keogh, 1982). This process has four distinct phases: (a) situation analysis where outcomes, demands, skills and expected sensory
experiences are identified; (b) self-analysis where personal level of proficiency and personal preference for movement sensations are identified; (c) evaluation of self/demands where movement competence and movement sense are identified; and (d) a state of movement confidence is produced (Griffin & Keogh, p. 217).

**Movement Confidence as a Mediator**

Griffin and Keogh (1982) also propose that movement confidence is a mediator in participation. This is process is represented in Figure 1. This figure depicts movement confidence as a mediator or influencing variable that will affect three aspects of participation (a) choice, (b) performance, and (c) persistence (Griffin & Keogh, 1982, p. 214). Essentially the aim of exercise science practitioners and promoters of health is to encourage the exercise participant to make choices that result in participation. As a result of this greater adherence to exercise programs is created. It must be recognised that perceived competence, enjoyment and fear of harm are crucial to positive reinforcement of physical activity behaviours. Only then by understanding the cognition's underlying a person's engagement in physical activity may we be better able to plan meaningful exercise programs for older adults (Godin, 1994).

The movement confidence model was selected as the theoretical basis for the current study because it not only includes perceptions of competence, but also perceptions of enjoyment and perceived fear of harm that are likely to have relevance in older adulthood. In older adults there is likely to be a decline in perceptions of competence (ability) (Berger et al., 2002, p. 304). However, at the same time the enjoyment in performing these activities may be increased to counteract the effect of low perceived competence in older adults. Furthermore there is likely to be an
increase in the fear of harm in performing physical tasks. This may be due to a fear of becoming injured and must be taken into account in the designing of an exercise program for older adults.

**Perceptions of Competence**

The concept of competence originated with White (1959) who proposed that perceived competence or feeling effective in the environment is an influencing agent on motivation. Harter (1981) developed and elaborated upon White's theory by adding more variables and acknowledging negative cycles when perceived competence is diminished. In Harter's model perceived competence is the value an individual places on his or her skill in successfully performing a movement. This is consistent with Griffin and Keogh's (1982) model of movement confidence. Essentially an individual will perceive high competence if the perceived skills outweigh the situation demands, they will perceive low competence if the situation demands outweigh the perceived skills. Where as much research in the past has demonstrated that perceived competence is a major predictor of level of physical activity (Rose, Larkin & Berger, 1997; Weiss, Bredemeier & Shewchuk, 1986) the aspects of enjoyment and fear of harm as influencing variables, largely have been ignored. Griffin and Keogh (1982) therefore, view the influences of these constructs as essential.

**Enjoyment**

Enjoyment falls within the category of MOVSENSE in Figure 1. It refers to the hedonic experiences associated with exercise, such as feelings of enjoyment, happiness or satisfaction. Shephard (1997, p.317) states that "Enjoyment seems to be the most important component of programs designed to enhance psychological well-
being in the older age group.” Kimiecik and Harris (1996, p. 256) define enjoyment as a perfect psychological state that leads an individual who is experiencing this state to perform an activity for its own benefits and is related to positive affect. This varies somewhat from the view of Csikzentmihalyi (1992) who makes a distinction between enjoyment and pleasure based on the motivating effect enjoyment has as opposed to straight pleasure derived from an experience. Ryan, Frederick, Lepes, Rubio and Sheldon (1997) found that in a study of 155 men and women who joined a nautilus centre adherence to the program was associated with motives focused on enjoyment, competence and social interaction. Studies with adolescent samples (Castaneda & Sherrill, 1999) also have demonstrated that fun and enjoyment are the most prevalent themes in the social construction process. While the importance of enjoyment in exercise has been studied in younger age groups little is known about the role of enjoyment and fear of harm in movement confidence among older adults.

Fear of Harm

According to the movement confidence model (Griffin & Keogh, 1982) fear of harm comes under the category of MOVSENSE in figure 1. The fear of harm associated with exercise refers to the feelings of physical danger that an individual may perceive as present when attempting to move the body in a particular fashion (Griffin & Keogh, 1982, p. 218). O’Brien and Vertinsky (1991) stress the importance of fear as a contributing factor in exercise avoidance coupled with a common belief that exercise and physical exertion is dangerous. Campbell, Robertson, Gardner, Norton and Buchner (1999, p. 517) found that elderly people who maintained a falls prevention program, at one year, exhibited a lower fear of falling than did those who withdrew from their study. In older adults fear of physical activity is likely to be
exacerbated due to the risk of harm many associate with it, where as in younger people risk of harm tends to illicit excitement rather than fear.

Contention in the Movement Confidence Model

Early studies have found that an individual’s perception of competence is the main contributor to level of movement confidence (Griffin, Keogh & Maybee, 1984). However, there is little research in this area with older adults. Research in children by Crawford & Griffin (1986) has shown that perceptions of enjoyment and fear of harm do not add to the prediction of physical activity levels. As fitness levels decline and as old injuries become more problematic, not only will perceived competence decline, but fear of harm may increase. Not only is the perceived competence likely to decline, as a result of lowered capacity, but lack of enjoyment compounded with fear of harm, may lead to ultimate withdrawal from physical activity. This downward spiral may, however, be reversed by implementing various strategies that increase enjoyment and perceived competence, while simultaneously decreasing the fear of harm that may be seen as inherent in physical activity. Furthermore, fear of harm may become more significant in contributing to the belief that one can perform a task. For example the thought of recovery from a fracture or damaged ligaments may be foremost in the mind of the older adult, whereas for a younger person winning or succeeding in their sport may be placed above recovery from an injury. In essence, what for a younger person may pose an exciting challenge, for an older person may illicit fear of injury from which they may never fully recover. The aims of exercise may also change with age in relation to enjoyment in that younger people may see competition as more important than enjoyment, whereas an older adult may now seek enjoyment as their
primary aim. To date the relative contributions of perceived competence, enjoyment and fear of harm to movement confidence have not been researched in older adults.

**Gender, Movement Confidence and Physical Activity**

The gender of an individual may influence confidence and physical activity independent of other variables. This section will review gender influences on (a) movement confidence, and (b) physical activity.

**Gender and Movement Confidence**

Gender has been shown to affect sport self-confidence in children (Eccles & Harold, 1991). Eccles and Harold (1991) found that gender role socialisation resulted in differences in perceived sports ability in boys and girls. Jones, Swain and Cale (1991) measured the self-confidence in males to females from 1 week leading up to 30 minutes before competition and found that females exhibited earlier and greater decreases in self-confidence than did males. These studies both claim that gender role socialisation is a key component in accounting for the differences in self-confidence in males and females. However, these studies do not target older adults.

**Gender and Physical Activity**

There is research to show that gender has an effect on level of physical activity. Trost et al. (1996) recorded the physical activity scores and the activity behaviour in 365 fifth grade students (179 males and 186 females). They found that in behaviours males exhibited greater physical fitness, self-efficacy, television watching, and sports participation than females. However, when physical activity scores were adjusted for the effects of these variables, gender significant differences (p < .001) in
the physical scores remained. Armstrong et al. (2000) in a study measuring the physical activity habits of 3,841 Australian adults, using forced entry logistic regression, reported that women were 20% less likely to engage in levels of physical activity sufficient enough to receive any benefits. It is therefore important that gender be considered in any study of movement confidence and level of physical activity.

Perceptions of Modes of Physical Activity

This section investigates the previous research into the perceptions people hold in relation to the modes of physical activity used in the MCN questionnaire employed in the current study. These activities are (a) 20 curl-ups, (b) 10 modified push-ups, (c) 50 minute aqua-fit exercise class in a swimming pool, (d) power walking for 30 minutes on a level surface, (e) slow stretch to touch the toes, (f) ride a bicycle for 30 minutes on a level surface, (g) 30 minutes moderate paced swimming in a swimming pool, and (h) jogging for 30 minutes on a level surface.

Curl-ups

Curl-ups, also know as sit-ups or trunk curls, incorporate the muscles of the abdominal wall (transverse abdominis, rectus abdominis, internal oblique and external oblique) and the iliopsoas muscle (Juker, McGill, Kropf & Steffen, 1998, p. 301) to cause flexion at the hip and raise the trunk off the floor. Juker et al. (1998, p. 301) state that these muscles also play a major role in the normal functioning of the lumbar spine. This view is supported by O’Brien Cousins (2000, p. 288) who states that “Strength in these muscles is therapeutic because it helps a person to maintain posture and support for the back.”
In a qualitative study of 143 women over the age of 70 O'Brien Cousins (2000, p. 289) found that in relation to trunk curls the largest concern was neck and back injury (28 women), second was angina or heart attack (13 women). O'Brien Cousins (2000, p. 289) in the same study reported that 24 women could think of no benefit in doing curl-ups, 34 thought of realistic benefits and 48 guessed benefits. Vera-Garcia, Grenier and McGill (2000) suggest that whilst curl-ups performed on labile surfaces provide greater muscle activity the higher spine loads only make them inappropriate for the most fragile of patients.

**Modified Push-ups**

The modified push up is the same in all respects to a normal push-up but different in one aspect in that it is performed from the knees instead of the feet. Therefore the load on the triceps, biceps, wrist flexors and joints of the arm are much lower. O'Brien Cousins (2000, p. 287) reported that only 12 women from 143 surveyed thought that modified push-ups would not be risky or potentially harmful. Also O'Brien Cousins (2000, p. 287) states that only 34 from 143, 70 year old women, surveyed thought that modified push-ups would be of any realistic benefit to them. There is little research on this exercise in older males but it is likely that men may feel more comfortable engaging in this activity due to greater upper body strength than females.

**Aqua-fit Exercise Classes**

D'Acquisto, D'Acquisto and Renne (2001, p. 12) define aquatic exercise or aqua fit exercise as an adaptation of land-based physical activity, such as walking, jogging, calisthenics, and a variety of locomotive movements to a water medium.
Von Duvillard, Le Mura, Presper, Plaud and Rohrer (2000) found that at 21 minutes of water exercise, subjects reported lower RPE (Borg 6-20 scale) than compared to 21 minutes of land exercise. This makes aquatic exercise far easier to adopt and maintain due to the low levels of discomfort associated with it.

