MEASURING MOTIVES FOR PHYSICAL ACTIVITY IN ADULTS

KEYVAN MOLANOROUZI

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SPORTS CENTRE
UNIVERSITY OF MALAYA
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ABSTRACT

Although there is abundant evidence to recommend a physically active lifestyle, adult physical activity (PA) levels have declined. In order to understand why this happens, studies have been conducted to uncover the reasons for people's participation in PA. The Physical Activity and Leisure Motivation Scale (PALMS) was created to be a comprehensive tool to measure motives for participating in PA. The present thesis consists of three studies investigating the validation of PALMS in Malaysian adults. In Study 1, I examined the reliability and validity of the PALMS. In Study 2, I investigated the construct validity of the PALMS by testing whether motives for participation best discriminated between types of PA, age, and gender. Finally, in Study 3, I further investigated the construct validity of the PALMS by examining whether PA motives predicted actual amount of PA at a later time.

In Study 1, a total of 502 (259 males, 243 females) Malaysian volunteer participants, aged 17 to 67 years completed the PALMS and REMM (questionnaire from which the PALMS was developed). The hypothesized eight sub-scale model demonstrated acceptable fit with the data (CMIN/DF = 2.820, NFI = 0.90, CFI = 0.91, RMSEA = 0.06). Cronbach's alpha coefficient (α = 0.79) indicated good internal consistency for the overall measure. Internal consistency for the PALMS sub-scales was sound, ranging from 0.78 to 0.82 Spearman's rho (rs = 0.86, p < 0.001) indicated strong criterion validity with the REMM. The test-retest reliability for the PALMS sub-scales was between 0.78 and 0.94 over a 4-week period.

In Study 2, a quantitative, cross-sectional descriptive research design was employed. The PALMS was used to assess motives for PA in 1,360 adults (703 males, 657 females). Respondents were divided into two age groups (young adults aged 20 to 40 years and middle-aged adults 41 to 64 years) and five types of activity (individual

sports, team sports, racquet sports, martial arts, and exercise). The group discriminant function analyses revealed significant canonical functions correctly classifying the cases into gender, age group, and type of activities group. The findings in this study suggest that strong and important motives for participation in PA are different across gender, age, and type of activity in adults.

In Study 3, a quantitative, cross-sectional descriptive research design was employed. The PALMS was used to assess motives for PA in adults on two occasions. A sample of 493 undergraduate students aged 18 to 25 years took part in the study. The results showed that not only were pertinent sub-scales of PALMS positively related to amount of PA, but separate regression analyses showed the positive predictive effect of PALMS motives for amount of PA for each type of PA among participants. This study supported the construct validity of the PALMS by showing that the motives measured by PALMS did predict amount of PA. The three studies in this thesis signal strong potential for the PALMS to be used in practice to advise individuals about suitable PA based on their primary motives for participating.

ABSTRAK

Walaupun terdapat banyak bukti yang mengesyorkan satu gaya hidup aktif secara fizikal, tahap aktiviti fizikal dewasa telah menurun. Untuk memahami mengapa ini berlaku, kajian telah dijalankan untuk mengkaji sebab penyertaan dewasa dalam aktiviti fizikal. Soal selidik 'Physical Activity and Leisure Motivation Scale' (PALMS) telah direka sebagai satu alat yang menyeluruh untuk mengukur motif penyertaan dewasa dalam aktiviti fizikal. Tesis ini terdiri daripada tiga kajian yang mengkaji kesahan soal selidik PALMS di kalangan orang dewasa warga Malaysia. Dalam Kajian 1, saya mengkaji kebolehpercayaan dan kesahan PALMS. Dalam Kajian 2 pula, saya mengkaji kesahan konstruk PALMS dengan menguji samada motif untuk penyertaan membezakan antara jenis aktiviti fizikal, umur dan jantina. Akhirnya, dalam Kajian 3, saya seterusnya mengkaji kesahan konstruk PALMS dengan mengkaji samada motif aktiviti fizikal meramalkan jumlah sebenar aktiviti fizikal pada satu masa kemudian.

Dalam Kajian 1, seramai 502 orang dewasa (259 lelaki, 243 perempuan) warga Malaysia, yang berumur antara 17 hingga 67 tahun, telah menjawab soal selidik PALMS dan REMM (soalselidik dari mana PALMS dibangunkan) secara sukarela. Model lapan sub-skala yang dihipotesiskan menunjukkan padanan yang baik dengan data (CMIN/DF = 2.820, NFI = 0.90, CFI = 0.91, RMSEA = 0.06). Koefisien *Cronbach's Alpha* (α = 0.79) menunjukkan konsistensi internal yang baik untuk ukuran keseluruhan. Konsistensi internal untuk sub-skala PALMS adalah memadai, dan adalah di antara 0.78 dan 0.82. Hasil analisis *Spearman rho* (rs = 0.86, p < .001) menunjukkan kesahan kriteria yang kuat dengan soal selidik REMM. Kesahan kaedah uji dan ulang-uji untuk sub-skala soal selidik PALMS adalah di antara 0.78 dan 0.94 dalam tempoh masa empat minggu.

Dalam Kajian 2, satu rekabentuk kajian kuantitatif berbentuk kaedah silang deskriptif digunakan. Soal selidik PALMS digunakan untuk menilai motif bagi aktiviti fizikal di kalangan 1,360 orang dewasa (703 lelaki, 657 perempuan). Responden telah dibahagikan kepada dua kumpulan umur (kumpulan awal dewasa di antara 20 hingga 40 tahun dan kumpulan pertengahan dewasa di antara 41 hingga 64 tahun) dan lima jenis aktiviti (sukan individu, sukan berkumpulan, sukan raket, seni mempertahankan diri dan senaman). Analisis fungsi diskriminan kumpulan menunjukkan fungsi kanonikal yang signifikan yang secara betulnya mengklasifikasikan kes ke dalam kumpulan jantina, umur dan jenis aktiviti. Dapatan kajian ini mencadangkan motif yang kuat dan penting untuk penyertaan dalam aktiviti fizikal adalah berbeza merentasi jantina, umur dan jenis aktiviti di kalangan dewasa.

Dalam Kajian 3, satu rekabentuk kajian kuantitatif berbentuk kaedah silang deskriptif digunakan. Soal selidik PALMS digunakan untuk menilai motif bagi aktiviti fizikal di kalangan dewasa pada dua masa. Satu sampel yang mengandungi seramai 493 mahasiswa yang berumur antara 18 hingga 25 tahun telah mengambil bahagian di dalam kajian ini. Dapatan kajian menunjukkan bahawa bukan sahaja sub-skala penting dalam PALMS berkait secara positif dengan jumlah PA, tetapi analisa regresi berasingan menunjukkan kesan positif telahan untuk motif PALMS bagi jumlah aktiviti fizikal untuk setiap jenis aktiviti fizikal di kalangan peserta. Kajian ini menyokong kesahan konstruk soal selidik PALMS dengan menunjukkan bahawa motif yang diukur oleh PALMS sememangnya telah meramalkan jumlah aktiviti fizikal. Ketiga-tiga kajian di dalam tesis ini menunjukkan potensi kuat untuk soal selidik PALMS digunakan dalam amalan untuk menasihati individu tentang kesesuaian aktiviti fizikal berdasarkan motif utama penyertaan individu tersebut.

DEDICATION

This thesis dedicated to my beloved parents for all their love, prayers, care, sacrifice, and effort in educating and preparing me for my bright future.

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LIST OF ABBREVIATIONS

AGT: Achievement Goal Theory

CFA: Confirmatory Factor Analysis

CFI: Comparative Fit Index

DFA: Discriminant Function Analysis

EFA: Exploratory Factor Analysis

PA: Physical Activity

PALMS: Physical Activity and Leisure Motivation Scale

REMM: Recreational Exercise Motivation Measure

RMSEA: Root Mean Square Error of Approximation

SDT: Self-Determination Theory

SMCSDS: The Shortened Marlowe-Crowne Social Desirability Scale

REMM: Recreational Exercise Motivation Measure

WHO: World Health Organization

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CHAPTER 1

GENERAL INTRODUCTION

1.1 Introduction

The benefits of physical activity (PA) are well-documented. There is abundant literature on the physical and psychological benefits of regular PA (Butt, Weinberg, Breckon, & Claytor, 2011; Eijkemans, Mommers, Draaisma, Thijs, & Prins, 2012; Holtermann et al., 2013). For instance, multiple risk factors like high cholesterol, diabetes mellitus, hypertension, stroke and cardiovascular illnesses and hypertension are directly linked with the status of physical inactivity, overweight and obesity (Aballay, Eynard, Díaz, Navarro, & Muñoz, 2013; Andersen & Olsen, 2013; Dalton et al., 2003; Eckel, Kahn, Robertson, & Rizza, 2006; Kopelman, 2007; Wang, Liu, Yanlin, Lim, & Chatzisarantis, 2010). Indeed, physical inactivity is the fourth leading risk factor for global mortality and estimated to cause 6% of deaths worldwide (WHO, 2013). An estimated 30% of the global ischaemic heart disease burden, 27% of diabetes and 21% of breast and colon cancer burden is attributable to physical inactivity.

The World Health Organization (WHO, 2013) recommends that adults do at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic PA or a combination of both moderate- and vigorous-intensity PA a week to gain health benefits. Individuals of all ages can gain an array of physical, psychological, social, and emotional benefits from PA (Imperatore, Cheng, Williams, Fulton, & Gregg, 2006; Michaëlsson et al., 2007; Parfitt & Eston, 2005).

Despite the established benefits of regular PA, a large proportion of the population in the United States (Butcher, Sallis, Mayer, & Woodruff, 2008), Europe (Armstrong & Welsman, 2006) and Malaysia (Poh et al., 2010) do not participate in adequate PA to

gain these health benefits and are still not sufficiently active or maintain a sedentary lifestyle. For example, it was found that the majority of Malaysian adults had low (35%) and moderate (62%) PA levels (Hashim, Golok, & Ali, 2011).

For these reasons, researchers, health professionals, and policy makers have all sought to explore why some people are physically active whereas others are not. Although the antecedents of participation in PA are highly complex (Standage, Gillison, Ntoumanis, & Treasure, 2012), the most crucial reason for people to be physically active is motivation. Motivation not only affects PA participation, but is also a critical factor in exercise adherence (Aaltonen et al., 2012; André & Dishman, 2012; Dishman, Sallis, & Ogilvie, 1985; Frederick & Morris, 2004).

In order to increase participation in PA, researchers have examined motives for sport and exercise involvement (Frederick & Ryan, 1993; Gill, Gross, & Huddleston, 1983; Morris, Clayton, Power, & Han, 1995), to try to understand why people engage in PA. Most researchers have focused on competitive sport (Chantal, Guay, DobrevaMartinova, & Vallerand, 1996; Morris, Clayton, Power, & Han, 1996) or adopted measures developed for competitive sport (Frederick & Morris, 2004; Pelletier et al., 1995). Others have focused on exercise (Li, 1999; Markland & Hardy, 1993). There is a need to validate measures of motivation that can be applied to non-competitive PA, including organized exercise and informal leisure activities, as well as competitive sport, so that researchers examining reasons for participation in PA can study the full range of activities with the same measure, thus, facilitating comparison.

Researchers have applied various approaches to enhance standardized instruments to investigate and study participation motives (Rogers, Morris, & Moore, 2008). In general, the two most commonly used approaches for this purpose are theoretical and atheoretical. Sport psychology has specifically seen the advent of a number of

theoretical frameworks, such as achievement theory (Atkinson, 1964), attribution theory (Weiner, 1979, 1985), theory of competence motivation (Harter, 1978), theory of goal setting (Locke & Latham, 1994), and self-efficacy theory (Bandura, 1977, 1986). What is more, Achievement Goal Theory (AGT; Nicholls, 1989) and Self-Determination Theory (SDT; Deci & Ryan, 1985, 1991) can be viewed as the two underlying theories controlling the majority of research regarding sport and exercise motives.

A number of questionnaires have been developed to measure participation motivation based on SDT and AGT. These include the 28-item Sport Motivation Scale (SMS; Fortier, Vallerand, Briere, & Provencher, 1995), the 44-item Exercise Motivation Inventory (EMI; Markland & Hardy, 1993), the 69-item EMI-2 (Markland & Ingledew, 1997), the 32-item Exercise Motivation Scale (EMS; Li, 1999), the original 30-item Participation Motivation Questionnaire (PMQ; Gill , Gross, & Huddleston, 1983), along with its various versions, the 23-item Motivation for Physical Activity Measure (MPAM; Frederick & Ryan, 1993), and the 30-item MPAM-Revised (Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997) .

The principal example of an atheoretical approach is probably the work of Gill, Gross, and Huddleston (1983), who asked adults to state their reasons for participation, applying open-ended questions. Using the acquired information, Gill et al. (1983) devised a 30-item questionnaire, named the PMQ.

To address the limitations of the previous instruments as well as the drawbacks of both the theory-based and the atheoretical approaches, Rogers and Morris (2003) created a new instrument merging both approaches. The Recreational Exercise Motivation Measure (REMM) provides information about individuals' motivation to participate in PA. However, the sizeable length of the REMM (73 items) drew some criticisms particularly in relation to its use in applied contexts. Consequently, a shorter measure,

called the Physical Activity and Leisure Motivation Scale (PALMS), was developed by selecting the five strongest items on each of the eight factors in the REMM, producing a 40-item measure. The shorter version is proposed to be more effective because it is succinct in nature and helps to minimize the detrimental effects of boredom and fatigue (Morris & Rogers, 2004).

The development of the PALMS is an important step in determining individuals' participation in PA. The aim of the PALMS is to redress an imbalance in previous research, where much of the research in this field has been devoted to competitive sport (Chantal et al., 1996; Morris et al., 1995; Rogers et al., 2008). Furthermore, the REMM has been found to be a reliable and valid measure (Rogers & Morris, 2003). Since the PALMS was developed by selecting the strongest items in the REMM (Morris & Rogers, 2004), it is plausible that, like the REMM, the PALMS will be reliable and valid. Thus, it would be valuable to examine if this new measure (PALMS) is as reliable and consistent as the longer "parent" measure (REMM). Moreover, to the best of my knowledge, there has been no comprehensive scale to measure motivation in PA participants in the Malaysian context. Thus, there is a need to validate the measures of motivation for PA. This is also related to the broader area of non-competitive PA. This means that the validation and the reliable measurement of motivation to investigate variables of motivation were critical.

Individuals vary, with some being a fan of exercising alone, some others prefer exercising in a group whereas some like their PA program to be tailored according to their preference. PA advice, particularly in primary health care may be an effective tool to promote active lifestyles at the population level (Siqueira et al., 2009).

According to SDT, adherence to PA could be improved by designing programmes or interventions that target the more autonomous reasons for exercise. Evidence supports

this contention. For example, over the course of a structured cycling exercise program, Wilson, Rodgers, Blanchard, and Gessell (2003) observed increases in identified and intrinsic exercise regulations among the adhering participants. In another study with a female sample, those who exercised for identified or intrinsic reasons were more likely to report higher perceptions of their physical self-worth, while the participants relying exclusively on external regulations reported lower physical self-esteem (Wilson & Rodgers, 2002). Hillsom et al. (2005) found that PA interventions, especially those with supervised environment were more successful in getting people to adhere in exercise compared to no intervention, at least for the first six months.

Also, it has been reported that individuals with higher PA motivation participated more regularly over an extended period of time than those with low PA motivation (Bryan & Solmon, 2012; Egli, Bland, Melton, & Czech, 2011; Kilpatrick, Hebert, & Bartholomew, 2005; Rogers et al., 2008; Standage et al., 2012). People`s motives to participate in PA or sports is a fascinating subject for multiple researchers and practitioners (Bryan & Solmon, 2012; Gill et al., 1983; Kozub & Farmer, 2011; Plonczynski, 2000; Roberts, 1993; Rogers et al., 2008; Sørensen, 2006; Zan, Podlog, & Harrison, 2012).

Research on participation motivation suggests that there are systematic differences between participation motives and some demographic variables. These may include country, gender, age, level of participation in PA, and the preference of individuals for specific forms of PA (Butt et al., 2011; Egli et al., 2011; Fontayne, Sarrazin, & Famose, 2001; Iannotti et al., 2013; Kilpatrick et al., 2005; McLane, Lox, Butki, & Stern, 2003; Ulseth, 2008; Yan & McCullagh, 2004).

In several studies, researchers have looked at demographic variables between participation motives. Researchers have found gender differences and reported that

females were motivated by extrinsic factors and males by intrinsic factors (Butt et al., 2011; Egli et al., 2011; Kilpatrick et al., 2005). Also, a number of other studies have shown that females consistently rated appearance motives higher than their male counterparts (Frederick & Ryan, 1993; Frederick, Morrison, & Manning, 1996; Frederick & Morrison, 1996; Weinberg et al., 2000).

Researchers have reported motivation for PA may also vary with age (Butt et al., 2011; Iannotti et al., 2013). For example, Brunet (2011) showed that middle-age adults (45-64 years) were less intrinsically motivated compared to younger adults (Brunet & Sabiston, 2011).

Very limited research has specifically examined participants' motivation across different types of PA. It is plausible that there is a relationship between PA types and the preference of individuals for those activities. In one of the few studies of PA motivation, Morris et al. (1995) examined five types of activities for PA participation which they labeled as individual sports, racquet sports, team ball games, exercise activities, and martial arts. Results showed that team sport participants rated affiliation higher than any other group, individual sport participants placed more emphasis on interest/enjoyment and competence/mastery, and racquet sport competitors rated challenge or competition/ego higher than others. Further, exercise participants rated physical condition and appearance higher, but martial arts competitors were especially interested in enhancing body and mind-related skills.

Furthermore, some authors have argued that there is a significant relationship between PA motives and the amount of PA people do (Kaupužs, 2013; Vancampfort et al., 2013; Yew, Whipp, Dimmock, & Jackson, 2013). Research on motivation and amount of PA support the prediction that motivation predicts amount of PA (Aelterman et al., 2012; Kaupužs, 2013; Vancampfort et al., 2013; Wilson & Rodgers, 2002). Kaupužs (2013)

investigated the relationship between exercise motivation and PA levels. The data showed a significant positive correlation between intrinsic motivation and level of PA.

Therefore, it is crucial to investigate PA motivation in Malaysian adults. It is also important to examine the motives for different types of PA based on age and gender. This could help health professionals understand the specific motivational factors of active people, which may give insight on how PA promotional strategies or advice proceed and the kind of PA people are likely to find most rewarding (i.e., that meets their motivational needs).

1.2 The Present Thesis

The present thesis extended the research on adult motivation to engage and adhere to PA during leisure time in the following ways: In Study 1, I focused on validating a new questionnaire to understand motives for participation in PA, the Physical Activity and Leisure Motivation Scale (PALMS), and adding knowledge to the literature about the measurement of participation motivation. In Study 2, I focused on examining meaningful distinctions between motives for participation in PA that were important across type of activity, age, and gender, based on motives measured by the PALMS. Findings from Study 2 may be useful in understanding systematic differences between participation motives and demographic variables. This will help policy makers and health professionals to determine more effective ways to enhance adults' motivation in PA participation during their free time. Moreover, in this study I investigated the construct validity of the PALMS based on the extent to which motive sub-scales discriminated between type of activity, age, and gender, as predicted by theory and previous research. In Study 3, I examined whether PA motives measured by the PALMS predict actual amount of PA at a later time to provide further evidence for the construct validity of the PALMS, based on the proposition that specific motives were

associated with amount of PA in predictable ways. Also, in this study, I investigated whether motives for PA change over time. Findings from Study 3 should be important for health professionals for programming strategies and promoting PA.

1.3 Study 1: Validating the Physical Activity and Leisure Motivation Scale (PALMS)

1.3.1 Objectives of the study:

a) To examine the test-retest reliability (stability) of the PALMS

b) To investigate internal consistency of the 8 PALMS motive sub-scales

c) To examine the 8-motive factor structure of the PALMS

d) To examine criterion validity of the PALMS in relation to the REMM

1.4 Study 2: Motives for Adult Participation in Physical Activity: Type of Activity, Age, and Gender

1.4.1 Objectives of the study:

a) To examine significant differences in participation motivation across type of activity, age, and gender

b) To investigate the motives for participation that best discriminate between type of activity, age, and gender

c) To examine construct validity of the PALMS based on predictions that different motives discriminate between different types of activity, age, and gender

1.5 Study 3: The Relationship between Motivation for Physical Activity and Amount of Physical Activity over Time

1.5.1 Objectives of the study:

a) To investigate the effect of motives for participation in PA on amount of PA

b) To examine construct validity of the PALMS based on the prediction that certain motives are associated with amount of PA, depending on type of PA

c) To examine changes in motives for participation in PA over time.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Despite the benefits of physical activity (PA) participation and the health risk factors associated with a sedentary lifestyle (Eijkemans et al., 2012; Holtermann et al., 2013), the statistics over the past decade demonstrate that many adults are not exercising regularly to obtain these health benefits and are still not sufficiently active or maintain a sedentary lifestyle (Armstrong & Welsman, 2006; Butcher et al., 2008; Poh et al., 2010). Researchers, such as Frederick and Ryan (1993); Gill, Gross, & Huddleston (1983); Morris, Clayton, Power & Han (1995), have investigated motives for involvement in sport and exercise in order to increase participation in PA and tried to discover why people undertake PA. In this chapter I examined the literature related to motivation for PA in adults, focusing on several areas and issues. In particular, in this review I explored literature in the following areas: public health issues, the benefits of PA, PA participation, motivation in PA and sport, AGT, SDT, measurement of participation motivation, REMM, PALMS and motivational differences between demographic variables.

2.2 Public Health Issues

Within the last 30 years, there has been an increasing prevalence of obesity in the world, particularly driven by major alterations in lifestyle (Ogden, Carroll, Kit, & Flegal, 2012). A report by the World Health Organization (WHO) projected that by 2015, there will be approximately 2.3 billion people overweight and more than 700 million obese (WHO, 2009). Results of the Australian National Health Survey for 2011-12 indicated that 62.8% of those aged 18 years old and older were obese and overweight; this was an increase from 61.2% in 2007-08 and 56.3% in 1995 (Australian Bureau of Statistics, 2013). Subsequently, one-third of the population of Australian adults will be obese in 2025 (Haby, Markwick, Peeters, Shaw, & Vos, 2012). Ogden et al. (2012) reported that roughly 67% of American adults are either obese or overweight and 35% of the adults aged 20 years and over are obese. In 2005, approximately 1.6 billion people worldwide above the age of 15 years were overweight and 400 million were obese (WHO, 2009). The overweight and obesity rates in Malaysia are also increasing. The prevalence of overweight and obesity increased from 21% in 1996 to 38.85% in 2003 and 44.5% in 2011 (Institute of Public Health, 2011).

Most literature lends support to the relationship between obesity, as well as overweight, and adverse health outcomes. Obesity and overweight are linked to a growing risk of coronary heart disease (CHD), osteoarthritis, gallbladder disease, stroke, multiple kinds of cancer, type 2 diabetes mellitus (T2DM), insulin resistance, and hypertension (Dalton et al., 2003; Dyson, 2010; Eckel et al., 2006; Eyre et al., 2004; Kim & Popkin, 2006; Pisunyer, 2007; Rejeski et al., 2012). The co-morbidity of overweight and T2DM is particularly high. In a number of studies, researchers have reported that it is a possibility for overweight to result in a fewer years of disability-free life as well as psychological issues like depression (Faith, Matz, & Jorge, 2002; Kim & Popkin, 2006; Luppino et al.,

2010; Rejeski et al., 2006). Other studies came to the conclusion that overweight increases risk of mortality (Jee et al., 2006; Manson et al., 1995; Nocon et al., 2008).

Physical inactivity is the fourth leading risk factor for global mortality and estimated to cause 6% of deaths (WHO, 2013). An estimated 30% of the global ischaemic heart disease burden, 27% of diabetes and 21% of breast and colon cancer burden is attributable to physical inactivity. In Malaysia, the National Health and Morbidity Survey II reported that 35.7% of adults surveyed were physically inactive, with 30.5% males and 41% females classified as inactive; and physical inactivity contributing to 6,400 deaths per year (Institute of Public Health, 2011). Studies concluded that the fundamental cause of obesity and overweight could be inadequate PA or a sedentary lifestyle (Desai, Miller, Staples, & Bravender, 2008; Eijkemans et al., 2012; Hansen, Holme, Anderssen, & Kolle, 2013; Seebacher & Glanville, 2010).

2.3 Benefits of Physical Activity

The link between regular PA and physical and psychological health has been well documented in the literature (Butt et al., 2011; Eijkemans et al., 2012; Holtermann et al., 2013). The most important health benefits of PA are reduced prevalence of many diseases as well as decreased mortality (Celis-Morales et al., 2012; Kujala, Kaprio, Sarna, & Koskenvuo, 1998; Löllgen, Böckenhoff, & Knapp, 2009; Seebacher & Glanville, 2010; Williams, 2012). People of different age groups can obtain emotional, psychological, social, and physical benefits from PA (Imperatore et al., 2006; Michaëlsson et al., 2007; Parfitt & Eston, 2005). For instance, researchers claimed that regular PA can prevent the major and minor causes of numerous chronic diseases, including, stroke, cancer (particularly colon, breast, and endometrial), heart and pulmonary diseases (chronic obstructive pulmonary disease, CHD, chronic heart failure), muscle, bone, and joint diseases (osteoporosis, osteoarthritis, rheumatoid

arthritis, fibromyalgia, intermittent claudication), and chronic fatigue syndrome (Ainsworth & Macera, 2012; Pearson et al., 2013; Pepera, Bromley, Sandercock, & Sandercock, 2013; Whiting et al., 2001). Additionally, some studies reported the key role of PA in T2DM prevention (Lakka & Laaksonen, 2007; Pisunyer, 2007) and management (Boulé, Haddad, Kenny, Wells, & Sigal, 2001; Praet & Van Loon, 2008), independent of weight loss (Bauman, 2004; Boulé et al., 2001; Jeon, Lokken, Hu, & Van Dam, 2007; Sherwin et al., 2004; Sigal, Kenny, Wasserman, Castaneda-Sceppa, & White, 2006).

A number of studies have found a relationship between regular PA and lowered danger of premature all-cause mortality as well as cardiovascular issues (Gregg, Gerzoff, Caspersen, Williamson, & Narayan, 2003; Lee & Skerrett, 2001; Warburton, Nicol, & Bredin, 2006). For instance, the study by Lee and Skerrett (2001) showed an estimated 30% lowered risk of all-cause mortality for regularly active people compared to those who are inactive. For those with T2DM, even two-hour weekly walks can decrease all-cause mortality, and diabetes and metabolic diseases by 39% & 34% respectively (Gregg et al., 2003).

There has been considerable and growing evidence of the relationship between regular PA and improved psychological health, such as improved mood, well-being and quality of life, as well as decreased anxiety, stress, and depression (Berger, 2004; Fox, 1999; Plante & Rodin, 1990). A number of studies have found psychological benefits of PA among the general population (Albright et al., 2000; Daley & Welch, 2004; Fontaine et al., 1999; Hamer, Stamatakis, & Steptoe, 2009; Phillips, Kiernan, & King, 2003; Thøgersen-Ntoumani, Fox, & Ntoumanis, 2005), adults with prior sedentary-oriented lifestyle (Ball, Burton, & Brown, 2009; Fox, 1999; Murphy, Nevill, Neville, Biddle, & Hardman, 2002), as well as obese and overweight people (Berger, 2004; Hayes & Ross,

1986; Perna et al., 1999). The psychological benefits of PA have been found among those suffering from other chronic illnesses like T2DM (Honkola, Forsen, & Eriksson, 1997; Kirk et al., 2001; Martinus, Corban, Wackerhage, Atkins, & Singh, 2006), multiple sclerosis (Mostert & Kesselring, 2002; Oken et al., 2004; Petajan et al., 1996), knee osteoarthritis (Penninx et al., 2002). Psychological-benefits of PA have also been found for those diagnosed to be clinically depressed (Babyak et al., 2000; Dunn, Trivedi, Kampert, Clark, & Chambliss, 2005; Pedersen & Saltin, 2006; Phillips et al., 2003; Richardson, Avripas, Neal, & Marcus, 2005). Another benefit of regular PA is improvement in cognitive functioning, particularly later in life (Fratiglioni, Paillard-Borg, & Winblad, 2004) and PA may have a supportive role against dementia as well as Alzheimer's disease (Fratiglioni et al., 2004).

2.4 Physical Activity Participation

PA is defined as any movement carried out by the skeletal muscles that requires energy above the basal metabolic rate (Fahey, Insel, & Roth, 2004). Exercise is a sub-category of PA that incorporates planned, structured, and repetitive movements. Sport is another sub-category of PA, which includes structured competitive situations that are governed by rules (Berger, Pargman, & Weinberg, 2007).

The World Health Organization (WHO) currently recommends that adults (18-64 years old) do at least 150 minutes of moderate-to-vigorous-intensity PA every week (WHO, 2013). The majority of adults, however, do not obtain sufficient levels of PA to derive the health benefits (Armstrong & Welsman, 2006; Butcher et al., 2008; Poh et al., 2010). Many factors influence people's PA participation. Some factors inhibit PA participation and adherence, whereas other factors facilitate people's efforts to either begin or maintain regular PA participation.

Numerous studies have been conducted to examine the barriers for PA behaviour among adults. Barriers include enjoyment of sedentary behaviour (e.g., reading, watching television), perceiving oneself to be too old to engage in PA, lack of time, low exercise self-efficacy, lack of knowledge, pain experienced during participation in PA, tiredness or lethargy, insufficient social support, lack of access to exercise facilities, having no exercise partner, and low motivation (Ansari & Lovell, 2009; Booth, Bauman, Owen, & Gore, 1997; Casey, De Civita, & Dasgupta, 2010; Craft, Perna, Freund, & Culpepper, 2008; Dwyer et al., 2005; Ebben & Brudzynski, 2008; Faulkner & Biddle, 2004; Jewson, Spittle, & Casey, 2008; Korkiakangas, Alahuhta, & Laitinen, 2009; Lawton, Ahmad, Hanna, Douglas, & Hallowell, 2006; Mier, Medina, & Ory, 2007; Nowak, Radzińska, & Rynkiewicz, 2009; Rhodes et al., 1999; Salmon, Owen, Crawford, Bauman, & Sallis, 2003; Schutzer & Graves, 2004; Struber, 2004; Thøgersen-Ntoumani et al., 2005; Trost, Owen, Bauman, Sallis, & Brown, 2002; Ussher, Stanbury, Cheeseman, & Faulkner, 2007).

Although the antecedents to participation in PA are highly complex (Standage et al., 2012), the most crucial reason for people to be physically active during their spare time is motivation. Motivation not only affects PA participation, but is also a critical factor in exercise adherence (Aaltonen et al., 2012; André & Dishman, 2012; Dishman et al., 1985; Frederick & Morris, 2004).

To promote PA adherence, scholars, such as Gill et al. (1983), Morris et al. (1995), Rhodes et al. (1999), and Kravitz (2011) have attempted to discover the reasons people engage in PA in order to be able to develop PA adherence. The significance of this line of research is that the results can help exercise professionals understand important motivational components of PA participants and design effective teaching or motivating strategies based on participants' motives, needs, or personal goals (Iannotti et al., 2013;

Pfeffer, 2013; Rejeski & Kennedy, 1988). Thus, the design of interventions is of utmost importance in PA motivation of adults. In order to design efficacious interventions, it is essential to identify the motivation and in particular the specific motives that are relevant to adult PA involvement. Prominent researchers like Morris et al. (1995) and Frederick and Ryan (1993) have focused on sport and exercise involvement, whereas other researchers pursued measures for competitive sport (Fortier et al., 1995; Frederick & Morris, 2004; Pelletier et al., 1995). However, there has been limited research on the motivation of participants in non-competitive physical activities. This can only be balanced by developing and validating measures that would reflect a range of motives for participation in PA, that apply both to competitive and non-competitive forms of PA.

2.5 Motivation in Physical Activity and Sport

Deci and Ryan (1985) defined motivation as "the energy and direction of behavior" (p. 112). The energy property of motivation illustrates the proportion of effort set aside in a specific activity, the direction property of motivation denotes the particular level of people's personal interest in one task compared to other, competing tasks (Deci, 1980; Deci & Ryan, 1985). Different people have different energy and motivation (direction of the behavior) (Deci, 1980; Deci & Ryan, 1985). For example, the PA motivation in someone jogging while enjoying music probably differs from PA motivation in a rugby player striving in scrums throughout an 80-minute match in order to win the competition or tournament. As a result, it is worth discovering what will drive and sustain individuals' motivation.

The focus of previous research on motivation was on how individuals were motivated in sport and PA settings, the reasons why people were motivated, and the different levels of motivation in individuals based on age, gender, and type of activity (Aaltonen et al.,

2012; Butt et al., 2011; Egli et al., 2011; Gallagher et al., 2012; Gill et al., 1983; Halbrook, Blom, Hurley, Bell, & Holden, 2012; Iannotti et al., 2013; Kilpatrick et al., 2005; Litt, Iannotti, & Jing, 2011; Pan & Nigg, 2011; Pero et al., 2010; Weinberg et al., 2000).

The sport psychology domain has witnessed the emergence of a variety of theoretical frameworks like Need for Achievement Theory (Atkinson, 1964), Attribution Theory (Weiner, 1979, 1985), Theory of Competence Motivation (Harter, 1978), Theory of Goal Setting (Locke & Latham, 1990), and Self-Efficacy Theory (Bandura, 1977, 1986). However, in the sport and exercise context, there are two theoretical frameworks, namely AGT and SDT that have been the basis of substantial, recent research on motivation. It is worth mentioning that Deci and Ryan (2000) and Duda (1992) claimed that both AGT and SDT were recognized as the two requisite frameworks of motivation which facilitate our understanding of motivational behavior along with relevant affective and cognitive results in the realm of PA.

2.5.1 Achievement Goal Theory (AGT)

Nicholls (1989) presented two basic goal states, which reflect involvement in an activity to attaining task goals and ego goals. According to Nicholls (1989), ego-involved people are primarily involved with their capability or score compared to others, whereas task-involved individuals have self-referenced perceptions of their demonstrated abilities. To put it differently, task-involved individuals concentrate on performing the task better than they did in the past that is, mastering the task, whereas ego-involved individuals experience competence via performing better than others.

Researchers have applied AGT to discern the orientations of the motivational goals not only in competitive sport (Duda, 1988, 1989; Fry & Newton, 2003; Waldron & Krane,

2005), but also in recreational sport and exercise (Duda & Tappe, 1988; Escartí & Gutiérrez, 2001; Ping, McBride, & Bruene, 2002). However, some researchers have claimed that the two achievement goals in AGT were not able to adequately explain the broad realm of goals individuals might have for involvement in PA (Maehr & Braskamp, 1986; Rogers et al., 2008; Whitehead, 1995).

2.5.2 Self-Determination Theory (SDT)

The second approach that provides an understanding of motivational processes is SDT (Deci & Ryan, 1985, 1991). SDT provides a framework to examine PA motives. Deci and Ryan (1985) developed SDT to investigate how various kinds of motivation result in changing levels of self-determination (Deci & Ryan, 1985). SDT considers that people have an inherent creative inclination to be involved in their social and physical environment to absorb and adapt ambient knowledge (Niemiec & Ryan, 2009). Moreover, such an inclination or driving force encases three basic psychologically-oriented requirements, namely autonomy, competence, and relatedness with others (Deci, 1980; Deci & Ryan, 1985, 1991). Autonomy can be defined as individuals' particular experience as volitional and a presentation of their self. The need for competence refers to individuals' feelings of being effective in their interactions with the world. Lastly, relatedness refers to feelings of belonging and relationship with others. Among the three needs, autonomy and competence have been the main focus of research in motivation. Furthermore, when autonomy and competence mix together, they formulate the foundation of a further dichotomy of intrinsic and extrinsic motivation (Deci, 1980; Deci & Ryan, 1985, 1991).

A number of studies claimed that this dichotomous category - intrinsic and extrinsic motivation - constitutes a continuum which makes a distinction among the self-determination of individuals (Carron, Hausenblas, & Estabrooks, 2003; Vallerand &

Losier, 1999). On one extreme, there is amotivation (the lack of motivation for a task), whereas intrinsic motivation (the motive to perform a task for its own sake or its pleasure) can be placed on the other end of the continuum with various levels of extrinsic motivation falling in between (Carron et al., 2003; Vallerand & Losier, 1999).

Following the hierarchy of importance, the highest degree of self-determination can be seen as intrinsic motivation (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand & Losier, 1999). Being intrinsically-stimulated, individuals should assume the task to be interesting or enjoyable (Deci & Ryan, 1985; Ryan & Deci, 2000; Vallerand & Losier, 1999). Intrinsically motivated individuals experience choice in their behavioural dispositions and an optimum level of challenge, thereby fulfilling their needs for autonomy and competence. An example is a soccer player who is influenced to train for the intrinsic fun and challenge of the game.

In contrast, many people also perform PA for extrinsically-oriented causes. In other words, extrinsically-motivated individuals perform the task for its advantages or the avoidance of negative results (Deci & Ryan, 1985; Vlachopoulos, Karageorghis, & Terry, 2000). Yet, people with extrinsic motivation undergo low optimal challenge or autonomy. For instance, a sportsman is extrinsically motivated when he takes part in a competition due to coach pressure, the acquisition of status, or confirmation from friends or family.

Ryan and Deci (2000) investigated the dichotomy of intrinsic and extrinsic motivation as well as their varying influences on overall well-being. They proposed that goal contents with intrinsic orientation, like personal growth or social affiliation, lead to the development of satisfaction because they are facilitative for the acquisition of autonomy and competence (psychological needs). On the other hand, extrinsically-oriented goal

contents, such as pursuit of financial rewards or fame, inhibit satisfaction because they are based on external eventualities.

Markland and Ingledew (2007) argued that different participation motives have different functional significance depending on their intrinsic-extrinsic orientation. Enjoyment and challenge as intrinsically-oriented motives, being autonomous in nature, will probably be maintained in the long run, whereas the improvement of appearance and competition with others, being inherently extrinsic and internally controlling, are unlikely to generate long-term commitment. The understanding of motivation in participants is particularly important in this context. Individuals might engage in PA either for the inherent pleasure or to compete for social attention. It is possible that the self-worth of people becomes dependent upon the orientation of their goals (Sheldon, Ryan, Deci, & Kasser, 2004). For instance, perhaps a karate exponent is involved in martial arts because of the need to learn skills, whereas a pleasure gym exerciser probably gets involved in weight training because of the gratification of his or her intrinsic requirement for the development of physical appearance. An individual's goal orientations can influence the decision to be involved in PA. Therefore, an adequate understanding of goal orientations will help health practitioners to provide individuals with accurate advice to engage in appropriate activities, thereby maximizing their satisfaction.

2.6 Measurement of Participation Motives

Researchers have adopted various approaches to develop standardized instruments to investigate and study participation motives (Rogers et al., 2008). Two approaches have typified the development of most measures of motives for participation in PA. Theoretical approaches involve the development of a questionnaire structure and the generation of items on the basis of a theory of motivation. Atheoretical approaches are

based on studies in which researchers identify reasons for participation in PA by asking participants why they participate, develop items based on participants' responses, and determine underlying factors statistically. The following instruments measure motives for PA based on a particular theory: the Sport Motivation Scale (SMS; Pelletier, et at., 1995), the Exercise Motivation Scale (EMS; Li, 1999), the Exercise Motivation Inventory (EMI; Markland & Hardy, 1993), the Motivation for Physical Activity Measure (MPAM; Frederick & Ryan, 1993), the Motivation for Physical Activity Measure – Revised (MPAM-R; Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997) and the Perception of Success Questionnaire for Exercise (POSQ-E; Zizzi, Keeler, & Watson, 2006). The developers of these instruments have based their content on different theoretical approaches to motivation for PA, resulting in a variety of motives in the different instruments.

The seven sub-scale SMS (namely, to know, to accomplish things, to experience stimulation, external regulation, introjected regulation, identified regulation, and a scale distinguishing amotivation from intrinsic and extrinsic motivation) and the eight sub-scale EMS (labelled integrated regulation, interjected regulation, identified regulation, external regulation, experience sensation, amotivation, intrinsic motivation to sensations, to learn, and to accomplish and experience) are dependent on SDT, particularly the intrinsic/extrinsic elements of SDT (Deci & Ryan, 1985, 1991). The creation of distinction in motivation with regard to intrinsic and extrinsic perspective is a unique attribute of the SMS and EMS. These measures are derived from theory, and consider extrinsic and intrinsic motivation as opposite extremes of a continuum. Such measures primarily try to discover individuals' degree of motivation on the continuum. In other words, these measures categorize the motivation level of people instead of looking at their real motives for PA involvement. The production of motives according to the regulation and amotivation perspectives of the SDT makes it improbable that such

scales cover all motives for PA, particularly as this is not their focus. These measures are not precisely related to the recognition of what motives individuals have, and are included here to make a distinction between them and scales of motives for exercise and sport involvement.

The EMI is made up of 12 sub-measures (stress management, weight management, recreation, social recognition, enjoyment, appearance, personal development, affiliation, ill health avoidance, competition, fitness, and health pressures). Despite the established validity of the EMI in several studies (Ingledew, Hardy, & De Sousa, 1995; Markland, Ingledew, Hardy, & Grant, 1992), a number of issues have been raised regarding the EMI. Similar to the EMS and SMS, the EMI was developed in the absence of participant consultation and thus, it is unlikely that it covers all reasons individuals could have for participation in exercise. The internal consistency of the fitness sub-measure is relatively low, perhaps because it consists of only three items. Moreover, the sub-measures related to health, such as health pressure and ill-health avoidance, have fairly negative implications. Some researchers have argued that progress toward well-being should be seen as a positive, intrinsically-oriented motivational influence (Duda & Tappe, 1988; Kasser & Ryan, 1996). Therefore, the measurement of both avoidance and approach motives would provide a more comprehensive assessment of motivation. In addition, the application of the following item-stem "personally, I exercise (or might exercise…)" is mostly for people who spend time exercising even though it could be used with non-exercisers. Its appropriateness has not been investigated for application in other domains like sports. Besides, there is an absence of primary theoretical structure and the measure is only loosely connected to SDT.

In order to develop the totality of EMI, the EMI-2 included a positive health sub-measure and divided the fitness sub-measure into strength, endurance, and nimbleness

(Markland & Ingledew, 1997). The EMI-2 has 25 items more than the EMI to enhance the depth of this measure. Though the EMI-2 has been rigorously tested on factorial validity and invariance of the factor structure across gender (Markland & Ingledew, 1997), the EMI-2 does not acknowledge motives relevant to the dimension of appearance reported in other research regarding motives for sport and exercise (Rogers, Tammen, & Morris, 1999).

In 1993, Frederick and Ryan created the 23-item MPAM to investigate three types of reasons for PA involvement (namely interest-enjoyment, competence, and body-related reasons) obtained from a review of literature, pilot studies, and the SDT (Frederick & Ryan, 1993). They created a number of items for the enjoyment and competence factors in terms of the basic elements of intrinsic motivation within the SDT, whereas the items in the body-related factor represented extrinsic motives for PA. The competence sub-scale covered motives pertinent to skill development, competition, and challenge. The body-related sub-scale covered items relating to the enhancement of appearance and fitness. The interest-enjoyment sub-scale included items regarding the task being fun, interesting, stimulating, and enjoyable.

After using the MPAM in a study on adherence of gym exercisers in an American university, researchers found limitations in the motives and modified the MPAM (Frederick & Ryan, 1993; Ryan et al., 1997). Ryan et al. (1997) divided the body-related questions into two sub-scales: fitness and appearance. Apart from that, seven items relevant to PA social motives were added based on reviewing the literature, thus recognizing that social goals, namely meeting people and being with friends, were important motives for PA involvement.

This led to five sub-scales (competence, interest/enjoyment, fitness, appearance-based, and social scales) in the 30-item MPAM-R (Ryan et al., 1997). Original MPAM items

that were excluded from the MPAM-R included those related to aspects of psychological health and competition (Ryan et al., 1997). However, the limitation of both the MPAM and MPAM-R is that their development was to measure scales that matched the intrinsic/extrinsic components of the SDT. Moreover, the main purpose of the scales (MPAM and MPAM-R) was to measure the motives for exercise involvement only, so these scales do not cover all reasons for sport participation. This has restricted the universality of the MPAM and MPAM-R because both do not sufficiently cover all motives for PA involvement.

Most of these measures of motivation include incentives for exercise or sport that are only relevant to the specific theory that underpins their development. Hence, they do not cover the motives and incentives that participants suggested when they were asked for the reasons they participated in PA in an open format, such as an unstructured interview. To put it differently, an open interview makes it possible for individuals to explain, provide instances and demonstrate personal motives for participation. What is more, a number of theoretically-based questionnaires have weak psychometric features. For instance, Markland and Ingledew (1997) proposed that the EMI not be applied to evaluate the degree of intrinsic motivation because of problems that are conceptually or operationally-oriented. The EMI did not affirm motives that were relevant to competitive dimensions. Also, the EMI did not evaluate a number of clear fitness-oriented reasons for exercising, such as endurance and strength. Besides, the sub-scales pertinent to wellbeing and health concentrated on ill-health, which ignored motives that were not only health-oriented, but also positively based (Markland & Ingledew, 1997).

Even as a 5-factor expansion of the MPAM, the MPAM-R (Ryan et al., 1997) suggested a restricted number of motives. The POSQ was created specifically to measure only two goal orientations: one is the task or mastery orientation and the other is the ego or

competition orientation. The obtained differences on the POSQ explained approximately 50% of the data variance, showing that further variables should be taken into consideration (Ryan et al., 1997). Moreover, the meticulous aim of design of the POSQ was to be used in the domain of competitive sports. As a result, the first approach, based on theories, in particular SDT or goal orientation theory, generated questionnaires with a relatively narrow focus, thus, lacking comprehensiveness. Research suggests that PA towards health could be a more positive, intrinsically-oriented motivational force (Lavigne, 2009; Puente & Anshel, 2010).

An alternative approach to investigate the motives in PA involvement has been labelled atheoretical, stemming from empirical discovery of PA involvement motives. A principal example of the atheoretical approach is the work of Gill, Gross, and Huddleston (1983). They adopted an empirical method to develop a measure of motives for participation in sports. They used open-ended questions to ask youth sport participants about their reasons for participation. Based on this information, Gill et al. (1983) created a questionnaire with 30 items named the Participation Motivation Questionnaire (PMQ). The items were preceded by the phrase 'I want to' or 'I like to'. For instance, 'I want to develop my skill' and 'I want to have fun'. Subsequently, the PMQ was administered to 1,138 youth participants at a multi-sport summer camp. After conducting an exploratory factor analysis (EFA), Gill et al. (1983) distinguished eight factors to be used in the PMQ, namely achievement, team (affiliation/social), fitness, energy release, to be with others, skill, friends, and fun.

 A number of researchers in the sport and exercise realm have used versions of the PMQ to examine motives for participation in a range of contexts. For example, a 3-point Likert scale with 30 items was created by Gould, Feltz, and Weiss (1985) and was administered to 365 swimmers (8 to 19 years old). Having run the factor analysis, they

discovered seven sub-scales, namely, achievement/status, team atmosphere, excitement/challenge, fitness, energy release, skill development, and friendship. In another study, a 32-item PMQ version was developed with answers on a 5-point Likert scale administered to 67 eight-to-sixteen year-old gymnasts (Klint & Weiss, 1987). Although no factor analysis was run, the top-rated options which appeared out of discriminant function analysis contained learning skills, getting in shape, improving skills, fun, staying in shape, and challenge. There was another development of a 37-item PMQ by Longhurst and Spink (1987) whose responses were based on a 5-point Likert scale. This version of the PMQ was subsequently administered to 404 athletes (8 to 18 years old) who took part in cricket, netball, Australian football and athletics. The results of the factor analysis revealed four factors, namely team/achievement, situational, status, and fitness. Creating another 37-item PMQ based on a 5-point Likert scale, Brodkin and Weiss (1990) administered it to 100 swimmers (6 to 76 years old). The results from the factor analysis revealed seven factors: health/fitness, social status, affiliation, energy release, significant others, fun, as well as further particular features of swimming.

Morris and Han (1991) investigated motives in PA involvement with a sample who were involved in a non-competitive PA, tai chi. To do so, they developed a 40-item version of the PMQ from open-ended interviews with tai chi participants. Responses were given on 5-point Likert scales. Morris and Han administered their 40-item PMQ to 228 tai chi participants (9 to 71 years old). They ran the factor analysis and discovered 11 sub-scales, namely aesthetic, philosophical, improve existing medical condition, exercising body and mind together, non-competitive, health, skill, energy release, social, status, and fun.

In another study, Morris, Power, and Pappalardo (1993) created a 44-item PMQ based on 5-point Likert scales which was administered to 346 table tennis players aged from 10 to 80 years. The results of the factor analysis revealed eight sub-scales: health/fitness, fun, challenge, social, skill development, aesthetic/philosophy, status, and relaxation.

Buonamano, Cei, and Mussino (1995) worked on the development of a 32-item PMQ based on a 7-point Likert scale. This version was administered to 2,589 athletes aged from 9 to 18 years. The outcomes of the factor analysis revealed six sub-scales, namely fitness/skill, friendship/fun, extrinsic rewards, success/status, energy release, and team. Sutherland and Morris (1997) conducted a study using a 50-item PMQ measured on a 5-point Likert scale on 293 athletes. The factor analysis demonstrated nine sub-scales: relaxation, health, environment, social, challenge, status, skills, affiliation and fun.

Kirby, Kolt, and Liu (1999) developed another PMQ with 30 items measured on a 3-point Likert scale and administered it to 383 gymnasts (8 to 15 years old). The results of the factor analysis uncovered seven sub-scales, which are social cohesion, excitement, action, affiliation, somatic (fitness/exercise), miscellaneous and status (win/energy release/be important). In the same year, Kolt, Kirkby, Bar-Eli, Blumenstein, Chadha, Liu, and Kerr (1999) created an alternative 30-item questionnaire measured on a 3-point Likert scale and administered it to 701 gymnasts aged from 8 to 15 years. The factor analysis revealed seven sub-scales, namely recognition/excitement, skills, team/affiliation, challenge/fun, popularity/energy release, achievement and miscellaneous.

In 2000, another group of researchers, Weinberg, Tenenbaum, McKenzie, Jackson, Anshel, Grove, and Fogarty (2000) created a 22-item PMQ using a 3-point Likert scale which was administered to 1,472 athletes aged between 13 and 18 years. The factor

analysis revealed four sub-scales for sport, namely fitness/fun, competition, teamwork, and social energy in addition to another four sub-scales, which were extrinsic, intrinsic, energy release, and fitness (Weinberg et al., 2000).

In a landmark study, Morris et al. (1995) examined gender, age, and type of activity to investigate motives for Australian PA involvement, using a 50-item PMQ measured on a 5-point Likert scale. The instrument was administered to 2,601 participants (1,164 males and 1,437 females), aged between 6 and over 80 years, who were involved in 14 different activities. The activities were selected to show five types of PA, namely racquet sports (squash, tennis, and table tennis), exercise activities (weight training, aerobics), body movement sports (swimming, gymnastics), team ball games (volleyball, netball, basketball, lacrosse) as well as martial arts (tae kwon do, tai chi, karate). An EFA produced nine sub-scales, which were affiliation, the environment, relaxation/aesthetic, fun, skills, health, challenge, status, and to be occupied. Morris et al. (1995) performed Discriminant Function Analysis (DFA) for gender and age. Status, challenge, health and affiliation were among the strongest discriminating sub-scales obtained. In further analysis of the data from this study, Morris et al. (1996) applied DFA to determine the motives that distinguished each type of activity from the rest of the sample. Results showed that team sport participants were discriminated from all the other participants by higher scores on the social or affiliation sub-scale of the PMQ. Racquet sport competitors were discriminated by higher scores than the rest of the sample on the challenge or competition/ego sub-scale. Exercise participants were discriminated by higher scores on physical condition from participants in other activities. Morris et al. (1996) also found that martial arts competitors were discriminated by higher scores on enhancing body and mind-related skills from the rest of the sample. Individual sports were not discriminated successfully.

Although the numerous versions of the PMQ do cover a breadth of motives for participation in PA, a stable version of the questionnaire has yet to be established with a set number of items that can be used in various PA contexts (Frederick & Morris, 2004). While the majority of researchers have investigated motives in an individual sport, other researchers have chosen a broad domain of activities. It should be stated that such activities were selected in terms of particular interest or convenience, rather than on a conceptually-oriented basis. Two other things which were different from one study to another were sample size and involvement level. Another drawback of the PMQ approach is that it is not supported by any specific theory of motivation (Frederick & Morris, 2004). Additionally, there has not been a constant version of the PMQ, which was used to gauge the motives of individuals in various physical activities. Various versions of the PMQ have included 22 to 50 items, as well as different derived factors ranging from 4 to 11 factors. Some of the existing versions of the PMQ are not comprehensive enough to provide for the various motives of involvement found in the exercise and sport realm. For example, Longhurst and Spink (1987) identified only four factors in their EFA and Weinberg et al. (2000) reported different factors for competitive sport participants compared to non-competitive exercisers. The probable cause for this could be because of the limited items in their study. In addition, the scales do not have a powerful conceptual basis for the discernment of motives in PA involvement. The biggest drawback of the PMQ is that it is descriptive and is not associated with an established theory of motivation.

2.6.1 Development of the Recreational Exercise Motivation Measure (REMM)

To address the limitations of previous instruments as well as the drawbacks of both the theoretical and the atheoretical approaches, Rogers et al. (2008) created a new instrument based on both empirical and theoretical approaches. Initially, a qualitative

study was performed where 11 in-depth, semi-structured interviews were conducted with exercise participants aged 21 to 50 years. The purpose was to investigate the reasons for non-competitive PA involvement (Rogers et al., 2008). The sample was regular exercisers who took part in PA three times a week for at least 30 to 60 minutes over the previous year. Using open-ended questions, Rogers et al. asked participants about their objectives for participating in PA and their success in achieving them. Focusing on achievement goals, Rogers et al. (2008) used the terms "success" and "goals" throughout the interview, and avoided the terms "motive", "motivation", or "reasons" for participation. This distinction was made because although goals and motives are often used interchangeably, they are conceptually distinct. More specifically, a goal is a specific external target, whereas a motive is an internal drive influencing behavior (Roberts, Treasure, & Balague, 1998). Such a technique illustrated the purpose of Rogers at al. (2008) to investigate AGT in non-competitive or recreational exercise.

Through inductive content analysis of the interviews, Rogers et al. (2008) identified 13 first-order themes (competition/ego, social comparison, appearance, rewards, others' expectations, affiliation/social, fitness, medical, psychological well-being, self-esteem, relaxation/stress release, mastery, and enjoyment), These were further reduced to seven meaningful concepts (competition/ego, extrinsic rewards, social, physical health, psychological health, mastery, and enjoyment), which were then grouped under the general dimensions of intrinsic and extrinsic motivation. Although the mastery and competition/ego orientations that emerged from the qualitative study aligned with AGT, a range of other themes were also generated that lacked theoretical underpinning. These appeared to illustrate motives, rather than goals. As a consequence, Rogers at el. (2008) suggested that mastery and enjoyment should be classified under intrinsic motivation and the other motives should be categorized into extrinsic motivation. This neatly

matched the underpinnings of SDT, which could explain the domain of motives obtained out of the qualitative study.

The study by Rogers et al. (2008) had advantages over prior studies. First, the motives that emerged from the qualitative study fitted a theoretical framework, namely intrinsic-extrinsic motivation as specified within SDT. Second, most of the motives obtained from the interviews were consistent with factors obtained from prior research (Frederick & Ryan, 1993; Morris et al., 1995; Ryan et al., 1997). Furthermore, although the motives were generated within the recreational exercise domain, they reflected considerable overlap with items in the PMQ, which was developed in a sport context.

Rogers (2000) developed a 90-item questionnaire to comprehensively cover the different aspects of each construct. This was reduced to 55 items based on advice from a board of 16 exercise psychologists. In order to develop a scale with high reliability and validity, they took a number of items from previous instruments, with permission of the original authors (e.g., MPAM, MPAM-R, and the 50-item PMQ). The MPAM and MPAM-R items were categorized into 13 integrated concepts and identical items were removed. Subsequently, the easily readable and comprehendible items were kept whereas the rest were removed. The MPAM and MPAM-R items, which reflected concepts not covered by the new items were added to the item pool under the relevant integrated concept. Two items (one relevant to getting status and recognition and the other was winning) from the 50-item PMQ that were not covered by the existing items were also added. This resulted in a 73-item questionnaire. Each item was independently reviewed to ensure that the 13 constructs were comprehensively covered and that none of them was over-represented by the items. To reflect the breadth of the constructs, a similar number of items (between four and eight) were used to represent each of the 13 constructs.

This questionnaire, named the Recreational Exercise Motivation Measure (REMM), used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), to indicate how people's motives for participation in PA agreed (or disagreed) with the motive expressed in each item (Rogers, 2000). The choice of a 5-point scale was based on the recommendations of several authors (Clark & Watson, 1995; Comrey, 1988; Kline, 2011). The items were randomly sequenced in the final version of the questionnaire. All the items start with the stem "I exercise ...". Examples of items include "to keep up current skill level", "because it makes my physical appearance better than others", and "because it is something I have in common with my friends".

Rogers (2000) validated the REMM with 750 recreational exercisers (439 females, 238 males, and 73 gender not specified) aged 14 to 84 years. Following that, a study was conducted on 245 sports participants (98 females, 119 males, 28 gender not specified), aged 17 to 74 years (Rogers, 2000). EFA revealed a similar factor structure for both the recreational sport sample and recreational exercise sample. First-order factor analysis revealed eight factors, namely mastery, enjoyment, psychological condition, physical condition, appearance, others' expectations, affiliation, and competition/ego. Cronbach's alpha coefficients of the eight sub-scales were 0.77 to 0.92, showing sound internal consistency, and test-retest reliabilities were 0.58 to 0.84 (Rogers, 2000). Because the eight factors were not orthogonal, that is, they were correlated, a second-order factor analysis was performed on participants' factor scores for the eight first-order factors. This produced three fundamental factors consistent with the intrinsic-extrinsic motivation components of SDT, namely an intrinsic motivation factor, comprising mastery and enjoyment, an extrinsic body-mind motives factor, comprising psychological condition, physical condition, and appearance, and an extrinsic social motives factor, including others' expectations, affiliation, and competition/ego. Rogers (2000) then conducted a comparison study with 250 recreational sports participants and

found that the REMM produced very similar reliability and validity statistics, indicating that the measure is acceptable for use with participants in competitive sports and non-competitive physical activities.

The REMM has been applied successfully in research. Aaltonen et al. (2012) showed that several motives on the REMM distinguished between pairs of twins one of whom had been active for 30 years and the other inactive for that period. In each case, REMM scores were significantly higher for the active twins than their inactive siblings. In a study by Caglar, Canlan, and Demir (2009), the REMM was administered to adult sport participants. Caglar et al. reported that females rated health as a more important motive than males and young adults rated health, appearance, social/affiliation, and skill motives more highly than adolescents.

In spite of the fact that the REMM has shown promise as a measure of motives for participation in sport and PA, it has limitations. A concern with the REMM was that administration of a scale of this length might not always be convenient in sport and PA contexts. In fact, impatience or boredom might affect the answers given by respondents. Rogers and Morris (2003) proposed that it would be fruitful to develop a shorter version of the REMM that was easier to administer and quicker to complete than the original.

2.6.2   Physical Activity and Leisure Motivation Scale (PALMS)

A short-form version of the REMM was developed based on a combination of empirical and theoretical factors. First, Morris and Rogers (2004) determined the structure and length that was appropriate for the short form version of the REMM. They decided that the short-form should retain the 8-factor structure of the REMM and that each factor or sub-scale should be measured by five items. Experts consider that three items is too little to ensure reliability and four items is acceptable, but not as reliable as five items (Kline,

2011). Second, in order to derive a brief form of the REMM that had sound psychometrics, Morris and Rogers (2004) performed item analysis, which included the examination of means and standard deviations, skewness and kurtosis, factor loadings, item-sub-scale correlations, and deleted alpha coefficient values. The items from the recreational exercise study and the recreational sport study of the REMM were retained based on several principles. The items retained had means not located too far toward one or other extreme of the scoring range, moderate to high standard deviations, indicating good spread in the distribution, high factor loadings on the factors they had been assigned to, high correlation coefficients with the total score for the sub-scale to which they had been assigned, and item-deleted alpha coefficients that did not increase the alpha coefficient compared with the sub-scale alpha. This left 40 items with five items on each of the eight sub-scales.

Given that the PALMS was derived from the REMM, it is plausible to accept that the PALMS, like the REMM, would have sound psychometric features. In order to ensure that the PALMS was a reliable and valid instrument, it should be tested on a large, international sample from a range of activities. A recent study by Zach, Bar-Eli, Morris, and Moore (2012) translated the PALMS into Hebrew (PALMS-H) and validated it with 678 recreational exercise participants (350 males, 316 females, and 12 gender not specified) aged 9 to 89 years who exercised regularly. The participants came from 30 clubs, fitness centres, gymnasiums and recreational parks in Israel. The EFA revealed that 8 sub-scales emerged as expected, but the others' expectations sub-scale split into two, family friends expectations and health/employers expectations (enjoyment, employers' expectations, affiliation, competition/ego, psychological condition, appearance, physical condition, families` and friends' expectations, health professionals' and employers' expectations, and mastery). Zach et al. (2012) reported that the PALMS-H showed sound reliability, with α values ranging from .63 to .96 for every sub-scale.

The α value for every sub-scale of the PALMS-H was as follows: competition/ego (.96), affiliation (.91), psychological condition (.90), appearance (.90), enjoyment (.89), physical condition (.84), mastery (.84), family's and friends' expectations (83), and health professionals' and employers' expectations (.63).

In a study by Chowdhury (2012), the PALMS was administered to 202 volunteer martial arts, sport and exercise participants, aged 18 to 71 years, from various clubs, leisure centres and organizations in Australia. They took part in various activities, namely, Australian Football League, gym-based exercise, tae kwon do, tennis, and yoga. The findings revealed a strong factor structure (CMIN/DF = 2.22; NFI = 0.95; CFI = 0.97; RMSEA = 0.078). The study also demonstrated sound reliability with a Cronbach's alpha of 0.79 and α values from 0.80 to 0.99 for PALMS sub-scales. To obtain criterion validity, Spearman's rho (rs) was used and results showed a strong positive relationship between the REMM and the PALMS (rs = 0.9). Moreover, the correlations between each PALMS sub-scale and the corresponding sub-scale on the validated REMM were also high and varied from 0.76 to 0.95.

Building on the foundation laid by the Australian and Israeli studies, future research should investigate the psychometric properties of PALMS as a measure of leisure-time PA in a diverse sample of exercisers and sport participants within the new population. More specifically, future research should focus on conducting the internal consistency, test-retest reliability and factor structure of the PALMS. The purpose of correlating the PALMS and the REMM was to assess how well the PALMS captures the same information as the REMM.

2.7 Motivational Differences between Demographic Variables

Increasing levels of PA to meet current guidelines during adulthood is a public health priority and PA recommendations and guidelines have been designed by public health organizations (Pearson et al., 2013). Therefore, identifying factors associated with adult PA behaviour is important because it will help in informing future research and may guide the implementation of interventions aimed at promoting PA behaviour across the lifespan. It is particularly important to identify and promote those factors that lead to sustained PA in the long term.

For these reasons, researchers, health professionals, and policy makers have all sought to explore the reasons why some people are physically active, whereas others are not. Although the antecedents to participation in PA are highly complex (Standage et al., 2012), one promising approach is to focus on motivation because it is a key factor that influences individuals' initiation and maintenance of behaviour (Hagger & Chatzisarantis, 2008). Motivation not only affects PA participation, but is also a critical factor in exercise adherence (Aaltonen et al., 2012; André & Dishman, 2012; Frederick & Morris, 2004). Based on SDT, motivation to engage in PA can include intrinsic and/or extrinsic aspects. Intrinsic motivation refers to engaging in an activity for the pleasure and inherent satisfaction. Intrinsically-motivated individuals experience choice in their behavioural dispositions and an optimum level of challenge, thereby fulfilling their needs for autonomy and competence. On the other hand, extrinsic motivation refers to engaging in an activity for instrumental reasons, such as external pressures or rewards. Extrinsically-motivated individuals experience little optimal challenge or autonomy (Deci & Ryan, 1985, 1991). Researchers have reported that extrinsic motives are critical during the early steps of PA adoption, whereas intrinsic motives are key for the

maintenance of PA programs (Dacey, Baltzell, & Zaichkowsky, 2008; Ryan et al., 1997).

Research on participation motivation suggests that there are systematic differences between participation motives and some demographic variables. These include gender (Egli et al., 2011), age (Brunet & Sabiston, 2011; Pero et al., 2010), country (Iannotti et al., 2013; Yan & McCullagh, 2004), and preference for specific forms of PA (Rogers et al., 2008; Ryan et al., 1997).

2.7.1 Gender Differences

Research on gender differences in participation motivation has indicated that males and females exhibit different motives for participation in PA. Cunningham (1971) showed that females identified fitness and health as the most important motives for PA involvement, whereas for males the most important experience was vertigo, that is, the thrill or excitement associated with PA. Similarly, in a study by Gill, Gross, and Huddleston (1983), the discriminant analysis indicated that the biggest discriminators were achievement and status, both of which were ranked higher by boys than girls for PA engagement.

Egli et al. (2011) found that male college students were motivated most by what Egli et al. termed intrinsic factors (strength, competition, and challenge), whereas females were motivated by extrinsic factors (weight management and appearance). In another study, Kilpatrick, Hebert, and Bartholomew (2005) found similar differences between the motives reported by males and females. Male college students reported higher motivation for challenge, competition, social recognition, strength, and endurance, whereas female college students reported higher motivation for weight management.

As an outcome of PA engagement, Butt et al. (2011) reported that body image contributed most to gender differences. Females consistently chose the motives of appearance in comparison to males (Frederick & Morrison, 1996; Frederick & Ryan, 1993; Weinberg et al., 2000). Frederick (1991) reported that females chose physical attractiveness and appearance as the primary motives, whereas males put more emphasis on motives related to mastery. However, Morgan et al. (2003) reported that friendship and weight control may be more important for girls than boys, whereas competition and enjoyment are less important for girls than boys. Mathes and Battista (1985) found that whereas females favoured social experience as the main reason of PA engagement, males gave their main reason as competition. In a large sample, including 14 different sports and exercise activities, Morris et al. (1995) also reported that females placed greater emphasis on the social motive, whereas males prioritised competition. A recent study by Martin et al. (2013) revealed that the motives related to social relationships, like fun, leisure time occupation and medical advice have a greater influence on females than males while males refer to the importance of previous practice on the current practice. Chowdhury (2012) also found significant motivational differences between males and females. Results indicated that females rated appearance as the primary motive for engaging in PA, whereas males rated affiliation as their priority. Also, Caglar et al. (2009) reported that females` motive for health were higher than males' motive. Unlike a number of studies which revealed significant differences in PA motivation across gender, Khan, Haider, and Ahmed (2011) found that there was no difference between male and female badminton players on motivation.

A problem with the research on participation motives of males and females is that most studies used convenience samples that varied in terms of age, skill level, and the specific activities that were included in the research. All these factors have also been shown to influence preferred motives for participation in PA. This is likely to have affected the

motives that were found to be most important for males and females. Nonetheless, the results across studies showed a pattern differences in motivation for PA participation between males and females. In general, males were more motived by competition and mastery, whereas females placed more importance on appearance, weight management, and social benefits for PA engagement.

2.7.2 Age Differences

In the adult population, it is well established that PA participation decreases significantly as age increases (Butt et al., 2011; Guthold, Ono, Strong, & Chaterrji, 2008; Institute of Public Health, 2011). Motivation for PA may also vary with age, and research within the sport and exercise domain reflects age-related differences in motives (Butt et al., 2011; Iannotti et al., 2013; Pero et al., 2010).

Studies on young athletes have shown evidence that intrinsic motives like enjoyment, fun, skill, and challenge are important for youth (Biddle, Wang, Chatzisarantis, & Spray, 2003; Bryan & Solmon, 2012; Buonamano et al., 1995; Caglar et al., 2009; Gill et al., 1983; Morris et al., 1996; Murcia, de San Román Blanco, Galindo, Villodre, & Coll, 2007; Ryska, 2004; Smith, Ullrich-French, Walker Ii, & Hurley, 2006; Whitehead, 1995; Zan et al., 2012).   Research with young and middle-aged adults, however, indicates that a more diverse set of motives, including health outcomes, drives these older sport and exercise participants (De Andrade Bastos, Salguero, Gonzalez-Boto, & Marquez, 2006; Gallagher et al., 2012; Morris & Han, 1991; Morris et al., 1993; Trujillo, Brougham, & Walsh, 2004).

Trujillo, Brougham, and Walsh (2004) tested the hypothesis that there are age-related differences in reasons for exercising. Participants included 212 people aged 18 to 34 years, 107 individuals aged 35 to 51 years, 79 people aged 52 to 68 years, and 59

individuals aged 69 to 86 years. Results provided mixed support for the hypotheses that younger individuals exhibit greater concern for interpersonal attraction outcomes, whereas older individuals exhibit greater concern for health outcomes. This result is consistent with research indicating that active older adults were motivated to exercise from the recognition they received from important others (Duda & Tappe, 1988).

Morris et al. (1995) investigated differences in activity type on participation motives in 2,601 participants (1,164 males and 1, 437 females) aged 6 to above 80 years. They found that the biggest discriminators were status and skills/movements, both of which were ranked higher by the 6 to 14 year-olds than the rest of sample. Multiple factors discriminated 15 to 18 year-olds from the overall sample. This group was discriminated from the other participants by challenge and status. Six crucial factors, including fun and health, discriminated the 19 to 22 year-old age group from the participants in other age groups. Within the 23 to 39 year-old age group, six factors discriminated between this group and the rest of the sample, including higher scores on the skills, status, and health sub-scales. Those aged 40 to 59 years were discriminated by challenge, status, and skills from the rest of the sample. In this case the mid-life adults rated these motives lower than the rest of the sample and rated physical health as a more important motive for participation. The motives that most clearly discriminated the 60 to 80 year-old age group from the rest of the sample were physical health and aesthetics/relaxation. Like the mid-life group, they also rated challenge, status, and skills lower than all the younger participant groups.

Koslow (1988) examined the effect of age on PA involvement among adults. There were three age categories: 18 to 30 years old, 31 to 40 years old and 41 to 50 years old. Each category comprised 50 females and 50 males. Those aged 18 to 30 years rated aesthetic benefits significantly higher than health benefits. Also, the benefits pertaining

to health and aesthetic enhancement were rated as significantly more important than social and emotional benefits and training benefits by participants aged 31 to 50 years. Koslow (1988) concluded that, regardless of age, participants were equally or more interested in aesthetic benefits compared to health benefits resulting from fitness-related activities.

Brodkin and Weiss (1990) used a lifespan method in their descriptive research on motives for PA involvement. Studying 6 to 74 year-old swimmers, they found social and health motives were among the most important factors selected by young children whereas older children and adolescents were attracted by the motives of skill development and health. Fitness and health were the most important factors for adults. Additionally, with regard to the youngest swimmers, fun was the topmost reason for PA participation (Brodkin & Weiss, 1990). Also, Brodkin and Weiss reported that competition was not as important to the sport motivation of older adults compared to younger participants.