O’Brien Cousins (2000, p. 287) found that only 23 women from the 143 surveyed believed that aqua-fit classes posed no risk or potential harm to them. However, 71 women believed there would be realistic benefits from engaging in this activity on a regular basis. Also Watanbe, Takeshima, Okada and Inomata (2001) found improvements in psychological wellbeing in 33 older adults, who engaged in water based exercise programs three times per week, over 12 weeks.

**Power Walking**

Walking is one of the most accessible forms of physical activity as it requires little skill and is very low cost. O’Brien Cousins (2000, p. 287) reports that 98 older women from 143 surveyed believed there to be realistic benefits in walking for 30 minutes at a moderate pace. Ann-Jones and Owen (1998) found that in a walking program participation increased from 0 to 213 over a 5 month period, however, female participation outnumbered male participation.

**Toe Touching**

Jensen, Shultz and Bangeter (1983) recommend stretching before exercise as it reduces the likelihood of muscle injury and damage to soft tissue. They also included increased and more complete relaxation as a result of stretching. O’Brien Cousins (2000, p. 288) views hip flexion and mobility as essential for good back health. The activity of toe touching, as used in the MCN, is performed in a seated position. In the
elderly it is increasingly important to maintain this mobility as it is used in common activities of daily living. O'Brien Cousins (2000, p. 287) reports that 49 older women believed there to be realistic benefits and 49 guessed there might be benefits, although these weren't realistic. However, 29 women in the same study believed they would receive neck or back damage as a result of doing this activity.

Cycling

Kuster, Spalinger, Blanksby and Gachter (2000, p. 721) report that the American College of Sports Medicine recommends cycling for 20-60 minutes 3-5 times per week. They found that after total knee replacement patients should engage in power walking and cycling due to the low amount of stress placed on the knee joint associated with the performance of these activities. High intensity cycling also has physiological effects on older adults. Petrella, Cunningham and Paterson (1997, p. 37) found that after 5 days of high intensity cycling, training isovolumic relaxation time was reduced by 31%, VO$_2$max increased by 12% and plasma volume increased by 10%. These returned to baseline after 21 days of detraining. Izquierdo et al. (2001, p. 1577) found that during sub-maximal cycling, muscle power and demand for aerobic energy per unit of muscle tissue remained the same in 26 middle aged men (42 years) and 21 elderly men (65 years). O'Brien Cousins (2000, p. 287) found that 64 women from 143 surveyed could give realistic benefits of cycling for 20 minutes per day at a moderate pace, however, only 16 reported that there would be no risk to them.

Kingma (1994, p. 1194) found that from a total of 4,479 bicycle accidents from 1st of January 1989 to the 31st of December 1993 injuries that didn't involve other traffic were highest among 20-29 year olds (23.2%). Fifty to fifty nine year olds were 6.7%,
60-69 year olds were 6.4%, and those 70 years or over were the least likely to incur injury at 5.9%.

**Swimming**

Brodkin and Weiss (1990) conducted a study of N = 100 swimmers spanning 6 age groups from children through to older adults. The characteristics of competitive swimming were ranked significantly lower by older adults whilst fun was rated as the most important. However, it is of interest that health and fitness benefits were rated last by older adults (Brodkin & Weiss, 1990).

**Jogging**

Pollock et al. (1991, p. 1194) found that in 57 health volunteers 70-79 years of age (25 males, 32 females), adherence to a 14 week walk/jog program and the associated benefits can be excellent. However, they also report an injury rate for the walk/jog group (n = 21) of 57%. These injuries were all to the lower extremities. Vitulli and Malek (1997, p. 675) report that in 96 subjects (28 men and 68 women) between the ages of 51-94, 69.8% reported that they engaged in forms of exercise other than jogging. Forty one point seven percent said jogging was too uncomfortable and 57.3% stated they had a health condition that prevented them from jogging.

**Measurement Issues**

There are several ways in which movement confidence and level of physical activity can be measured. Movement confidence is measured by Griffin and Keogh (1982) through a movement confidence equation, whilst O'Brien Cousins (1997) measured movement confidence directly. In the current study movement confidence is
measured directly by asking participants how sure are they that they can perform a particular activity. Level of physical activity is usually measured in one of two ways, kilocalories and Mets.min (Brown and Bauman, 2000). In the present study the kilocalories method is used.

Movement Confidence

Griffin and Kough (1982) conceptually presented movement confidence by using an equation that incorporated (a) perceived competence (PC), (b) enjoyment (EN), and (c) fear of harm (FH). The equation appears as PC + (EN - FH) = MC. On the other hand O'Brien Cousins (1997) individually measured movement confidence, enjoyment, fear of harm, and previous experience across different types of physical activities. However, perceived competence was not included.

By not including perceived competence in the MCN O'Brien Cousins does not include all of the components of the movement confidence model. Thus, for the purposes of this study there was clearly a need to incorporate a question on perceived competence. This was done in order that all three components of movement confidence, that is (a) perceived competence, (b) enjoyment, and (c) fear of harm were measured. These variables were measured using a Likert scale of 1-4. A score for every one of these variables was calculated for each movement task. In addition an overall score was calculated for each variable.

Level of Physical Activity

There are two major methods for measuring level of physical activity, these are kilocalories and Mets.min (Brown & Bauman, 2000). Although it has been reported that the kilocalories method overestimates level of physical activity in
regards to obese individuals due to the inclusion of body weight (Brown & Bauman, 2000), the questionnaire chosen for this study showed virtually identical estimated exercise status.

The Older Adult Exercise Status Inventory (OA-ESI) provides a great deal of information about an individual's weekly physical activity (O'Brien Cousins, 1996). The OA-ESI is a kcal method of measuring physical activities, that is, the amount of physical activity done is represented by the amount of kcals used. The original OA-ESI measured the physical activity at paid work and leisure, for the purposes of this study only physical activity for leisure was measured as it related closely to the movement confidence model rather than paid work physical activity.

The inclusion of weight as a variable in the kcal method was considered to overestimate the energy used in overweight individuals (Brown & Bauman, 2000). However, O'Brien Cousins (1996, p. 301) reports that for adjusted (includes body weight) and unadjusted (no body weight) the estimated exercise status was virtually identical ($r = .975$).

Summary

From the literature it is clear that in Australian society, people over the age of 45 are not exercising sufficiently to produce vital benefits. As a result of this lack of physical activity in their daily lives, these individuals are unlikely to receive the psychosocial and physiological benefits a healthy lifestyle can bestow. By studying movement confidence and related constructs, programs may be better designed and implemented in order to reverse this trend.

Movement confidence is viewed by Griffin and Keogh (1982) and O'Brien Cousins (1997) as a central factor influencing physical activity levels. People who
have little confidence in their movement are less likely to engage in physical activity. It is therefore clearly important that we understand the constructs underlying overall confidence. By studying movement confidence in terms of (a) perceived competence, (b) enjoyment, and (c) fear of harm health professionals may be better guided in planning exercise programs for older adults, especially those who work in a university environment.

Whilst research in children and youth have found that perceived competence is the major contributor to movement confidence it is likely that the inclusion of enjoyment and fear of harm is particularly important for older adults. By examining the importance of each of these variables it will be possible to more accurately target the areas of need in the promotion of physical activity. Furthermore this analysis will enable exercise practitioners and health promoters to breakdown barriers to engagement in physical activity in older adults.

**Theoretical Framework**

![Diagram](image)

**Figure 2.** The factors influencing physical activity levels in late adulthood.

The theoretical framework for this study is presented in Figure 2. According to Griffin and Cough (1982) the three factors of movement confidence (a) perceived competence, (b) enjoyment, and (c) fear of harm combine to produce a state of
movement confidence. It is this state of movement confidence that affects the level of physical activity. Considering research that indicates males and females differ in level of movement confidence, gender is an issue that must be addressed when applying the movement confidence model. In addition to this the level of physical activity could also be influenced by gender, as indicated by the male and female variables depicted in Figure 2.

While the Griffin and Keogh model has had application with children and youth in sporting contexts, it has yet to be applied in its entirety to older adults. It is therefore crucial that we investigate the relative contributions of (a) perceived competence, (b) enjoyment and (c) fear of harm to movement confidence in male and female older adults. This study will then enable health professionals to design programs that have a strong basis in promoting confidence of movement in older adults thereby increasing the number of participants who engage in regular physical activity that is both psychologically and physiologically beneficial.
CHAPTER THREE

Methodology

Participants

The participants in this study were people aged between 50 and 65 years, the sample number of $N=54$ people ($n=26$ male and $n=28$ female) were volunteers drawn from staff of a university. The sample used both academic and support staff. Recruiting occurred through mailing of information sheets (see Appendix A) via the university's internal mail service to senior members of staff across three campuses. As the initial response rate to this mail out was 20%, a follow up e-mail was made to those who did not respond. The response rate to the e-mail was 80%, and the researcher telephoned those who agreed to participate in order to organise a meeting time with each participant. Permission to undertake the study was granted by the Human Research Ethics Committee of Edith Cowan University. The participants filled out consent forms (see Appendix A) after the questionnaire had been fully explained and witnessed by the researcher. Considering that gender may be such a strong influencing variable, males and females were analysed separately. This initial analysis on male and female differences was made to ensure that gender did not influence the level of movement confidence as opposed to (a) perceived competence, (b) enjoyment, and (c) fear of harm. It also established whether gender would influence level of physical activity when examining physical activity in relation to movement confidence.
Design

This study answered four questions in relation to male and female older adults. The first question asked 'What were the relative contributions of (a) perceived competence, (b) enjoyment, and (c) fear of harm to movement confidence?' The second question was 'What was the relationship between level of movement confidence and level of physical activity?' The third question asked 'What was the relationship between level of movement confidence and level of previous experience in male and female older adults?' The last question was 'Which of the eight physical activities used in the study stood out as more pertinent to male and female older adults?' Data was collected using the MCN (O'Brien Cousins, 1997) and OA-ESI (O'Brien Cousins, 1996).