Egli et al. (2011) investigated differences in PA motivation between age, gender, and race with 2,199 students adults (1,081 males and 1,118 females) who engaged in exercise. The results revealed a significant difference in health pressure, affiliation, and ill-health avoidance between the under 20 and over 20 year olds. Affiliation was more important for the over 20 year old group, whereas health pressure and ill-health avoidance were more important for the under 20 year old group. This result is at odds with previous studies (Brodkin & Weiss, 1990; Trujillo et al., 2004). In most research examining age differences in motives for participation in PA, concerned with physical and mental health have become more prominent as age increased.

To summarize, there has been substantial research on the motives associated with participation in PA in people of different ages. In general, researchers have found that

young adults were more motivated by mastery (skill learning/improvement) and challenge, whereas older participants exhibited more concern for consequences related to physical and psychological health than younger adults. Findings highlight the importance of considering age when studying PA motivation, because the strength of the associations between the motivational regulations and PA behaviour varied across age groups. Findings highlight the importance of considering age when studying PA motivation because identifying factors that influence motivation for PA at different ages is necessary to develop interventions to increase PA behaviour across the lifespan (Brunet & Sabiston, 2011).

2.7.3   Type of Activity

Very limited research has specifically examined motivation for certain types of PA. It is plausible that there is a relationship between motives for participation in PA and the types of PA that individuals choose to spend their time doing. Studies that have reported the relationship between participation motives and specific types of PA suggested systematic differences (Frederick & Ryan, 1993; Morris et al., 1995, 1996; Rogers et al., 2008; Ryan et al., 1997). For example, Frederick and Ryan (1993) compared the motivation of those who participated in individual sports (such as tennis and sailing) and those who participated in fitness or exercise-oriented activities (such as running and aerobics), using the MPAM. They found that those who participated in individual sports had higher interest/enjoyment and competence motivation, whereas those who participated in fitness or exercise activities had higher body-related motivation. In another study, Kilpatrick et al. (2005) reported that sports participants were motivated by intrinsic factors like enjoyment and challenge, whereas exercise participants were motivated by extrinsic factors and focused on appearance and weight and stress management.

Laverie (1998) conducted in-depth interviews with aerobics participants and discovered that their motives were associated with social and health factors in addition to factors related to aerobics, such as the environment within an aerobics class and the emotions linked with the performance of aerobics. Skår, Odden, and Vistad (2008) reported that physical exercise and personal health were the basic motives for mountain biking. Coghill and Cooper (2009) showed that the most important motives for walkers were health and fitness.

In one of the few comprehensive studies on motives for participation in different types of PA, Morris et al. (1995) administered the PMQ (Gill et al., 1983) to 2,601 participants (1,164 males and 1, 437 females), aged from 6 to over 80 years, who were involved in 14 different sport and exercise activities. The activities were grouped into five categories of PA, namely team ball games (lacrosse, netball, basketball, volleyball), racquet sports (tennis, table tennis, squash), exercise activities (aerobics, weight training), martial arts (karate, tae kwon do, taiji), and individual body movement sports (gymnastics, swimming). Morris et al. (1995) applied DFA to determine the motives that distinguished each type of activity from the rest of the sample. Results showed that team sport participants were discriminated from all the other participants by higher scores on the social or affiliation sub-scale of the PMQ. Racquet sport competitors were discriminated by higher scores than the rest of the sample on the challenge or competition/ego sub-scale. Exercise participants were discriminated by higher scores on physical condition than participants in other activities. Martial arts competitors were discriminated by higher scores on enhancing body and mind-related skills than the rest of the sample. Morris et al. reported that individual body movement sports were not discriminated from the rest of the sample. They suggested this might be because the two activities, gymnastics and swimming, really involve body movement to attain very different goals. In gymnastics body movement is used to produce aesthetically-judged

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performance, whereas in swimming body movement is employed to beat opponents in a race. More consistent motives might be identified if gymnastics is grouped with other aesthetic body movement activities like diving, trampoline, and synchronized swimming, whereas swimming is grouped with other racing activities like cycling, running, and rowing.

Individuals vary from one to another; some like to exercise alone, but some like to be in a group. Some individuals like their PA program to be tailored, whereas others prefer some level of personal choice. PA advice, particularly in primary health care, may be an effective tool to promote active lifestyles at the population level (Siqueira et al., 2009). According to SDT, long-term adherence to PA could be improved by designing programs or interventions that target the more autonomous reasons for exercise (Wilson & Rodgers, 2002; Wilson et al., 2003), which should increase intrinsic motivation. It is clear that variables, including gender, age, and type of activity, do influence PA motivation, so it is important to consider them when developing strategies to promote PA. In particular, selection of a type of PA that will satisfy individuals' primary motives has great potential to enhance intrinsic motivation and encourage long-term participation, but there is little definitive research examining this issue.

Acknowledging the low levels of PA that currently exist among adults, individualizing activities based on motives is critical in ensuring that PA recommendations and guidelines are met. High levels of motivation, especially intrinsic motivation, for any behaviour are associated with greater effort and persistence. Most previous studies have only compared differences across age and gender (Egli et al., 2011; Kilpatrick et al., 2005; Martin et al., 2013). Few studies have examined scores from measures of motivation using statistical techniques that are specifically designed to identify differences in motives between categories, such as types of PA. There is still a lack of

research on how motivation differs between various demographics of the adult population, especially concerning the key issue of whether different motives are satisfied by various types of activity.

2.7.4   Level of Activity

According to the tenets espoused within SDT, effortful and sustained involvement in exercise behaviour is most likely to occur when people act for autonomous reasons (Standage & Ryan, 2012). In SDT, Deci and Ryan (1985) proposed that motivation is multidimensional and resides along a continuum of self-determination ranging from amotivation (i.e., when individuals lack identifiable motivation, yet continue to act), through extrinsic motivation (i.e., when individuals act in response to external cues), to intrinsic motivation (i.e., when individuals act for the inherent pleasure derived from that particular activity). In short, in SDT Deci and Ryan argued that self-determined motivation leads to positive behavioural (e.g., persistence) (Deci, Koestner, & Ryan, 1999; Gagne, 2003), cognitive (e.g., interest and enjoyment) (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), and psychological (e.g., wellbeing) (Deci et al., 2001; Ryan & Deci, 2002) outcomes. In SDT, Deci and Ryan predicted that more autonomous motives for a particular behaviour will result in increased levels of that behaviour and there is extensive research to support this prediction. Intrinsic and identified motives have been linked with increased exercise participation (Ingledew & Markland, 2008; Standage, Sebire, & Loney, 2008) and higher amounts of PA (Wilson, Mack, Muon, & LeBlanc, 2007).

A growing body of research on motivation and amount of PA has provided support for the prediction that motivation predicts amount of PA. Kaupužs (2013) investigated the relationship between exercise motivation and level of PA of 92 first-year university students. Findings showed that 81.5% of the respondents did large amounts of PA, 17%

did moderate amounts, and 1.5% did low amounts of PA. Kaupužs claimed that intrinsic motivation was the main factor determining amount of exercise in that context. The data showed a significant positive correlation between amount of PA and intrinsic motivation. Vancampfort et al. (2013) examined differences in motivation according to amount of PA. They found significant positive correlations between the motivation sub-scales and amount of PA (according to the International Physical Activity Questionnaire procedure (IPAQ); Craig et al. (2003)).

Cox, Smith, and Williams (2008) tested the relationships among motivation-related variables and leisure-time PA behaviour (Physical Activity Questionnaire for Older Children (PAQ-C)). Results showed that motivation-related constructs positively predicted leisure-time PA behaviour. Enjoyment of PA activities mediated the relationship between self-determined motivation in leisure-time PA. Based on an SDT perspective, perceived competence, autonomy, and relatedness were important antecedent variables, with autonomy and relatedness showing less stability over time than competence and positively predicting self-determined motivation.

Gillison, Standage, and Skevington (2006) examined the effects of exercise goals on exercise motivation and leisure-time exercise behaviour. The data showed that intrinsic goals positively predicted self-determined motivation, which in turn positively predicted exercise behaviour. Furthermore, self-determined motivation partially mediated the effects of exercise goals on reported exercise behaviour. After controlling for the possible confounding effects of age and gender, Vierling, Standage, and Treasure (2007) found that autonomous motivation toward PA positively, albeit weakly, predicted pedometer step counts over a 4-day period.

In a recent systematic review, Teixeira, Carraça, Markland, Silva, and Ryan (2012) reported consistent support for a positive relationship between more autonomous forms

of motivation and exercise, with a trend towards identified regulation predicting initial/short-term adoption more strongly than intrinsic motivation, and intrinsic motivation being more predictive of long-term exercise adherence. The literature is also consistent in indicating that competence satisfaction and more intrinsic motives positively predicted exercise participation across a range of samples and settings. Also, Jones, Harris, Waller, and Coggins (2005) demonstrated that encouraging PA is an essential area of health promotion.

2.8   Changes in Motives

While numerous theoretical models of motivation have attempted to account for PA behaviour, a growing number of studies have employed SDT. SDT presents a dynamic view of motivation, linking characteristics of individuals' social environment to their motivational consequences (Deci & Ryan, 2008). SDT proposes that motivation is multidimensional, and resides along a continuum of self-determination ranging from more controlled types of motivation (e.g., acting in response to external pressures, such as reward or punishment, or internal cues such as guilt) to more autonomous forms of motivation (e.g., acting for pleasure, or the inherent value of an activity). Motivation can move along the continuum to become more autonomous if support for the three basic psychological needs proposed in SDT is provided by the social environment (Deci & Vansteenkiste, 2004). Li (1999) proposed that by applying the theory, researchers could measure the antecedents of exercise motivation, as well as the correlates and consequences of those processes. Cognitive Evaluation Theory, as a subset of SDT, has been applied to describe exercise motivation. It indicates that certain variables of exercise motivation could be considered as intrinsic or extrinsic (Deci & Ryan, 1985). Variables related to intrinsic motivation are suited to both proficiency and fascination-pleasure, whereas variables concerning extrinsic motivation concentrate on acquiring

results which are extraneous to taking part in PA (Deci & Ryan, 1985; Pelletier et al., 1995; Ryan, Vallerand, & Deci, 1984). Extrinsic motivations play a crucial role during the early stages of PA, whereas intrinsic incentives are critical in progressing toward PA (Dacey, Baltzell & Zaichkowsky, 2008; Ryan, Fredrick, Lepes, Rubio & Sheldon, 1997). Nonetheless, it is noteworthy that Ingledew and Sullivan (2002) claimed that there was a fluidity in motivation and individuals can move along this continuum. Thus individuals who are initially externally regulated can eventually feel self-determined, even if they are never truly intrinsically motivated. In this regard, health professionals should encourage individuals to move toward intrinsic factors to enhance exercise motivation (Deci & Ryan, 1985, 1991).

In SDT, Deci and Ryan (1985) proposed that when individuals are autonomously motivated in their actions, as opposed to being controlled to act, they will experience more interest, excitement, and confidence that will be manifested as enhanced performance and persistence (Ryan & Deci, 2000). With performance and persistence in mind, insight can be gleaned from past SDT-based research that has employed "free-choice" measures of behavioural engagement and/or markers of behavioural persistence. Indeed, experimental work has generally shown that individuals who are induced to participate in tasks for internal (or autonomous) reasons persist longer in free-choice behaviour than those motivated by extrinsic factors (Deci & Ryan, 1985). Similarly, field-based studies in education (Vallerand & Blssonnette, 1992) and sport (Pelletier, Fortier, Vallerand, & Briere, 2001) have shown autonomous forms of motivation to positively predict behavioural persistence.

A number of researchers have investigated PA motivation across different variables, such as age, gender, country, and culture (Egli et al., 2011; Iannotti et al., 2013; Kilpatrick et al., 2005; Kimbrough, Rose, Vallee, & Nelan Jr, 2005; Maltby & Day,

2001; Martin et al., 2013; Vartanian & Shaprow, 2008; Yan & McCullagh, 2004). Little is known of motives for PA among adults or how their motivations may present themselves and alter in differing contexts over time. In one of the few studies, O'Dougherty, Kurzer, and Schmitz (2010) investigated young women's reflections on PA over time and across contexts. They interviewed 39 participants aged 18 to 30 years old in focus groups or interviews during a 4-month exercise intervention. Results showed that for the majority of females (n = 24), obligation to the study prevailed as the motivator during the intervention. Some (n = 15) became physically active for their own benefit. Afterward, exercisers and controls said they were physically active to feel better and/or healthy (n = 20), for body image and/or weight loss (n = 20), or both. Females expressed motives for PA in ways that resonated with SDT. Their commentaries expand on theory to include experiencing multiple motivations simultaneously and motives shifting over time and in differing contexts. Social motives were compelling, both those associated with societal values (research, health) and cultural trends (body image).

Small changes in the way activities are framed can make big differences in PA motivation and behaviours (Vansteenkiste, Simons, Soenens, & Lens, 2004). For example, shifting the emphasis for participating in an activity to an intrinsic, rather than extrinsic, orientation enhances youth self-determined motivation, amount of PA, and persistence over time (Vansteenkiste, Matos, Lens, & Soenens, 2007; Vansteenkiste et al., 2004). Examples of intrinsic goals include seeking supportive peer and adult relationships, attaining a positive self-identity, and participating for health benefits, whereas extrinsic goals refer to such things as participating for popularity, physical attractiveness, and approval from others. Efforts to enhance the feelings of youth participants for competence, autonomy, social relationships, and enjoyment should enhance motivation for and amounts of PA (Vansteenkiste et al., 2007; Vansteenkiste et al., 2004).

CHAPTER 3

STUDY 1: VALIDATING THE PHYSICAL ACTIVITY AND LEISURE

MOTIVATION SCALE (PALMS)

3.1 Introduction

Rogers et al. (2008) created a new 73-item measure with responses on 5-point Likert scales (REMM) based on both empirical and theoretical approaches to address the limitations of previous instruments as well as the drawbacks of both the theory-based and the atheoretical approaches. Rogers and Morris (2003) proposed that it would be fruitful to develop a shorter version of the REMM that was easier to administer and quicker to complete than the original. A short-form version of the REMM was developed based on a combination of empirical and theoretical factors. The five strongest items were selected on all eight factors in the REMM to create a 40-item measure - the PALMS.

Given that the PALMS was derived from the REMM, it is plausible to accept that the PALMS, like the REMM, would have sound psychometric features. In order to ensure that the PALMS was a reliable and valid instrument, it should be tested on a large, international sample from a range of activities.

Building on the foundation laid by previous studies (Chowdhury, 2012; Zach et al., 2012), the objective of the present study was to examine the psychometric properties of PALMS as a measure of leisure-time PA in a diverse sample of exercisers and sport participants within the population of Malaysia. More specifically, in this study I examined the internal consistency, test-retest reliability and factor structure of the PALMS. Investigating these properties in a diverse Asian population like Malaysia not only gave the opportunity to examine whether the PALMS is appropriate for use in

research and practice in various Asian cultures, but also provided the opportunity to test the robustness of the PALMS for use within a wide range of cultures.

3.2 Materials and Methods

3.2.1 Ethics Statement

The study was approved by the ethics committee of the Institute of Research Management and Monitoring, University of Malaya and the Sports Centre Research Committee. Participation in the study was voluntary and all adult participants provided written consent to participate in the study.

3.2.2 Participants

A sample of 502 volunteers (259 males, 243 females) aged 18 to 67 years (31.55 ± 11.87 years) who participated in regular PA (at least 150 minutes of moderate- to vigorous-intensity PA per week) in the last six months participated in this study. Participants were recruited from over 25 different fitness and recreational parks and facilities in Kuala Lumpur. Participants were provided with a recruitment letter with details of the objectives of the study. They were allowed to ask questions if they needed more information about the study. The demographics data for these participants are presented in Table 3.1.

Table 3.1. Descriptive Statistics of Participants (N = 502)

	Minimum	Maximum	M	SD
Age (in years)	18	67	31.55	11.87
Male (n=259)	18	67	33.64	12.94
Female (n=243)	18	61	29.33	10.15
Frequency of activity per week (number of times)	2	7	2.85	1.32
Average duration of each session of activity (in minutes)	30	240	57.36	31.32
Period of regular exercise (in months)	6	60	8.40	3.75

Legend: N = sample size. M = Mean. SD = Standard deviation.

Participants reported their main PA, which included basketball, bowling, badminton, cycling, dancing, football, futsal, gym, jogging, karate, netball, running, squash, swimming, tennis, table tennis, taekwondo, tai chi, volleyball and walking (Table 3.2).

Table 3.2. Frequency and Percentage of Activities of Participants (N = 502)

Activity	N	%
Basketball	35	7
Bowling	32	7
Badminton	30	6
Cycling	15	3
Dancing	19	4
Football	34	7
Futsal	42	8
Gym	33	7
Jogging	32	7
Karate	12	2
Netball	21	4
Running	21	4
Squash	21	4
Swimming	34	7
Tennis	18	4
Table tennis	21	4
Taekwondo	14	3
Tai chi	8	1
Volleyball	18	3
Walking	42	8
Total	502	100

Participants who were willing to fill in the PALMS again a month later were asked for their email address. Test-retest reliability of the PALMS was examined by administering the PALMS twice, four weeks apart, with a sub-sample of 92 of the

participants who volunteered for the main study. The sub-sample comprised 49 males and 43 females aged 18 to 55 years (36.65 ± 9.94 years).

Participants reported their main PA, which included basketball, bowling, badminton, football, futsal, gym, jogging, netball, running, squash, swimming, tennis, table tennis, volleyball, walking (Table 3.3).

Table 3.3. Frequency and Percentages of Activities of Test-Retest Sample (N = 92)

Activity	N	%
Basketball	5	5
Bowling	3	3
Badminton	9	10
Football	7	8
Futsal	4	4
Gym	6	7
Jogging	5	5
Netball	6	7
Running	7	8
Squash	7	8
Swimming	2	2
Tennis	9	10
Table tennis	8	9
Volleyball	5	5
Walking	9	10
Total	92	100

3.2.3 Measures

3.2.3.1 Demographics Form

Participants reported key demographic variables, including gender, age and ethnicity (see Appendix B). They also reported their primary PA, and the level, frequency, duration and intensity of activity and extent of their participation per week. To calculate regular PA, only the activities lasting at least 150 minutes of moderate- to vigorous-intensity PA per week were taken into account.

In the present study participants were instructed to respond to the PALMS and the REMM with reference to their main PA. To provide information about what this activity was, I asked participants to state their main PA in the Demographics Form.

3.2.3.2 Recreational Exercise Motivation Measure (REMM)

The 73-item REMM measures eight motives for participation in recreational exercise, namely mastery, enjoyment, psychological condition, physical condition, appearance, other's expectations, affiliation, and competition/ego, on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The range for each sub-scale of the REMM varies because the number of items varies from 7 to 13. The range is represented by the lowest score of 1 multiplied by the number of items on that sub-scale to the highest score of 5 multiplied by the number of items on the sub-scale. Thus, for the 7-item sub-scale the range is 7 to 35, whereas for the 13-item sub-scale the range is 13 to 65 (Rogers & Morris, 2003) (see Appendix E).

3.2.3.3 Physical Activity and Leisure Motivation Scale (PALMS)

The 40-item PALMS (Table 3.4) assesses the same eight motives for participation in PA as the REMM. It was developed as a short form of the REMM by selecting the five items with the strongest psychometrics on each of the eight sub-scales. Responses to the PALMS are made on the same 5-point Likert scales as used with the REMM. The range of each PALMS sub-scale is 5 to 25 because each sub-scale has five items (Morris & Rogers, 2004) (see Appendix D).

Table 3.4. Items and Sub-Scales in the PALMS

Item No.	Item	Sub-scale
5	To get better at an activity	Mastery
16	To improve existing skills	Mastery
19	To do my personal best	Mastery
24	To obtain new skills/activities	Mastery
31	To keep current skill level	Mastery
3	Because it's interesting	Enjoyment
13	Because it makes me happy	Enjoyment
25	Because it's fun	Enjoyment
34	Because I enjoy exercising	Enjoyment
37	Because I have a good time	Enjoyment
2	Because it helps me relax	Psychological Condition
9	To better cope with stress	Psychological Condition
14	To get away from pressures	Psychological Condition
22	Because it acts as a stress release	Psychological Condition
35	To take mind off other things	Psychological Condition
10	Because it helps maintain a healthy body	Physical Condition
12	Be physically fit	Physical Condition
15	To maintain physical health	Physical Condition
28	Because it keeps me healthy	Physical Condition
33	To improve cardiovascular fitness	Physical Condition
11	To define muscle, look better	Appearance
23	To improve body shape	Appearance
32	To improve appearance	Appearance
36	To lose weight, look better	Appearance
40	To maintain trim, toned body	Appearance

1	To earn a living	Others Expectations
7	Because I get paid to do it	Others Expectations
18	To manage medical condition	Others Expectations
21	Because people tell me I need to	Others Expectations
26	Because it was prescribed by doctor, physio	Others Expectations
4	Because I enjoy spending time with others	Affiliation
8	To do activity with others	Affiliation
20	To do something in common with friends	Affiliation
30	To talk with friends exercising	Affiliation
38	To be with friends	Affiliation
6	Because I perform better than others	Competition/Ego
17	To be best in the group	Competition/Ego
27	To work harder than others	Competition/Ego
29	To compete with others around me	Competition/Ego
39	To be fitter than others	Competition/Ego

3.2.3.4 Shortened Marlowe-Crowne Social Desirability Scale (SMCSDS)

Researchers have often found that self-report instruments are subject to faking good. Even when there is no apparent benefit to be gained from responding in a socially desirable way, many people still do so (Seol, 2007). Henceforth, it is of maximal significance to the psychometric features of a new measure to see if it is tended toward socially appropriate responding. An approach to perform such a thing is to apply a lie scale or a measure that is particularly created to recognize individuals who are inclined to fake good. An approach to investigate if the new tool (PALMS) nurtures social desirability responding could be checking the correlation between grades out of a social desirability tool such as Shortened Marlowe-Crowne Social Desirability Scale

(SMCSDS; Reynolds, 1982) and the PALMS. There is a prediction that there will not be any important relationship between any sub-scale of the PALMS and SMCSDS. The SMCSDS is a 13-item questionnaire which is the abbreviated from of the 33-item Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960). Reynolds (1982) demonstrated a sufficient internal consistency of 0.76 as well as a high correlation of 0.93 along with the original 33-item questionnaire. In this questionnaire, the participants are asked to provide true or false answers. The objective behind the SMCSDS is to evaluate the requirements of individuals to answer in a socially desirable manner (Reynolds, 1982). The term social desirability bias denotes the inclination of people to answer to self-evaluative questions in a socially approved way in order to reveal themselves in an acceptable style. Despite the development of a series of instruments for the evaluation of the tendencies in the social desirability responses (Block, 1965; Edwards, 1970; Messick, 1962), the MCSDS can be considered as one of the most prominent instruments.

In the current research, in order to examine whether people respond to a questionnaire, in this case the PALMS, to look good, scores on the questionnaire are correlated with scores on the MCSDS. A moderate to high positive correlation with the MCSDS would indicate socially desirable responding on the PALMS (see Appendix F).

3.2.4 Procedure

Participants were recruited from various recreational parks and facilities from May to July 2012. Their participation was voluntary. Information sheets were distributed to all participants. If they agreed to participate after reading the information sheet, completion of the questionnaires was considered to indicate consent. Thus, this was a convenience sample in which participants were accessed through local recreation facilities. One implication of this is that there was no systematic control over the gender, age, and

regular PA patterns of the participants. Participants completed all the measures in English. Malaysia is a country in which the national language, Malay, is widely spoken, while several other languages associated with the large ethnic Indian and Chinese populations are also spoken by substantial numbers of people. Nonetheless, because of its British colonial heritage, English language education starts in primary school in Malaysia and a substantial proportion of the population from all ethnic backgrounds speak English well, even if it is not their "native" language. For this study, the PALMS and other measures were administered in English. To ensure that participants' responses were based on sound understanding of the instructions, the items, and the response format, participants were screened for their capacity to read and comprehend English at a high level. I examined the questionnaire responses made by participants and did not identify indications in those responses that suggested lack of comprehension for the participants included in the analyses cited in this paper. Based on standard questionnaire checking processes, any participants whose responses showed signs of such response patterns were eliminated from the sample before the analyses were conducted. The number eliminated was small.

In order to eliminate order effects, half the participants were given the demographics form and the PALMS followed by the SMCSDS. After a short break, the participants were given the REMM. The other half completed the demographics form and the REMM followed by a break after which the SMCSDS and PALMS were completed. The 502 respondents took 20-25 minutes to complete the demographics form and the three questionnaires. Test-retest reliability of the PALMS was examined by administering the PALMS twice, four weeks apart, with a sub-sample of 92 of the participants who volunteered for the main study. The sub-sample comprised 49 males and 43 females aged 18-55 years (36.65 ± 9.94 years) (Table 3.5).

Table 3.5. Descriptive Statistics for the Test-Retest Sample (N = 92)

	Minimum	Maximum	M	SD
Age (in years)	21	64	36.65	12.32
Male (n=49)	21	64	39.81	9.29
Female (n=43)	23	52	33.41	11.01
Frequency of activity per week (number of times)	2	7	2.91	1.76
Average duration of each session of activity (in minutes)	35	240	59.13	26.92
Period of regular exercise (in months)	6	48	7.67	3.05

Legend: N = sample size. M = Mean. SD = Standard deviation.

3.2.5   Statistical Analysis

Reliability was assessed by means of test-retest reliability to examine stability over time, and alpha coefficients to examine internal consistency. In terms of criterion validity, each of the eight sub-scales of the PALMS was correlated using Spearman's rank-order correlation coefficient with the corresponding sub-scale on the REMM. Pearson's product-moment correlations between the sub-scales of the PALMS and the SMCSDS were also examined to determine whether participants were responding to the PALMS in socially desirable ways. Effect sizes are used as indicators of practically meaningful differences. Cohen (1988) indicated that Pearson's Product Moment Correlation Coefficient (r) is itself a measure of effect size. Values of r can be interpreted in the same way as Cohen's d, a common indicator of effect size. Thus, values of 0.2-0.3 are considered to be small effect sizes, those around 0.5 are medium, and values of 0.7-0.8 are viewed as large effect sizes. Other correlations can be considered in a similar way.

There are few social desirability scales. The SMCSDS is the most widely used measure. One way to use the SMCSDS in practice or research is to exclude participants who score above the cut-off point. Another way to use the SMCSDS is to use the scores from a large sample to check whether people respond to other questionnaires in socially desirable ways. This is the way in which the SMCSDS is used in the present study. Thus, the MCSDS was correlated with the sub-scales of the PALMS. A strong correlation indicates a systematic pattern of responding to the PALMS that is consistent with the responses given to the MCSDS. For example, given that high scores on the MCSDS reflect that participants are responding in a socially desirable way, a positive correlation with high scores on the PALMS would indicate that participants are systematically responding in a socially desirable way on the PALMS, that is, they are reporting high motivation sub-scale scores to look good. Conversely a low correlation between the SMCSDS and the PALMS would indicate that participants are not responding systematically to the PALMS in a socially desirable way (Reynolds, 1982).

Prior to performing CFA, preliminary analyses were conducted on the univariate distributions of all the variables to verify whether they were normally distributed with low degrees of skewness and kurtosis. CFA was then conducted through AMOS 20.0 on the eight sub-scales of the PALMS. Each sub-scale included in the path diagram in the CFA was measured by its own set of observed indicators. Maximum likelihood was the method of estimation used for the models. In the present study, a path diagram was drawn to depict the relationship between the sub-scales (8 factors) and the observed variables (items on the PALMS), as shown in Figure 3.1 in the Results section. In this path diagram, an 8-factor model is proposed, based on the results of the first-order Exploratory Factor Analysis (EFA) of the REMM. The factors are the eight PALMS sub-scales mastery, enjoyment, psychological condition, physical condition, appearance, others' expectations, affiliation, and competition/ego. The analysis

examined the paths from the five items designated to measure each motive sub-scale to that motive sub-scale or factor. The assumptions of normality were also checked.

To evaluate the fit of the models, I considered four indices of model fit: the minimum discrepancy divided by the degrees of freedom (CMIN/DF ratio), two comparative fit indexes, the comparative fit index (CFI) and the Tucker-Lewis index (TLI), and the root mean square error of approximation (RMSEA). Values of CMIN/DF less than 5 are considered reasonable for macro constructs (Marsh & Hocevar, 1985). The CFI and TLI reflect the degree to which the sample variances and covariances are reproduced by the hypothesized model structure. CFI and TLI values above 0.90 usually indicate acceptable fit. RMSEA was used to assess approximate fit, preferably with values less than or equal to 0.06 (Hu & Bentler, 1999).

3.3 Results

3.3.1   Internal Consistency, Criterion Validity and Reliability of the PALMS

3.3.1.1 Internal Consistency

The PALMS demonstrated good internal consistency with a Cronbach's alpha (α) of 0.82. The internal consistency values of the eight PALMS sub-scales are presented in Table 3.6. They were generally high, the lowest being 0.78 for Mastery and Competition/ego, demonstrating that all the sub-scales had strong internal consistency in this sample (Table 3.6).

Table 3.6. Internal consistency of the PALMS

Sub-scale	Internal consistency (α)
Mastery	0.78[*]
Physical condition	0.82[*]
Affiliation	0.80[*]
Psychological condition	0.81[*]
Appearance	0.81[*]
Others' expectations	0.82[*]
Enjoyment	0.79[*]
Competition/ego	0.78[*]

Legend: α = Cronbach's alpha.

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

3.3.1.2 Criterion Validity

Spearman's rho indicated a strong positive correlation between the REMM and the PALMS (r_s = 0.86, p < 0.001). Furthermore, the Spearman's rho correlations between each PALMS sub-scale and the corresponding REMM sub-scale showed high correlations (r_s = 0.79 to 0.95), which lends support to the criterion validity of the eight PALMS sub-scales (Table 3.7).

Table 3.7. Criterion Validity Between the PALMS and REMM

Sub-scale	Correlation (r_s)
Mastery	0.83*
Physical condition	0.89*
Affiliation	0.95*
Psychological condition	0.80*
Appearance	0.86*
Others' expectations	0.88*
Enjoyment	0.83*
Competition/ego	0.89*

Legend: r_s = Spearman's rho.

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

3.3.1.3 Reliability

The eight sub-scales of the PALMS also showed high test-retest correlations, ranging from r_s = 0.78 to 0.94, supporting the stability of the components of the measure over time (Table 3.8).

Table 3.8. Test-Retest Correlation for 8 Sub-scales of the PALMS

Sub-scale	Test-retest correlation
Mastery	0.91**
Physical condition	0.82**
Affiliation	0.91**
Psychological condition	0.88**
Appearance	0.91**
Others' expectations	0.94**
Enjoyment	0.83**
Competition/ego	0.78*

** Correlation is significant at the 0.01 level (2-tailed).

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

Table 3.9 shows the Pearson's product-moment correlation coefficients between each of the sub-scales of the PALMS and the SMCSDS. These correlations are all close to zero, indicating that the PALMS did not encourage socially desirable responses in this study.

Table 3.9. Correlation Between Each of the Sub-scales of the PALMS and the SMCSDS

Sub-scale	Pearson's Product-Moment correlations (r)
Mastery	-0.09
Physical condition	0.01
Affiliation	0.05
Psychological condition	-0.01
Appearance	-0.05
Others' expectations	-0.04
Enjoyment	0.04
Competition/ego	-0.02

3.3.2 Confirmatory Factor Analysis (CFA)

CFA was performed on responses to the PALMS questionnaire assessing the fit of the model depicted in Figure 3.1, in which each of the 40 items is shown with a path connecting it to the appropriate motive among the eight sub-scales (mastery, enjoyment, psychological condition, physical condition, appearance, other's expectations, affiliation, and competition/ego). Consistent with previous EFA research on the PALMS, it is postulated in the hypothesized model in this study that each of the observed variables will load on one and only one factor (i.e., latent variable).
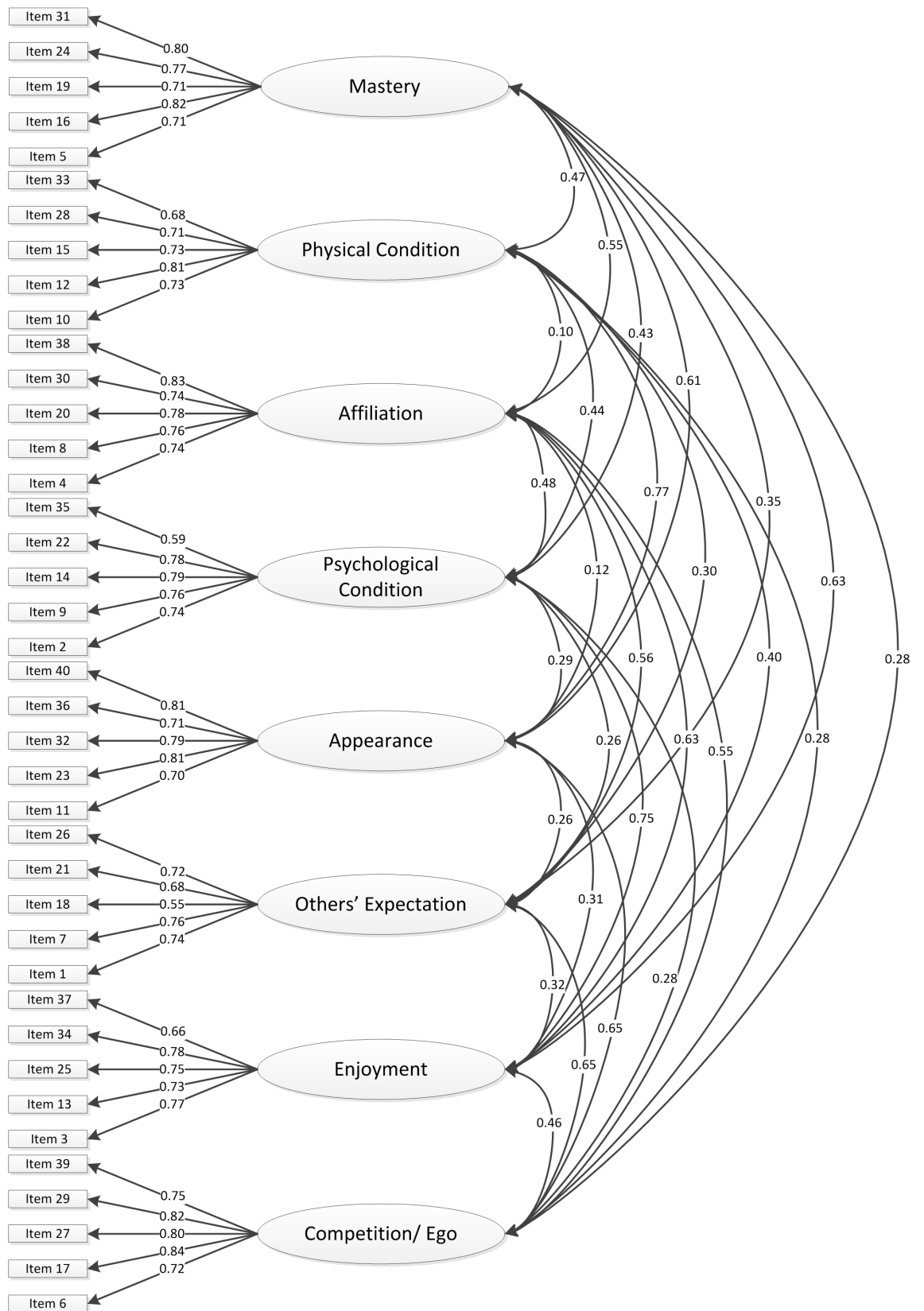
Figure 3.1. Measurement Model for PALMS

The observed variables (items on the PALMS) and their corresponding questions and

sub-scales are presented in Table 3.10.