The preliminary analysis for research question one involved an independent groups t-test. The main analysis for the first research question included a Pearson's correlation, followed by hierarchical multiple regression with movement confidence as the dependent variable and perceived competence, enjoyment and fear of harm as the independent predictor variables. The preliminary analysis for the second research question used an independent groups t-test. The main analysis for research question two encompassed a Pearson's correlation. For research question three the preliminary analysis involved an independent groups t-test. The main analysis for the third research question used a Pearson's correlation with previous experience and level of movement confidence. The preliminary analysis for the fourth research question contained an independent groups t-test. The main analysis for research question four encompassed an ANOVA with Tukey's HSD post hoc multiple comparisons. The design of this study is presented in Figure 3 below.
Measures

Questionnaires that were administered included the MCN (O'Brien Cousins, 1997) and the OA-ESI (O'Brien Cousins, 1996).

Movement confidence

Movement confidence, perceived competence, enjoyment, and fear of harm were measured using the MCN (O'Brien Cousins, 1997). This instrument asked participants to rate their perceptions and feelings about performing 8 different physical activities, each on a scale of 1-4. The tasks were based on the types of activity commonly engaged in by older adults. O'Brien Cousins (1997, p. 235) reported that the instrument was pilot tested for 4-week reproducibility, with 17 women aged 55-75 years, and was found to be highly reliable ($r = .779, p < .001$).
questionnaire was trialed on 5 adults over the age of 50 years to determine if there was any cultural difference. The result of this was that some minor adjustments were made to the questionnaire to make it more aligned to the movement confidence model (Griffin and Keogh, 1982). These were (a) to include a question relating to perceived competence and (b) to make it more relevant to an Australian population. Firstly, the researcher included an additional question relating to perceived competence. This question asked ‘How skilled are you in this activity?’ Secondly, the item relating to the activity of ‘Cycling on a push bike or pedalling an exercise bike’ was altered as cycling on a push bike and riding an exercise bike are two separate activities due to the need to balance whilst cycling on a push bike. Therefore the item was changed to read ‘Ride a bicycle for 30 minutes on a level surface’. Lastly, as the activity of swimming is popular for all age groups in Australia, an item referring to the activity ‘30 minutes moderate paced swimming in a swimming pool’ was included. O’Brien Cousins (1997, p. 235) reports a reliability for the MCN of $r = 0.951$ ($p < 0.001$) in a 4-week reproducibility study with 17 older women aged between 55 and 75 years. A complete copy of the adjusted version of the MCN questionnaire is presented in Appendix B.

**Level of physical activity**

Level of physical activity was measured using the OA-ESI (O’Brien Cousins, 1996), in which participants were asked to record their participation in physical and sedentary leisure activities for the previous week. However, as this study was limited to the motor domain, physical leisure activities were included in the data analysis whilst any sedentary leisure activities were excluded. The intensity of each physical activity, dependent on body weight, was identified from McArdle, Katch and Katch (1996, p. 35).
This intensity was then multiplied by the time spent on the activity. This result is the amount of kcal's per week spent on physical activity. An example of the questionnaire is provided in Appendix C. In overweight individuals the inclusion of body weight as a variable in kcal methods was considered to overestimate the energy used (Brown & Bauman, 2000). However, O'Brien Cousins (1996, p. 301) reports that for adjusted (includes body weight) and unadjusted (no body weight) estimated exercise status was virtually identical ($\gamma = 0.975$). Therefore it was decided to include body weight in the calculation of estimated exercise status. The formula used to calculate the kcal measurement is Intensity (mets) x Time (min) = kcal.

**Procedure**

The following steps were carried out as the research procedure.

1. 75 senior staff members (35 males and 40 females) from a university (including academic and support staff) were identified from departmental lists and invited to participate through distribution of information sheets (see Appendix A) via internal mail.
2. The volunteers who wished to participate completed the consent form (see Appendix A) and contacted the researcher to organise a meeting time.
3. Each participant was assigned a number located on the consent forms and the questionnaire, the consent form was then detached and filed separately from the questionnaire.
4. Due to a low response rate of 20%, the researcher followed up the mail out with an e-mail 3 weeks later that asked senior staff members...
whether or not they wished to participate. The response to the e-mail was much higher reaching 80%.

5. On expression of interest the researcher contacted the staff member by telephone and informed them that the questionnaire would take approximately 20 minutes to complete and was not a test and they would not be evaluated in any way. The researcher then arranged a meeting time with the participant.

6. The researcher administered the questionnaire to each participant in his/her office, at a convenient time and in a standardised manner. To ensure control and administration of the questionnaire the same researcher conducted the meetings for all participants. Questionnaires were presented in the same order to control for variability that can occur between testers. The procedure for introducing the questionnaire was as follows. Firstly the researcher briefly outlined to the participant the purpose of the study. Secondly the participant was given a brief verbal description of what the questionnaire entailed, similar to that in the information sheet (Appendix A). Thirdly, the researcher informed the participant that they could withdraw at any time and were free to ask questions while answering the questionnaire.

7. After the participant completed the questionnaire they were informed that they may contact the researcher to discuss the results of their questionnaire at a later date. The total amount of time to administer all questionnaires to all participants was approximately 18 hours.

8. The data was analysed using SPSS for windows and results recorded.
9. The data was stored in a locked cabinet and all hard copies, disks, and computerised data will be destroyed after a period of 5 years.

10. The procedures and questionnaires administered had been passed by the Edith Cowan University Human Research Ethics Committee.

11. The follow up of the study entailed sending the participants an outline of the findings of the study, how they scored on the MCN and OA-ESI, and how they scored in relation to the norms for the group.

Data Analysis

Data was analysed using SPSS for windows and associated word processing software on a PC. The statistics used in this study to calculate the results were:

1. The first research question asked 'What are the relative contributions of 3 identified components of movement competence (MC); (a) perceived competence (PC), (b) perceived enjoyment (EN) and (c) perceived fear of harm (FH), to levels of movement confidence in older adults?' This was analysed using an independent groups t test with gender as the grouping variable and MC, PC, EN and FH as the testing variables. Secondly, a Pearson's correlation was carried out followed by a hierarchical multiple regression. The dependent variable was MC with three independent variables of PC, EN and FH.

2. The second research question was 'Does a relationship exist between level of movement confidence and level of physical activity (LPA) in male and female older adults?' To analyse this an independent groups t test was conducted with gender as the grouping variable and LPA as the testing variable. Secondly, a Pearson's correlation with beta
weights was used to discover if there was a relationship between movement confidence and level of physical activity.

3. The third research question was 'What is the relationship between level of movement confidence and level of previous experience (PE)\?' This question was analysed using an independent groups t-test with gender as the grouping variable and PE as the testing variable. Secondly a Pearson's correlation was performed to discover if there was a correlation between movement confidence and previous experience.

4. The fourth research question asked 'Did any one of the eight physical activities used in the study stand out as being more pertinent to male and female older adults?\' This question was analysed by conducting an independent groups t-test with gender as the grouping variable and the eight physical activities as the testing variables. Secondly, the data was analysed by activity using an ANOVA and Tukey's HSD with post hoc multiple comparisons to discover if any of the physical activities in the MCN stood out as being more popular than the others among the participants.
Limitations of the Study

The limitations of this study were as follows:

1. The specificity of the population limited the ability to generalise the results to the wider population. So findings could only apply to university staff 50 years and over.

2. Whilst we can, from a cross sectional design, examine relationships it is not possible to determine whether movement confidence causally influences level of physical activity, or vice versa.

3. Although social support, work load and perceived effort are likely to influence levels of physical activity, the scope of this study did not permit the investigation of these variables. However, separately analysing males and females controlled any likely effect of gender.

4. Similarly physical health status is likely to influence movement confidence. The scope of this study did not permit investigation of a relationship between an individual’s physical health and their level of physical activity.

5. The Griffin and Keogh model (1982) also includes aspects of choice, performance and persistence. Due to the scope of the study only level of engagement in physical activity and choice of activity were included. Level of persistence and performance were not included.
CHAPTER FOUR
Results

This chapter is divided into four sections, each dealing with one of the four separate research questions. The four sections are (a) the relative contributions of perceived competence, enjoyment and fear of harm to movement confidence, (b) the relationship between movement confidence and level of physical activity, (c) the relationship between movement confidence and previous experience, and (d) differences in perceptions between the eight physical activities.

Relative Contributions of Perceived Competence, Enjoyment and Fear of Harm to Movement Confidence

Research question one asked 'What were the relative contributions of (a) perceived competence, (b) enjoyment, and (c) fear of harm to movement confidence?' The results are presented as three separate analyses involving an independent groups t-test, a Pearson's correlation and hierarchical multiple regressions. Analyses were made for the overall sample, then separately for males and females.