Table 3.10. Observed Variables and the Corresponding Questions and Sub-Scales on

the PALMS

Observed Variable	PALMS	
	Question	Sub-scale
Item 1	To earn a living	Others Expectations
Item 2	Because it helps me relax	Psychological Condition
Item 3	Because it's interesting	Enjoyment
Item 4	Because I enjoy spending time with others	Affiliation
Item 5	To get better at an activity	Mastery
Item 6	Because I perform better than others	Competition/Ego
Item 7	Because I get paid to do it	Others Expectations
Item 8	To do activity with others	Affiliation
Item 9	To better cope with stress	Psychological Condition
Item 10	Because it helps maintain a healthy body	Physical Condition
Item 11	To define muscle, look better	Appearance
Item 12	Be physically fit	Physical Condition
Item 13	Because it makes me happy	Enjoyment
Item 14	To get away from pressures	Psychological Condition
Item 15	To maintain physical health	Physical Condition
Item 16	To improve existing skills	Mastery
Item 17	To be best in the group	Competition/Ego
Item 18	To manage medical condition	Others Expectations
Item 19	To do my personal best	Mastery
Item 20	20. To do something in common with friends	Affiliation

Item 21	Because people tell me I need to	Others Expectations
Item 22	Because it acts as a stress release	Psychological Condition
Item 23	To improve body shape	Appearance
Item 24	To obtain new skills/activities	Mastery
Item 25	Because it's fun	Enjoyment
Item 26	Because it was prescribed by doctor, physio	Others Expectations
Item 27	To work harder than others	Competition/Ego
Item 28	Because it keeps me healthy	Physical Condition
Item 29	To compete with others around me	Competition/Ego
Item 30	To talk with friends exercising	Affiliation
Item 31	To keep current skill level	Mastery
Item 32	32. To improve appearance	Appearance
Item 33	To improve cardiovascular fitness	Physical Condition
Item 34	Because I enjoy exercising	Enjoyment
Item 35	To take mind off other things	Psychological Condition
Item 36	To lose weight, look better	Appearance
Item 37	Because I have a good time	Enjoyment
Item 38	To be with friends	Affiliation
Item 39	To be fitter than others	Competition/Ego
Item 40	To maintain trim, toned body	Appearance

For the purpose of multivariate outliers, I checked for missing data. Multivariate skewness and kurtosis coefficients were applied for the examination of multivariate normality. Based on Table 3.11, it has been demonstrated that some items significantly departed from normality. In this regard, Harrington (2008) argued that when abnormality occurs, perhaps it is not appropriate to utilize maximum likelihood (ML) as one of the widely applied estimation measures. According to Kline (2011), however, asymptotically distribution-free (ADF) does not assume multivariate normality and

would be reasonable to be applied, yet as commended by McDonald and Ho (2002), it needs a huge sample size to achieve dependable weight matrices. It would be plausible for the present research since its sample is adequately large (502).

Table 3.11. Means, Range, Skewness, and Kurtosis Values of the Observed Variables in the CFA

Observed Variable	Mean	Min	Max	Skewness	Kurtosis
Item 1	2.95	1	5	-0.078	-1.116
Item 2	4.12	2	5	-0.623	0.525
Item 3	4.00	1	5	-0.733	0.972
Item 4	3.85	1	5	-0.600	0.074
Item 5	3.75	1	5	-0.616	0.576
Item 6	3.11	1	5	-0.084	-0.480
Item 7	2.42	1	5	0.548	-0.771
Item 8	3.68	1	5	-0.503	-0.056
Item 9	4.06	1	5	-0.708	1.080
Item 10	4.16	1	5	-0.708	0.814
Item 11	3.63	1	5	-0.442	-0.076
Item 12	3.99	1	5	-0.455	0.345
Item 13	4.16	1	5	-0.678	1.103
Item 14	4.11	2	5	-0.525	-0.214
Item 15	4.11	1	5	-0.674	0.918
Item 16	3.61	1	5	-0.499	-1.212
Item 17	3.05	1	5	-0.057	-0.704
Item 18	3.40	1	5	-0.543	-0.105
Item 19	3.64	1	5	-0.440	0.070

Item 20	3.50	2	5	-0.514	-0.257
Item 21	2.66	1	5	0.226	-0.871
Item 22	4.01	2	5	-0.637	0.654
Item 23	3.75	2	5	-0.611	0.327
Item 24	3.57	2	5	-0.501	-0.237
Item 25	3.98	1	5	-0.862	0.980
Item 26	2.79	1	5	0.127	-0.923
Item 27	3.08	1	5	-0.134	-0.553
Item 28	4.04	1	5	-0.745	0.905
Item 29	3.10	1	5	-0.096	-0.831
Item 30	3.34	1	5	-0.267	-0.573
Item 31	3.47	1	5	-0.378	-1.34
Item 32	3.62	1	5	-0.528	0.153
Item 33	3.81	1	5	-0.596	0.595
Item 34	3.96	1	5	-0.914	1.261
Item 35	3.99	1	5	-0.630	0.548
Item 36	2.77	1	5	0.852	-0.886
Item 37	3.86	1	5	-0.605	0.210
Item 38	3.63	1	5	-0.504	-0.226
Item 39	3.24	1	5	-0.153	-0.432
Item 40	3.60	2	5	-0.399	-0.964

Table 3.12 presents a number of fit statistics such as least discrepancy which is divided by the proportion of freedom (CMIN/DF ratio), normed fit index (NFI), degrees of freedom (DF), root mean square error of approximation (RMSEA), minimum discrepancy (CMIN or $\chi2$), and comparative fit index (CFI). Table 3.12 indicates that, in the present study, the hypothesized model produced a significant chi-square, $\chi2$ (712, 502) = 2007.758, p < .001. It has also been shown that the CMIN/DF or $\chi2$/df ratio was

realized to be 2.820. The NFI value of 0.90, CFI value of 0.90 and RMSEA value of 0.060 indicated acceptable fit.

Table 3.12. Model Fit Indices for the Data Collected Using PALMS

	N	CMIN	DF	CMIN/DF	NFI	CFI	RMSEA	(90%CI)
Model$_H$	502	2007.758	712	2.820	0.899	0.909	0.060	0.057–0.063

Legend: Model $_H$ = the hypothesized model. N = sample size. CMIN = minimum discrepancy. DF = degrees of freedom. NFI = normed fit index. CFI = comparative fit index. RMSEA = root mean square error of approximation. (90%CI) = lower boundary of a two-sided 90% confidence interval for the population and upper boundary of a two-sided 90% confidence interval for the population.

Table 3.13 illustrates the standardized straight (unmediated) impact of the covert variables upon the researched variables. There is an indication that there are high loadings for the whole items.

Table 3.13. Standardized Direct (unmediated) Effects of the Latent Variables on the Observed Variables

PALMS item	Psychological Condition	Affiliation	Physical condition	Mastery	Competition/Ego	Enjoyment	Others' expectations	Appearance
Item 35	0.59	--	--	--	--	--	--	--
Item 22	0.78	--	--	--	--	--	--	--
Item 14	0,79	--	--	--	--	--	--	--
Item 9	0.76	--	--	--	--	--	--	--
Item 2	0.72	--	--	--	--	--	--	--
Item 38	--	0.83	--	--	--	--	--	--
Item 30	--	0.74	--	--	--	--	--	--
Item 20	--	0.78	--	--	--	--	--	--
Item 8	--	0.76	--	--	--	--	--	--
Item 4	--	0.74	--	--	--	--	--	--
Item 33	--	--	0.68	--	--	--	--	--
Item 28	--	--	0.71	--	--	--	--	--
Item 15	--	--	0.73	--	--	--	--	--
Item 12	--	--	0.81	--	--	--	--	--
Item 10	--	--	0.73	--	--	--	--	--
Item 31	--	--	--	0.80	--	--	--	--
Item 24	--	--	--	0.77	--	--	--	--
Item 19	--	--	--	0.77	--	--	--	--
Item 16	--	--	--	0.82	--	--	--	--
Item 5	--	--	--	0.71	--	--	--	--
Item 39	--	--	--	--	0.75	--	--	--
Item 29	--	--	--	--	0.82	--	--	--

Item 27	--	--	--	--	0.80	--	--	--
Item 17	--	--	--	--	0.84	--	--	--
Item 6	--	--	--	--	0.72	--	--	--
Item 37	--	--	--	--	--	0.66	--	--
Item 34	--	--	--	--	--	0.78	--	--
Item 25	--	--	--	--	--	0.75	--	--
Item 13	--	--	--	--	--	0.73	--	--
Item 3	--	--	--	--	--	0.77	--	--
Item 26	--	--	--	--	--	--	0.72	--
Item 21	--	--	--	--	--	--	0.68	--
Item 18	--	--	--	--	--	--	0.55	--
Item 7	--	--	--	--	--	--	0.76	--
Item 1	--	--	--	--	--	--	0.74	--
Item 40	--	--	--	--	--	--	--	0.81
Item 36	--	--	--	--	--	--	--	0.71
Item 32	--	--	--	--	--	--	--	0.79
Item 23	--	--	--	--	--	--	--	0.81
Item 11	--	--	--	--	--	--	--	0.70

3.4 Discussion

The results showed acceptable internal consistency reliability for the PALMS. Cronbach's alpha values were comparable to those reported by other researchers, particularly Zach et al. (2012) and Chowdhury (2012). Cronbach's alpha values for all sub-scales of the PALMS were high. Based on statistical indexes, this means that the items consistently measure the factors with which they are associated. The PALMS sub-scales maintained high internal consistency reliability values despite being shorter than

the corresponding sub-scales in the REMM. This is consistent with previous research (Chowdhury, 2012; Rogers et al., 2008; Zach et al., 2012). These findings lend further support to the consistency of the items in the PALMS as representative of the sub-scales to which they have been attributed. This supports the internal consistency of the instrument for assessing participation motivation for PA. In addition, the test-retest reliability, measured by Spearman's rank-order correlation coefficient, was high for all sub-scales, with the lowest value for competition/ego, reflecting a strong association between scores from administrations four weeks apart. The other seven PALMS sub-scales reflected very high associations over this substantial 4-week test-retest period. As test-retest reliability has not been examined in previous studies on this questionnaire, there are no test-retest values for the purpose of comparison. Thus, this is the first demonstration that the motives for participation measured by the PALMS are stable over a fairly long period of four weeks. The criterion validity of the PALMS was supported by Spearman's rho, which indicated a strong positive correlation between the REMM and the PALMS overall, as well as high correlations between the corresponding sub-scales of the REMM and the PALMS. This provides strong support for the criterion validity of the PALMS as a measure of participation motivation that can be used to examine participation motives of people for their involvement in diverse PA contexts.

The very low correlations of each of the eight sub-scales of the PALMS with the SMCSDS, which mostly approached zero, indicate that the PALMS did not encourage socially-desirable responses in this sample of participants within the largely recreational contexts in which they completed the questionnaires. This indicates that participants did not feel the need to respond to items in ways that they thought would make them look good. Evidence that the PALMS encourage honest responding is promising for the future use of the measure in diagnostic work related to motivation for PA.

It is noteworthy that the internal consistency, test-retest reliability over a 4-week period, and criterion validity of the PALMS in relation to the REMM were all sound in the present study given that the participants were all Malaysian residents completing the questionnaires in English. For most of these participants English was not their first language. This suggests, not only that the PALMS is robust, but that it is also clear and comprehensible enough to produce results that so closely mirror those found in the Australian sample, for whom English was their first language. The robustness found in the current study was also evident in the degree of consistency between the results found in the Hebrew translation of the PALMS in the study conducted in Israel and the English language version used in the present study and the Australian study.

In addition, results from the CFA on the 40 PALMS items revealed a desirable goodness-of-fit between the proposed 3-factor model and the data collected from this substantial sample of participants in diverse types of PA in the context of a large city in Malaysia. This is consistent with the eight sub-scale structure of the PALMS and also provides support for the construct validity of the PALMS, as reflected in previous research (Chowdhury, 2012; Zach et al., 2012). Furthermore, the high, unmediated effects of the latent variables on the observed variables indicated that the items are actually measuring what they have been assigned to measure. Hence, the results reported here suggest that the hypothesized model in the current study fitted the data well, lending support to the validity of the PALMS. It can be claimed that the present results support the applicability of this questionnaire as a measure of a wide range of motives for participation in diverse PA contexts. The eight factors measured by the PALMS can be categorized as aspects of intrinsic motivation (mastery, enjoyment sub-scales) and extrinsic motives (the other six sub-scales). This is based both on the results of second-order factor analysis (Rogers & Morris, 2003) and on SDT (Deci & Ryan, 1991). Further, the six extrinsic motives can be classified into two second-order factors,

body-mind motives (psychological condition, physical condition, and appearance) and social motives (others' expectations, affiliation, and competition-ego) (Rogers & Morris, 2003). In addition, each of the eight motivational sub-scales has implications for intentions and behaviour related to PA. For example, a high score on the appearance sub-scale might reflect an intention to seek out PA that with improve body shape, such as weight training to build muscle or yoga to increase suppleness and flexibility. Similarly, a high score on affiliation could lead individuals to join football teams or weekend cycling clubs.

The PALMS demonstrated not only proper factor structure, validity, and reliability, but also showed that it is applicable to PA contexts. The obtained factor structure provided support for the SDT framework of motivational categories. Furthermore, the PALMS offers a more comprehensive analysis of participant motives than previous questionnaires that were based on either achievement goals or SDT, such as the MPAM-R. The factor structure within the PALMS could provide valuable information for health authorities and fitness professionals about the range of motives that people have for participation. This information can be applied to enhance exercise participation to fulfil a variety of purposes, not just health-based motives, which have traditionally been seen as important reasons for doing PA.

Like other studies, this one has a number of limitations and assets. Firstly, I gathered the data by self-report. However, previous studies on motivation for PA have generally used self-report and the results have shown acceptable reliability and validity. A second limitation is that the sizeable commitment of time to complete the demographics form and the three questionnaires could have caused fatigue or boredom, but high correlations between the PALMS and the REMM suggest that it is unlikely that responding was distorted by these factors. One further point to be considered is that the

data in the present study was checked for missing values, so only responses from completed questionnaires were selected for analysis. The sample comprised a diverse range of people in terms of age, gender, and type of PA, but they were all from one country, Malaysia. Nonetheless, they do represent a culture that is quite different from the Australian culture in which the motivation questionnaires (REMM, PALMS) were developed. The REMM and PALMS have now been examined in Australia (Chowdhury, 2012; Rogers & Morris, 2003), Turkey (Caglar et al., 2009), Finland (Aaltonen et al., 2012), Israel (Zach et al., 2012), and now Malaysia with a high degree of consistency and stability, suggesting that the underlying factors measured by these instruments are motives that apply across cultures and languages. This provides support for the factorial invariance of the PALMS. Caution in interpreting these results should reflect limitations in the design and measures. One limitation is that the data are cross-sectional and do not permit inferences about causality. In addition, all of the indices are based on self-report and subject to the potential for reporter bias.

In the present study the PALMS was shown to have good stability across four weeks. It is important for researchers to examine the long-term stability of the PALMS, so that it can be used to monitor changes in motives resulting from intentional interventions, which might last for several months, with confidence that changes observed do not reflect artifacts of the measuring instrument. Also, although previous work with the REMM in Finland and Turkey, as well as PALMS studies in Australia, Israel, and now Malaysia show promise for the universal nature of the motives measured by the PALMS, the PALMS should be further investigated in other contexts (e.g., different countries, languages, and/or activities and participants from other cultures).

3.5 Conclusion

The PALMS can be used as an instrument to help understand people's motives for PA as the basis for recommending types of activity to which those individuals should be suited. In addition, the PALMS would then be suitable for research and applied work conducted around the world.

CHAPTER 4

STUDY 2: MOTIVES FOR ADULT PARTICIPATION IN PHYSICAL

ACTIVITY: TYPE OF ACTIVITY, AGE, AND GENDER

4.1 Introduction

Based on the low levels of PA among Malaysians, individualizing activities based on motives is critical in ensuring that PA recommendations and guidelines are met. High levels of motivation for any behaviour are associated with greater effort and persistence. Most previous studies have only compared differences across age and gender (Egli et al., 2011; Kilpatrick et al., 2005; Martin et al., 2013). Few studies have examined scores from measures of motivation using statistical techniques that are specifically designed to identify differences in motives between categories, such as types of PA. In this study my aim was to apply DFA to tease out meaningful distinctions between motives that are important for one gender or the other, for young adults compared to middle-aged adults, and, most importantly, for different types of PA. There is still a lack of research on how motivation differs between various demographics of the adult population, especially concerning the key issue of type of activity. Therefore, the aims of this study were to: a) examine significant differences in participation motivation across gender, age and type of activity, and (b) investigate the motives for participation that best discriminated between gender, adult age categories and type of PA.

Moreover, the third aim of this study was to examine the construct validity of the PALMS based on the extent to which motive sub-scales discriminate between gender, age, and type of activity. Based on the constructs of the motives this study predicts that different motives will discriminate gender, age, and type of activity.

4.2 Materials and Methods

4.2.1 Ethics Statement

The university Institute of Research Management and Monitoring and Sports Centre Research Committee approved the study. Participation in the study was voluntary and all participants provided written consent to participate in the study.

4.2.2 Participants

A sample of 1,360 Malaysian volunteers (703 males, 657 females) who did regular PA (at least 150 minutes of moderate- to vigorous-intensity PA per week) in the last six months participated in this study. Participants were recruited from over 25 different fitness and recreational parks and facilities in Kuala Lumpur from May to August 2013. They were divided into in two age groups - young adults aged 20 to 40 years (n = 763; M = 29.12; SD = 3.9) and middle-aged adults aged 41 to 64 years (n = 597, M = 54.21; SD = 4.32) according to Erikson's (1998) stages of human development and five types of activity (individual sports, team sports, racquet sport, martial arts and exercise). These activities were regarded as recreational exercises. All participants resided in Malaysia. They comprehended spoken and written English.

4.2.3 Measures

4.2.3.1 Demographics Form

Participants reported key demographic variables, including gender, age, ethnicity, and PA. They also reported their primary PA, and the level, frequency, duration, and intensity of PA per week (see Appendix B).

4.2.3.2 Physical Activity and Leisure Motivation Scale (PALMS)

The PALMS was described completely in Study 1 (Chapter 3) (see Appendix D).

4.2.4   Procedure

Participants were given information sheets, signed consent forms, and completed the questionnaires in a private setting as they entered or left group activity, as they left the sports centres, or, occasionally, while they were exercising. It was then explained to prospective participants that their participation was voluntary and that they could withdraw from the study at any point should they feel uncomfortable. Prospective participants who were willing to participate in the study were then told the nature and purpose of the study. They were also informed that there were no right or wrong answers and that their responses would be kept confidential. Participants were asked to fill in the questionnaire and return it to me at the testing location. The 1,360 respondents took 10-12 minutes to complete the questionnaire.

4.2.5   Data Analysis

SPSS version 21.0 was used for data analysis. Data were screened for normality, outliers, and homogeneity. Participants with missing responses on one or more items (n = 23, 1.6% of sample) were excluded from subsequent analyses. First, descriptive statistics (frequencies, means, SDs) for the whole sample and each classification (age, gender, and type of activity) were calculated. Next, DFA was used to determine which motives for participation sub-scales could best distinguish between age, gender, and type of activity to seek an equation that would predict the motives to which adults might be best suited. Follow-up analysis of an independent t-test was also performed to identify significant between group differences in the variables assessed. Statistical significance was set at $p < 0.05$. SPSS version 21.0 was used for this analysis.

4.3 Results

4.3.1   Characteristic of the Sample

Table 4.1 shows the demographics of the participants. Age of participants ranged from 20 to 64 years with 703 participants (52% of the sample) being male and 657 (48%) female. All participants were classified according to age: 703 young adults (age range 20 to 40 years) with a mean age of 29.12 (SD = 3.9) and 597 middle-aged adults (age range 41 to 64 years) with a mean age of 54.21 years (SD = 4.32). The participants did an average of 2.85 sessions of PA per week with each session lasting 57.38 ± 31.32 minutes. They had been participating in regular PA for 8.4 ± 3.8 months.

Table 4.1. Descriptive Statistics of Participants

	N	Minimum	Maximum	M	SD
Age (in years)	1360	20	64	35.71	10.28
Young adult	763	20	40	28.8	6.49
Middle-aged adult	597	41	64	49.5	7.92
Frequency of activity per week (number of times)	1360	2	7	2.85	1.32
Average duration of each session of activity (in minutes)	1360	30	240	57.36	31.32
Period of regular exercise (in months)	1360	6	60	8.40	3.75

Legend: N = sample size. M = Mean. SD = Standard deviation

The activities they participated in were grouped into individual sports (20%), team sports (26.4%), martial arts (15.5%), racquet sports (20.5%), and exercise (17.6%) (Table 4.2).

Table 4.2. Frequency and Percentage of Type of Activity

Type of activity	Activity	Frequency	Percent in group
Team sports	Basketball	72	20
	Football	125	35
	Futsal	116	32
	Volleyball	45	13
	Total	358	100
Individual sports	Bowling	46	17
	Swimming	68	25
	Running	119	44
	Cycling	39	14
	Total	272	100
Racquet sports	Badminton	159	57
	Tennis	36	13
	Table tennis	84	30
	Total	279	100
Martial arts	Taekwondo	67	32
	Karate	51	24
	Tai chi	93	44
	Total	211	100
Exercise	Walking	91	38
	Jogging	61	25
	Dancing	19	8
	Gym	69	29
	Total	240	100

4.3.2   Examination of Motives by Gender, Age, And Type of Physical Activity

4.3.2.1 Gender Differences

Table 4.3 shows the results of the independent t-test for the sub-scales of PALMS for males and females. There were statistically significant gender differences for a number of sub-scales, namely mastery, psychological condition, appearance, affiliation, and competition/ego ($p < 0.05$). Results of the independent samples t-tests showed that males had significantly higher means compared to females on competition/ego (19.31 ± 4.15 vs 15.53 ± 4.53), affiliation (19.67 ± 3.58 vs 17.95 ± 4.24), and mastery (20.61 ± 3.42 vs 18.30 ± 3.94). In contrast, results reported that females had significantly higher means to males on psychological condition (20.80 ± 20.8 vs 19.89 ± 3.16) and appearance (20.37 ± 3.86 vs 18.28 ± 4.27).

Table 4.3. Means and SD for the Sub-scales of PALMS between Males and Females

Sub-scale	Gender	
	Male	**Female**
Mastery	20.61 ± 3.42*	18.30 ± 3.94*
Enjoyment	20.93 ± 3.03	19.77 ± 3.37
Psychological Condition	19.89 ± 3.16*	20.80 ± 20.8*
Physical Condition	19.86 ± 3.76	20.84 ± 2.91
Appearance	18.28 ± 4.27*	20.37 ± 3.86*
Others' Expectation	16.61 ± 4.59	14.84 ± 4.65
Affiliation	19.67 ± 3.58*	17.95 ± 4.24*
Competition/Ego	19.31 ± 4.15*	15.53 ± 4.53*

Legend: Results are shown as Mean ± SD; *$p < 0.05$

DFA revealed a significant canonical function (Wilks' Lambda = 0.619, p < 0.001), indicating that male and female groups could be effectively discriminated by the motivational sub-scales measured. DFA also identifies the extent to which group membership can be successfully predicted. Examination of the structure coefficients (Table 4.4), showed that competition/ego (0.97), appearance (0.77), physical condition (0.58), and mastery (0.48) contributed most to gender differences in PA participation, using a minimum discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996). Examination of group means and t-tests indicated that females reported higher motivation for appearance and physical condition than males, whereas males were more motivated by competition/ego and mastery than females (Table 4.3).

Table 4.4. Structure Coefficients for Gender Canonical Function

Sub-scale	Discriminant function loading
	Gender main effect
Mastery	.481
Enjoyment	.274
Psychological Condition	-.579
Physical Condition	-.159
Appearance	-.768
Others' Expectation	-.058
Affiliation	-.098
Competition/Ego	.972

Legend: A minimum canonical structure coefficient of ±0.30 considered significant (Tabachnik & Fidell, 1996)

Also, in this analysis, 82.4% of the sample was correctly classified according to gender (Table 4.5).

Table 4.5. Classification Result for Gender Canonical Functions

			Predicted Group Membership		
		Gender	Male	Female	Total
Cross-validated[a]	Count	Male	627	76	703
		Female	164	493	657
	%	Male	89.2	10.8	100.0
		Female	25.0	75.0	100.0

[a]. 82.4% of cross-validated grouped cases correctly classified

4.3.2.2 Age Differences

Table 4.6 shows the means and standard deviation of PALMS sub-scales for both young and middle-aged adults. The results showed statistically significant differences in mastery, enjoyment, psychological condition, physical condition, appearance, other`s expectation, affiliation, appearance, and competition/ego ($p < 0.05$). Independent samples t-test demonstrated that young adults had significantly higher means compared to middle-aged adults on the following: mastery (20.90 ± 3.03 vs 17.71 ± 4.05), enjoyment (21.17 ± 2.92 vs 19.79 ± 3.42), affiliation (19.89 ± 3.37 vs 17.49 ± 4.34), and competition/ego (18.47 ± 4.43 vs 16.22 ± 4.79). On the other hand, middle-aged adults showed higher means on others' expectation (16.19 ± 4.87 vs 15.41 ± 4.54) and psychological condition (21.64 ± 3.02 vs 20.08 ± 3.21) compared to young adults.

Table 4.6. Means and SD for the Sub-scales of PALMS between Young and Middle-Aged Adults

Sub-scale	Age	
	Young adults **(20 to 40 years old)**	**Middle-aged adults** **(41 to 64 years old)**
Mastery	20.90 ± 3.03*	17.71 ± 4.05*
Enjoyment	21.17 ± 2.92*	19.79 ± 3.42*
Psychological Condition	20.08 ± 3.21*	21.64 ± 3.02*
Physical Condition	20.42 ± 3.47	20.22 ± 3.33
Appearance	18.76 ± 4.25	18.86 ± 3.93
Others' Expectation	15.41 ± 4.54*	16.19 ± 4.87*
Affiliation	19.89 ± 3.37*	17.49 ± 4.34*
Competition/Ego	18.47 ± 4.43*	16.22 ± 4.79*

Legend: Results are shown as Mean ± SD; *$p < 0.05$

DFA revealed a significant canonical function (Wilks' Lambda = 0.590, p < 0.001), revealing that young and middle-aged adults could be effectively discriminated by the motivational sub-scales measured. Examination of the structure coefficients indicated that the mastery (0.87), psychological condition (0.83), physical condition (0.80), affiliation (0.55), and enjoyment (0.33) sub-scales contributed most to age differences (Table 4.7), using a minimum value of ±0.30 (Tabachnik & Fidell, 1996). Examination of group means and t-tests indicated that young adults reported higher affiliation, mastery, and enjoyment associated with participation in PA than middle-aged adults, whereas middle-aged adults considered psychological condition and others' expectations more important motives for participating in PA than young adults (Table 4.6).

Table 4.7. Structure Coefficients for Age Canonical Function

Sub-scale	Discriminant function loading
	Age main effect
Mastery	.868
Enjoyment	.331
Psychological Condition	-.830
Physical Condition	.021
Appearance	-.248
Others' Expectation	-.803
Affiliation	.548
Competition/Ego	.231

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

(Tabachnik & Fidell, 1996)

In the case of young and middle-aged adults, 83.5% of the sample was correctly

classified according to age category (Table 4.8).

Table 4.8. Classification Results for Age Group

			Predicted Group Membership		
		Age group	Young adult	Middle-aged adult	Total
Cross-validated[a]	Count	Young adult	635	128	763
		Middle-aged adult	96	501	597
	%	Young adult	83.2	16.8	100.0
		Middle-aged adult	16.1	83.9	100.0

[a]. 83.5% of cross-validated grouped cases correctly classified

4.3.2.3 Type of Activity Differences

Table 4.9 shows the means and standard deviations of motivation in participation for the various types of PA.

Table 4.9. Motivation Sub-scales According to Type of Activity

Sub-scale	Team sports	Individual sports	Racquet sports	Exercise	Martial arts
Mastery	20.46 ± 3.37	18.45 ± 3.27	22.52 ± 2.53	16.58 ± 3.62	20.44 ± 2.56
Enjoyment	19.27 ± 3.11	21.49 ± 3.11	19.72 ± 3.01	17.60 ± 3.73	18.35 ± 2.84
Psychological Condition	17.51 ± 3.07	18.08 ± 2.80	18.40 ± 3.12	22.20 ± 3.16	20.75 ± 2.37
Physical Condition	19.09 ± 3.47	21.01 ± 3.24	21.60 ± 3.28	21.95 ± 3.42	19.43 ± 2.1
Appearance	19.80 ± 3.61	16.91 ± 3.78	19.15 ± 3.46	21.61 ± 2.37	15.91 ± 4.76
Others' Expectation	17.64 ± 3.87	14.34 ± 4.98	15.74 ± 4.25	14.83 ± 4.64	15.46 ± 5.22
Affiliation	21.78 ± 2.81	16.60 ± 4.36	18.23 ± 2.91	15.30 ± 3.86	19.42 ± 3.38
Competition/Ego	19.63 ± 3.99	18.36 ± 4.54	20.27 ± 3.26	15.32 ± 4.14	23.15 ± 4.53

Legend: Results are shown as Mean ± SD

To examine the extent to which the motives measured by the PALMS differentiated between participation in the five types of activity examined in the present study, I conducted five separate DFAs. In each case, I examined whether participants in the target type of PA could be discriminated from the rest of the sample combined on the basis of the eight motives measured by the PALMS.

DFA indicated a significant canonical function for team sport players (Wilks' Lambda = 0.725, $p < 0.001$), revealing that team sport players and the rest of the sample could be effectively discriminated by the motivational sub-scales measured. Examination of the structure coefficients (Table 4.10), using a minimum discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996), indicated that affiliation contributed most to the

discriminant function, with mastery and physical condition also representing meaningful contributors (±0.30).

Table 4.10. Structure Coefficients for Team Sport Player Canonical Function

Sub-scale	Canonical structure coefficients
	Team sports function
Mastery	0.380
Enjoyment	-0.085
Psychological Condition	-0.229
Physical Condition	0.319
Appearance	0.295
Others' Expectation	-0.095
Affiliation	1.172
Competition/Ego	0.162

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

(Tabachnik & Fidell, 1996)

Examination of group means in Table 4.11 and a follow-up independent t-test showed that team sport participants reported higher motives for affiliation and mastery than the rest of the sample and a somewhat lower motive for physical condition.

Table 4.11. Motivation Sub-scales According to Team Sport Players vs Rest of Sample

Sub-scale	Team sports	Rest of sample
Mastery	20.46 ± 3.37*	19.49 ± 5.11*
Enjoyment	19.27 ± 3.11	19.29 ± 4.25
Psychological Condition	17.51 ± 3.07*	19.85 ± 4.09*
Physical Condition	19.09 ± 3.47*	20.99 ± 3.87*
Appearance	19.80 ± 3.61*	18.39 ± 4.92*
Others' Expectations	17.64 ± 3.87*	15.09 ± 4.37*
Affiliation	21.78 ± 2.81*	17.38 ± 5.71*
Competition/Ego	19.63 ± 3.99	19.27 ± 4.62

Legend: Results are shown as Mean ± SD; *$p < 0.05$

In this case, 76.1% of the sample was correctly classified according to team sport category (Table 4.12).

Table 4.12. Classification Results for Team Sport Group

			Predicted Group Membership		
		Group	Team sport	Rest of sample	Total
Cross-validated[a]	Count	Team sport	305	53	358
		Rest of sample	259	743	1002
	%	Team sport	85.2	14.8	100.0
		Rest of sample	25.8	74.2	100.0

[a]. 76.1% of cross-validated grouped cases correctly classified

For individual sport participants, DFA reflected a significant canonical function (Wilks' Lambda = 0.490, $p < 0.001$). This result indicated that individual sport participants and the rest of the sample could be effectively discriminated by the motivational sub-scales

assessed. Examination of the structure coefficients (Table 4.13), using a minimum discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996), revealed that enjoyment contributed most to the discriminant function, with appearance and affiliation sub-scales also representing meaningful contributors (±0.30).

Table 4.13. Structure Coefficients for Individual Sports Canonical Function

Sub-scale	Canonical structure coefficients
	Individual sports function
Mastery	0.216
Enjoyment	1.333
Psychological Condition	-0.246
Physical Condition	-0.199
Appearance	0.343
Others' Expectation	-0.143
Affiliation	0.478
Competition/Ego	0.232

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

      (Tabachnik & Fidell, 1996)

Examination of group means in Table 4.14 and a follow-up independent t-test showed that individual sport participants were more motivated by enjoyment than the rest of the sample, but less motivated by appearance and affiliation.

Table 4.14. Motivation Sub-scales According to Individual Sports vs Rest of Sample

Sub-scale	Individual sports	Rest of sample
Mastery	18.45 ± 3.27*	20.00 ± 4.72*
Enjoyment	21.49 ± 3.11*	18.73 ± 3.81*
Psychological Condition	18.08 ± 2.80*	19.71 ± 5.14*
Physical Condition	21.01 ± 3.24	20.51 ± 3.81
Appearance	16.91 ± 3.78*	19.11 ± 5.13*
Others' Expectations	14.34 ± 4.98*	15.91 ± 6.11*
Affiliation	16.60 ± 4.36*	18.68 ± 4.33*
Competition/Ego	18.36 ± 4.54*	19.59 ± 5.41*

Legend: Results are shown as Mean ± SD; *$p < 0.05$

In this analysis, 91% of the sample was correctly classified according to individual sport group (Table 4.15).

Table 4.15. Classification Results for Individual Sport Group

			Predicted Group Membership		
		Group	Rest of sample	Individual sport	Total
Cross-validated[a]	Count	Rest of sample	991	97	1088
		Individual sport	14	258	272
	%	Rest of sample	91.1	8.9	100.0
		Individual sport	5.1	94.9	100.0

[a]. 91.8% of cross-validated grouped cases correctly classified

Also, DFA showed a significant canonical function for racquet sport players (Wilks' Lambda = 0.602, p < 0.001), indicating that racquet sport players and the rest of the sample could be effectively discriminated by the motivational sub-scales assessed. Examination of the structure coefficients (Table 4.16), using a minimum discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996), revealed that mastery contributed most to the discriminant function, with the competition sub-scale also representing a meaningful contributor (±0.30).

Table 4.16. Structure Coefficients for Racquet Sport Canonical Function

Sub-scale	Canonical structure coefficients
	Racquet sports function
Mastery	1.051
Enjoyment	-0.218
Psychological Condition	0.218
Physical Condition	-0.195
Appearance	0.215
Others' Expectation	0.226
Affiliation	-0.299
Competition/Ego	0.413

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

(Tabachnik & Fidell, 1996)

Examination of group means in Table 4.17 and a follow-up independent t-test showed that racquet sport participants reported a significantly higher motive for mastery than the rest of the sample and a higher motive for competition.

Table 4.17. Motivation Sub-scales According to Racquet Sport Players vs Rest of Sample

Sub-scale	Racquet sports	Rest of sample
Mastery	22.52 ± 2.53*	18.98 ± 3.82*
Enjoyment	19.72 ± 3.01	19.17 ± 4.70
Psychological Condition	18.40 ± 3.12*	19.63 ± 3.89*
Physical Condition	20.60 ± 3.28	20.27 ± 5.19
Appearance	19.15 ± 3.46	18.55 ± 4.56
Others' Expectations	15.74 ± 4.25	15.56 ± 3.94
Affiliation	18.23 ± 2.91*	18.27 ± 5.11*
Competition/Ego	20.27 ± 3.26*	19.11 ± 4.07*

Note: Results are shown as Mean ± SD; *$p < 0.05$

In this case, 90% of the sample was correctly classified according to whether they were from racquet sports or the rest of the sample (Table 4.18).

Table 4.18. Classification Results for Racquet Sport Group

			Predicted Group Membership		
		Group	Rest of sample	Racquet sport	Total
Cross-validated[a]	Count	Rest of sample	964	117	1081
		Racquet sport	14	265	272
	%	Rest of sample	89.2	10.8	100.0
		Racquet sport	5.0	95.0	100.0

Legend: 90.4% of cross-validated grouped cases correctly classified

For exercisers, DFA indicated a significant canonical function (Wilks' Lambda = 0.697, $p < 0.001$), showing that exercise and the rest of the sample could be effectively discriminated by the motivational sub-scales measured. Examination of the structure coefficients (Table 4.19), using a minimum discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996), identified that psychological condition contributed most to the discriminant function, with the mastery, competition/ego, appearance, and physical condition sub-scale also representing meaningful contributors (±0.30).

Table 4.19. Structure Coefficients for Exercise Canonical Function

Sub-scale	Canonical structure coefficients
	Exercise function
Mastery	-0.562
Enjoyment	-0.282
Psychological Condition	1.225
Physical Condition	0.341
Appearance	0.411
Others' Expectation	0.218
Affiliation	-0.295
Competition/Ego	-0.426

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

(Tabachnik & Fidell, 1996)

Examination of group means in Table 4.20 and a follow-up independent t-test showed that exercisers reported higher motives for psychological condition, appearance, and physical condition than the other participants in the study, but lower motives than the rest of the sample for mastery and competition/ego.

Table 4.20. Motivation Sub-scales According to Exercisers vs Rest of Sample

Sub-scale	Exercise	Rest of sample
Mastery	16.58 ± 3.62*	20.46 ± 4.65*
Enjoyment	17.60 ± 3.73*	19.70 ± 4.12*
Psychological Condi	22.20 ± 3.16*	18.68 ± 3.90*
Physical Condi	21.95 ± 3.42*	20.28 ± 3.88*
Appearance	21.61 ± 2.37*	17.94 ± 3.94*
Others' Expectations	14.83 ± 4.64	15.79 ± 5.17
Affiliation	15.30 ± 3.86*	19.00 ± 4.80*
Competition/Ego	15.32 ± 4.14*	20.35 ± 4.84*

Note: Results are shown as Mean ± SD; *$p < 0.05$

In this analysis, 84.7% of the sample was correctly classified according to whether they were from the exercise group or the rest of the sample (Table 4.21).

Table 4.21. Classification Results for Exercise Group

			Predicted Group Membership		
		Group	Rest of sample	Exercisers	Total
Cross-validated[a]	Count	Rest of sample	956	164	1120
		Exercisers	44	196	240
	%	Rest of sample	85.4	14.6	100.0
		Exercisers	18.3	81.7	100.0

[a]. 84.7% of cross-validated grouped cases correctly classified

DFA indicated a significant canonical function for martial arts participants (Wilks'
Lambda = 0.595, p < 0.001). This finding indicated that martial arts participants and the
rest of the sample could be effectively discriminated by the motivational sub-scales
measured. Examination of the structure coefficients (Table 4.22), using a minimum
discriminant function loading of ±0.30 (Tabachnik & Fidell, 1996), indicated that
competition/ego contributed most to the discriminant function, with mastery and
psychological condition also representing meaningful contributors (±0.30).

Table 4.22. Structure Coefficients for Martial Arts Canonical Function

Sub-scale	Canonical structure coefficients
	Martial arts function
Mastery	0.301
Enjoyment	-0.275
Psychological Condition	0.314
Physical Condition	0.296
Appearance	-0.221
Others' Expectation	-0.104
Affiliation	0.182
Competition/Ego	1.330

Legend: A minimum canonical structure coefficient of ±0.30 considered significant

(Tabachnik & Fidell, 1996)

Examination of group means in Table 4.23 and a follow-up independent t-test showed
that martial arts participants reported higher motives for competition/ego, mastery, and
psychological condition than the other participants in this sample.

Table 4.23. Motivation Sub-scales According to Martial Arts participants vs Rest of Sample

Sub-scale	Martial arts	Rest of sample
Mastery	20.44 ± 2.56*	19.50 ± 3.78*
Enjoyment	18.35 ± 2.84*	19.52 ± 4.18*
Psychological Condition	20.75 ± 2.37*	19.04 ± 3.86*
Physical Condition	19.43 ± 2.17*	20.91 ± 3.78*
Appearance	15.91 ± 4.76*	19.36 ± 5.89*
Others' Expectations	15.46 ± 5.22	15.63 ± 4.36
Affiliation	19.42 ± 3.38	17.97 ± 3.81
Competition/Ego	23.15 ± 4.53*	18.39 ± 3.72*

Note: Results are shown as Mean ± SD; *$p < 0.05$

In this case, 91.8% of the sample was correctly classified according to whether they participated in martial arts compared to the rest of the activities in the sample (Table 4.24).

Table 4.24. Classification Results for Martial Arts Group

			Predicted Group Membership		
		Group	Rest of sample	Martial arts	Total
Cross-validated[a]	Count	Rest of sample	1069	80	1149
		Martial arts	31	180	211
	%	Rest of sample	93.0	7.0	100.0
		Martial arts	14.7	85.3	100.0

[a]. 91.8% of cross-validated grouped cases correctly classified

4.4 Discussion

In this study, I investigated differences in motives for PA across gender, age, and type of activity. Research on participation motivation suggests that there are systematic differences between participation motives related to demographic variables, such as age and gender (Brunet & Sabiston, 2011; Egli et al., 2011). In this study, I found significant gender differences between males and females in motives for participation in PA measured by the PALMS. The discrimination between males and females was significant on four of the eight PALMS sub-scales. The strongest discriminators were competition/ego, appearance, psychological condition, and mastery. The current findings showed that males were more motivated than females by mastery and competition/ego, whereas females were motivated more than males by appearance and physical condition. This is consistent with previous research, which found that males showed significantly higher intrinsic motivation based on desire to achieve mastery (Egli et al., 2011; Kilpatrick et al., 2005; Morgan et al., 2003). Also, this result supports past research, which revealed that males were more motived than females by competition and challenge (Egli et al., 2011; Kilpatrick et al., 2005; Mathes & Battista, 1985). Females, on the other hand, had higher scores then males for extrinsic motives related to physical attractiveness and appearance (Butt et al., 2011; Egli et al., 2011; Kilpatrick et al., 2005). Indeed, the results of this study support previous studies and show that there are big differences on motivation sub-scales, especially in competition/ego and appearance sub-scales among males and females who participate in PA.

Some studies have demonstrated that decline in PA levels occurred more in females than males when males and females participated together in mixed-gender classes (Butt et al., 2011; Casperson, Pereira, & Curran, 2000; Guthold et al., 2008). Based on the

findings of the present study, health educators and health professionals might pay attention to different aspects of motivation in mixed-gender classes because, among adults, male participants are likely to be more motivated by mastery and competition, whereas females are more motivated by appearance and body physical condition to improve and maintain PA levels. Additionally, health professionals might focus on providing opportunities for males to experience mastery (by learning new skills) and to compete (at a level where they experience success, because losing tends to reduce motivation) and, for females, health and exercise professionals should provide opportunities to enhance psychological well-being and to maintain or enhance their appearance.

This research distinguished different motives for participation in PA that young adults (aged 20 to 41) and middle-aged adults (aged 41 to 64) considered to be more important. I found that five sub-scales (mastery, psychological condition, others' expectations, affiliation, and enjoyment) discriminated between young and middle-aged adults. Mastery and psychological condition were the strongest discriminators. Participants who were classified as young adults were more motivated by mastery, whereas participants who were categorized as middle-aged adults were more motivated by enhancing their psychological condition. This finding supports previous researchers (Brunet & Sabiston, 2011; Egli et al., 2011), who found that older participants took part in PA because of more extrinsic motivation compared to younger participants.

Results of the current study also support the theories of Buhler (1935), Buhler and Massarik (1968), and Erikson (1963) regarding changes in motivation that occur as people age. They proposed that in later years, people are involved in the evaluation of their lives. Buhler (1935), Buhler and Massarik (1968), Havighurst (1972), and Newman and Newman (1975) further suggested that old age brings increasing concern

with the deterioration of one's physical health and the resulting increase in dependence on others. Exercise habits have a large impact on one's physical health through the prevention of heart disease and strokes and maintaining physical strength (Blair, Wells, Weathers, & Paffenbarger, 1994; Bouchard, Shephard, & Stephens, 1994; Powell & Blair, 1994). PA also has a large impact on one's psychological health by reducing stress and raising self-esteem, and possibly even maintaining cognitive abilities (Emery & Blumenthal, 1991; McAuley, 1994; Plante & Rodin, 1990; Thomas, Landers, Salazar, & Etnier, 1994). Thus, it is reasonable to expect that older adults would show more concern for physical and psychological health issues in making their PA decisions.

Researchers have reported that level of PA declined as age increased (Butt et al., 2011; Guthold et al., 2008; Institute of Public Health, 2011) and intrinsic motivation has been positively linked with exercise adherence. Indeed, participants with higher levels of intrinsic motivation have been shown to persist in activities for longer, and report higher levels of adherence (Aaltonen et al., 2012; André & Dishman, 2012; Dishman et al., 1985; Frederick & Morris, 2004). The results of the present study suggest that health educators and professionals need to understand the importance of individual motivation sub-scales on measures like the PALMS to increase the likelihood of success in their PA interventions.

Five DFAs were conducted, one to compare each of the five PA types with the rest of the sample, to identify the motives that were particularly strong reasons for participation in that type of PA. I found that participants' motives for participation in PA distinguished each of the five types of PA from the rest of the sample. The strongest discriminators were affiliation for team sports, enjoyment for individual sport players,

mastery for racquet sports, psychological condition for exercisers, and competition/ego for martial arts players.

The finding that team sport participants were most clearly discriminated from the rest of this sample by their motive for affiliation is consistent with the only previous study that examined team sports compared to a range of sport types similar to the ones examined here. In a sample of 2,601 Australian participants in sport and PA, Morris et al. (1995) found that affiliation discriminated the team sports players from the other PA types most strongly on the PMQ. In a study that compared specific activities that represented different types of PA, Chowdhury (2012) found that team sport participants in Australian football were discriminated most clearly from tennis, gym, yoga and tae kwon do participants by the affiliation motive on the PALMS. These findings represent the most robust discriminator of any type of PA found in this kind of research.

Individual sports participants were discriminated from the rest of the sample most clearly by the motive of enjoyment. Comparisons of individual and team sports in previous research reflect similar patterns. For example, Frederick and Ryan (1993) found that those who participated in individual sports had higher interest/enjoyment and competence motivation than those who participated in team activities.

For racquet sport participants, mastery was the key discriminating motive. This result is not consistent with previous research (Morris et al., 1995). Morris et al. reported that racquet sport competitors were discriminated by higher scores than the rest of the sample on the challenge or competition/ego sub-scale. Chowdhury (2012) also found that the competition/ego motive was a strong discriminator of tennis players from participants in Australian football, gym, yoga, and tae kwon do. This inconsistency might relate to the level at which participants typically performed in these studies. In the study by Morris et al. and the research conducted by Chowdhury the tennis players were

accessed from tennis clubs where most players were highly competitive. On the other hand, the tennis players in the present study were accessed at local tennis courts and might be described as recreational or developing participants. For sports performers who are learning the skills of an activity, it is likely that mastery is the primary motive and competition might become more prominent as their skills develop. For performers who have mastered the skills of an activity to a large degree and who play at a competitive level, perhaps in leagues, competition might replace mastery as the primary motive driving participation. The developing players in the present study reflected this pattern citing mastery as their primary motive on the PALMS, with competition as a secondary motive. In the two studies in which either racquet sports or tennis were examined among more competitive players, it is not surprising that competition/ego had replaced mastery as the primary motive for participation.

For exercisers the motive of psychological condition was the important discriminator. These findings are not entirely consistent with previous research by Morris et al. (1995) who reported exercise participants were discriminated by higher scores on physical condition than participants in other activities. This might be because exercisers in this study (walking, jogging, dancing, and gym) were from different activities to those in the study by Morris et al. (aerobics and weight training). Many participants in activities like aerobics and weight training, especially those in the kinds of fitness centres where Morris et al. recruited participants were involved in relatively high-intensity exercise activities. Participants in the exercise category in the present study were in the main conducting lower intensity activities. It is possible that these participants focused more on general wellbeing with a psychological focus, whereas the main motive for participants in the Morris et al. study has sought out aerobics and weight training because they were more interested in improving their physical condition. Nonetheless, it

should be noted that appearance and physical condition were also motives that discriminated the exercisers in the present study from the rest of the sample.

Finally, for martial arts participants in the present study, competition/ego was the main sub-scale compared to other types of activity. In the sample involved in the research by Morris et al. (1995), using the PMQ, and in Chowdhury's (2012) PALMS study, it was found that psychological condition discriminated the martial arts from the other PA types most strongly. Again this could be related to varying skill levels in different studies. It is clear that participants in the present study were at a more developmental level than those in the previous research, where mastery is likely to be an important motive. It is also possible that differences in the specific activities between studies played a role. In the Morris et al. (1995) study a substantial proportion of the martial arts participants came from taiji, an activity in which grace, beauty and mental relaxation play a significant part.

Comparison of motives between different types of activity participants suggests that people participating in several types of PA placed varied emphasis on different motives. These findings suggest that particular participation motives clearly distinguish between the different types of physical activities. It is understandable that people participate in different physical activities for different reasons. This information gives practitioners an idea of the benefits likely to be derived from each activity. In this study, the sample was correctly classified in the five activity groups, suggesting that potential participants can be directed to types of activity that most closely match their motives, where they are likely to encounter others with similar aims because those activity types satisfy important motives for participation for those individuals. Types of activity can also be promoted in different ways to take advantage of variations in primary motives for participation, and hopefully reduce the typically high drop-out rates from different types

of activity, especially in the first few months after initiation of an activity. For example, team sport participants clearly valued affiliation more highly than other participants, whereas martial arts participants were more motivated by competition than other participants. Thus, for somebody who dislikes the discipline of exercising alone at unsocial hours, instead wanting to be with friends, participating in certain kinds of team sport might be a more appropriate form of PA than running, bicycle riding, or swimming alone. By having knowledge of the most important motives for participation in different types of PA, practitioners can direct people to activities that most suit them on the basis of their personal profile of motives for participation on measures like the PALMS. Given that the present study provides support for the major motives that characterize different types of activity, the results suggest that people could be matched to a type of activity based on their principal motives. This would leave choice of specific activity, based on access, cost, culture, preferences and the like, but reduce the risk of rapid dropout by targeting a type of activity that matches primary motives.

A secondary aim of this study was to examine the construct validity of the PALMS as a measure of motives for participation in PA. Construct validity provides support to the validity of measures to the extent that predictions made from the construct are supported by studies testing those predictions. In this study, I examined the construct validity of the PALMS by testing the prediction that different motives would predict participation in different types of PA, age, and gender based on theory and previous research. The results of the present study supported the construct validity of PALMS by showing that the motives for participation in PA were different for females from males. Consistent with theory and research males were motivated more by competition and mastery, whereas females were motivated more by appearance and psychological condition. Younger adults were motivated primarily by mastery of the activity, whereas middle-aged adults were primarily motivated by psychological condition, as predicted by theory

and previous research. The most specific predictions were made for the motives that discriminated each type of PA from the rest of the sample. In a number of types of PA the primary motives were consistent with previous research. In two cases, namely racquet sports and martial arts, the predictions were reversed compared with previous research, but were consistent with the specific activities and the level of participation in those activities observed in the present study. Therefore, this study provided support for a number of predictions, while raising some direction for further research that supported the construct validity of the PALMS.

This study had limitations in its conception and conduct. A number of issues have been raised in the discussion of the findings that relate to the level at which participants in the present study participated in the activities to which they attributed their motives. While this study targeted certain types of activity, otherwise, the study employed a convenience sample, which was not controlled to monitor level of participation. Some trends that were observed could be attributable to the level at which participants took part in the activities. I considered that the sample in the present study was less competitive and more recreational than in previous studies. In addition, the specific activities that emerged from this convenience sample could have influenced the activities that were found to be the strongest discriminators. These issue should be addressed by more systematic sampling of specific activities and of level at which participants are involved in further research.

The present study focused on the differences between motives and types of PA, as well as gender and age, using DFA to identify the motives that discriminated each type of activity from the rest of the sample. This approach has only been used in two previous studies to my knowledge. In the study by Morris et al. (1995), a large sample was recruited, but a different questionnaire was employed to measure motives for

participation in PA. Although the PMQ has some similarity to the PALMS, differences between these measures are evident. This limits the confidence with which I can compare these two studies. The study conducted by Chowdhury (2012) used the same questionnaire that was employed in the present study, but that study examined five specific activities in a much smaller sample than the present study. Thus, there is a need to replicate the present study with large samples of carefully selected participants and activities. Discussion of the outcomes of this research suggests some directions in which to extend the present research. It has been suggested here that the level at which individuals participate, such as recreational, club, state, or national level, might influence motives in a way that is independent of the types of activity. This can be examined by systematically sampling participants from each activity to represent different levels of participation. I also argued that differences might exist between activities that have been categorized as belonging to the same type of activity in this type of research. An example is classifying aerobics and weight training in the same category as walking and dancing. Although there are many classification systems for PA, the great diversity of PA means that no classification satisfactorily encompasses all physical activities. Further research should be conducted to refine the activities that can be confidently grouped together on the basis of motives for participation. Such research might employ cluster analysis to group activities together on the basis of the motives that characterize them.

4.5 Conclusion

The findings of the present study illustrate the importance of gender, age, and type of activity when investigating PA motivation. This study was an important first step in understanding differences in various types of PA motivation and associations between motives for participation in PA and PA behaviour across the adult lifespan. Most

importantly, the results of this study highlighted the message that understanding strong participation motives across gender, age, and type of activity may be effective in promoting PA in adults.

CHAPTER 5

STUDY 3: THE RELATIONSHIP BETWEEN MOTIVATION FOR PHYSICAL ACTIVITY AND LEVEL OF PHYSICAL ACTIVITY OVER TIME

5.1 Introduction

According to the tenets espoused within SDT, SDT predicts that motivation for PA influences amount of PA. Research on motivation and amount of PA supports the prediction that motivation predicts amount of PA (Aelterman et al., 2012; Kaupužs, 2013; Vancampfort et al., 2013; Wilson & Rodgers, 2002). Kaupužs (2013) investigated the relationship between exercise motivation and PA levels. The data showed a significant positive correlation between intrinsic motivation and level of PA. Vancampfort et al. (2013) examined differences in motivation according to level of PA. The results showed significant positive correlations between the motivation sub-scale and PA score. Cox et al. (2008) tested the relationships among motivation-related variables and leisure-time PA behaviour. Results showed that motivation-related constructs positively predicted leisure-time PA behaviour. Enjoyment of PA activities mediated the relationship between self-determined motivation in leisure-time PA. Perceived competence, autonomy, and relatedness were important antecedent variables, with autonomy and relatedness showing less stability over time and positively predicting self-determined motivation. Also, in a recent systematic review, Teixeira et al. (2012) reported consistent support for a positive relationship between more autonomous forms of motivation and exercise, with a trend towards identified regulation predicting initial/short-term adoption more strongly than intrinsic motivation, and intrinsic motivation being more predictive of long-term exercise adherence. The literature is also consistent in indicating that competence satisfaction and more intrinsic motives positively predicted exercise participation across a range of samples and

settings. Moreover, Jones et al. (2005) demonstrated that encouraging PA is an essential area of health promotion. Thus, if PALMS measures motives for participation in PA, PALMS motives should predict amount of PA. To test the construct validity of PALMS, I predicted that specified PALMS motives for participation in PA would predict amount of PA.

Based on the literature reviewed and the research conducted in Study 1 and Study 2, the primary aim of the present study was to examine whether PA motives measured by the PALMS predicted actual amount of PA at a later time to provide evidence for the construct validity of the PALMS (Aelterman et al., 2012; Kaupužs, 2013; Morris et al., 1995, 1996; Rogers et al., 2008; Ryan et al., 1997; Teixeira et al., 2012; Vancampfort et al., 2013; Wilson & Rodgers, 2002). A secondary aim was to examine whether motives for PA changed over time. Additionally, given the differences between motives associated with different types of PA and gender in Study 2 and previous studies (Egli et al., 2011; Kilpatrick et al., 2005; Morris et al., 1995), in this study, I examined motives for participation in PA separately for males and females and for different types of PA.

5.2 Materials and Methods

5.2.1   Participants

The study was approved by the Institute of Research Management and Monitoring, University of Malaya and the Sports Centre Research Committee. Participation in the study was voluntary and all participants provided written consent to participate in the study. A sample of 640 (489 males, 151 females) undergraduate students aged 18 to 25 years (22.30 ± 8.13 years) took part in the study. They completed questionnaires on two occasions, 14 weeks apart. They were recruited from over 12 fitness and sports facilities at the University of Malaya. Male participants reported that their main PA was football,

futsal, basketball, volleyball, badminton, table tennis, tennis, gym, jogging, swimming, running, or walking. These were categorised into three types of activities, namely exercise, racquet sport, and team sports. Female participants only took part in one type of activity, namely team sports (football, futsal, basketball, volleyball, and netball). After 14 weeks, all 640 undergraduate students who had filled in the initial questionnaire (Occasion 1) received the two questionnaires via email (Occasion 2). Of the 640 students, 493 (77%; 378 males, 115 females) emailed back the completed questionnaires.

5.2.2   Measures

5.2.2.1 Demographics Form

Participants reported their level of study (undergraduate or postgraduate), year of study, gender, and age. I also asked students to provide their cell phone numbers and e-mail addresses so that the questionnaires could be distributed appropriately for the next step data collection (see Appendix C).

5.2.2.2 Physical Activity and Leisure Motivation Scale (PALMS)

The PALMS was described in Study 1 (Chapter 3) (see Appendix D).

5.2.2.3 International Physical Activity Questionnaire Short Form (IPAQ-S) (Craig et al., 2003)

 The IPAQ-S is designed to assess PA among adults. It was developed to be used among individuals aged 15 to 69 years (Ekelund et al., 2006; Macfarlane, Lee, Ho, Chan, & Chan, 2007; Oh, Yang, Kim, & Kang, 2007). The IPAQ-S is relatively easy to administer and can be filled out in less than 5 minutes. The IPAQ-S is used to record PA undertaken in the last seven days (IPAQ Research Committee, 2005).   The IPAQ-S

provides information on the time spent walking, moderate PA (activities which makes one breathe harder than normal like carrying light loads, bicycling a regular pace or light swimming) and vigorous PA (activities which makes one breathe much harder than normal like heavy lifting, digging, aerobics and fast bicycling). The frequency and length of participation in physical activities are measured. Participants indicated how often in the last seven days they were physically active for more than 10 minutes at a time either walking, doing moderate intensity activity or vigorous intensity activity. In addition, participants are asked to provide the length of time per day they spent being physically active at both moderate and vigorous intensity. The items in the IPAQ-S are structured to provide separate scores on walking, moderate-intensity and vigorous-intensity activity. Computation of the total score requires summation of the duration (in minutes) and frequency (days) of walking, moderate-intensity and vigorous-intensity activities. Domain specific estimates cannot be estimated (IPAQ Research Committee, 2005). The scoring protocol can produce either categorical or continuous variables. Data collected with IPAQ-S can be reported as a continuous measure. One measure of the volume of activity can be computed by weighting each type of activity by its energy requirements defined in METs to yield a score in MET–minutes. METs are multiples of the resting metabolic rate and a MET-minute is computed by multiplying the MET score of an activity by the minutes performed. MET-minute scores are equivalent to kilocalories for a 60 kilogram person. Kilocalories may be computed from MET-minutes using the following equation: MET-min x (weight in kilograms/60 kilograms) (IPAQ Research Committee, 2005). According to the scoring protocol for the IPAQ-S, total PA of at least 3,000 MET-minutes per week is categorized as high PA level, total PA of at least 600 MET-minutes per week is categorized as moderate PA, and total PA of less than 600 MET- minutes per week is categorized as low PA (IPAQ Research Committee, 2005) (see Appendix G).

5.2.3   Procedure

Participants were recruited from various fitness and sports facilities at the University of Malaya from September 2013 to January 2014. Participants completed the Demographic Form, the PALMS, and the IPAQ-S on two occasions, 14 weeks apart. Participants who took part in sports and PA at the beginning of the semester were invited to participate in the study (Occasion 1). All participants read the participant information sheets. They were then given the opportunity to ask any questions about the study. Their participation was voluntary. Those who agreed to participate completed the Demographic Form, PALMS, and IPAQ-S questionnaires on the first occasion at the start of the academic semester. They completed the questionnaires in a private setting. They were also informed that there were no right or wrong answers and that their responses would be kept confidential. Participants completed all the measures in English. The 640 respondents took 10-12 minutes to complete the questionnaires. Participants who were willing to fill in the questionnaire package again 14 weeks later (Occasion 2) were asked for their email address. After 14 weeks, I sent emails to 602 participants who agreed to fill in the questionnaire again. Of these, 493 participants completed the questionnaires (PALMS and IPAQ-S) on Occasion 2.

5.2.4   Data Analysis

SPSS version 21.0 was used for data analysis. Data were first screened for normality, outliers, and homogeneity. Then, descriptive statistics were calculated for age, PA level, PA motives, and type of activity. Next, Pearson product-moment correlation was used to determine the relationship between PALMS motives (Occasion 1) and METs (Occasion 2). The purpose of doing correlations first was to identify which PALMS motives were strongly associated with amount of PA. Only those motives with strong correlations to amount of PA were included in the regression analysis for that gender

and type of PA. Reducing the number of motives used in the regression analyses increased the power of the regression analyses to identify significant differences. Then, the regression analyses were conducted to determine the impact of the selected PALMS sub-scales (Occasion 1) on METs (Occasion 2) for each type of PA for participants who completed the questionnaire on two occasions. Next, a paired-samples t-test was conducted to compare PA motives for participants on Occasion 1 and Occasion 2. Finally, paired samples t-tests were computed to examine whether level of PA differences existed between Occasions 1 and 2. The level of statistical significance was set at $p < 0.05$.

5.3 Results

I present the results in three subsections. In the first subsection, I describe the participants' characteristics. In the second subsection, I present the effect of motives for participation in PA on amount of PA in different types of PA. For each type of PA, results involve means and standard deviations for the PALMS sub-scales, Pearson's correlation coefficients, and regression analysis. Results reflect whether PA motives measured by the PALMS at the start of the semester predict actual amount of PA at a later time, that is, the end of the semester 14 weeks later. Finally, in the third subsection, I present the differences in motives and amount of PA on two occasions.

5.3.1 Characteristics of the Sample

The participants ranged in age from 18 to 25 years with 378 males (76.6%; M = 22.81; SD = 4.17) and 115 females (24.4%; M = 21.38; SD = 4.08).

Participants reported the MET-minutes per week on Occasion 1 (M = 5514.5; SD = 2562.1) and Occasion 2 (M = 6491.5; SD = 3014.4). For the purposes of describing the

sample, participants were classified into three groups according to their PA level based on the IPAQ-S scores. Table 5.1 shows the level of PA of participants.

Table 5.1. Frequency Distribution of Physical Activity Level of Participants

PA Level	Occasion 1				Occasion 2			
	Male		Female		Male		Female	
	N	%	N	%	N	%	N	%
Low	186	49	55	49	81	21	28	25
Moderate	140	37	42	36	194	52	52	45
High	52	14	18	15	103	27	35	30
Total	378	100	115	100	378	100	115	100

The activities of male participants were categorized into team sports (40%), racquet sports (27%), and exercise (33%) (Table 5.2).

Table 5.2. Frequency and Percentage of Type of Activity among Male Participants

Type of activity	Activity	N	%
Team sports	Football	47	12.5
	Futsal	68	18
	Basketball	17	4.5
	Volleyball	19	5
Racquet sports	Badminton	62	16.5
	Table Tennis	31	8
	Tennis	10	2.5
Exercise	Gym	53	14
	Jogging	24	6.5
	Swimming	12	3
	Running	22	6
	Walking	13	3.5
	Total	493	100

All the female participants took part in team sports with the largest number playing netball (Table 5.3).

Table 5.3. Frequency and Percentage of Type of Activity among Female Participants

Type of activity	Activity	N	%
Team sport	Football	21	18
	Futsal	12	11
	Basketball	15	13
	Volleyball	23	20
	Netball	44	38
	Total	115	100

5.3.2   Effect of Motives for Participation in Physical Activity on Amount of Physical Activity

5.3.2.1 Male Team Sports Players

The sample consisted of 151 male team sport players. Table 5.4 shows the means and standard deviations for the PALMS sub-scales among male team sport players on Occasion 1.

Table 5.4. Means for Sub-scales of the PALMS for Male Team Sport Players on Occasion 1

Sub-scale	Mean ± SD
Mastery	22.03 ± 4.13
Enjoyment	21.93 ± 3.91
Psychological Condition	16.32 ± 3.87
Physical Condition	18.31 ± 4.39
Appearance	19.12 ± 4.17
Others' Expectation	15.34 ± 4.61
Affiliation	23.81 ± 3.76
Competition/Ego	22.15 ± 4.18

Table 5.5 shows that there were statistically significant correlations between PALMS motives on Occasion 1 and the IPAQ-S scores (MET-minutes/week) on Occasion 2 among male team sport players. Pearson's correlation test revealed that there was a significant positive correlation between mastery and METs (r: 0.710, $p < 0.05$), enjoyment and METs (r: 0.399, $p < 0.05$), psychological condition and METs (r: 0.288, $p < 0.05$), physical condition and METs (r: 0.299 $p < 0.05$), appearance and METs (r: 0.293, $p < 0.05$), others' expectation and METs (r: 0.171, $p < 0.05$), affiliation and METs (r: 0.731, $p < 0.05$), and competition/ego and METs (r: 0.461, $p < 0.05$).

Table 5.5 shows that METs on Occasion 2 had a strong positive correlation with affiliation and mastery on Occasion 1, a moderate positive relationship with enjoyment and competition, weak positive relationships with physical condition, appearance, and psychological condition, and a very weak positive relationship with others' expectations.

Based on Cohen's (1988) statement that correlations can be interpreted like Cohen's d as effect sizes, the meaningful effect size/correlations were mastery, enjoyment, affiliation, and competition, so these were used in the regression analysis.

Table 5.5. Pearson Product–Moment Correlations between the 8 Sub-scales of PA Motivation on Occasion 1 and the IPAQ-S Score (MET-Minutes/Week) on Occasion 2 for Male Team Sport Players

		MA	EN	PS	PA	AP	OT	AF	CO
MET-minutes/week	r	0.710	0.399	0.288	0.299	0.293	0.171	0.731	0.461
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: MA = mastery. EN = enjoyment. PS = psychological condition. PH = physical condition. AP = appearance. OT = others' expectation. AF = affiliation. CO = competition/ego

The regression analysis was used to test whether PALMS motives on Occasion 1 significantly predicted PA in METs on Occasion 2 among male team sport players. As shown in Table 5.6, the predictors of this analysis (mastery, enjoyment, affiliation and competition) were statistically significant and this regression accounted for 33% of the variance in the predicted variable METs, which is due to the levels of mastery, enjoyment, affiliation, and competition/ego, all of which function as predicting variables (F = 179.076, p < 0.01) (Table 5.6). Based on these findings, I concluded that the level of PA in METs was significantly predicted by mastery, enjoyment, affiliation, and competition among male team sport players.

Table 5.6. Regression Analysis Results on the IPAQ-S Score (METs)

Sub-scale	β	t	p
Mastery	0.160	2.791	0.001
Enjoyment	0.159	2.723	0.005
Affiliation	0.178	2.783	0.005
Competition/Ego	0.173	2.842	0.115
$R = 0.521$; $R^2 = 0.339$			
$F = 158.016$; $p < 0.05$			

Note: Dependent variable: The IPAQ-S score (METs)

5.3.2.2 Male Racquet Sports Players

The sample consisted of 103 racquet sport players. Table 5.7 shows the means and standard deviations for the PALMS sub-scales among male racquet sport players on Occasion 1.

Table 5.7. Means for Sub-scales of the PALMS for Male Racquet Sport Players on Occasion 1

Sub-scale	Mean ± SD
Mastery	21.93 ± 3.13
Enjoyment	19.43 ± 3.52
Psychological Condition	18.29 ± 3.48
Physical Condition	18.87 ± 3.59
Appearance	19.17 ± 3.99
Others' Expectation	15.21 ± 4.62
Affiliation	19.03 ± 3.28
Competition/Ego	22.11 ± 3.41

Table 5.8 shows that there were statistically significant correlations between PALMS motives on Occasion 1 and the IPAQ-S scores (MET-minutes/week) on Occasion 2. Pearson's correlations revealed that there was a significant positive correlation between mastery and METs (r: 0.641, $p < 0.05$), enjoyment and METs (r: 0.452, $p < 0.05$), psychological condition and METs (r: 0.275, $p < 0.05$), physical condition and METs (r: 0.264, $p < 0.05$), appearance and METs (r: 0.292, $p < 0.05$), others' expectation and METs (r: 0.251, $p < 0.05$), affiliation and METs (r: 0.276, $p < 0.05$), and competition/ego and METs (r: 0.641, $p < 0.05$) among male racquet sport Players.

Table 5.8 shows that METs on Occasion 2 had a strong positive correlation with competition/ego and mastery on Occasion 1, a moderate positive relationship with enjoyment, and weak positive relationship with affiliation, physical condition, appearance, psychological condition, and others' expectation. The meaningful effect size/correlations were competition, mastery, and enjoyment, so these were used in the regression analysis.

Table 5.8. Pearson Product–Moment Correlations between the 8 Sub-scales of PA Motivation on Occasion 1 and the IPAQ-S Score (MET-Minutes/Week) on Occasion 2 for Racquet Sport Players

		MA	EN	PS	PA	AP	OT	AF	CO
MET-minutes/week	r	0.641	0.452	0.275	0.264	0.292	0.251	0.276	0.652
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: MA = mastery. EN = enjoyment. PS = psychological condition. PH = physical condition. AP = appearance. OT = others' expectation. AF = affiliation. CO = competition/ego

The regression analysis was used to test whether PALMS motives on Occasion 1 significantly predicted PA in METs on Occasion 2 among male racquet sport players. As shown in Table 5.9, the predictors of this analysis (competition, mastery, and enjoyment) were statistically significant, accounting for 41% of the variance in the predicted variable METs which is due to the levels of competition, mastery, and enjoyment, all of which functioned as predictor variables ($F = 13.712$, $p < 0.01$) (Table 5.9). Based on these findings, I concluded that the level of PA in METs was significantly predicted by competition, mastery, and enjoyment among male racquet sport players.

Table 5.9. Regression Analysis Results on the IPAQ-S Score (METs)

Sub-scale	β	t	p
Mastery	0.342	3.031	0.000
Enjoyment	0.262	3.262	0.002
Competition/Ego	0.299	2.533	0.003
$R = 0.614$ $R^2 = 0.411$			
$F = 13.712$ $p < 0.05$			

Legend: Dependent variable: The IPAQ-S score (METs)

5.3.2.3 Male Exercise

The sample consisted of 124 exercisers. Table 5.10 shows the means and standard deviations for the PALMS sub-scales among male exercisers on Occasion 1.