Independent Groups t-test

The results of the independent groups t-test on the overall sample with gender as the grouping variable and MC, PC, EN and FH as the testing variables are presented in Table 1. There was no significant difference between the scores males and females received in MC (t = 1.322, p = 0.192), PC (t = 0.631, p = 0.531), EN (t = 0.262, p = 0.794) and FH (t = 0.630, p = 0.532).
Table 1
Difference in Males (n = 26) and Females (n = 28) between Movement Confidence (MC), Perceived Competence (PC), Enjoyment (EN) and Fear of Harm (FH)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>MC</th>
<th>PC</th>
<th>EN</th>
<th>FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>24.62</td>
<td>21.27</td>
<td>20.23</td>
<td>25.65</td>
</tr>
<tr>
<td>females</td>
<td>22.79</td>
<td>20.39</td>
<td>19.96</td>
<td>24.82</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>4.82</td>
<td>4.57</td>
<td>3.09</td>
<td>3.53</td>
</tr>
<tr>
<td>females</td>
<td>5.31</td>
<td>5.55</td>
<td>4.25</td>
<td>5.95</td>
</tr>
<tr>
<td>t</td>
<td>1.322</td>
<td>0.631</td>
<td>0.262</td>
<td>0.63</td>
</tr>
<tr>
<td>df</td>
<td>52</td>
<td>52</td>
<td>52</td>
<td>44.462</td>
</tr>
<tr>
<td>p</td>
<td>0.192</td>
<td>0.531</td>
<td>0.794</td>
<td>0.532</td>
</tr>
</tbody>
</table>

Note. p < 0.025

Pearson's Correlation

The overall sample correlations among the variables of MC and PC, EN, FH and PE are presented in Table 2. There was a positive relationship between MC and PC (r = 0.776, p < 0.01), EN (r = 0.670, p < 0.01) and FH (r = 0.535, p < 0.01). The correlations among the variables MC and PC, EN, FH and PE for the male population are presented in Table 2. It was evident that MC showed a positive relationship with PC (r = 0.653, p < 0.01), EN (r = 0.525, p < 0.01) and FH (r = 0.523, p < 0.01). The correlations among the variables MC, PE, PC, EN and FH for the female population are presented in Table 2. It was evident that MC displayed a positive relationship with PC (r = 0.862, p < 0.01), EN (r = 0.772, p < 0.01) and FH (r = 0.550, p < 0.01).
### Table 2
Pearson's Correlation Matrix Between Movement Confidence (MC), Previous Experience (PE), Perceived Competence (PC), Enjoyment (EN) and Fear of Harm (FH) for the Overall (N = 54), Male (n = 26) and Female (n = 28) Populations

<table>
<thead>
<tr>
<th>Variables</th>
<th>MC</th>
<th>PE</th>
<th>PC</th>
<th>EN</th>
<th>FH</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>--</td>
<td>.705**</td>
<td>.776**</td>
<td>.670**</td>
<td>.535**</td>
</tr>
<tr>
<td>Male</td>
<td>--</td>
<td>.695**</td>
<td>.653**</td>
<td>.525**</td>
<td>.523**</td>
</tr>
<tr>
<td>Female</td>
<td>--</td>
<td>.730**</td>
<td>.862**</td>
<td>.772**</td>
<td>.550**</td>
</tr>
<tr>
<td>PE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>--</td>
<td>.653**</td>
<td>.736**</td>
<td>.378**</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>--</td>
<td>.551**</td>
<td>.682**</td>
<td>.206</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>--</td>
<td>.712**</td>
<td>.763**</td>
<td>.448*</td>
<td></td>
</tr>
<tr>
<td>PC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>--</td>
<td>.682**</td>
<td>.488**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>--</td>
<td>.496**</td>
<td>.311</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>--</td>
<td>.787**</td>
<td>.571**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>--</td>
<td></td>
<td>.380**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>--</td>
<td></td>
<td>.220</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>--</td>
<td></td>
<td>.444*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FH</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>23.67</td>
<td>19.30</td>
<td>20.81</td>
<td>20.09</td>
<td>25.22</td>
</tr>
<tr>
<td>Male</td>
<td>24.62</td>
<td>19.42</td>
<td>21.27</td>
<td>20.23</td>
<td>25.65</td>
</tr>
<tr>
<td>Female</td>
<td>22.79</td>
<td>19.18</td>
<td>20.39</td>
<td>19.96</td>
<td>24.82</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>5.12</td>
<td>4.95</td>
<td>5.07</td>
<td>3.70</td>
<td>4.91</td>
</tr>
<tr>
<td>Male</td>
<td>4.82</td>
<td>4.11</td>
<td>4.57</td>
<td>3.09</td>
<td>3.53</td>
</tr>
<tr>
<td>Female</td>
<td>5.31</td>
<td>5.70</td>
<td>5.55</td>
<td>4.25</td>
<td>5.95</td>
</tr>
</tbody>
</table>

* _p < .05, **_p < .01

**Hierarchical Multiple Regressions**

The hierarchical multiple regression for the overall population is presented in Table 3. This showed the variance in MC scores attributed to each of the independent variables of PC, EN and FH. Specifically, PC made a significant contribution of 60.2%
to the score of MC ($p < 0.05$), EN made a significant contribution of 3.7% to the score of MC ($p < 0.05$) and FH made a significant contribution of 2.8% to the score of MC ($p < 0.05$).

Table 3
Hierarchical Multiple Regression with Movement Confidence (MC) as Dependent Variable and Perceived Competence (PC), Enjoyment (EN) and Fear of Harm (FH) as Predictor Variables for the Overall (N = 54) Population

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R$ Square</th>
<th>Change $R$ Square</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.776$^a$</td>
<td>0.602</td>
<td>0.602</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.799$^b$</td>
<td>0.639</td>
<td>0.037</td>
<td>0.026</td>
</tr>
<tr>
<td>3</td>
<td>0.816$^c$</td>
<td>0.667</td>
<td>0.028</td>
<td>0.047</td>
</tr>
</tbody>
</table>

$^a$ Predictors: (Constant), PC
$^b$ Predictors: (Constant), PC, EN
$^c$ Predictors: (Constant), PC, EN, FH

The hierarchical multiple regression for the male population is presented in Table 4. This demonstrated the variance in MC scores attributed to each of the independent variables of PC, EN and FH in the male population. PC made a significant contribution of 42.6% to the score of MC ($p < 0.05$), EN did not make a significant contribution to the score of MC ($p = 0.138$) and FH made a significant contribution of 10.2% to the score of MC ($p < 0.05$).
Table 4
Hierarchical Multiple Regression with Movement Confidence (MC) as Dependent Variable and Perceived Competence (PC), Enjoyment (EN) and Fear of Harm (FH) as Predictor Variables for the Male (n = 26) Population

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Change</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.653a</td>
<td>0.426</td>
<td>0.426</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.693b</td>
<td>0.480</td>
<td>0.054</td>
<td>0.138</td>
</tr>
<tr>
<td>3</td>
<td>0.763c</td>
<td>0.582</td>
<td>0.102</td>
<td>0.030</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), PC  
b Predictors: (Constant), PC, EN  
c Predictors: (Constant), PC, EN, FH

The hierarchical multiple regression for the female population is presented in Table 5. This demonstrated the variance in MC scores attributed to each of the independent variables of PC, EN and FH in the female population. PC made a significant contribution of 74.4% to the score of MC (p < 0.05), EN did not make a significant contribution to the score of MC (p = 0.127) and FH did not make a significant contribution to the score of MC (p = 0.466).

Table 5
Hierarchical Multiple Regression with Movement Confidence (MC) as Dependent Variable and Perceived Competence (PC), Enjoyment (EN) and Fear of Harm (FH) as Predictor Variables for the Female (n = 28) Population

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Change</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.862a</td>
<td>0.744</td>
<td>0.744</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.876b</td>
<td>0.767</td>
<td>0.023</td>
<td>0.127</td>
</tr>
<tr>
<td>3</td>
<td>0.879c</td>
<td>0.772</td>
<td>0.005</td>
<td>0.466</td>
</tr>
</tbody>
</table>

a Predictors: (Constant), PC  
b Predictors: (Constant), PC, EN  
c Predictors: (Constant), PC, EN, FH
Research question two asked 'What was the relationship between MC and LPA?' The results are presented in two sections. Firstly, that of the independent groups t test, followed by the results of the Pearson's correlation.

### Independent Groups t Test

The independent groups t test using gender as the grouping variable and LPA as the testing variable found that there was no significant difference between males and females for LPA ($t = 2.095, p > 0.025$). This data is presented in Table 6.

<table>
<thead>
<tr>
<th>Statistic</th>
<th>LPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>2827.8615</td>
</tr>
<tr>
<td>females</td>
<td>1984.9214</td>
</tr>
<tr>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>1536.7615</td>
</tr>
<tr>
<td>females</td>
<td>1410.3361</td>
</tr>
<tr>
<td>t</td>
<td>2.095</td>
</tr>
<tr>
<td>df</td>
<td>50.688</td>
</tr>
<tr>
<td>p</td>
<td>0.041</td>
</tr>
</tbody>
</table>

Note. $p < 0.025$ (2-tailed significance).

### Pearson's Correlation

The overall Pearson's correlation is presented in Table 7. These results showed that MC was positively correlated to LPA ($r = 0.302, p < 0.05$). However, when the population was divided into males and females the relationship became insignificant.
Table 7
Pearson's Correlations for the Overall (N = 54), Male (n = 26) and Female (n = 28) Populations between Movement Confidence (MC) and Level of Physical Activity (LPA)

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th></th>
<th>Male</th>
<th></th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MC</td>
<td>LPA</td>
<td>MC</td>
<td>LPA</td>
<td>MC</td>
</tr>
<tr>
<td>MC</td>
<td>--</td>
<td>0.302*</td>
<td>--</td>
<td>0.176</td>
<td>--</td>
</tr>
<tr>
<td>LPA</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>M</td>
<td>23.67</td>
<td>2390.78</td>
<td>24.62</td>
<td>2827.86</td>
<td>22.79</td>
</tr>
<tr>
<td>SD</td>
<td>5.12</td>
<td>1519.21</td>
<td>4.82</td>
<td>1536.76</td>
<td>5.31</td>
</tr>
</tbody>
</table>

* p < .05

The Relationship between Movement Confidence and Previous Experience

Research question three asked 'What was the relationship between movement confidence and previous experience?' The results are presented as two separate analyses. These are an independent groups t test and a Pearson's correlation.

Independent Groups t Test

The results from the independent groups t test with gender as the grouping variable and PE as the testing variable showed that there was no significant difference between males and females in PE (t = 0.182, p > 0.025). This data is presented in Table 8.
Table 8
Difference between Males (n = 26) and Females (n = 28) in Previous Experience (PE)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>PE</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>19.42</td>
</tr>
<tr>
<td>females</td>
<td>19.18</td>
</tr>
<tr>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>4.11</td>
</tr>
<tr>
<td>females</td>
<td>5.7</td>
</tr>
</tbody>
</table>

$t$ = 0.182  
$df$ = 49.096  
$p$ = 0.856

Note. $p < .025$ (2-tailed significance).

Pearson's Correlation

The results from the Pearson's correlation between MC and PE for the overall, male and female samples are presented in Table 9. Overall MC correlates highly with PE ($r = 0.705$, $p < 0.01$), for males MC correlates highly with PE ($r = 0.695$, $p < 0.01$) and in females MC also correlates highly with PE ($r = 0.730$, $p < 0.01$).

Table 9
Pearson's Correlation for the Overall (N = 54), Male (n = 26) and Female (n = 28) Populations between Movement Confidence (MC) and Previous Experience (PE)

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MC</td>
<td>PE</td>
<td>MC</td>
</tr>
<tr>
<td>MC</td>
<td>--</td>
<td><strong>0.705</strong></td>
<td>--</td>
</tr>
<tr>
<td>PE</td>
<td><strong>0.705</strong></td>
<td>--</td>
<td><strong>0.695</strong></td>
</tr>
<tr>
<td>$M$</td>
<td>23.97</td>
<td>19.30</td>
<td>24.62</td>
</tr>
<tr>
<td>$SD$</td>
<td>5.12</td>
<td>4.95</td>
<td>4.82</td>
</tr>
</tbody>
</table>

**$p < .01$**
Differences in Perceptions between the Eight Physical Activities

Research question four asked 'Did any one of the eight physical activities used in the study stand out as more pertinent to male and female older adults?' The results were divided into two separate analyses. The first was an independent groups t test and the second was a one-way ANOVA with post hoc Tukey's HSD and multiple comparisons.

Independent Groups t Test

The results for the independent groups t test are presented in Table 10. There were no significant differences between males and females in CU, PU, AF, PW, SS, BR, MPS or JG. The only physical activity in which males and females differed significantly was PU (t = 2.332, p < 0.025).

Table 10

<table>
<thead>
<tr>
<th>Variable</th>
<th>CU</th>
<th>PU</th>
<th>AF</th>
<th>PW</th>
<th>SS</th>
<th>BR</th>
<th>MPS</th>
<th>JG</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>12.92</td>
<td>14.31</td>
<td>12.65</td>
<td>18.12</td>
<td>12.73</td>
<td>15.46</td>
<td>15.15</td>
<td>11.00</td>
</tr>
<tr>
<td>females</td>
<td>12.71</td>
<td>11.96</td>
<td>13.07</td>
<td>17.96</td>
<td>14.07</td>
<td>13.96</td>
<td>13.18</td>
<td>10.64</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>males</td>
<td>3.350</td>
<td>3.100</td>
<td>3.220</td>
<td>2.120</td>
<td>3.480</td>
<td>3.610</td>
<td>3.990</td>
<td>4.220</td>
</tr>
<tr>
<td>t</td>
<td>0.199</td>
<td>2.332*</td>
<td>-0.491</td>
<td>0.238</td>
<td>-1.215</td>
<td>1.444</td>
<td>0.886</td>
<td>0.322</td>
</tr>
<tr>
<td>df</td>
<td>52.000</td>
<td>49.345</td>
<td>52.000</td>
<td>52.000</td>
<td>52.000</td>
<td>52.000</td>
<td>52.000</td>
<td>52.000</td>
</tr>
<tr>
<td>p</td>
<td>0.843</td>
<td>0.024</td>
<td>0.626</td>
<td>0.813</td>
<td>0.230</td>
<td>0.155</td>
<td>0.380</td>
<td>0.749</td>
</tr>
</tbody>
</table>

*p < 0.025
One Way ANOVA

Results for the one way ANOVA between CU, PU, AF, PW, SS, BR, MPS and JG for the overall sample are presented in Table 13. The Levene statistic for the overall sample (3.233) is significant ($p < 0.05$) therefore it can be assumed that the homogeneity of variance is violated. Therefore a degree of caution must be exercised when interpreting these results. The one way ANOVA shows there is a significant difference between the groups CU, PU, AF, PW, SS, BR, MPS and JG ($F = 16.762, p < 0.05$). The Tukey's HSD post hoc Multiple Comparison is presented in Table 12. The Tukey's HSD shows that there are significant mean differences between (a) PW and CU, PU, AF, SS, BR, MPS and JG ($p < 0.05$) and (b) JG and CU, PU, AF, PW, SS, BR and MPS ($p < 0.05$).

Table 11
Homogeneity of Variance and ANOVA Results for the Overall ($N = 54$) Sample between Curl Ups (CU), Push Ups (PU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG)

<table>
<thead>
<tr>
<th>Homogeneity of Variance</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levene Statistic</td>
<td>df1</td>
</tr>
<tr>
<td>----------------------</td>
<td>-----</td>
</tr>
<tr>
<td>3.233</td>
<td>7</td>
</tr>
<tr>
<td>* $p &lt; .05$</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>* $p &lt; .05$</td>
<td></td>
</tr>
</tbody>
</table>
Table 12
Tukey's HSD Post Hoc Multiple Comparison between Curl Ups (CU), Push Ups (PU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG) for the Overall (n = 54) Sample

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW</td>
<td>CU 5.00*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PU 4.85*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>AF 5.00*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SS 4.39*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>BR 3.13*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>MPS 4.17*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td>JG</td>
<td>CU -2.19*</td>
<td>0.708</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>PU -2.33*</td>
<td>0.708</td>
<td>0.022</td>
</tr>
<tr>
<td></td>
<td>AF -2.19*</td>
<td>0.708</td>
<td>0.043</td>
</tr>
<tr>
<td></td>
<td>PW -7.19*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SS -2.80*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>BR -4.06*</td>
<td>0.708</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>MPS -3.02*</td>
<td>0.708</td>
<td>0.001</td>
</tr>
</tbody>
</table>

* p <.05

The results from the one way ANOVA between CU, PU, AF, PW, SS, BR, MPS and JG for the male population are presented in Table 13. The Levene statistic for the male population (1.677) is not significant (p > 0.05) therefore homogeneity of variance is not violated. The one way ANOVA shows that there is a significant difference between the groups CU, PU, AF, PW, SS, BR, MPS and JG (F = 9.905, p < 0.05). The Tukey's HSD post hoc Multiple Comparison for the male population is presented in Table 14. There are significant mean differences between (a) AF and PW, BR (p < 0.05), (b) PW and CU, PU, AF, SS, MPS, JG (p < 0.05), and (c) JG and PU, PW, BR, MPS (p < 0.05).
Table 13
Homogeneity of Variance and ANOVA Results for the Male (n = 26) Sample between Curl Ups (CU), Push Ups (PU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG)

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.677</td>
<td>7</td>
<td>200</td>
<td>0.117</td>
</tr>
</tbody>
</table>

* p < .05

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>819.673</td>
<td>117.096</td>
<td>9.905</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>2364.308</td>
<td>11.822</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>3183.981</td>
<td>11.822</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05

Table 14
Tukey's HSD Post Hoc Multiple Comparison between Curl Ups (CU), Push Ups (PU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG) for the Male (n = 26) Population

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF</td>
<td>PW -5.15*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>BR -2.96*</td>
<td>0.954</td>
<td>0.040</td>
</tr>
<tr>
<td>PW</td>
<td>CU 4.73*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>PU 3.62*</td>
<td>0.954</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>AF 5.15*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SS 4.92*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>BR 2.19</td>
<td>0.954</td>
<td>0.294</td>
</tr>
<tr>
<td></td>
<td>MPS 3.50*</td>
<td>0.954</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>JG 7.04*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td>JG</td>
<td>CU -2.31</td>
<td>0.954</td>
<td>0.231</td>
</tr>
<tr>
<td></td>
<td>PU -3.42*</td>
<td>0.954</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>AF -1.88</td>
<td>0.954</td>
<td>0.498</td>
</tr>
<tr>
<td></td>
<td>PW -7.04*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>SS -2.12</td>
<td>0.954</td>
<td>0.341</td>
</tr>
<tr>
<td></td>
<td>BR -4.85*</td>
<td>0.954</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>MPS -3.54*</td>
<td>0.954</td>
<td>0.005</td>
</tr>
</tbody>
</table>

* p < .05
The results for the one way ANOVA between CU, PC, AF, PW, SS, BR, MPS, and JG for the female population are shown in Table 15. The Levene statistic in the female population (2.883) is significant (p < 0.05). Therefore it can be assumed that the homogeneity of variance is violated and caution must be exercised when interpreting the results. The one way ANOVA shows there is a significant difference between the groups CU, PU, AF, PW, SS, BR, MPS and JG (F = 8.473, p < 0.05). The Tukey's HSD post hoc Multiple Comparison is displayed in Table 16. There are significant mean differences between (a) PW and CU, PU, AF, SS, BR, MPS, JG (p < 0.05) and (b) JG and PW, SS, BR (p < 0.05).

Table 15
Homogeneity of Variance and ANOVA Results for the Female (n = 28) Sample between Curl Ups (CU), Push Ups (SU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG)

<table>
<thead>
<tr>
<th>Levene Statistic</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.883</td>
<td>7</td>
<td>216</td>
<td>0.007</td>
</tr>
</tbody>
</table>

* p <.05

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>891.781</td>
<td>7</td>
<td>127.397</td>
<td>8.473</td>
<td>0.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>3247.679</td>
<td>216</td>
<td>15.036</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4139.460</td>
<td>223</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p <.05
Table 16
Tukey's HSD Post Hoc Multiple Comparison between Curl Ups (CU), Push Ups (PU), Aquafit (AF), Power Walking (PW), Slow Stretch (SS), Bike Ride (BR), Moderate Paced Swimming (MPS) and Jogging (JG) for the Female (n = 28) Population

<table>
<thead>
<tr>
<th></th>
<th>Mean Difference</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CU</td>
<td>5.25*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>PU</td>
<td>6.00*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>AF</td>
<td>4.86*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>SS</td>
<td>3.89*</td>
<td>1.036</td>
<td>0.004</td>
</tr>
<tr>
<td>BR</td>
<td>4.00*</td>
<td>1.036</td>
<td>0.003</td>
</tr>
<tr>
<td>MPS</td>
<td>4.79*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>JG</td>
<td>7.32*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>JG</td>
<td>-7.32*</td>
<td>1.036</td>
<td>0.000</td>
</tr>
<tr>
<td>PW</td>
<td>-3.32*</td>
<td>1.036</td>
<td>0.021</td>
</tr>
<tr>
<td>SS</td>
<td>-3.32*</td>
<td>1.036</td>
<td>0.021</td>
</tr>
<tr>
<td>BR</td>
<td>-2.54*</td>
<td>1.036</td>
<td>0.029</td>
</tr>
</tbody>
</table>

* p < .05
CHAPTER FIVE

Discussion

There were four major purposes to this study. The first purpose was to identify the relative contributions of (a) perceived competence, (b) enjoyment, and (c) fear of harm to movement confidence measured on the Movement Confidence Now (MCN) scale (O'Brien Cousins, 1997) in older adults. Secondly, this study aimed to identify the relationship between level of movement confidence and level of physical activity (LPA) measured on the Older Adults Exercise Status Inventory (OA-ESI) (O'Brien Cousins, 1996). The third purpose was to identify the relationship between MC and past experience. Lastly, the study examined the differences in the participant's perceptions of MC, PC, EN, FH and PE across the 8 physical activities measured in the MCN. These activities included curl-ups, modified push-ups, aquafit, power walking, slow stretch, bike ride, moderate paced swimming and jogging.