Table 5.10. Means for Sub-scales of the PALMS for Male Exercisers on Occasion 1

Sub-scale	Mean ± SD
Mastery	15.09 ± 4.84
Enjoyment	22.19 ± 3.65
Psychological Condition	21.65 ± 4.16
Physical Condition	21.97 ± 3.96
Appearance	22.52 ± 3.83
Others' Expectation	18.01 ± 4.89
Affiliation	15.80 ± 3.74
Competition/Ego	15.23 ± 4.96

Table 5.11 shows that there were statistically significant correlations between PALMS motives on Occasion 1 and the IPAQ-S scores (MET-minutes/week) on Occasion 2.

Pearson's correlations revealed that there was a significant positive correlation between mastery and METs (r: 0.281, p < 0.05), enjoyment and METs (r: 0.672, p < 0.05), psychological condition and METs (r: 0.691, p < 0.05), physical condition and METs (r: 0.472, p < 0.05), appearance and METs (r: 0.401, p < 0.05), others' expectation and METs (r: 0.439, p < 0.05), affiliation and METs (r: 0.160, p < 0.05). There was no significant correlation between competition/ego sub-scale on Occasion 1 and METs on Occasion 2 (r: -0.071, p < 0.05) among male exercisers.

Table 5.11 shows that METs on Occasion 2 had a strong positive correlation with physical condition and enjoyment on Occasion 1, a moderate positive relationship with psychological condition and appearance, and weak positive relationships with mastery, affiliation, and others' expectations, the meaningful effect size/correlations were physical condition, enjoyment, psychological condition, and appearance, so these were used in the regression analysis.

Table 5.11. Pearson Product–Moment Correlations between the 8 Sub-scales of PA Motivation on Occasion 1 and the IPAQ-S Score (MET-Minutes/Week) on Occasion 2 for Exercisers

		MA	EN	PS	PA	AP	OT	AF	CO
MET-minutes/week	r	0.281	0.672	0.691	0.472	0.401	0.239	0.160	-0.071
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.285

Note: MA = mastery. EN = enjoyment. PS = psychological condition. PH = physical condition. AP = appearance. OT = others' expectation. AF = affiliation. CO = competition/ego

The regression analysis was used to test whether PALMS motives on Occasion 1 significantly predicted PA in METs on Occasion 2 among male racquet sport players.

As shown in Table 5.12, the predictors in this analysis (physical condition, enjoyment, psychological condition, and appearance) were statistically significant accounting for 52% of the variance in the predicted variable METs, which is due to the levels of physical condition, enjoyment, psychological condition, and appearance, all of which functioned as predictor variables (F = 32.592, p < 0.01) (Table 5.12). Based on these findings, I concluded that the level of PA in METs was significantly predicted by physical condition, enjoyment, psychological condition, and appearance among male exercisers.

Table 5.12. Regression Analysis Results on the IPAQ-S Score (METs)

Sub-scale	β	t	P
Enjoyment	0.299	5.261	0.000
Psychological Condition	0.541	7.391	0.000
Physical Condition	0.194	4.091	0.000
Appearance	0.015	0.191	0.000
R = 0.642; R^2 = 0.521			
F = 32,592; p < 0.05			

Note: Dependent variable: The IPAQ-S score (METs)

5.3.2.4 Female Team Sport Players

The sample consisted of 113 female team sport players. Table 5.13 shows the means and standard deviations for the PALMS sub-scales among female team sport players on Occasion 1.

Table 5.13. Means for Sub-scales of the PALMS for Female Team Sport Players on Occasion 1

Sub-scale	Mean ± SD
Mastery	21.43 ± 3.17
Enjoyment	21.51 ± 4.11
Psychological Condition	19.63 ± 4.12
Physical Condition	18.89 ± 3.71
Appearance	21.69 ± 4.35
Others' Expectation	17.41 ± 3.59
Affiliation	23.12 ± 4.21
Competition/Ego	22.01 ± 3.84

Table 5.14 shows that there were statistically significant correlations between PALMS motives on Occasion 1 on the IPAQ-S scores (MET-minutes/week) on Occasion 2. Pearson's correlations revealed that there was a significant positive correlation between mastery and METs (r: 0.729, $p < 0.05$), enjoyment and METs (r: 0.471, $p < 0.05$), psychological condition and METs (r: 0.261, $p < 0.05$), physical condition and METs (r: 0.372, $p < 0.05$), appearance and METs (r: 0.616, $p < 0.05$), others' expectation and METs (r: 0.286, $p < 0.05$), affiliation and METs (r: 0.723, $p < 0.05$), and competition/ego and METs (r: 0.362, $p < 0.05$) among female team sport players.

Table 5.14 shows that METs on Occasion 2 had a strong positive correlation with mastery and affiliation on Occasion 1, a moderate positive relationship with enjoyment and appearance, and weak positive relationship with physical condition, psychological condition, competition/ego, and others' expectation, so the meaningful effect size/correlations were mastery, enjoyment, appearance, and affiliation, so these were used in the regression analysis.

Table 5.14. Pearson Product–Moment Correlations between the 8 Sub-scales of PA Motivation on Occasion 1 and the IPAQ-S Score (MET-Minutes/Week) on Occasion 2 for Female Team Sport Players.

		MA	EN	PS	PA	AP	OT	AF	CO
MET-minutes/week	r	0.729	0.471	0.261	0.372	0.616	0.286	0.723	0.296
	p	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note: MA = mastery. EN = enjoyment. PS = psychological condition. PH = physical condition. AP = appearance. OT = others' expectation. AF = affiliation. CO = competition/ego

The regression analysis was used to test whether PALMS motives on Occasion 1 significantly predicted PA in METs on Occasion 2 among female team sport players. As shown in Table 5.15, the predictors of this analysis (mastery, enjoyment, appearance, and affiliation) was statistically significant, accounting for 54% of the variance in the predicted variable METs, which is due to the levels of mastery, enjoyment, appearance, and affiliation, all of which functioned as predictor variables ($F = 41.173$, $p < 0.01$) (Table 5.15). Based on these findings, I concluded that the level of PA in METs was significantly predicted by mastery, enjoyment, appearance, and affiliation among female team sport players.

Table 5.15. Regression Analysis Results on the IPAQ-S Score (METs)

Sub-scale	β	t	p
Mastery	0.446	7.909	0.000
Enjoyment	0.149	2.921	0.002
Appearance	0.163	2.723	0.021
Affiliation	0.424	7.351	0.000
R = 0.724; R^2 = 0.545 F = 41.173; p < 0.05			

Note: Dependent variable: The IPAQ-S score (METs)

5.3.3 Differences in Motives

Table 5.16 shows the means and standard deviations of the sub-scales of PALMS for the sample on Occasions 1 and 2. There were statistically significant differences for a number of sub-scales, namely mastery, enjoyment, appearance, and competition/ego ($p < 0.05$). Paired samples t-tests revealed that participants on Occasion 2 reported a significantly higher mean on the sub-scales of mastery and enjoyment than on Occasion 1, whereas participants on Occasion 1 reported a significantly higher mean on the sub-scales of appearance and psychological condition than on Occasion 2. There were differences in PALMS motives on two occasions. Participants reported higher motivation on Occasion 2 in intrinsically-oriented motives, such as enjoyment and mastery. On the contrary, individuals had higher body-mind motives like appearance and psychological condition on Occasion 1.

Table 5.16. Means for Sub-scales of the PALMS for Whole Sample on Two Occasions

Variables	Motives	
	Occasion 1	**Occasion 2**
Mastery	20.12 ± 3.92*	23.41 ± 3.71*
Enjoyment	21.26 ± 2.98*	23.13 ± 3.82*
Psychological Condition	18.97 ± 4.71*	17.21 ± 3.62*
Physical Condition	19.51 ± 4.18	20.64 ± 3.88
Appearance	20.62 ± 3.88*	18.37 ± 3.86*
Others' Expectation	16.69 ± 5.17	15.81 ± 4.73
Affiliation	20.44 ± 3.73	21.95 ± 4.14
Competition/Ego	20.37 ± 4.28	21.43 ± 3.63

Note: Results are shown as Mean ± SD; *$p < .05$

5.3.4 Differences in Levels of Physical Activity

According to the scoring protocol for the IPAQ-S, total PA of at least 3,000 MET-minutes per week is categorized as high PA level, total PA of at least 600 MET-minutes per week is categorized as moderate PA and total PA of less than 600 MET- minutes per week is categorized as low PA (IPAQ Research Committee, 2005). The distribution of PA for the whole sample for Occasion 1 and 2 is presented in Figure 5.1.
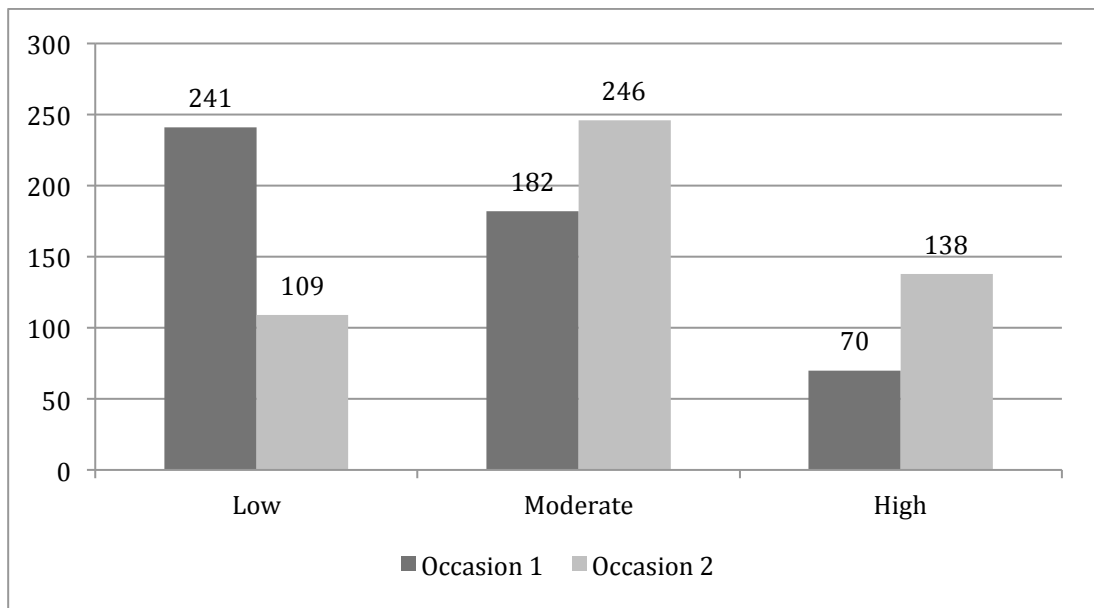
Figure 5.1. The Distribution of PA by Occasion

The data shows that approximately half of the respondents on Occasion 1 and two-thirds of the respondents on Occasion 2 were active in the present study. On Occasion 1, 57% of participants and 78% on Occasion 2 reported a moderate to high level of PA, which exceeded 600 MET-minutes per week.

The results showed significant differences in the total amount and level of PA between Occasions 1 and 2 among participants ($p < 0.05$). Results of paired samples t-tests showed that participants on Occasion 2 had significantly higher means compared to Occasion 1 on MET-minutes per week (6491.5 ± 3014.4 vs 5514.5 ± 2562.1). Participants reported higher levels of PA (MET-minutes per week) on Occasion 2.

5.4 Discussion

SDT (Deci & Ryan, 2000) and AGT (Nicholls, 1989) have been increasingly studied in the PA and sport context, as they are both considered sound theoretical frameworks to investigate motives in PA that are associated with adults' behaviours and experiences during PA participation (Rogers et al., 2008). The present study had two purposes. The

primary aim was to examine whether motives for participation in PA predicted actual amount of PA at a later time. Construct validity of the PALMS was assessed by examining the prediction that motives for participation in PA predict amount of PA undertaken. The secondary aim was to examine whether the motives for participation in PA changed over time.

5.4.1 Effect of Motives for Participation in Physical Activity on Amount of Physical Activity in Different Types of Physical Activity

Based on findings of Study 2 and previous research (Egli et al., 2011; Kilpatrick et al., 2005; Morris et al., 1995) that reported the differences between motives associated with different types of PA and gender, I investigated motives for participation in PA separately for males and females and for different types of PA in this study.

According to the tenets espoused within SDT (Deci & Ryan, 1985), specific motives will predict the amount of PA people do (Kaupužs, 2013; Wilson et al., 2007). This is because behaviour is driven by motivation. People do the behaviours that they are motivated to do (Deci et al., 1999; Deci et al., 2001; Gagne, 2003; Reis et al., 2000; Ryan & Deci, 2002). Thus, motives that are high will lead to more of the behaviour related to those motives, in this study PA. SDT predicts that more autonomous motives for a particular behaviour will result in increased levels of that behaviour and there is extensive research to support this prediction. Intrinsic and identified motives have been linked with increased exercise participation (Ingledew & Markland, 2008; Standage et al., 2008) and higher levels of PA (Wilson et al., 2007).

This prediction from the constructs (motives) was tested in this study for participation in PA separately for males (team sport, racquet sport, and exercise) and females (teams

sport) for different types of PA, which also examined the construct validity of the PALMS.

Four regression analyses were conducted, one to identify whether specific motives of PALMS predicted amount of PA people do for each of the PA types. I found that participants' motives for participation in PA did predict amount of PA and more impressively that this related to the specific motives that were shown in Study 2 to be influential in different types of PA and even to some extent with different genders.

Firstly, I found that amount of PA predicted by mastery, enjoyment, affiliation, and competition among male team sport players and this regression accounted for 33% of the variance in the criterion variable METs. These results support and extend research by Kaupužs (2013) and Cox et al. (2008), which demonstrated that intrinsic motivation was more important than extrinsic motivation in increasing the amount of PA in adults. Further, consistent with the predictions of the present study, some sub-scales of PA motivation affected the amount of PA undertaken based on systematic differences in certain types of PA based on Study 2 and previous research (Morris et al., 1996). Consistent with what was reported by Morris et al. (1996), the results of Study 2 indicated that team sport players were more motived by affiliation. This supported the construct validity of the PALMS, because theory and pervious study predicted that these effects would be happen.

Secondly, for male racquet sports players, competition, mastery, and enjoyment were the key predictor motives and they accounted for 41% of the variance in amount of PA, the criterion variable. These results are also consistent with past work (Morris et al., 1995) and results of Study 2 from which my predictions were derived. This finding suggested that racquet sport competitors were discriminated by higher scores than the rest of the sample on the challenge or competition/ego sub-scale. Also, intrinsic

motivation (mastery and enjoyment) was a more important motive for increasing amount of PA. This result supports past research which revealed that intrinsic motivation was a stronger predictor of long-term exercise adherence than extrinsic motivation (Cox et al., 2008; Kaupužs, 2013). This finding also supported the construct validity of the PALMS, because theory and pervious research supported this study prediction.

Thirdly, for male exercisers the motives of physical condition, enjoyment, psychological condition, and appearance were the important predictors, accounting for 52% of the variance in the criterion variable METs. These results support and extend research by Kilpatrick et al. (2005), which demonstrated that exercise participants were motivated by extrinsic factors and focused on appearance, weight, and stress management. These results are also consistent with past work (Morris et al., 1995) and Study 2 from which the predictions were derived. Morris et al. reported that for exercisers the motive of physical condition was the important discriminator. The finding for male exercisers in the present study supported the construct validity of the PALMS, because these effects happened as theory and previous research predicted.

Finally, for female team sport participants, mastery, enjoyment, appearance, and affiliation were the main predictors compared to other sub-scales of PALMS, accounting for 54% of the variance in the criterion variable amount of PA. This is consistent with previous findings where females were mostly motivated by weight management and appearance (Egli et al., 2011; Kilpatrick et al., 2005; Ryan et al., 1997). There is of concern because "extrinsic motivation (for example, appearance and weight loss) will backfire in time" (Edmunds, Ntoumanis, & Duda, 2006). Past research on PA motivation generally posits appearance as an external motive. Based on SDT, in time a person who is physically active to obtain this outcome might react against this

kind of external inducement, as it counters individual autonomy, or if the desired result of improved appearance or weight change does not occur, the theory predicts the person would lose motivation for the activity (Markland & Ingledew, 2007; Ryan et al., 1997). Furthermore, these results are consistent with past work (Morris et al., 1995) and results of Study 2 regarding the motives that discriminate team sport players from a range of other sports and exercise activities from which the present predictions were derived. In particular, affiliation has been shown to discriminate people's motives for participation in team sports, regardless of gender. In this regression analysis, affiliation was one of the main predictor variables. Thus, results of the regression analysis for female team sport players supported the construct validity of the PALMS, based on theory and previous research.

In the present work, the prediction was that pertinent sub-scales of the motives for participation in PA measure, PALMS, were positively related to amount of PA for each type of PA. Supporting previous studies and this prediction, the results showed that not only were pertinent sub-scales of PALMS positively related to amount of PA, but separate regression analyses showed the positive predictive effect of PALMS motives for amount of PA for each type of PA among participants in the present study. This prediction from the constructs (motives) was tested in the present study which is also a construct validity study. This study supported the construct validity of the PALMS by showing that the motives measured by PALMS did predict amount of PA and more impressively that this related to the specific motives that were shown to be influential in different types of PA and even to some extent with different genders.

5.4.2 Change in Physical Activity Motivation Over Time

Many researchers have looked at motives for PA in order to better understand participation in PA. PA motivation is understood as the impetus for exercise

participation (Aaltonen et al., 2012; André & Dishman, 2012; Dishman et al., 1985; Frederick & Morris, 2004). However, limited attention has been paid to how motives for PA change over time. Understanding if and how motives for participation in PA change over time when no systematic manipulation is applied to produce predictable change is important. Without appreciation of changes that are likely to occur simply due to the passage of time, it is difficult to determine whether any changes observed when a manipulation is intentionally applied are due to the manipulation or simply reflect spontaneous changes in motives that occur over time. Thus, it is interesting to examine whether participants' PA motives change over time when there is no systematic manipulation, as in the present study.

Based on SDT, there is a fluidity in motivation and individuals can move along this continuum (Ingledew & Sullivan, 2002). When applied to PA behaviour, SDT holds that variables related to intrinsic motivation are related to both proficiency and fascination-pleasure, whereas variables concerning extrinsic motivation concentrate on acquiring results that are extraneous to taking part in PA (Deci & Ryan, 1985; Pelletier et al., 1995; Ryan et al., 1984). Extrinsic motives play a crucial role during the early stages of PA, whereas intrinsic motives are critical in progressing toward long-term participation in PA (Dacey, Baltzell & Zaichkowsky, 2008; Ryan, Fredrick, Lepes, Rubio & Sheldon, 1997). Supporting such theoretical reasoning and my prediction, the results showed that only two out of six sub-scales of extrinsic motivation changed over time, but all sub-scales of intrinsic motivation (mastery and enjoyment) did. In the present study, participants had significantly higher intrinsic motivation (mastery and enjoyment) after 14 weeks. On the other hand, extrinsic sub-scales of motivation (appearance and psychological condition) lowered significantly over time. The findings are theoretically congruent and add objectively-assessed PA behaviour to the growing array of adaptive behavioural, cognitive, and affective consequences that have been

shown to be positively linked to intrinsic motivation functioning in PA, exercise, and health settings (Dacey et al., 2008; Deci & Ryan, 1985; Deci & Vansteenkiste, 2004; Pelletier et al., 1995; Ryan et al., 1984).

It is important to note that there were significant differences in the amount of PA participation over time among participants in the present study. Participants reported a significantly higher amount of PA on Occasion 2, based on IPAQ-S score (MET-minutes per week). A total of 57% of participants on Occasion 1 and 78% on Occasion 2 reported a moderate to high level of PA. Previous research has shown that intrinsic motivation was the main factor in PA amount and there was a significant positive correlation between amount of PA and intrinsic motivation (Kaupužs, 2013). Therefore, the finding of the present study that motivation changes over time indicated that intrinsic motivation significantly increased and extrinsic motivation significantly decreased among participants. It is worth mentioning that the amount of PA was also significantly higher on Occasion 2 than on Occasion 1 in the present study. It would be interesting to investigate PA motivation changes among individuals whose amount of PA did not change over time.

It is important to acknowledge potential limitations that must be considered in the interpretation of the research data. First, the motives for participation in PA and the amount of PA were obtained from self-report questionnaires. It is acknowledged that self-report is not always reliable. It is possible when examining psychological variables like motivation that people respond in socially desirable ways. Researchers have reported that self-report of PA can be distorted by memory as well as efforts to look good or please researchers (Duncan, Sydeman, Perri, Limacher, & Martin, 2001; Montoye, Kemper, Saris, & Washburn, 1996). Thus, the self-report method might overestimate the results of total PA. As in any questionnaire approach, the reports given

were dependent on respondents' recollection and how attentive the participants may have been in their responses. Second, the sample was limited to university students, thereby restricting the potential to generalize the findings to other age groups and people with different educational backgrounds. Finally, the balance between samples in different types of PA was not equal because of sampling peculiarities.

In future, researchers should investigate other types of PA among different subgroups of the population. Also, findings of the present study suggest that type of PA is one of the most important variables associated with PA motives that should be investigated in future research along with demographic variables, such as age, gender, and country of origin or residence. Additionally, the findings suggest that there is a need to consider types of PA that were not included in the present study, when selecting participants in future studies. For example, a type of PA that is increasing in popularity is extreme sports. It would be interesting to examine whether participants in extreme sports show similar patterns of motivation to those in established physical activities or whether they have different primary motives. When considering other types of PA, a key issue for extension of the present research is whether those who possess the primary motives for those activities are also the people who do the largest amount of those types of PA. In future research, it would be helpful to include more stringent controls for amount of PA or, better still, to use more direct measures of activity, such as monitoring techniques like pedometers or accelerometers. A 14-week period also may not be long enough to capture motives effects that will lead to changes in amount of PA. Longer periods of time or monitoring periods would be valuable in future research across different stages of age and gender. To increase long-term effectiveness of PA interventions and create more successful health-promotion campaigns, it may be useful to identify multiple motives (intrinsic and extrinsic) in various variables, such as age, gender, and types of

PA that will support sustained PA in the maintenance phase of interventions and in daily life.

5.5 Conclusion

Because of the 14-week delay between measuring motives and testing amount of PA, results of the present study clearly show that primary participation motives for specific types of PA varied in predictable ways and those primary motives were associated with participation in larger amounts of PA, providing support for the construct validity of the PALMS as a measure of motives for participation in PA. The present study also provides evidence to support the idea that by identifying the specific motives that push people to be actively involved in PA, useful and precise information can be obtained to match people with particular types of sport or PA, which in turn could potentially promote longer adherence to the chosen activity.

CHAPTER 6

GENERAL DISCUSSION

6.1 Introduction

The present thesis consists of three studies investigating the validation of a measure of motives for participation in PA in adults in the context of Malaysia. In Study 1, I examined the reliability and validity of the PALMS for measuring motives for participation in PA. In Study 2, I investigated the construct validity of the PALMS by testing whether motives for participation best discriminated between types of PA, age, and gender in ways that were predictable based on theory and previous research. Finally, in Study 3, I further investigated the construct validity of the PALMS by examining whether PA motives predicted actual amount of PA at a later time, as would be expected on the basis of theory and previous research. I also examined whether motives for PA changed over time. In this General Discussion chapter, first, I summarise the conclusions from the three studies. Next, I present directions for future research that are based on the findings from all three studies in the thesis. Following this, I examine implications for practice based on the understanding gleaned from the three studies. Finally, I make concluding remarks about the research reported in this thesis.

6.2 Conclusions

In order to measure motives in PA among adults, I validated the PALMS in the cultural context of Malaysia. In Study 1, a quantitative, cross-sectional descriptive research design was employed. All participants completed a demographic information form, the PALMS, the MCSDS, and the REMM. The major findings of the Study 1 were that good internal consistency was shown for the overall measure by Cronbach's alpha

coefficient and for the eight PALMS sub-scales. Also, the results of Study 1 showed that the test-retest reliability for the PALMS sub-scales was sound over a 4-week period. I also found that the hypothesized 8-factor model demonstrated acceptable fit with the data, the correlations between each PALMS sub-scale and the corresponding sub-scale on the validated REMM (the 73-item questionnaire from which the PALMS was developed) were high. Finally, the Pearson's product–moment correlation coefficients between each of the sub-scales of the PALMS and the MCSDS were all close to zero, reflecting very small effect sizes, indicating that the PALMS did not encourage socially desirable responses in this study. I concluded that the PALMS questionnaire can be used to measure motives for participation in PA among Malaysian adults in future research and practice.

Based on SDT and previous studies, there are predicted to be systematic differences between participation motives and some demographic variables, such as types of PA, age, and gender (Brunet & Sabiston, 2011; Egli et al., 2011; Pero et al., 2010; Rogers et al., 2008; Ryan et al., 1997). Thus, I predicted that different motives would discriminate different types of activity, age, and gender. In Study 2, I applied DFA to investigate meaningful distinctions between motives that are important for one gender or the other, for young adults compared to middle-aged adults, and most importantly, for different types of PA. A quantitative, cross-sectional descriptive research design was employed in Study 2. The PALMS was used to assess motives for PA in adults who had been regularly physically active for at least six months. Discriminant function analyses that contrasted male and female, young and middle age, and each type of PA with the rest of the sample revealed significant canonical functions correctly classifying the cases into gender (82%), age group (83%), team sport players (76%), individual sport players (91%), racquet sport players (90%), exercisers (84%), and martial arts participants (91%). The competition/ego, appearance, physical condition, and mastery sub-scales

contributed most to gender differences. Five sub-scales (mastery, psychological condition, others' expectations, affiliation, and enjoyment) contributed most to the discriminant function for age. For type of activity, different sub-scales were the strongest contributors to the discriminant function for each type of PA. For team sport, affiliation was the strongest discriminator. Enjoyment discriminated individual sports from the rest of the sample most effectively. For racquet sport players the clearest discriminating motive was mastery. Psychological condition was the motive that most strongly discriminated exercisers from the rest of the sample. Finally, for martial arts participants, the strongest discriminator was competition/ego. These findings support previous research that reported systematic differences between participation motives related to demographic variables, such as types of PA, age, and gender (Brunet & Sabiston, 2011; Egli et al., 2011; Pero et al., 2010; Rogers et al., 2008; Ryan et al., 1997). Also, the results of Study 2 supported the construct validity of PALMS by showing that different motives were associated with different types of PA, age, and gender in ways that were predicted on the basis of theory and previous research. The findings in Study 2 suggest that strong and important motives for participation in PA are different across age, gender, and type of activity in adults. Understanding the motives that influence PA participation is critical for developing interventions to promote higher levels of involvement.

According to SDT, some researchers have reported that motives predicted the amount of PA people do (Aelterman et al., 2012; Kaupužs, 2013; Vancampfort et al., 2013; Wilson & Rodgers, 2002). Based on the definition of construct validity, if PALMS measures motives for participation in PA, PALMS motives should predict amount of PA. Based on the findings of Study 2 and previous studies, there were differences between motives associated with different types of PA and gender. Therefore, in Study 3 I predicted that specified PALMS motives for participation in PA separately for males and females and

for different types of PA would predict amount of PA to test the construct validity of PALMS. A quantitative, cross-sectional descriptive research design was employed in Study 3. The PALMS was used to assess motives for PA in adults on two occasions. Results showed that PALMS motives were related to amount of PA for each type of PA as predicted on the basis of theory and previous research. Further, the PALMS motives that were the strongest predictors of amount of PA for each type of PA among male and female participants were those predicted on the basis of findings in Study 2 (male team sport players: mastery, enjoyment, and affiliation; male racquet sports player: competition, mastery, and enjoyment; male exercisers: physical condition, enjoyment, psychological condition, and appearance; female team sport participants: mastery, enjoyment, appearance, and affiliation). Findings of Study 3 showed that PALMS motives did predict amount of PA as expected, thus, further supporting the construct validity of the PALMS.

Based on theory and previous research (Morris et al., 1996), findings of Studies 2 and 3 about different types of PA provide support for the practical use of PALMS to recommend activities to people who wish to participate in PA. Results of Study 2 suggested that people who prioritized different motives for participating in PA participated in different types of PA. The findings were consistent in many ways with research conducted by Morris et al. (1996), using the PMQ in an Australian sample. Some discrepancies suggested further refinement considering factors like skill level. Replication of these findings is needed, as well as extension to other types of physical activity not examined to date. Nonetheless, the results suggest that using PALMS motives for participation in PA to recommend types of PA that individuals with certain patterns of motives might find rewarding might be a fruitful way to increase long-term participation in PA. The findings of Study 3 indicated that PALMS motives for participation in PA did predict amount of PA. The specific PALMS motives that were

implicated in predicting amount of PA varied for gender and type of activity. The finding that specific motives are associated with amount of participation in particular types of PA suggests that it might be possible to increase individuals' participation in each type of activity by enhancing the key motives associated with that type of PA. Certainly, the findings of Study 3 are new in that I cannot identify previous studies that have looked at amount of PA in relation to motives for participation, using a validated questionnaire like the PALMS. Thus, there is a need for replication of these findings in different contexts and samples.

The results of the studies in this thesis add to knowledge about the most important motives for participation in different types of PA; practitioners can direct people to activities that most suit them on the basis of their personal profile of motives for participation on measures like the PALMS. People could be matched to a type of activity based on their principal motives. The studies also raise a range of questions that should be addressed in further research.

6.3 Further Research

Some interesting implications for future research have emerged from the three studies in this thesis in terms of PALMS and different types of PA motivation. A number of topics are examined separately in this subsection.

PALMS was developed based on consideration of a combination of empirical and theoretical factors. The outcome is a questionnaire that measures eight motives for involvement in PA and leisure. Those motives can be categorized as aspects of intrinsic motivation (mastery, enjoyment sub-scales) and extrinsic motives (the other six sub-scales). This is based both on the results of second-order factor analyses and on theory. Further, the six extrinsic motives can be classified into two second-order factors, body-

mind motives (physical condition, psychological condition, and appearance) and social motives (others' expectations, affiliation, and competition-ego). In addition, each of the eight motivational sub-scales has implications for intentions and behaviour.

To achieve some of the goals for use of the PALMS discussed in this research it would be helpful to have a standard way of displaying levels of the motives that would make it easy to see patterns and interpret them for individuals and groups, as well as to match them to typical profiles. Morris, Khoo, Chowdhury, and Molanorouzi (2013) proposed a graphical profiling method that is illustrated in Figure 6.1.
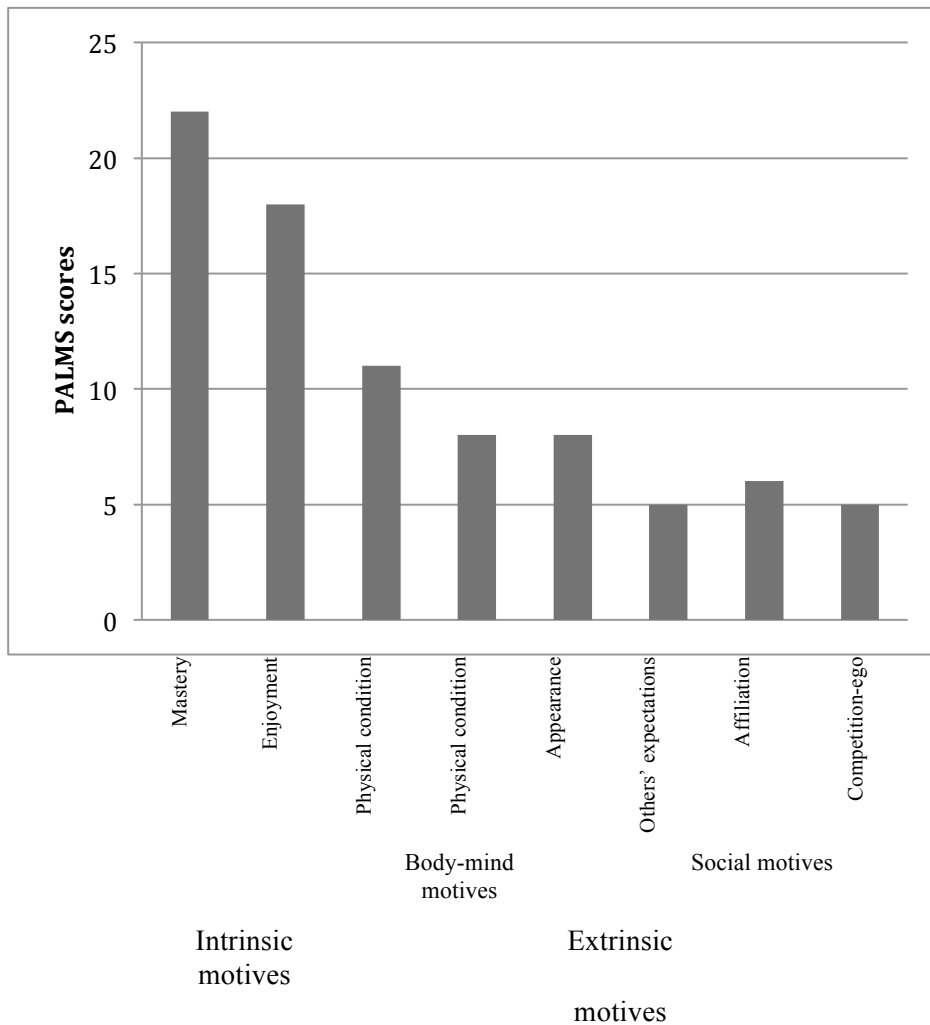
Figure 6.1. Theoretical Profile of Motives in the PALMS

PALMS Profiling is a proposed way to represent the scores on the eight motive sub-scales visually. The Profiles are presented as vertical bar charts. Researchers can present profiles that represent the means from large samples and can also use PALMS profiles in individual consulting work, where an individual completes the PALMS, their profile is generated and either a face-to-face consultant or an online software package interprets the profile.

This means that there are several levels at which it is possible to interpret results from the PALMS, either for samples in research or for individuals in applied work, when the PALMS is used to help understand a person's motives for PA as the basis for

recommending types of activity to which that individual should be suited. Clearly, it is possible to simply look at the scores on each of the sub-scales. Because each of the scales has five items, each scoring from 1 to 5, the range of scores for each sub-scale is 5 to 25. Thus, in a purely numerical sense sub-scale scores can be compared directly.

The profiles depicted in this preliminary statement of the PALMS profiling concept reflect only one of an almost infinite number of ways that eight motives could be patterned when each motive can vary on a scale from 5 to 25. People are unique, so the possible profiles are endless. It is argued, however, that only some of the possible profiles are highly probable. That is, it is proposed that individuals typically show variations on a number of profiles that reflect major types of motivation. These should be identifiable by empirical work in which those "types" are examined using the PALMS. For example, it is likely that profiles differ for different types of PA. The typical profile of team sports players should be different from the profile representing individual exercise participants, whereas racquet sport players should be different to non-competitive martial arts devotees.

PALMS profiling may lead researchers to be able to use the PALMS in a prescriptive manner to advise people about the kind of PA they are likely to find most rewarding (i.e., that meets their motivational needs) for helping people around the world to get more physically active and stay active for life.

Morris et al. (1996) presented a proposal that is pertinent to the research I conducted in the present thesis. The present research provides evidence on the relationship between motives for participation in PA and the types of PA that individuals choose to spend their time doing. With the information obtained from this research, researchers can begin to employ effective interventions guided by PALMS that aim to enhance motivation, or to increase certain types of motivation (e.g., intrinsic motivation) that

will likely lead to a more sustained involvement in specific types of PA. It would be especially interesting for researchers to examine use of the PALMS as a basis for recommending types of activity. This would involve longitudinal studies in which some people are given PALMS recommendations and others are allowed to choose activities based on other factors and then they are followed up after 6 months or 12 months or longer to see who is still doing the activity, how much time they are spending on it, and how it has affected their motives.