A preliminary analysis of the data corresponding to each research question was conducted. This analysis involved performing a series of independent group t-tests with gender as the grouping variable. It was revealed that there were no gender differences in movement confidence, perceived competence, enjoyment, fear of harm or previous experience. Nor were there any gender differences in level of physical activity. Similarly no gender differences were found in 7 of the 8 physical activities used in the MCN, the exception being curl-ups. Therefore in this discussion gender differences will not be considered.

The following discussion is presented in six sections. These are (a) the relative contributions of perceived competence, enjoyment and fear of harm to movement
confidence, (b) the relationship between movement confidence and level of physical activity, (c) the relationship between movement confidence and previous experience, (d) differences in perceptions between the eight physical activities, (e) general implications of findings, and (f) future directions.

Relative Contributions of Perceived Competence, Enjoyment and Fear of Harm to Movement Confidence

The first research question asked 'What were the relative contributions of perceived competence, enjoyment, and fear of harm to movement confidence?' An initial correlation analysis was carried out to examine the relationship between perceived competence, enjoyment, fear of harm and movement confidence. It was revealed that PC ($r = 0.776$), EN ($r = 0.670$) and FH ($r = 0.535$) were all significantly related to MC ($p < 0.01$). The strongest relationship emerged between perceived competence and movement confidence. This supports the findings of Griffin, Keogh and Maybee (1984) who found that in 352 college students perceived competence contributed more to confidence than enjoyment and fear of harm. There is very little prior research into the application of the Griffin and Keogh model in older adults. There are, however, other models that have been used to explain cognition in physical activity among older adults. O'Brien Cousins (1997) used Bandura's self-efficacy theory (1977), while Oman and McAuley (1993) studied intrinsic motivation and its link to exercise behaviour. The current study is the first of its kind to apply the Griffin and Keogh model to older adults. The advancement of knowledge of the relative contributions of perceived competence, enjoyment and fear of harm to movement confidence have important implications for enhancing confidence to participate in physical activity.
Bandura's self-efficacy theory (1977) included three aspects of experience (performance, vicarious and imaginal), one on social support, one on physiological state and one on emotional state. The view self-efficacy theory proposes is that experience is going to have a greater effect than any other single factor. Griffin and Keogh (1982) propose that previous experience with a task has a direct impact on perceived competence. Perceived competence is then mediated by sense of enjoyment or fear of harm to produce a state of movement confidence. Therefore, in both these theories it is clear that the individual's belief in their ability to perform a skill has a greater effect on their confidence than does enjoyment or fear of harm. The results of the current study therefore provide support for all 3 theories of movement related confidence. Lastly, no matter how significant perceived competence is, simple correlation analyses have little explanatory value. For this reason enjoyment and fear of harm must also be taken into account.

A hierarchical multiple regression was performed to discover the relative contributions of perceived competence, enjoyment and fear of harm to movement confidence. This analysis revealed that PC (60.2%), EN (3.7%) and FH (2.8%) all made significant contributions to the score of MC ($p < 0.05$). It is clear that perceptions of competence made the highest contribution to movement confidence. It must be noted that enjoyment and fear of harm made significant contributions but these were marginal when compared to perceived competence. Therefore it is clear that a person's perceptions of ability will contribute to overall movement confidence. What a person feels in relation to exercise is largely dependent on how capable they feel at performing the task. Although enjoyment and fear of harm are significant components it is by far, perceived competence that is most likely going to determine future engagement in physical activity.
These findings parallel those of Crawford and Griffin (1986) who found that in 250 fifth grade children, perceived competence explained 90% of the variance in the PMCI (Playground Movement Confidence Inventory). Enjoyment and fear of harm sub-scales, included in the same study, accounted for only 10% of the variance (Crawford & Griffin, 1986). Likewise Griffin, Keogh and Maybee (1984) studied movement confidence, perceived competence, enjoyment and potential for harm in 352 college students. They concluded that competence accounted for 51% of the variance in movement confidence, enjoyment and harm accounted for only 31% (Griffin, Keogh and Maybee, 1984). Similarly, in a study by Oman and McAuley (1993) with 109 older adults, the more successful participants in the 8 week aerobic program perceived higher competence, experienced greater enjoyment and put in greater effort. They concluded that these factors along with intrinsic motivation and higher attendance increased the confidence of the participants in continuing to exercise after the program had finished (Oman & McAuley, 1993).

While it is generally viewed that it is important for young people to develop a sense of competence, little attention has been given over to older exercisers. Clearly to feel sufficient ability, to have a sense of competence, is important in an older person's overall movement confidence. The findings of the current study with older adults lend further support to the Griffin and Keogh (1982) model and demonstrate the validity of this theory with an older population. More importantly the current study has added to the body of knowledge surrounding movement confidence and physical activity in older adults. This has practical implications for exercise practitioners. While enjoyment and fear of harm must be taken into account in the design and implementation of physical activity programs, perceived competence is clearly a very important factor in the feelings of confidence experienced by older adults. Therefore it
should form the basis for any such programs. Berger et al. (2002, p. 59) believe the best method for building perceptions of competence and confidence is to engage in an activity that increases competence without evoking fear or anxiety. This process is enhanced with social support from family and peers. The theoretical implications of this finding mean that studies investigating movement confidence should include perceived competence along with enjoyment and fear of harm as additional variables.

**The Relationship between Movement Confidence and Level of Physical Activity**

The second major question posed by this study asked 'What was the relationship between movement confidence and level of physical activity?' A Pearson's correlation revealed that MC and LPA were significantly correlated ($r = 0.302, p < 0.05$). The Griffin and Keogh (1982) model implies that an individual with high levels of movement confidence will also exhibit high levels of physical activity. This occurs as a result of movement confidence acting as a mediator in the participation of physical activity. An individual will participate in an activity and will then evaluate their participation. If their confidence is high they will persist, if it is low they may reduce the situation demands or withdraw (Griffin & Keogh, 1982, p. 222). For this reason it was expected that the correlation between MC and LPA, although found to be significant, would be higher than that presented in the results.

They do however, reflect the findings of Oman and McAuley (1993) with 109 older adults. They found that after an 8 week aerobic exercise program confidence to continue exercising was significantly correlated to effort in exercise ($r = 0.32, p < 0.001$). Although this correlation was not large it was similar to the correlation recorded in the present study. In the current study the relationship between MC and LPA is positive and significant, although somewhat low. It is likely that other
contributing variables outside the scope of this study, cited in the limitations, have had a large effect on level of physical activity of participants. For example, it is possible that in this population the level of physical activity is influenced strongly by how much leisure time participants have available to them. So, whilst they have the confidence, there are likely to be barriers to actively participating. Both males and females in this study may have experienced high work loads thus limiting the amount of free time accessible to them. Therefore, due to the similar nature of work that the males and females in this study were engaged in, it is possible that the amount of time set aside for leisure and physical activity would be similar.

Although the correlation between movement confidence and physical activity was significant, it was not as high as the Griffin and Keogh model would predict. This points to a need of examining barriers to physical activity in older adults, especially those in the work force. Whaley and Ebbeck (1997) investigated constraints to engage in structured exercise classes in 17 older adults. From self-identified constraints to participate 20%, of the subjects reported they were busy all the time (Whaley & Ebbeck, 1997). Similarly in the constraints identified from previous literature, 41% reported time as a major constraint to participate in structured exercise classes (Whaley & Ebbeck, 1997). Whilst confidence is important, other variables not measured in this study (such as time constraints) can moderate the motivating effect of confidence in inducing older adults to participate in regular exercise. There is clearly a need for such influences to be researched in older adults.

Therefore in older adults, who still work full-time, the amount of free time available to these individuals must be taken into account when designing physical activity initiatives aimed at them. Future studies examining the relationship of level of physical activity to movement confidence need to consider the effect of occupation.
and time constraints. The current study was limited to examining the Griffin and Keogh model. For this reason the variables of perceived competence, enjoyment, fear of harm, past experience and level of physical activity were examined in relation to movement confidence. Therefore the scope of the study did not allow the inclusion of additional variables such as work load and time constraints that may have had an effect on level of physical activity. It is recommended that future studies test a redeveloped model of movement confidence that includes aspects of social support, physical health and other constructs related to movement confidence and physical activity participation.

The Relationship between Movement Confidence and Previous Experience

The third research question asked 'What was the relationship between previous experience and movement confidence?' The Pearson's correlation revealed that for the overall population PE correlates highly with MC ($r = 0.705, p < 0.01$). Considering Bandura's (1977) self-efficacy theory that includes performance experiences as a determining factor in one's level of self-efficacy this finding is important. O'Brien Cousins (1997) studied late life self-efficacy in 327 women born between 1896 and 1921 (the eldest being 98 years of age when the study was conducted). She found that efficacy to exercise in later life was significantly correlated to movement confidence in childhood ($r = 0.463, p < 0.05$). She also found that "older women judge their efficacy for exercise based on their understanding of their ability as defined by perceived health, chronological age, and previous skills" (O'Brien Cousins, 1997, p. 241). This highlights the importance of previous experience in the formation of movement confidence in older adults. It is important to note that Griffin and Keogh did pay attention to the variable of previous experience through its effect on perceived
competence. However, the effect of this variable on movement confidence in older adults may be just as significant as perceived competence. Previous experience and perceived competence are almost equal in their correlation to movement confidence ($r = 0.705$ and $r = 0.776$ respectively). Therefore the influence of previous experience may be just as important as perceived competence in determining an individual’s movement confidence. The reason for the strong relationship between previous experience and confidence can be explained by revisiting the Griffin and Keogh model. In the model they propose that an individual identifies the skills needed to perform a task, this is followed by a self-analysis in which the individual asks if they have those skills (Griffin & Keogh, 1982). It is this evaluation that forms the perceived competence. An individual who experiences high levels of previous experience in a task is likely to also have the skills to perform that task. Therefore the perceived competence is higher as is the movement confidence resulting in a high correlation between previous experience and movement confidence. This points to the importance of early positive experiences in physical activity that may form a strong basis for building confidence to participate in later life.

Older adults who have engaged in certain modes of physical activity as younger adults will continue these activities into later life. However, as people age their susceptibility to serious injury increases as a result of several physiological changes. These range from a decrease in cardiovascular capacity, loss of muscle mass, bone loss and loss of flexibility (Spirduso, 1995). If an aging individual is involved in an activity that begins to cause injury it is likely they will have to cease that activity. When withdrawal occurs other physical activities are unlikely to be adopted as the individual may not have any confidence in these new modes of exercise. Therefore there may be a drop in level of physical activity and a decrease in quality of life.
However, if confidence in new activities can be developed the quality of life may return to the levels experienced prior to the cessation of physical activity. Take for example an individual who jogged regularly for many years, and then finds that more injuries occur due to physiological changes associated with aging and now can no longer jog. At this point two courses of action can be taken (a) withdrawal from all forms of physical activity, or (b) engagement in new forms of physical activity that do not aggravate the existing injury. In order to encourage people to adopt new physical activities, programmers can use past experiences to build on confidence.

There are clear practical implications from the finding that previous experience is closely linked to movement confidence. There is clearly a need to build on previous experience in the design of physical activity programs for older populations with the aim of increasing the rate of adoption of these programs. However, the activities may have to be modified to account for existing injuries. The theoretical implications of this finding are linked to the effect previous experience has on physical activity participation, as well as that of movement confidence.

Differences in Perceptions between the Eight Physical Activities

The fourth research question asked 'Did any one of the eight physical activities used in the MCN stand out as more pertinent to male and female older adults?' There were eight physical activities included in the MCN these were curl ups (CU), modified push-ups (PU), aqua-fit (AF), power walking (PW), slow stretch (SS), bike ride (BR), moderate paced swimming (MPS) and jogging (JG). The one way ANOVA with Tukey's post hoc multiple comparisons revealed that PW and JG were significantly different from all other activities in the MCN. The mean score for PW was significantly higher ($p < 0.05$) than mean score for all other activities in the
MCN, whilst in jogging the mean score was significantly lower ($p < 0.05$) than the mean score for all other activities in the MCN. The reason as to why walking scored more highly than the other activities may be due to the low incidence of injury associated with it. Pollock et al. (1991) found that in 21 people 70-79 years old, a walk training program from 1-13 weeks resulted in a 4.8% occurrence in injury. Ann-Jones and Owen (1998) report that in a community based walking program participation rates rose from 0 to 213 over a four-month period. Participants cited two main reasons for commitment to the program. These were (a) the desire to meet other people (55%) and (b) a desire to improve their fitness (65%). Lastly, 40% of participants reported the safety of being in a group as a key motivator (Ann-Jones and Owen, 1998).

Pollock et al. (1991) also provides evidence as to why jogging scored lower than other activities. After 13 weeks walk training 14 subjects from the original group of 21 began a jogging program from week 14-26, in this group the incidence of injury rose to 57%. Therefore, the high injury rate associated with jogging may also be the reason as to why jogging scored lower on MCN.

The practical implications of this finding relate to the inclusion of walking in physical activity programs for older adults in order to increase participation rates. The theoretical implications focus on the influence type of activity has on results of studies investigating movement confidence.
General Implications of Findings

The findings of this study produced a number of practical and theoretical implications for use in the practice and research of exercise psychology that are outlined in the following section.

Practical Implications

The findings associated with the relative contributions to movement confidence have relevance to the design and implementation of physical activity programs for older adults. Perceived competence should form the basis of any physical activity program for older adults. Berger et al. (2002, p. 59) asserted that perceived competence and movement confidence can be built up through physical activity. The inclusion of enjoyment has previously been shown to increase exercise adherence (Ryan et al., 1997) and therefore due attention should be paid to this factor in the design of exercise programs for older adults. Fear of harm is another contributor to movement confidence that should also be focused on in relation to exercise and older adults. Fear of injury as a result of physical exertion is prevalent amongst older adults (O'Brien Cousins, 2000) therefore by providing a more safe, secure and supportive exercise environment adherence to exercise programs may increase.

The findings linked to the relationship between movement confidence and level of physical activity focus on the fact that time constraints play a major role in adopting regular physical activity. Whaley and Ebbeck (1997) found that time was a major constraint to physical activity in older adults. Therefore even though confidence may be high and the desire to exercise present, time constraints may be preventing many working older adults from engaging in regular physical activity. This lack of available time must be taken into account when designing physical activity programs.
aimed at older adults who still work full-time. Limitations of this study did not allow exploration of these factors. However, it is clear that they do have a role to play in the participation of physical activity in older adults.

The relationship between movement confidence and previous experience has a considerable impact on the design of physical activity programs. When designing physical activity programs for older populations, examining the previous exercise experiences of the participants and using these previous experiences to form the basis of the program may have positive results. The participant's, having had previous experience in the activity, are likely to have higher levels of movement confidence and therefore become more likely to incorporate the program into their daily lives. However, it must be noted that the activities engaged in by older adults, when they were younger, may no longer be appropriate for some due to potential injuries. Therefore modifying activities to make them more appropriate and taking into account the physiological changes associated with aging will lead to better programs for older adults. This may then result in greater participation rates among this population.

The findings associated to the variances in score between the eight physical activities impact on the design of physical activity programs for older adults. The inclusion of walking in physical activity programs for older adults may result in the program becoming more readily adopted by the participants, where as programs that use more rigorous forms of exercise like jogging are less likely to be taken up. Therefore using lighter and more comfortable forms of exercise to introduce inactive older adults to physical activity may yield better results than other forms that may be perceived as potentially harmful.
Theoretical Implications

The theoretical implications of the relative contributions to movement confidence have a bearing on any studies that examine movement confidence and associated variables. It is important to note the impact of perceived competence on movement confidence may alter under the influence of other variables like enjoyment and fear of harm. With this in mind the design of future studies investigating the impact of perceived competence on movement confidence must take into account these other variables.

The theoretical implications of the relationship between movement confidence and level of physical activity relate to the effect of occupation and time. Time constraints due to occupation can influence level of physical activity independent of movement confidence (Whaley & Ebbeck, 1997). This moderating effect of time constraints on movement confidence must be taken into account when designing studies that aim to identify the motivations to exercise.

The theoretical implications of the relationship between movement confidence and previous experience centre on motivations to adopt a particular form of physical activity. When investigating movement confidence the variable of previous experience must be included alongside competence, enjoyment and fear of harm. This must be done in order to develop an accurate understanding of the motivations to engage in regular physical activity. If the effect of this variable is not included the significance of its impact cannot be measured resulting in an overestimation of the impact of other variables.

The theoretical implications of the variances in score between the activities of the MCN lend themselves to the impact different types of exercise have on studies that examine movement confidence and level physical activity. The use of activities
that are popular in one population may give biased results. Also the inclusion of physical activities that are unpopular will also impact on the results of the study. Therefore in order to control this bias a large number of different activities must be included in studies investigating movement confidence and related variables.

**Future Directions**

This study provided a sound basis from which practical implications can be drawn and valuable future research can be conducted. The following section will outline some possible directions that future researchers can take. Such studies may add to the body of knowledge surrounding movement confidence research in older adults.

Studies that incorporate participants from other demographics would allow a comparison between different groups. This comparison would give an understanding of the cognitions underlying movement confidence and motivation to exercise across adulthood. Some suggested categories would be (a) full-time employed younger adults, (b) full-time employed older adults and (c) semi-retired older adults and (d) retired older adults. If it was known when confidence began to decline, or motivations to change, then interventions aimed at that specific group could be developed.

A study that included an intervention aimed at changing level movement confidence and level of physical activity on a permanent basis in older adults would supply health practitioners with a useful tool to combat physical inactivity. It would also provide researchers with useful information regarding what variables can most contribute to long lasting positive physical activity habits.

Any new research would benefit greatly from investigating the variables of social support (such as family, friends and colleagues), work hours at place of
employment, and perceived effort. It is likely that these variables may have a significant impact on level of movement confidence and level of physical activity in older adults. Examining these possible links may provide researchers with information that could be invaluable in designing physical activity programs aimed at older adults.

Another area of investigation that would provide benefits to researchers is examination of the relationship between physical health and the level of physical activity. A study investigating whether a decrease in physical activity is due to a decrease in physical health, the result of aging, or does physical health decrease as a result of decreasing levels of physical activity. This would then allow researchers to focus on the best methods for maintaining high qualities of life in older adults.

Finally, it is suggested that future research with the Griffin and Keogh model include not only level of physical activity but also level of persistence and level of performance as indicators of participation. This together with an expansion of the model to include social factors would provide the basis of a more comprehensive analysis of this area of study.