In the current research, based on the study conducted by Morris et al. (1996), I focused on the DFA for different types of PA motivation for examining level and intensity of the activities. However, it would also be interesting to use a similar research design involving different types of analysis in association with different types of PA motivation, such as cluster analysis. Cluster analysis would examine scores on the motives and identify clusters of activities that show similar patterns of motives for PA. Thus, instead of determining the groupings of activities a priori and testing to see whether they can be discriminated from each other, research that employed cluster analysis would examine patterns of motives to identify groups of activities empirically. This kind of research would involve collection of information on a measure of motives for participation in PA, such as the PALMS, from a large sample of people from a wide range of physical activities. The resulting data would be subjected to cluster analysis, which would identify groups of activities that showed similar patterns of motives for participation in PA. Interpretation of the identity of each group would be a subjective process based on examination of the activities that had clustered into that group. If the satisfaction of motives for participation in PA represents a key factor in the selection of activities, then the groups produced by cluster analysis should reflect motives that together are satisfied by the activities in a particular group. It would be interesting to examine the extent to which the activity groups and the motives that identified them

would be consistent with the motives and types of activity that resulted from Study 2 in this thesis, which started with predetermined groups of activities.

6.4 Implications for Practice

The findings in this thesis highlight that the PALMS has shown sound reliability and validity, which suggests it is a useful questionnaire to use to measure motives for participation in PA in a range of contexts. Based on the studies in the current thesis and previous research (Chowdhury, 2012; Zach et al., 2012), I propose that the PALMS represents a very useful tool for studying situational motivation in laboratory and field settings, and also I would advocate the 40-item PALMS measure for research assessing situational motivation in PA settings.

Noteworthy practical implications for the practice of measuring motives for participation in PA can be derived from Studies 2 and 3. Many health professionals and sport psychologists are not aware of the different types of PA motivation. Activity selected to match the requirements of motivation, can create a positive psychological state, leading to an increased level of PA. The studies in this thesis suggest that it should be possible to recommend suitable types of activity on the basis of patterns of motives. Given that the present study provides support for the major motives that characterize different types of activity, the results suggest that certain motives are associated with higher amounts of PA. This suggests that to increase PA amount in practice practitioners should match motives to activities or they should increase motives that are important to activities that are being undertaken. Measurement of motives for participation in PA, using the PALMS, could be applied to help people decide what kinds of activities they might do.

6.5 Concluding Remarks

Although there is abundant evidence to recommend a physically active lifestyle, adult PA levels have declined over the past two decades. In order to understand why this is happening, numerous studies have been conducted to uncover the reasons for people's participation in PA. Often, the measures used were not broad enough to reflect all the reasons for participation in PA. The PALMS was created to be a comprehensive tool measuring motives for participating in PA. This 40-item scale related to participation in sport and PA is designed for adolescents and adults. Five items constitute each of the eight sub-scales (mastery, enjoyment, psychological condition, physical condition, appearance, others' expectations, affiliation, competition/ego), reflecting motives for participation in PA that can be categorized as features of intrinsic and extrinsic motivation based on SDT. The present thesis was designed to extend motivation research by validating the PALMS. The thesis provides insights into the reliability and validity of the PALMS. By examining construct validity of the PALMS based on the constructs of the motives in this thesis, I have raised a range of questions about different types of PA motivation and the effects of specific type of PA on amount of PA, which I hope will stimulate other researchers to undertake further research on this topic to lead to greater understanding of the effect of types of PA for PA and provides support for the idea that if people do PA that matches their motives they will do more of that PA.

REFERENCES

Aaltonen, S., Leskinen, T., Morris, T., Alen, M., Kaprio, J., Liukkonen, J., & Kujala, U. M. (2012). Motives for and barriers to physical activity in twin pairs discordant for leisure time physical activity for 30 years. *International Journal of Sports Medicine, 33*(2), 157-163. doi: 10.1055/s-0031-1287848

Aballay, L. R., Eynard, A. R., Díaz, M. d. P., Navarro, A., & Muñoz, S. E. (2013). Overweight and obesity: a review of their relationship to metabolic syndrome, cardiovascular disease, and cancer in South America. *Nutrition Reviews, 71*(3), 168-179.

Aelterman, N., Vansteenkiste, M., Van Keer, H., Van den Berghe, L., De Meyer, J., & Haerens, L. (2012). Students' objectively measured physical activity levels and engagement as a function of between-class and between-student differences in motivation toward physical education. *Journal of Sport & Exercise Psychology, 34*(4), 457-480.

Ainsworth, B. E., & Macera, C. A. (2012). *Physical Activity and Public Health Practice*. London: CRC Press.

Albright, A., Franz, M., Hornsby, G., Kriska, A., Marrero, D., Ullrich, I., & Verity, L. S. (2000). Exercise and Type 2 Diabetes, Position Stand. *Medicine and Science in Sports and Exercise, 32*(7), 1345-1360.

Andersen, K. K., & Olsen, T. S. (2013). Body mass index and stroke: overweight and obesity less often associated with stroke recurrence. *Journal of Stroke and Cerebrovascular Diseases*, 22(8), e576-e581.

André, N., & Dishman, R. (2012). Evidence for the construct validity of self-motivation as a correlate of exercise adherence in french older adults. *Journal of Aging & Physical Activity, 20*(2), 231-245.

Ansari, W., & Lovell, G. (2009). Barriers to exercise in younger and older non-exercising adult women: a cross sectional study in london, united kingdom. *International Journal of Environmental Research and Public Health, 6*(4), 1443-1455.

Armstrong, N., & Welsman, J. R. (2006). The physical activity patterns of european youth with reference to methods of assessment. *Sports Medicine, 36*, 1067-1086.

Atkinson, J. W. (1964). *An Introduction to Motivatingon*. Oxford, England: Van Nostrand.

Australian Bureau of Statistics. (2013). Australian health survey: updated results, 2011-2012 from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4364.0.55.003Chapter12011-2012

Babyak, M., Blumenthal, J. A., Herman, S., Khatri, P., Doraiswamy, M., Moore, K., & Krishnan, K. R. (2000). Exercise treatment for major depression: maintenance of therapeutic benefit at 10 months. *Psychosomatic Medicine, 62*(5), 633-638.

Ball, K., Burton, N., & Brown, W. (2009). A prospective study of overweight, physical activity, and depressive symptoms in young women. *Obesity, 17*(1), 66-71.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215.

Bandura, A. (1986). *Social Foundations of Thought and Action*. Englewood Cliffs, NJ: Prentice- Hall.

Bauman, A. E. (2004). Updating the evidence that physical activity is good for health: an epidemiological review 2000–2003. *Journal of Science and Medicine in Sport, 7*(1), 6-19.

Berger, B. (2004). Subjective Well-being in obese individuals: the multiple roles of exercise. *Quest, 56*(1), 50-76.

Berger, B., Pargman, D., & Weinberg, R. (2007). *Foundations of exercise psychology*. Morgantown, WV: Fitness Information Technology.

Biddle, S. J. H., Wang, C. K. J., Chatzisarantis, N. L. D., & Spray, C. M. (2003). Motivation for physical activity in young people: entity and incremental beliefs about athletic ability. *Journal of Sports Sciences, 21*(12), 973-989.

Blair, S. N., Wells, C. L., Weathers, R. D., & Paffenbarger, J. (1994). Chronic disease: the physical activity dose-response controversy. In R. Dishman (Ed.), *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics Publishers.

Block, J. (1965). *The challenge of response sets*. East Norwalk, CT, US: Appleton-Century-Crofts.

Booth, M. L., Bauman, A., Owen, N., & Gore, C. J. (1997). Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive australians. *Preventive Medicine, 26*(1), 131-137.

Bouchard, C., Shephard, R. J., & Stephens, T. (1994). *The consensus statement. physical activity, fitness, and health*. Champaign, IL: Human Kinetics Publishers.

Boulé, N. G., Haddad, E., Kenny, G. P., Wells, G. A., & Sigal, R. J. (2001). Effects of exercise on glycemic control and body mass in type 2 diabetes mellitus. *The Journal of the American Medical Association, 286*(10), 1218-1227.

Brodkin, P., & Weiss, M. (1990). Developmental differences in motivation in competitive swimming. *Journal of Sport and Exercise Psychology, 12*, 248-263.

Brunet, J., & Sabiston, C. M. (2011). Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport and Exercise, 12*(2), 99-105. doi: 10.1016/j.psychsport.2010.09.006

Bryan, C. L., & Solmon, M. A. (2012). Student motivation in physical education and engagement in physical activity. *Journal of Sport Behavior, 35*(3), 267-285.

Buhler, C. (1935). The curve of life as studied in biographies. *Journal of Applied Psychology*, 19(4), 405-422.

Buhler, C., & Massarik, F. (1968). *The course of human life: a study of goals in the humanistic perspective*. New York: Springer.

Buonamano, R., Cei, A., & Mussino, A. (1995). Participation motivation in italian youth sport. *Sport Psychologist, 9*(3), 265-281.

Butcher, K., Sallis, J. F., Mayer, J. A., & Woodruff, S. (2008). Correlates of physical activity guideline compliance for adolescents in 100 U.S cities. *Journal of Adolescent Health, 42*, 360-368.

Butt, J., Weinberg, R., Breckon, J. D., & Claytor, R. P. (2011). Adolescent physical activity participation and motivational determinants across gender, age, and race. *Journal of Physical Activity & Health, 8*(8), 1074-1083.

Caglar, E., Canlan, Y., & Demir, M. (2009). Recreational exercise motives of adolescents and young adults. *Journal of Human Kinetics, 22*(1), 83-89.

Carron, A. V., Hausenblas, H. A., & Estabrooks, P. A. (2003). *The Psychology of Physical Activity*. New York: Mcgraw-Hill.

Casey, D., De Civita, M., & Dasgupta, K. (2010). Understanding physical activity facilitators and barriers during and following a supervised exercise programme in type 2 diabetes: a qualitative study. *Diabetic medicine, 27*(1), 79-84.

Casperson, C., Pereira, M., & Curran, K. (2000). Changes in physical activity pattems in the USA, by sex and cross-sectional age. *Med Sci Sports Exere, 32*, 1601-1609.

Celis-Morales, C. A., Perez-Bravo, F., Ibañez, L., Salas, C., Bailey, M. E. S., & Gill, J. M. R. (2012). Objective vs. self-reported physical activity and sedentary time: effects of measurement method on relationships with risk biomarkers. *PLoS ONE, 7*(5), e36345. doi: 10.1371/journal.pone.0036345

Chantal, Y., Guay, F., DobrevaMartinova, T., & Vallerand, R. J. (1996). Motivation and elite performance: an exploratory investigation with bulgarian athletes. *International Journal of Sport Psychology, 27*(2), 173-182.

Chowdhury, D. (2012). *Examining reasons for participation in sport and exercise using the Physical Activity and Leisure Motivation Scale (PALMS)*. (Doctor of Applied Psychology Degree Doctoral dissertation), Victoria University, School of Social Science And Psychology Faculty of Arts.

Clark, L. A., & Watson, D. (1995). Constructing validity: basic issues in objective scale development. *Psychological Assessment*, 7(3), 309-319.

Coghill, N., & Cooper, A. R. (2009). Motivators and de-motivators for adherence to a program of sustained walking. *Prev Med, 49*(1), 24-27. doi: 10.1016/j.ypmed.2009.04.017

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2 ed.). New York: Academic Press.

Comrey, A. L. (1988). Factor-analytic methods of scale development in personality and clinical psychology. *Journal of Consulting and Clinical Psychology, 56*(5), 754-766.

Cox, A. E., Smith, A. L., & Williams, L. (2008). Change in physical education motivation and physical activity behavior during middle school. *Journal of Adolescent Health, 43*(5), 506-513. doi: 10.1016/j.jadohealth.2008.04.020

Craft, L. L., Perna, F. A., Freund, K. M., & Culpepper, L. (2008). Psychosocial correlates of exercise in women with self-reported depressive symptoms. *Journal of Physical Activity Health, 5*(3), 469-480.

Craig, C. L., Marshall, A. L., Sjorstrom, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., . . . Sallis, J. F. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise, 35*(8), 1381-1395.

Crowne, D. P., & Marlowe, D. (1960). A New Scale of Social Desirability Independent of Psychopathology. *Journal of Consulting Psychology, 24*, 349-354.

Cunningham, S. (1971). *A comparison of attitudes toward physical activity by male and female students in the required physical education activity program at north texas state university*. Master's Thesis: North Texas State University.

Dacey, M., Baltzell, A., & Zaichkowsky, L. (2008). Older adults' intrinsic and extrinsic motivation toward physical activity. *American Journal of Health Behavior, 32*(6), 570-582.

Daley, A., & Welch, A. (2004). The effects of 15 min and 30 min of exercise on affective responses both during and after exercise. *Journal of Sports Sciences, 22*(7), 621-628.

Dalton, M., Cameron, A. J., Zimmet, P. Z., Shaw, J. E., Jolley, D., Dunstan, D. W., & Welborn, T. A. (2003). Waist circumference, waist–hip ratio and body mass index and their correlation with cardiovascular disease risk factors in australian adults. *Journal of Internal Medicine, 254*(6), 555-563.

De Andrade Bastos, A., Salguero, A., Gonzalez-Boto, R., & Marquez, S. (2006). Motives for participation in physical activity by brazilian adults. *perceptual and motor skills, 102*(2), 358-367.

Deci, E. (1980). *The psychology of self-determination*. Toronto: Lexington Books.

Deci, E., Koestner, R., & Ryan, R. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin, 125*(6), 627-639.

Deci, E., & Ryan, R. (1985). *Intrinsic motivation and self-determination in human behaviour*. New York: Plenum.

Deci, E., & Ryan, R. (1991). *A motivational approach to self: integration in personality.* Paper presented at the Nebraska Symposium on Motivation.

Deci, E., & Ryan, R. (2000). The" what" and" why" of goal pursuits: human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268.

Deci, E., & Ryan, R. (2008). Facilitating optimal motivation and psychological well-being across life's domains. *Canadian Psychology, 49*(1), 14-22.

Deci, E., Ryan, R., Gagné, M., Leone, D., Usunov, J., & Kornazheva, B. (2001). Need satisfaction, motivation, and well-being in the work organizations of a former eastern bloc country: a cross-cultural study of self-determination. *Personality and Social Psychology Bulletin, 27*(8), 930-942.

Deci, E., & Vansteenkiste, M. (2004). Self-determination theory and basic need satisfaction: understanding human development in positive psychology. *Ricerche di Psicologia, 27*, 17-34.

Desai, M. N., Miller, W. C., Staples, B., & Bravender, T. (2008). Risk factors associated with overweight and obesity in college students. *Journal of American College Health, 57*(1), 109-114.

Dishman, R., Sallis, J., & Ogilvie, D. (1985). The determinants of physical activity and exercise. *Public Health Rep, 100*(2), 158-171.

Duda, J. L. (1988). Goal perspectives, participation, and persistence in sport. *Journal of Sport Psychology, 19*, 117-130.

Duda, J. L. (1989). Goal perspectives and behavior in sport and exercise settings. *Advances in Motivation and Achievement, 6*, 81-115.

Duda, J. L., & Tappe, M. K. (1988). Predictors of personal investment in physical activity among middle-aged and older adults. *Perceptual and Motor Skills, 66*(2), 543-549.

Duncan, G. E., Sydeman, S. J., Perri, M. G., Limacher, M. C., & Martin, A. D. (2001). Can sedentary adults accurately recall the intensity of their physical activity?. *Preventive Medicine, 33*(1), 18-26.

Dunn, A. L., Trivedi, M. H., Kampert, J. B., Clark, C. G., & Chambliss, H. O. (2005). Exercise treatment for depression: efficacy and dose response. *American Journal of Preventive Medicine, 28*(1), 1-8.

Dwyer, J. J., Allison, K. R., Goldenberg, E. R., Fein, A. J., Yoshida, K. K., & Boutilier, M. A. (2005). Adolescent girls' perceived barriers to participation in physical activity. *Adolescence, 41*(161), 75-89.

Dyson, P. (2010). The therapeutics of lifestyle management on obesity. *Diabetes, Obesity and Metabolism, 12*(11), 941-946.

Ebben, W., & Brudzynski, L. (2008). Motivations and barriers to exercise among college students. *Journal of Exercise Physiology Online,* 11, 1-9.

Eckel, R. H., Kahn, R., Robertson, R. M., & Rizza, R. A. (2006). Preventing cardiovascular disease and diabetes: a call to action from the american diabetes association and the american heart association. *Circulation, 113*(25), 2943-2946.

Edmunds, J., Ntoumanis, N., & Duda, J. L. (2006). A test of self-determination theory in the exercise domain. *Journal of Applied Social Psychology, 36*(9), 2240-2265.

Edwards, A. L. (1970). *The Measurement of Personality Traits by Scales and Inventories*. New York: Holt, Rinehart, & Winston.

Egli, T., Bland, H. W., Melton, B. F., & Czech, D. R. (2011). Influence of age, sex, and race on college students' exercise motivation of physical activity. *Journal of American College Health, 59*(5), 399-406.

Eijkemans, M., Mommers, M., Draaisma, J. M. T., Thijs, C., & Prins, M. H. (2012). Physical Activity and asthma: a systematic review and meta-analysis. *PLoS ONE, 7*(12), e50775. doi: 10.1371/journal.pone.0050775

Ekelund, U., Sepp, H., Brage, S., Becker, W., Jakes, R., Hennings, M., & Wareham, N. J. (2006). Criterion-related validity of the last 7-day, short form of the international physical activity questionnaire in swedish adults. *Public Health Nutrition- Cab International, 9*(2), 258-266.

Emery, C. F., & Blumenthal, J. A. (1991). Effects of physical exercise on psychological and cognitive functioning of older adults. *Annals of Behavioral Medicine, 13*(3), 99-107.

Erikson, E. H. (1998). *The life cycle completed (extended version)*. London: WW Norton & Company.

Escartí, A., & Gutiérrez, M. (2001). Influence of the motivational climate in physical education on the intention to practice physical activity or sport. *European Journal of Sport Science, 1*(4), 1-12.

Eyre, H., Kahn, R., Robertson, R. M., Clark, N. G., Doyle, C., Gansler, T., . . . Taubert, K. (2004). Preventing cancer, cardiovascular disease, and diabetes: a common agenda for the american cancer society, the american diabetes association, and the american heart association. *A Cancer Journal for Clinicians, 54*(4), 190-207.

Fahey, T. D., Insel, P. M., & Roth, W. T. (2004). *Fit and well: core concepts and labs in physical fitness and wellness*. London: McGraw-Hill.

Faith, M. S., Matz, P. E., & Jorge, M. A. (2002). Obesity–depression associations in the population. *Journal of Psychosomatic Research, 53*(4), 935-942.

Faulkner, G., & Biddle, S. (2004). Exercise and depression: considering variability and contextuality. *Journal of Sport & Exercise Psychology, 26*(1), 5-17.

Fontaine, K., Barofsky, I., Andersen, R., Bartlett, S., Wiersema, L., Cheskin, L., & Franckowiak, S. (1999). Impact of weight loss on health-related quality of life. *Quality of Life Research, 8*(3), 275-277.

Fontayne, P., Sarrazin, P., & Famose, J. P. (2001). Culture and achievement motivation in sport: a qualitative comparative study between maghrebian and european french adolescents. *European Journal of Sport Science, 1*(4), 1-11.

Fortier, M., Vallerand, R., Briere, N., & Provencher, P. (1995). Competitive and recreational sport structures and gender: a test of their relationship with sport motivation. *International Journal of Sport Psychology, 54*, 5-12.

Fox, K. R. (1999). The Influence of physical activity on mental well-being. *Public Health Nutrition, 2*(3), 411-418.

Fratiglioni, L., Paillard-Borg, S., & Winblad, B. (2004). An active and socially integrated lifestyle in late life might protect against dementia. *The Lancet Neurology, 3*(6), 343-353.

Frederick, C. (1991). *An invsivity.* (Unpublished doctoral dissertation), University of Rochester, New York.

Frederick, C., & Morris, T. (2004). Intrinsic and extrinsic motivation in sport and exercise. In T. Morris & J. Summers (Eds.), *Sport Psychology: Theory, Applications and Issues* (pp. 121-151). Australia: John Wiley & Sons.

Frederick, C., & Morrison, C. (1996). Social physique anxiety: personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and Motor Skills, 82*(3), 963-972.

Frederick, C., & Ryan, R. (1993). Differences in motivation for sport and exercise and their relations with participation and mental health. *Journal of Sport Behaviour, 16*(124-146).

Fry, M. D., & Newton, M. (2003). Application of achievement goal theory in an urban youth tennis setting. *Journal of Applied Sport Psychology, 15*(1), 50-66.

Gagne, M. (2003). Autonomy support and need satisfaction in the motivation and well-being of gymnasts. *Journal of Applied Sport Psychology, 15*(4), 372-390.

Gallagher, P., Yancy, W. S., Swartout, K., Denissen, J. J. A., Kühnel, A., & Voils, C. I. (2012). Age and sex differences in prospective effects of health goals and motivations on daily leisure-time physical activity. *Preventive Medicine, 55*(4), 322-324.

Gill, D., Gross, J., & Huddleston, S. (1983). Participation Motivation in Youth Sports. *International Journal of Sport Psychology, 14*, 1-14.

Gillison, F. B., Standage, M., & Skevington, S. M. (2006). Relationships among adolescents' weight perceptions, exercise goals, exercise motivation, quality of life and leisure-time exercise behaviour: a self-determination theory approach. *Health Education Research, 21*(6), 836-847.

Gould, D., Feltz, D., & Weiss, R. (1985). Motives for participating in competitive youth swimming. *International Journal of Sport Psychology, 16*, 126-140.

Gregg, E. W., Gerzoff, R. B., Caspersen, C. J., Williamson, D. F., & Narayan, K. (2003). Relationship of walking to mortality among us adults with diabetes. *Archives of Internal Medicine, 163*(12), 1440.

Guthold, R., Ono, T., Strong, K., & Chaterrji, S. (2008). Worldwide variability in physical inactivity a 51-country survey. *American Journal of Preventive Medicine, 34*(6). doi: 10.1016/j

Haby, M. M., Markwick, A., Peeters, A., Shaw, J., & Vos, T. (2012). Future predictions of body mass index and overweight prevalence in australia, 2005–2025. *Health promotion international, 27*(2), 250-260.

Hagger, M., & Chatzisarantis, N. (2008). Self-determination theory and the psychology of exercise. *International Review of Sport and Exercise Psychology, 1*(1), 79-103.

Halbrook, M., Blom, L. C., Hurley, K., Bell, R. J., & Holden, J. E. (2012). Relationships among motivation, gender, and cohesion in a sample of collegiate athletes. *Journal of Sport Behavior, 35*(1), 61-77.

Hamer, M., Stamatakis, E., & Steptoe, A. (2009). Dose-response relationship between physical activity and mental health: the scottish health survey. *British Journal of Sports Medicine, 43*(14), 1111-1114.

Hansen, B. H., Holme, I., Anderssen, S. A., & Kolle, E. (2013). Patterns of objectively measured physical activity in normal weight, overweight, and obese individuals (20–85 years): a cross-sectional study. *PLoS ONE, 8*(1), e53044. doi: 10.1371/journal.pone.0053044

Harrington, D. (2008). *Confirmatory factor analysis*. New York: Oxford University Press.

Harter, S. (1978). Effectance motivation reconsidered. toward a developmental model. *Human development, 21*(1), 34-64.

Hashim, H. A., Golok, F., & Ali, R. (2011). Profiles of exercise motivation, physical activity, exercise habit, and academic performance in malaysian adolescents: a cluster analysis. *International Journal of Collaborative Research on Internal Medicine and Public Health, 3*(6), 416-428.

Havighurst, R. J. (1972). *Developmental tasks and education* (3 ed.). New York: Longman Inc.

Hayes, D., & Ross, C. (1986). Body and mind: the effect of exercise, overweight, and physical health on psychological well-being. *Journal of Health and Social Behavior, 4*(1), 387-400.

Holtermann, A., Marott, J. L., Gyntelberg, F., Søgaard, K., Suadicani, P., Mortensen, O. S., . . . Schnohr, P. (2013). Does the benefit on survival from leisure time physical activity depend on physical activity at work? a prospective cohort study. *PLoS ONE, 8*(1), e54548. doi: 10.1371/journal.pone.0054548

Honkola, A., Forsen, T., & Eriksson, J. (1997). Resistance raining improves the metabolic profile in individuals with type 2 diabetes. *Acta Diabetologica, 34*(4), 245-248.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct Equ Modeling, 6*, 1-55.

Iannotti, R. J., Chen, R., Kololo, H., Petronyte, G., Haug, E., & Robert, C. (2013). Motivations for adolescent participation in leisure-time physical activity: international differences. *Journal of Physical Activity & Health, 10*(1), 106-112.

Imperatore, G., Cheng, Y. J., Williams, D. E., Fulton, J., & Gregg, E. W. (2006). Physical activity, cardiovascular fitness, and insulin sensitivity among US adolescents the National Health and Nutrition Examination Survey, 1999–2002. *Diabetes Care, 29*(7), 1567-1572.

Ingledew, D., Hardy, L., & De Sousa, K. (1995). Body shape dissatisfaction and exercise motivations. *Journal of Sports Sciences, 13*, 60-69.

Ingledew, D., & Markland, D. (2008). The role of motives in exercise participation. *Psychology and Health, 23*(7), 807-828.

Ingledew, D., & Sullivan, G. (2002). Effects of body mass and body image on exercise motives in adolescence. *Psychology of Sport and Exercise, 3*(4), 323-338.

Institute of Public Health. (2011). *National Health and Morbidity Survey (NHMS 2011) Non-Communicable Diseases* (Vol. II). Kuala Lumpur: Ministry of Health.

IPAQ Research Committee. (2005). Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ)—Short and long forms. Retrieved Septembe, 2010, from https://sites.google.com/site/theipaq/

Jee, S. H., Sull, J. W., Park, J., Lee, S.-Y., Ohrr, H., Guallar, E., & Samet, J. M. (2006). Body-mass index and mortality in korean men and women. *New England Journal of Medicine, 355*(8), 779-787.

Jeon, C. Y., Lokken, R. P., Hu, F. B., & Van Dam, R. M. (2007). Physical activity of moderate intensity and risk of type 2 diabetes a systematic review. *Diabetes Care, 30*(3), 744-752.

Jewson, E., Spittle, M., & Casey, M. (2008). A preliminary analysis of barriers, intentions, and attitudes towards moderate physical activity in women who are overweight. *Journal of Science and Medicine in Sport, 11*(6), 558-561.

Jones, F., Harris, P., Waller, H., & Coggins, A. (2005). Adherence to an exercise prescription scheme: the role of expectations, self-efficacy, stage of change and psychological well-being. *British Journal of Health Psychology, 10*(3), 359-378.

Kasser, T., & Ryan, R. (1996). Further examining the american dream: differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin, 22*, 280, 280–287.

Kaupužs, A. (2013). The relationship between physical activity and exercise motivation of the first year students from rezekne augstskola. *LASE Journal of Sports Science, 4*, 3-15.

Kilpatrick, M., Hebert, E., & Bartholomew, J. (2005). College students' motivation for physical activity: differentiating men's and women's motives for sport participation and exercise. *Journal of American College Health, 54*(2), 87-94.

Kim, S., & Popkin, B. M. (2006). Commentary: understanding the epidemiology of overweight and obesity—a real global public health concern. *International Journal of Epidemiology, 35*(1), 60-67.

Kimbrough, S., Rose, M., Vallee, J., & Nelan Jr, C. D. (2005). *Use of a shortened EMI-2 in assessment of exercise motivations of participants in college campus group exercise (psychology).* Paper presented at the AAHPERD National Convention and Exposition, Chicago, IL.

Kirk, A., Higgins, L., Hughes, A., Fisher, B., Mutrie, N., Hillis, S., & MacIntyre, P. (2001). A Randomized, controlled srial to study the effect of exercise consultation on the promotion of physical activity in people with type 2 diabetes: a pilot study. *Diabetic medicine, 18*(11), 877-882.

Kline, R. B. (2011). *Principles and practice of structural equation modeling.* New York: Guilford press.

Klint, K., & Weiss, M. (1987). Dropping in and dropping out: participation motives of current and former youth gymnasts. *Canadian Journal of Applied Sport Sciences, 11*, 106-114.

Kolt, G., Kirkby, R., Bar-Eli, M., Blumenstein, B., Chadha, N., Liu, J., & Kerr, G. (1999). A cross-cultural investigation of reasons for participation in gymnastics. *International Journal of Sport Psychology, 30*(3), 381-398.

Kopelman, P. (2007). Health risks associated with overweight and obesity. *Obesity Reviews, 8*(1), 13-17.

Korkiakangas, E. E., Alahuhta, M. A., & Laitinen, J. H. (2009). Barriers to regular exercise among adults at high risk or diagnosed with type 2 diabetes: a systematic review. *Health Promotion International, 24*(4), 416-427.

Koslow, R. E. (1988). Age-related reasons for expressed interest in exercise and weight control. *Journal of Applied Social Psychology, 18*, 349-354.

Kozub, F. M., & Farmer, J. (2011). Free time motivation and physical activity in middle school children. *Physical Educator, 68*(1), 18-29.

Kravitz, L. (2011). What motivates people to exercise. reasons and strategies for exercise adherence. *Fitness Journal*, 11(1), 120-125.

Kujala, U. M., Kaprio, J., Sarna, S., & Koskenvuo, M. (1998). Relationship of leisuretime physical activity and mortality : the finnish twin cohort. *JAMA, 279*, 440-444.

Lakka, T. A., & Laaksonen, D. E. (2007). Physical activity in prevention and treatment of the metabolic syndrome. *Applied Physiology, Nutrition, and Metabolism, 32*(1), 76-88.

Laverie, D. A. (1998). Motivations for ongoing participation in a fitness activity. *Leisure Sciences, 20*(4), 277-302.

Lavigne, G., Hauw, N., Vallerand, R., Brunel, P., Blanchard, C., Cadorette, I., and Angot, C. (2009). On the dynamic relationships between contextual (or general) and situational (or state) motivation toward exercise and physical activity: a longitudinal test of the topdown and bottom-up hypotheses. *International Journal of Sport and Exercise Psychology & Health, 7*, 147-168.

Lawton, J., Ahmad, N., Hanna, L., Douglas, M., & Hallowell, N. (2006). 'I Can't do any serious exercise': barriers to physical activity amongst people of pakistani and indian origin with type 2 diabetes. *Health Education Research, 21*(1), 43-54.

Lee, I. M., & Skerrett, P. J. (2001). Physical activity and all-cause mortality: what is the dose-response relation?. *Medicine and Science in Sport and Exercise, 33*(6; SUPP), S459-S471.

Li, F. (1999). The Exercise motivation scale: its multifaceted structure and construct validity. *Journal of Applied Sport Psychology, 11*, 97-115.

Litt, D. M., Iannotti, R. J., & Jing, W. (2011). Motivations for adolescent physical activity. *Journal of Physical Activity & Health, 8*(2), 220-226.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting & task performance*. New Jersey: Prentice-Hall.

Locke, E. A., & Latham, G. P. (1994). Goal setting theory. *Motivation: Theory and Research*, 2(3), 13-29.

Löllgen, H., Böckenhoff, A., & Knapp, G. (2009). Physical activity and all-cause mortality: an updated meta-analysis with different intensity categories. *International Journal of Sports Medicine, 30*(3), 213-224. doi: 10.1055/s-0028-1128150

Longhurst, K., & Spink, K. (1987). Participation motivation of australian children involved in organized sport. *Canadian Journal of Sport Science, 12*(1), 24-30.

Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry, 67*(3), 220-225.

Macfarlane, D. J., Lee, C. C., Ho, E. Y., Chan, K., & Chan, D. T. (2007). Reliability and validity of the chinese version of ipaq (short, last 7 days). *Journal of Science and Medicine in Sport, 10*(1), 45-51.

Maehr, M. L., & Braskamp, L. A. (1986). *The motivation factor: a theory of personal investment*. Lanham: Lexington Books.

Maltby, J., & Day, L. (2001). The relationship between exercise motives and psychological weil-being. *The Journal of Psychology, 135*(6), 651-660.

Manson, J. E., Willett, W. C., Stampfer, M. J., Colditz, G. A., Hunter, D. J., Hankinson, S. E., . . . Speizer, F. E. (1995). Body weight and mortality among women. *New England Journal of Medicine, 333*(11), 677-685.

Markland, D., & Hardy, L. (1993). The exercise motivations inventory: preliminary development and validity of a measure of individuals' reasons for participation in regular physical exercise. *Personality and Individual Differences, 15*(3), 289-296.

Markland, D., & Ingledew, D. (1997). The measurement of exercise motives: factorial validity and invariance across gender of a revised exercise motivation inventory. *British Journal of Health Psychology, 2*, 361-376.

Markland, D., & Ingledew, D. (2007). Exercise participation motives. In M. S. Hagger & N. L. D. Chatzisarantis (Eds.), *Intrinsic motivation and self-determination in exercise and sport* (pp. 21-34). Champaign: Human Kinetics.

Markland, D., Ingledew, D., Hardy, L., & Grant, L. (1992). A comparison of the exercise motivations of participants in aerobics and weight-watcher exercisers. *Journal of Sports Sciences, 10*, 609-610.

Marsh, H. W., & Hocevar, D. (1985). Application of confirmatory factor analysis to the study of self-concept: first-and higher-order factor models and their invariance across groups. *Psychological Bulletin, 97*(3), 562-582.

Martin, M., Moscoso, D., & Pedrajas, N. (2013). Gender differences in motivations to practice physical activity and sport in old age. *Revista Internacional De Medicina Y Ciencias De La Actividad Fisica Y Del Deporte, 13*(49), 121-129.

Martinus, R., Corban, R., Wackerhage, H., Atkins, S., & Singh, J. (2006). Effect of psychological intervention on exercise adherence in type 2 diabetic subjects. *Annals of the New York Academy of Sciences, 1084*(1), 350-360.

Mathes, S., & Battista, R. (1985). College men's and women's motives for participation in physical activity. *Perceptual and Motor Skills, 61*(3), 719-726.

McAuley, E. (1994). Physical activity and psychosocial outcomes. In C. Bouchard, R. J. Shephard & T. Stephens (Eds.), *Physical Activity, Fitness, and Health*. Champaign, IL: Human Kinetics Publishers.

McDonald, R. P., & Ho, M.-H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods, 7*(1), 64-72.

McLane, S. L., Lox, C. L., Butki, B., & Stern, L. (2003). An investigation of the relation between religion and exercise motivation. *Perceptual & Motor Skills, 97*(2), 1043-1048.

Messick, S. (1962). Response style and content measures from personality inventories. *Educational and Psychological Measurement, 22*(1), 41-56.

Michaëlsson, K., Olofsson, H., Jensevik, K., Larsson, S., Mallmin, H., Vessby, B., & Melhus, H. (2007). Leisure physical activity and the risk of fracture in men. *PLoS Med, 4*(6), e199. doi: 10.1371/journal.pmed.0040199

Mier, N., Medina, A. A., & Ory, M. G. (2007). Peer reviewed: mexican americans with type 2 diabetes: perspectives on definitions, motivators, and programs of physical activity. *Preventing Chronic Disease, 4*(2), 1-8.

Montoye, H., Kemper, H., Saris, W., & Washburn, R. (1996). *Measuring physical activity and energy expenditure*. Champaign, IL: Human Kinetics.

Morgan, C., McKenzie, T., Sallis, J., Broyles, S., Zive, M., & Nader, P. (2003). Personal, social, and environmental correlates of physical activity in a bi-ethnic sample of adolescents. *Pediatric Exercise Science, 15*(3), 288-301.

Morris, T., Clayton, H., Power, H., & Han, J. (1995). Activity type differences in participation motives. *Australian Journal of Psychology, 47*, 101-102.