This study has applied a theory that had previously only been used in children. It has added to our knowledge of the importance of perceived competence in contributing to movement confidence and the association of confidence to the level of physical activity. It has also highlighted the very close association of previous experience in an older person's confidence to engage in physical activity.
Conclusion

Griffin and Keogh (1982) were the first to propose a theory of movement confidence that gave equal weighting to sensations of enjoyment and harm alongside those of perceived competence. It had been established earlier in children that perceived competence was the most significant contributor to movement confidence while movement sensations contributed little (Crawford & Griffin, 1986). O’Brien Cousins (1997) investigated the influence of enjoyment and fear of harm in movement confidence in older adults. Her study was more closely aligned to Bandura’s self-efficacy theory (1977). The current study was the first to investigate Griffin and Keogh’s model of movement confidence in Australian older adults.

It was found that perceptions of competence contributed more to movement confidence than did enjoyment or fear of harm. Thus it provides researchers with a variable to manipulate in order to change the movement confidence experienced by an individual.

It was concluded that other variables such as social support may be important moderators of movement confidence on level of physical activity. It is strongly recommended that future research include these variables when employing the Griffin and Keogh model. Therefore studies investigating the relationship between movement confidence and level of physical activity must also be aware that other variables could influence their findings.

An important finding was the close association between past experience and movement confidence. The strong relationship between these variables requires further examination to fully understand its effect.
Lastly power walking was viewed more positively by older adults as it scored significantly higher on the MCN than did other activities. Jogging was associated with more negative perceptions by older adults as it score significantly lower on the MCN than other activities. Therefore when designing physical activity for older adults it is important to realise that certain activities are going to be more popular than others and this popularity can be used to increase the adoption of regular physical activity.

There were several practical and theoretical outcomes to this study. When designing physical activity programs for older adults who work full-time it is important to (a) consider how to increase perceptions of competence, (b) fit the program into very busy schedules, (c) include aspects of activities they have previous experience with and (d) ensure that the activities chosen are viewed positively by the individuals concerned. Future studies investigating movement confidence and physical activity in older adults should (a) include perceived competence alongside enjoyment and fear of harm, (b) consider the effect of occupation and time constraints, (c) note that previous experience could be just as significant as perceived competence so due attention should be paid, and (d) realise that types of activity will influence the results found. Future studies investigating movement confidence and level of physical activity in older adults should look at (a) wider demographics, (b) interventions to change levels of movement confidence and physical activity, (c) variables such as social support, occupation and perceived effort and (d) the relationship between level of physical health and level of physical activity.

The Griffin and Keogh (1982) model previously had limited application to older adults. The current study has provided a significant step forward in presenting a lifespan approach to the study and application of movement confidence to participation in physical activity.
References


Appendices

Appendix A

Movement Confidence, Physical Activity and Older Adults

This study is about what you believe in reference to physical activity. We are very interested in your answers irrelevant of current physical activity status. To participate you only need to be above 50 years of age.

Purpose

There has been very little research conducted on the views of older adults toward physical activity. This study will aim to identify how confidence may affect physical activity levels in older adults.

Benefits

The information you provide will be used to identify which aspects of confidence may, or may not, affect levels of physical activity. The findings of this study will be used by health professionals to create better health improvement strategies for older adults. If you wish you can contact the student researcher for advice in designing your own exercise program.

Procedure

Thank you, firstly, for taking the time to read the information sheet. It takes about 30 minutes to complete the questionnaires. All information will be coded with numbers and kept strictly confidential - your name and address will be removed from the questionnaire and filed separately. From that point on, the information on your questionnaire will be identified by a number only.

You may refuse to participate or withdraw from the study anytime. You do not have to answer any questions that are difficult for you. However it would help us if you would write down your reason for not answering. The questionnaire is more valuable to us if it is as complete as possible.

If you wish to participate in this study please contact the student researcher on the following number to make a meeting time appropriate for you.

Student Researcher: Alastair Stewart
Supervisor: Dr. Elizabeth Rose
Ph: 93706803
email: e.rose@cowan.edu.au

In order to obtain a summary of the research findings, please feel free to contact the researcher on the number supplied. This page will be detached from the remaining questionnaire so that your anonymity is preserved.
Consent Form

This is to certify that on _____________ all of the information and procedures detailed in the information sheet were clearly and fully explained prior to asking participants to sign the consent form and to participate in the study.

_____________________________  ____________________________
Date                                    Signature of Participant

_____________________________
Name (please print)

_____________________________  ____________________________
Date                                    Signature of Researcher

_____________________________  ____________________________
Date                                    Signature of Supervisor

If there are questions at any time, please feel free to contact the following individuals

Student Researcher: Alastair Stewart

Supervisor
Dr. Elizabeth Rose
Ph: 93706803
email: e.rose@cowan.edu.au
Appendix B

MOVEMENT CONFIDENCE NOW

Please mark the box that best describes you now.

CURL-UP 20 TIMES

How sure are you that you could do curl up 20 times?

<table>
<thead>
<tr>
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<th>(4) very sure</th>
<th>(3) pretty sure</th>
<th>(2) not very sure</th>
<th>(1) I know that I couldn’t</th>
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How many times would you have done an exercise like this in the past year?

<table>
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<tr>
<th></th>
<th>(1) I’ve never done this</th>
<th>(2) I tried it once</th>
<th>(3) I have done this a few times</th>
<th>(4) I’ve done this a lot</th>
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How skilled are you in this activity?

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<th>(3) Pretty skilled</th>
<th>(4) Very skilled</th>
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Is this activity enjoyable for you?

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<th>(1) Not at all enjoyable</th>
<th>(2) Not very enjoyable</th>
<th>(3) Somewhat enjoyable</th>
<th>(4) Very enjoyable</th>
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Is this activity risky or potentially harmful for you?

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<tr>
<th></th>
<th>(4) Not at all</th>
<th>(3) Not very</th>
<th>(2) Somewhat</th>
<th>(1) Very</th>
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MODIFIED PUSHUP 10 TIMES

How sure are you that you could do a modified push-up 10 times?

(4) very sure
(3) pretty sure
(2) not very sure
(1) I know that I couldn’t

How many times would you have done an exercise like this in the past year?

(4) I’ve never done this
(3) I tried it once
(2) I have done this a few times
(1) I’ve done this a lot

How skilled are you in this activity?

(4) Not skilled at all
(3) Not very skilled
(2) Pretty skilled
(1) Very skilled

Is this activity enjoyable for you?

(4) Not at all enjoyable
(3) Not very enjoyable
(2) Somewhat enjoyable
(1) Very enjoyable

Is this activity risky or potentially harmful for you?

(4) Not at all
(3) Not very
(2) Somewhat
(1) Very
50 MINUTE AQUA-FIT EXERCISE CLASS IN A SWIMMING POOL

How sure are you that you could do a 50 minute aqua-fit class?

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How many times would you have done an exercise like this in the past year?

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How skilled are you in this activity?

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Is this activity enjoyable for you?

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Is this activity risky or potentially harmful for you?

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<td>(1)</td>
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POWER WALKING FOR 30 MINUTES ON A LEVEL SURFACE

How sure are you that you could power walk for 30 minutes?

(4) very sure  (3) pretty sure  (2) not very sure  (1) I know that I couldn't

How many times would you have done an exercise like this in the past year?

(1) I've never done this  (2) I tried it once  (3) I have done this a few times  (4) I've done this a lot

How skilled are you in this activity?

(1) Not skilled at all  (2) Not very skilled  (3) Pretty skilled  (4) Very skilled

Is this activity enjoyable for you?

(1) Not at all enjoyable  (2) Not very enjoyable  (3) Somewhat enjoyable  (4) Very enjoyable

Is this activity risky or potentially harmful for you?

(4) Not at all  (3) Not very  (2) Somewhat  (1) Very
**SLOW STRETCH TO TOUCH THE TOES**

How sure are you that you could do a slow stretch to touch the toes?

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<td>very sure</td>
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<td>I know that I couldn't</td>
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How many times would you have done an exercise like this in the past year?

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<td>I've never done this</td>
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How skilled are you in this activity?

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Is this activity risky or potentially harmful for you?

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<td>Not at all</td>
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</table>
RIDING A BICYCLE FOR 30 MINUTES ON A LEVEL SURFACE

How sure are you that you could ride a bicycle for 30 minutes?

(4) very sure  (3) pretty sure  (2) not very sure  (1) I know that I couldn’t

How many times would you have done an exercise like this in the past year?

(1) I’ve never done this  (2) I tried it once  (3) I have done this a few times  (4) I’ve done this a lot

How skilled are you in this activity?

(1) Not skilled at all  (2) Not very skilled  (3) Pretty skilled  (4) Very skilled

Is this activity enjoyable for you?

(1) Not at all enjoyable  (2) Not very enjoyable  (3) Somewhat enjoyable  (4) Very enjoyable

Is this activity risky or potentially harmful for you?

(4) Not at all  (3) Not very  (2) Somewhat  (1) Very
# 30 Minutes Moderate Paced Swimming in a Swimming Pool

How sure are you that you could do moderate paced swimming for 30 minutes?

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<td>I know that I couldn't</td>
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How many times would you have done an exercise like this in the past year?

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**JOGGING FOR 30 MINUTES ON A LEVEL SURFACE**

How sure are you that you could jog for 30 minutes?

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<tr>
<th>(4) very sure</th>
<th>(3) pretty sure</th>
<th>(2) not very sure</th>
<th>(1) I know that I couldn’t</th>
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How many times would you have done an exercise like this in the past year?

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<tr>
<th>(1) I’ve never done this</th>
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Is this activity risky or potentially harmful for you?

<table>
<thead>
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<th>(4) Not at all</th>
<th>(3) Not very</th>
<th>(2) Somewhat</th>
<th>(1) Very</th>
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</thead>
</table>
Appendix C

Physical Activity Questionnaire

What did you do last week? How much time (in minutes) did you spend on these activities in the past week? If the activity you participated in is not listed, add it to the list and fill in the time spent on that activity.

LEISURE TIME ACTIVITIES

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<th></th>
<th>MON</th>
<th>TUE</th>
<th>WED</th>
<th>THU</th>
<th>FRI</th>
<th>SAT</th>
<th>SUN</th>
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OFFICE USE ONLY

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</tr>
</thead>
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What is your height (cm)?: __________

What is your body weight (kg)?: __________