Morris, T., Clayton, H., Power, H., & Han, J. (1996). *Participation motivation for different types of physical activity*. Paper presented at the international Pre-Olympic Congress, Texas, USA.

Morris, T., & Han, J. (1991). *Motives for taking up Tai-chi*. Paper presented at the first Asian South Pacific Association of Sport Psychology International Congress, Melbourne, Australia.

Morris, T., Khoo, S., Chowdhury, D., & Molanorouzi, K. (2013). *Profiling motives for participation in physical activity: profiles for three samples*. Paper presented at the 13th International Society of Sport Psychology World Congress, Beijing, China.

Morris, T., Power, H., & Pappalardo, B. (1993). *Motivation for participation in table tennis*. Paper presented at the VIIIth World Congress in Sport Psychology, Lisbon, Portugal.

Morris, T., & Rogers, H. (2004). *Measuring motives for physical activity*. Paper presented at the Sport and Chance of Life: International Sport Science Congress, Seoul, Korea.

Mostert, S., & Kesselring, J. (2002). Effects of a short-term exercise training program on aerobic fitness, fatigue, health perception and activity level of subjects with multiple sclerosis. *Multiple Sclerosis, 8*(2), 161-168.

Murcia, J. A. M., de San Román Blanco, M. L., Galindo, C. M., Villodre, N. A., & Coll, D. G.-C. (2007). Efeffects of the gender, the age and the practice frequency in the motivation and the enjoyment of the physical exercise. *Fitness & Performance Journal, 6*(3), 140-146.

Murphy, M., Nevill, A., Neville, C., Biddle, S., & Hardman, A. (2002). Accumulating brisk walking for fitness, cardiovascular risk, and psychological health. *Medicine and Science in Sports and Exercise, 34*(9), 1468-1474.

Newman, B. M., & Newman, P. R. (1975). *Psychosocial theory. Development Through life: A psychosocial approach*. Pacific Grove, CA: Brooks/Cole.

Nicholls, J. G. (1989). *The competitive ethos and democratic education*: Harvard University Press.

Niemiec, C. P., & Ryan, R. (2009). Autonomy, competence, and relatedness in the classroom applying self-determination theory to educational practice. *Theory and Research in Education, 7*(2), 133-144.

Nocon, M., Hiemann, T., Müller-Riemenschneider, F., Thalau, F., Roll, S., & Willich, S. N. (2008). Association of physical activity with all-cause and cardiovascular mortality: a systematic review and meta-analysis. *European Journal of Cardiovascular Prevention & Rehabilitation, 15*(3), 239-246.

Nowak, M., Radzińska, M., & Rynkiewicz, T. (2009). Women's free time versus professional work and family and household duties. *Human Movement, 10*(2), 182-189.

O'Dougherty, M., Kurzer, M. S., & Schmitz, K. H. (2010). Shifting motivations: young women's reflections on physical activity over time and across contexts. *Health Education & Behavior, 37*(4), 547-567.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity in the United States, 2009-2010. *NCHS Data Brief*, 82, 1-8.

Oh, J. Y., Yang, Y. J., Kim, B. S., & Kang, J. H. (2007). Validity and reliability of Korean version of International Physical Activity Questionnaire (IPAQ) short form. *Journal of the Korean Academy of Family Medicine, 28*(7), 532-541.

Oken, B., Kishiyama, S., Zajdel, D., Bourdette, D., Carlsen, J., Haas, M., . . . Mass, M. (2004). Randomized controlled trial of yoga and exercise in multiple sclerosis. *Neurology, 62*(11), 2058-2064.

Pan, J., & Nigg, C. (2011). Motivation for physical activity among Hawaiian, Japanese, and Filipino university students in Hawaii. *Journal of Applied Sport Psychology, 23*(1), 1-15.

Parfitt, G., & Eston, R. G. (2005). The relationship between children's habitual activity level and psychological well-being. *Acta Paediatrica, 94*(12), 1791-1797.

Pearson, T. A., Palaniappan, L. P., Artinian, N. T., Carnethon, M. R., Criqui, M. H., Daniels, S. R., . . . Galloway, J. M. (2013). American heart association guide for improving cardiovascular health at the community level, 2013 update a scientific statement for public health practitioners, healthcare providers, and health policy makers. *Circulation, 127*(16), 1730-1753.

Pedersen, B. K., & Saltin, B. (2006). Evidence for prescribing exercise as therapy in chronic disease. *Scandinavian Journal of Medicine & Science in Sports, 16*(S1), 3-63.

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., & Briere, N. M. (2001). Associations among perceived autonomy support, forms of self-regulation, and persistence: a prospective study. *Motivation and Emotion, 25*(4), 279-306.

Pelletier, L. G., Fortier, M. S., Vallerand, R. J., Tuson, K. M., Briere, N. M., & Blais, M. R. (1995). Toward a new measure of intrinsic motivation, extrinsic motivation, and amotivation in sports: the Sport Motivation Scale (SMS). *Journal of Sport & Exercise Psychology, 17*(1), 35-53.

Penninx, B. W., Rejeski, W. J., Pandya, J., Miller, M. E., Di Bari, M., Applegate, W. B., & Pahor, M. (2002). Exercise and depressive symptoms a comparison of aerobic and resistance exercise effects on emotional and physical function in older persons with high and low depressive symptomatology. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 57*(2), 124-132.

Pepera, G., Bromley, P. D., Sandercock, G. R., & Sandercock, G. (2013). A pilot study to investigate the safety of exercise training and testing in cardiac rehabilitation patients. *The British Journal of Cardiology, 20*(2), 2-12.

Perna, F., Bryner, R., Donley, D., Kolar, M., Hornsby, G., Sauers, J., . . . Yeater, R. (1999). Effect of diet and exercise on quality of life and fitness parameters among obese individuals. *Official Journal of The American Society of Exercise Physiologists, 2*(2), 1-6.

Pero, R., Amici, S., Benvenuti, C., Minganti, C., Capranica, L., & Pesce, C. (2010). Motivation for sport participation in older Italian athletes: the role of age, gender and competition level. *Sport Sciences for Health, 5*(2), 61-69.

Petajan, J. H., Gappmaier, E., White, A. T., Spencer, M. K., Mino, L., & Hicks, R. W. (1996). Impact of aerobic training on fitness and quality of life in multiple sclerosis. *Annals of Neurology, 39*(4), 432-441.

Pfeffer, I. (2013). Regulatory fit messages and physical activity motivation. *Journal of Sport & Exercise Psychology, 35*(2), 119-131.

Phillips, W., Kiernan, M., & King, A. (2003). Physical activity as a nonpharmacological treatment for depression: a review. *Complementary Health Practice Review, 8*(2), 139-152.

Ping, X., McBride, R., & Bruene, A. (2002). Relations of parents' beliefs to children's motivation in an elementary physical education running program. *Journal of Teaching in Physical Education, 22*(4), 410-425.

Pisunyer, F. X. (2007). How effective are lifestyle changes in the prevention of type 2 diabetes mellitus?. *Nutrition Reviews, 65*(3), 101-110.

Plante, T. G., & Rodin, J. (1990). Physical fitness and enhanced psychological health. *Current Psychology: Research and Reviews, 9*(1), 3-24.

Plonczynski, D. J. (2000). Measurement of motivation for exercise. *Health Education Research, 15*(6), 695-705.

Poh, B., Safiah, M., Tahir, A., Siti Haslinda, M., Siti Norazlin, N., Norimah, A., . . . Fatimah, S. (2010). Physical activity pattern and energy expenditure of Malaysian adults: findings from the Malaysian Adult Nutrition Survey (MANS). *Malaysian Journal of Nutrition, 16*(1), 13-37.

Powell, K. E., & Blair, S. N. (1994). The public health burdens of sedentary health habits: theoretical but realistic estimates. *Medicine and Science in Sport and Exercise, 26*, 851-856.

Praet, S., & Van Loon, L. (2008). Exercise: the brittle cornerstone of type 2 diabetes treatment. *Diabetologia, 51*(3), 398-401.

Puente, R., & Anshel, M. H. (2010). Exercisers' perceptions of their fitness instructor's interacting style, perceived competence, and autonomy as a function of self-determined regulation to exercise, enjoyment, affect, and exercise frequency. *Scandinavian Journal of psychology, 51*(1), 38-45.

Reis, H. T., Sheldon, K. M., Gable, S. L., Roscoe, J., & Ryan, R. (2000). Daily well-being: the role of autonomy, competence, and relatedness. *Personality and Social Psychology Bulletin, 26*(4), 419-435.

Rejeski, W. J., Ip, E. H., Bertoni, A. G., Bray, G. A., Evans, G., Gregg, E. W., & Zhang, Q. (2012). Lifestyle change and mobility in obese adults with type 2 diabetes. *New England Journal of Medicine, 366*(13), 1209-1217.

Rejeski, W. J., & Kennedy, E. (1988). *Fitness motivation: preventing participant drop-out*. Champaign, IL: Human Kinetics.

Rejeski, W. J., Lang, W., Neiberg, R. H., Dorsten, B., Foster, G. D., Maciejewski, M. L., . . . Williamson, D. F. (2006). Correlates of health-related quality of life in overweight and obese adults with type 2 diabetes. *Obesity, 14*(5), 870-883.

Reynolds, W. M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology, 38*(1), 119-125.

Rhodes, R., Martin, A. D., Taunton, J. E., Rhodes, E. C., Donnelly, M., & Elliot, J. (1999). Factors associated with exercise adherence among older adults. *Sports Medicine, 28*(6), 397-411.

Richardson, C. R., Avripas, S. A., Neal, D. L., & Marcus, S. M. (2005). Increasing lifestyle physical activity in patients with depression or other serious mental illness. *Journal of Psychiatric Practice, 11*(6), 379-388.

Roberts, G. C. (1993). Motivation in sport: understanding and enhancing the motivation and achievement of children. In P. F. Rice (Ed.), *Human development: A life-span approach* (pp. 405-420). New York: MacMillan.

Roberts, G. C., Treasure, D. C., & Balague, G. (1998). Achievement goals in sport: the development and validation of the perception of success questionnaire. *Journal of Sports Sciences, 16*(4), 337-347.

Rogers, H. (2000). *Development of a Recreational Exercise Motivation Questionnaire.* (Unpublished Doctoral Thesis), Victoria University, Melbourne, Australia.

Rogers, H., & Morris, T. (2003). *An overview of the development and validation of the Recreational Exercise Motivation Measure (REMM).* Paper presented at the XIth European Congress of Sport Psychology Proceedings Book, Copenhagen, Denmark.

Rogers, H., Morris, T., & Moore, M. (2008). A qualitative study of the achievement goals of recreational exercise participants. *The Qualitative Report, 13*(4), 706-734.

Rogers, H., Tammen, V., & Morris, T. (1999). *Motivation in recreational exercise participants*. Paper presented at the 5th International Olympic Committee World Congress on Sport Sciences, Sydney, Australia.

Ryan, R., & Deci, E. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist, 55*(1), 68-76.

Ryan, R., & Deci, E. (2002). Overview of self-determination theory: an organismic dialectical perspective. In E. Deci & R. Ryan (Eds.), *Handbook of Self Determination Research* (pp. 3-33). Rochester, NY: University of Rochester Press.

Ryan, R., Frederick, C., Lepes, D., Rubio, N., & Sheldon, K. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology, 28*, 235-254.

Ryan, R., Vallerand, R. J., & Deci, E. (1984). Intrinsic motivation in sport: a cognitive evaluation theory interpretation. In W. F. Staub & J. M. Williams (Eds.),

Cognitive Sport Psychology (pp. 231-242). Lansing, NY: Sport Science
Associates.

Ryska, T. A. (2004). Enjoyment of evaluative physical activity among young
participants: the role of self-handicapping and intrinsic motivation. *Child Study
Journal, 33*(4), 213-234.

Salmon, J., Owen, N., Crawford, D., Bauman, A., & Sallis, J. F. (2003). Physical
activity and sedentary behavior: a population-based study of barriers, enjoyment,
and preference. *Health Psychology, 22*(2), 178-189.

Schutzer, K. A., & Graves, B. S. (2004). Barriers and motivations to exercise in older
adults. *Preventive Medicine, 39*(5), 1056-1061.

Seebacher, F., & Glanville, E. J. (2010). Low levels of physical activity increase
metabolic responsiveness to cold in a rat (rattus fuscipes). *PLoS ONE, 5*(9),
e13022. doi: 10.1371/journal.pone.0013022

Seol, H. (2007). A psychometric investigation of the Marlowe-Crowne Social
Desirability Scale using rasch measurement. *Measurement and Evaluation in
Counseling and Development, 40*(3), 155-167.

Sheldon, K., Ryan, R., Deci, E., & Kasser, T. (2004). The independent effects of goal
contents and motives on well-being: it's both what you pursue and why you
pursue it. *Personality and Social Psychology Bulletin, 30*(4), 475-486.

Sherwin, R., Anderson, R., Buse, J., Chin, M., Eddy, D., Fradkin, J., . . . Nwankwo, R.
(2004). Prevention or delay of type 2 diabetes. *Diabetes Care, 27*, 47-67.

Sigal, R. J., Kenny, G. P., Wasserman, D. H., Castaneda-Sceppa, C., & White, R. D.
(2006). Physical activity/exercise and type 2 diabetes a consensus statement
from the american diabetes association. *Diabetes Care, 29*(6), 1433-1438.

Siqueira, F. V., Nahas, M. V., Facchini, L. A., Silveira, D. S., Piccini, R. X., Tomasi,
E., & Hallal, P. C. (2009). Counseling for physical activity as a health education
strategy. *Cad. Saúde Pública, 25*(1), 203-213.

Skår, M., Odden, A., & Vistad, O. I. (2008). Motivation for mountain biking in
Norway: change and stability in late-modern outdoor recreation. *Norsk
Geografisk Tidsskrift-Norwegian Journal of Geography, 62*(1), 36-45.

Smith, A. L., Ullrich-French, S., Walker Ii, E., & Hurley, K. S. (2006). Peer relationship
profiles and motivation in youth sport. *Journal of Sport & Exercise Psychology,
28*(3), 362-382.

Sørensen, M. (2006). Motivation for physical activity of psychiatric patients when
physical activity was offered as part of treatment. *Scandinavian Journal of
Medicine & Science in Sports, 16*(6), 391-398.

Standage, M., Gillison, F. B., Ntoumanis, N., & Treasure, D. C. (2012). Predicting
students' physical activity and health-related well-being: a prospective cross-

domain investigation of motivation across school physical education and exercise settings. *Journal of Sport & Exercise Psychology, 34*(1), 37-60.

Standage, M., & Ryan, R. (2012). Self-determination theory and exercise motivation: facilitating self-regulatory processes to support and maintain healthy and well-being. In G. C. Roberts & D. C. Treasure (Eds.), *Advances in motivation in sport and exercise* (3 ed., pp. 233–270). Champaign, IL: Human Kinetics.

Standage, M., Sebire, S., & Loney, T. (2008). Does exercise motivation predict engagement in objectively assessed bouts of moderate-intensity exercise? A self-determination theory perspective. *Journal of Sport & Exercise Psychology, 30*(4), 337.

Struber, J. (2004). Considering physical inactivity in relation to obesity. *The Internet Journal of Allied Health Sciences and Practice, 2*(1), 76-88.

Sutherland, G., & Morris, T. (1997). *Gender and participation motivation in 13-to 15-year-old adolescents.* Paper presented at the IX World Congress of Sport Psychology, Netanya, Israel.

Tabachnik, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. New York: HarperCollins.

Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 9*(1), 78-91.

Thøgersen-Ntoumani, C., Fox, K. R., & Ntoumanis, N. (2005). Relationships between exercise and three components of mental well-being in corporate employees. *Psychology of Sport and Exercise, 6*(6), 609-627.

Thomas, J. R., Landers, D. M., Salazar, W., & Etnier, J. (1994). Exercise and cognitive function In R. J. Bouchard, R. J. Shephard & D. E. Stephens (Eds.), *Physical Activity, Fitness, and Health*. Champaign, IL: Human Kinetics Publishers.

Trost, S., Owen, N., Bauman, A., Sallis, J., & Brown, W. (2002). Correlates of adults' participation in physical activity: review and update. *Medicine & Science in Sports & Exercise, 34*(12), 1996-2001.

Trujillo, K., Brougham, R., & Walsh, D. (2004). Age differences in reasons for exercising. *Current Psychology, 22*(4), 348-367.

Ulseth, A.-L. B. (2008). New opportunities - complex motivations: gender differences in motivation for physical activity in the context of sports clubs and fitness centers. *International Journal of Applied Sports Sciences, 20*(1), 44-66.

Ussher, M., Stanbury, L., Cheeseman, V., & Faulkner, G. (2007). Physical activity preferences and perceived barriers to activity among persons with severe mental illness in the United Kingdom. *Psychiatric services, 58*(3), 405-408.

Vallerand, R. J., & Blssonnette, R. (1992). Intrinsic, extrinsic, and amotivational styles as predictors of behavior: a prospective study. *Journal of personality, 60*(3), 599-620.

Vallerand, R. J., & Losier, G. F. (1999). An integrative analysis of intrinsic and extrinsic motivation in sport. *Journal of Applied Sport Psychology, 11*(1), 142-169.

Vancampfort, D., De Hert, M., Vansteenkiste, M., De Herdt, A., Scheewe, T. W., Soundy, A., . . . Probst, M. (2013). The importance of self-determined motivation towards physical activity in patients with Schizophrenia. *Psychiatry research, 210*(3), 812-818.

Vansteenkiste, M., Matos, L., Lens, W., & Soenens, B. (2007). Understanding the Impact of intrinsic versus extrinsic goal framing on exercise performance: the conflicting role of task and ego involvement. *Psychology of Sport and Exercise, 8*(5), 771-794.

Vansteenkiste, M., Simons, J., Soenens, B., & Lens, W. (2004). How to become a persevering exerciser? providing a clear, future intrinsic goal in an autonomy-supportive way. *Journal of Sport and Exercise Psychology, 26*(2), 232-249.

Vartanian, L. R., & Shaprow, J. G. (2008). Effects of weight stigma on exercise motivation and behavior a preliminary investigation among college-aged females. *Journal of Health Psychology, 13*(1), 131-138.

Vierling, K. K., Standage, M., & Treasure, D. C. (2007). Predicting attitudes and physical activity in an "at-risk" minority youth sample: a test of self-determination theory. *Psychology of Sport and Exercise, 8*(5), 795-817.

Vlachopoulos, S. P., Karageorghis, C. I., & Terry, P. C. (2000). Motivation profiles in sport: a self-determination theory perspective. *Research Quarterly for Exercise and Sport, 71*(4), 387-397.

Waldron, J. J., & Krane, V. (2005). Whatever it takes: health compromising behaviors in female athletes. *Quest, 57*(3), 315-329.

Wang, C. K. J., Liu, W. C., Yanlin, S., Lim, B. S. C., & Chatzisarantis, N. L. D. (2010). Chinese students' motivation in physical activity: goal profile analysis using Nicholl's achievement goal theory. *International Journal of Sport & Exercise Psychology, 8*(3), 284-301.

Warburton, D. E., Nicol, C. W., & Bredin, S. S. (2006). Health benefits of physical activity: the evidence. *Canadian medical association journal, 174*(6), 801-809.

Weinberg, R., Tenenbaum, G., McKenzie, A., Jackson, S., Anshel, M., Grove, R., & Fogarty, G. (2000). Motivation for youth participation in sport and physical activity: relationships to culture, self-reported activity levels, and gender. *International Journal of Sport Psychology, 31*(3), 321-346.

Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71*(1), 3-11.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological R eview, 92*(4), 548-556.

Whitehead, J. (1995). Multiple achievement orientations and participation in youth sport: a cultural and developmental perspective. *International Journal of Sport Psychology, 26*(4), 431-452.

Whiting, P., Bagnall, A.-M., Sowden, A. J., Cornell, J. E., Murlow, C. D., & Ramirez, G. (2001). Interventions for the treatment and management of chronic fatigue syndrome. a systematic review. *Journal of the American Medical Association, 286*(11), 1360-1368. doi: 10.1001

WHO. (2009). *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva, Switzerland: World Health Organization.

WHO. (2013). *Global strategy on diet, physical activity and health*. Geneva, Switzerland: World Health Organization

Williams, P. T. (2012). Attenuating effect of vigorous physical activity on the risk for inherited obesity: a study of 47,691 runners. *PLoS ONE, 7*(2), e31436. doi: 10.1371/journal.pone.0031436

Wilson, P. M., Mack, D., Muon, S., & LeBlanc, M. (2007). What role does psychological need satisfaction play in motivating exercise participation? In L. Chiang (Ed.), *Motivation of Exercise and Physical Activity*. Hauppage: Nova Science Publishers.

Wilson, P. M., & Rodgers, W. M. (2002). The relationship between exercise motives and physical self-esteem in female exercise participants: an application of Self-Determination Theory. *Journal of Applied Biobehavioral Research, 7*(1), 30-43.

Wilson, P. M., Rodgers, W. M., Blanchard, C. M., & Gessell, J. (2003). The relationship between psychological needs, self-determined motivation, exercise attitudes, and physical fitness. *Journal of Applied Social Psychology, 33*(11), 2373-2392.

Yan, J. H., & McCullagh, P. (2004). Cultural influence on youth's motivation of participation in physical activity. *Journal of Sport Behavior, 27*(4), 378-390.

Yew, H., Whipp, P., Dimmock, J., & Jackson, B. (2013). The effects of choice on autonomous motivation, perceived autonomy support, and physical activity levels in high school physical education. *Journal of Teaching in Physical Education, 32*(2), 131-148.

Zach, S., Bar-Eli, M., Morris, T., & Moore, M. (2012). Measuring motivation for physical activity: an exploratory study of PALMS - The Physical Activity And Leisure Motivation Scale. *Athletic Insight, 4*(2), 141-152.

Zan, G., Podlog, L. W., & Harrison, L. (2012). College students' goal orientations, situational motivation and effort/persistence in physical activity classes. *Journal of Teaching in Physical Education, 31*(3), 246-260.

Zizzi, S. J., Keeler, L. A., & Watson, J. C. (2006). The interaction of goal orientation and stage of change on exercise behavior in college students. *Journal of Sport Behavior, 29*, 96-110.

LIST OF PUBLICATION AND PAPER PRESENTATION

Molanorouzi, K., Khoo, S., & Morris, T. (2014). Validating the Physical Activity and Leisure Motivation Scale (PALMS). *BMC Public Health*, 14(1), 909.

Molanorouzi, K., Khoo, S., & Morris, T. (2015). Motives for Adult Participation in Physical Activity: Type of Activity, Age, and Gender. *BMC Public Health*, 15(1), 66.

Molanorouzi, K., Khoo, S., & Morris, T. (2013). Measuring Motivation for Physical Activity in Malaysia, the Physical Activity and Leisure Motivation Scale (PALMS). Paper presented at the ISSP 13th Word Congress of Sport Psychology, Bejing, China.

Molanorouzi, K., Khoo, S., & Morris, T. (2013). Measuring Motivation for Physical Activity in Malaysia: The Physical Activity and Leisure Motivation Scale (PALMS). Paper presented at the International Sport Science Students Conference (ISSSC), Kuala Lumpur, Malaysia.

Morris, T., Khoo, S., RoyChowdhury, D., & Molanorouzi, K. (2013). Profiling Motives for Participation in Physical Activity: Profiles for Three Samples. Paper presented at the 13th International Society of Sport Psychology World Congress, Beijing, China.

APPENDIX A: INFORMATION TO PARTICIPANTS INVOLVED IN RESEARCH

Measuring Motives for Physical Activity in Adults

You are invited to participate in a study entitled "Measuring Motives for Physical Activity in Adults". This project is being conducted by a PhD student, Keyvan Molla Norouzi, under the supervision of Dr. Selina Khoo from the Sports Centre, University of Malaya and Prof. Dr. Tony Morris from the School of Human Movement, Recreation and Performance, Victoria University.

Participation in this study will involve completing a personal information form and a questionnaire pack, and will take around 20 minutes. The researcher will answer any questions that you may have.

The questions in the questionnaire are based on personal experiences and hence there are no right or wrong answers. Your participation in this study is completely voluntary and you may refuse to participate. If you decide not to participate in the study it will not result in any penalty or loss. There are no benefits or risks for you associated with completion of the following survey, and you will not be compensated in any way for your involvement in this study.

Your completion and return of the questionnaire indicates that you voluntarily agree to participate in this study. Please complete the survey independently and honestly. Your responses are completely anonymous.

For further information or questions related to this study please contact:

Dr. Selina Khoo   Mr. Keyvan Molanorouzi

selina@um.edu.my   keivannorozy@gmail.com

Please tick (✓) the appropriate box or fill in the blanks.

1. **Gender:**   Male ☐   Female ☐

2. **Age:** _____

3. In the table below, the top row is an **<u>example</u>**, where the details have been filled in using **bold italics**, to show you the way to respond. In the bottom row, please write the physical activity **you do most**. Then, tick what type of activity it is and what level you play, if appropriate.

ACTIVITY	TYPE OF ACTIVITY		LEVEL OF ACTIVITY	
Example: **Running**	1) Sport	✓	1) International	☐
	2) Planned exercise activity	☐	2) National	☐
	3) Leisure activity	☐	3) State	☐
	4) Other (please specify):	☐	4) Club	☐
			5) Recreational	✓
	1) Sport	☐	1) International	☐
	2) Planned exercise activity	☐	2) National	☐
	3) Leisure activity	☐	3) State	☐
	4) Other (please specify):	☐	4) Club	☐
			5) Recreational	☐

4. In the table below, the top row is an **<u>example</u>**, where the details have been filled in using **bold italics**, to show you the way to respond. In the space provided below could you please indicate the **frequency, duration, and intensity** of the physical activity or sport you do most.

Please think of the physical activity/sport **you do most** when answering these questions.

ACTIVITY	FREQUENCY Number of times per week	DURATION IN MINUTES Average length of each session of that activity	INTENSITY • During **vigorous intensity** physical activity, you'll only be able to say a few words before pausing for breath. • During **moderate intensity** physical activity, you can talk but not sing. • During **light intensity** physical activity, you can sing out loud.
Example: **Aerobics**	*4*	*40 minutes*	1) Vigorous ☐ 2) Moderate ☑ 3) Light ☐
			1) Vigorous ☐ 2) Moderate ☐ 3) Light ☐

APPENDIX C: DEMOGRAPHIC INFORMATION FORM FOR STUDY 3

Please tick (✓) the appropriate box or fill in the blanks.

1. **Gender:** Male ☐   Female ☐

2. **Age:** _____

3. **Email address:** ----------------------------------

4. **Phone number:** ----------------------------------

5. In the table below, the top row is an **example**, where the details have been filled in using **bold italics**, to show you the way to respond. In the bottom row, please write the physical activity **you do most**. Then, tick what type of activity it is and what level you play, if appropriate.

ACTIVITY	TYPE OF ACTIVITY		LEVEL OF ACTIVITY	
Example: **Running**	1) Sport	✓	1) International	☐
	2) Planned exercise activity	☐	2) National	☐
	3) Leisure activity	☐	3) State	☐
	4) Other (please specify):	☐	4) Club	☐
			5) Recreational	✓
	2) Sport	☐	1) International	☐
	2) Planned exercise activity	☐	2) National	☐
	3) Leisure activity	☐	3) State	☐
	4) Other (please specify):	☐	4) Club	☐
			5) Recreational	☐

6. In the table below, the top row is an **example**, where the details have been filled in using **bold italics**, to show you the way to respond. In the space provided below could you please indicate the **frequency, duration, and intensity** of the physical activity or sport you do most.

Please think of the physical activity/sport **you do most** when answering these questions.

ACTIVITY	FREQUENCY Number of times per week	DURATION IN MINUTES Average length of each session of that activity	INTENSITY • During **vigorous intensity** physical activity, you'll only be able to say a few words before pausing for breath. • During **moderate intensity** physical activity, you can talk but not sing. • During **light intensity** physical activity, you can sing out loud.
Example: **Aerobics**	4	40 minutes	1) Vigorous ☐ 2) Moderate ☑ 3) Light ☐
			1) Vigorous ☐ 2) Moderate ☐ 3) Light ☐

APPENDIX D: THE PHYSICAL ACTIVITY AND LEISURE MOTIVATION

SCALE (PALMS)

In responding to the following statements, think of the motives you have for the physical activity/sport you do most. Try not to spend time pondering over your responses. There are no right or wrong answers. Indicate how much your motives correspond with each of the statements. In each case **1** indicates **strongly disagree** and **5** indicates **strongly agree**. Please circle the number that best represents your response.

I undertake physical activity…..	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. to earn a living	1	2	3	4	5
2. because it helps me relax	1	2	3	4	5
3. because it's interesting	1	2	3	4	5
4. because I enjoy spending time with others	1	2	3	4	5
5. to get better at an activity	1	2	3	4	5
6. because I perform better than others	1	2	3	4	5
7. because I get paid to do it	1	2	3	4	5
8. to do activity with others	1	2	3	4	5
9. to better cope with stress	1	2	3	4	5
10. because it helps maintain a healthy body	1	2	3	4	5
11. to define muscle, look better	1	2	3	4	5
12. be physically fit	1	2	3	4	5
13. because it makes me happy	1	2	3	4	5
14. to get away from pressures	1	2	3	4	5
15. to maintain physical health	1	2	3	4	5
16. to improve existing skills	1	2	3	4	5
17. to be best in the group	1	2	3	4	5
18. to manage medical condition	1	2	3	4	5
19. to do my personal best	1	2	3	4	5
20. to do something in common with friends	1	2	3	4	5
21. because people tell me I need to	1	2	3	4	5
22. because it acts as a stress release	1	2	3	4	5
23. to improve body shape	1	2	3	4	5
24. to obtain new skills/activities	1	2	3	4	5
25. because it's fun	1	2	3	4	5
26. because it was prescribed by doctor, physio	1	2	3	4	5
27. to work harder than others	1	2	3	4	5
28. because it keeps me healthy	1	2	3	4	5
29. to compete with others around me	1	2	3	4	5
30. to talk with friends exercising	1	2	3	4	5
31. to keep current skill level	1	2	3	4	5
32. to improve appearance	1	2	3	4	5
33. to improve cardiovascular fitness	1	2	3	4	5
34. because I enjoy exercising	1	2	3	4	5
35. to take mind off other things	1	2	3	4	5
36. to lose weight, look better	1	2	3	4	5
37. because I have a good time	1	2	3	4	5
38. to be with friends	1	2	3	4	5
39. to be fitter than others	1	2	3	4	5
40. to maintain trim, toned body	1	2	3	4	5

APPENDIX E: THE RECREATIONAL EXERCISE MOTIVATION MEASURE

(REMM)

In responding to the following statements, think of the motives you have for the physical activity/sport you do most. Try not to spend time pondering over your responses. There are no right or wrong answers. Indicate how much your motives correspond with each of the statements. In each case **1** indicates **strongly disagree** and **5** indicates **strongly agree**. Please circle the number that best represents your response.

I participate…..	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1. to keep up current skill level	1	2	3	4	5
2. because I like activities that are challenging	1	2	3	4	5
3. to do my personal best	1	2	3	4	5
4. because I get rewarded for doing it	1	2	3	4	5
5. because it is something I have in common with my friends	1	2	3	4	5
6. because exercise helps keep my mind healthy	1	2	3	4	5
7. to meet new people	1	2	3	4	5
8. to do more for my fitness than other people	1	2	3	4	5
9. because friends want me to	1	2	3	4	5
10. because the activities I do are exciting	1	2	3	4	5
11. because I want to cope better with stress	1	2	3	4	5
12. because doing exercise helps me maintain a healthy body.	1	2	3	4	5
13. to improve my appearance	1	2	3	4	5
14. to improve my strength	1	2	3	4	5
15. to define muscle to look better	1	2	3	4	5
16. because I like the physical challenges	1	2	3	4	5
17. to perform well compared to my own past performance	1	2	3	4	5
18. to obtain new skills or try new activities	1	2	3	4	5
19. because it keeps me healthy	1	2	3	4	5
20. because exercise is stimulating	1	2	3	4	5
21. because after exercise I feel good about myself.	1	2	3	4	5
22. because doing exercise helps me achieve other things in life	1	2	3	4	5
23. because it acts as a stress release	1	2	3	4	5
24. because exercise helps improve my mental health	1	2	3	4	5
25. to make new friends	1	2	3	4	5
26. to achieve an exercise goal I have set myself	1	2	3	4	5
27. because someone close to me approves my exercise activities	1	2	3	4	5
28. to improve my body shape	1	2	3	4	5
29. because it helps me gain status or recognition	1	2	3	4	5
30. because exercise helps me take my mind other things	1	2	3	4	5
31. to be physically fit	1	2	3	4	5
32. because it helps me relax	1	2	3	4	5
33. because doing exercise stops me from feeling depressed	1	2	3	4	5
34. to improve cardiovascular fitness	1	2	3	4	5
35. because I like to win	1	2	3	4	5

I participate…..	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
36. because it makes my physical appearance better than others	1	2	3	4	5
37. to talk with friends while I exercise	1	2	3	4	5
38. because I am required to stay fit for my job	1	2	3	4	5
39. because it helps me manage a medical condition	1	2	3	4	5
40. to do an activity with others	1	2	3	4	5
41. to improve existing skills	1	2	3	4	5
42. to have more energy	1	2	3	4	5
43. to be attractive to others	1	2	3	4	5
44. to compete with others around me	1	2	3	4	5
45. because it is fun	1	2	3	4	5
46. to earn a living	1	2	3	4	5
47. to beat my friends	1	2	3	4	5
48. because I enjoy exercising	1	2	3	4	5
49. to be the best in the group	1	2	3	4	5
50. to work harder than others when I exercise	1	2	3	4	5
51. because it helps me maintain a trim, toned body	1	2	3	4	5
52. because it is interesting	1	2	3	4	5
53. to improve my skill or technique	1	2	3	4	5
54. to achieve the looks/figure others expect of me	1	2	3	4	5
55. because I have a good time	1	2	3	4	5
56. because it helps me stay in shape	1	2	3	4	5
57. to be with friends	1	2	3	4	5
58. to lose weight to look better	1	2	3	4	5
59. because it makes me happy	1	2	3	4	5
60. because I get paid to do it	1	2	3	4	5
61. to be fitter than others	1	2	3	4	5
62. because exercise lessens the physical effects of ageing	1	2	3	4	5
63. to make my muscles look more toned than other people's	1	2	3	4	5
64. to make my body look better than other people's	1	2	3	4	5
65. to get away from pressures at work/home	1	2	3	4	5
66. because people tell me I need to exercise	1	2	3	4	5
67. because I enjoy spending time with others doing exercise	1	2	3	4	5
68. because I like the excitement of participation	1	2	3	4	5
69. to maintain strength	1	2	3	4	5
70. to maintain physical health	1	2	3	4	5
71. to get better at activity	1	2	3	4	5
72. because it is prescribed by my doctor, physiotherapist	1	2	3	4	5
73. to perform better than others	1	2	3	4	5

Do you have any reasons for participation that are not included in the above statements? Please write them here.

_____
_____
_____
_____

APPENDIX F: THE SHORTENED MARLOWE-CROWNE SOCIAL

DESIRABILITY SCALE (SMCSDS)

Listed below are a number of statements concerning personal attitudes and traits. Read each item and decide whether the statement is true or false as it pertains to you personally. Circle either true (T) or false (F) beside each question.

1. It is sometimes hard for me to go on with my work if I am not encouraged.	T	F
2. I sometimes feel resentful when I don't get my own way.	T	F
3. On a few occasions, I have given up doing something because I thought too little of my ability.	T	F
4. There have been times when I felt like rebelling against people in authority even though I knew they were right.	T	F
5. No matter who I'm talking to, I'm always a good listener.	T	F
6. There have been occasions when I took advantage of someone.	T	F
7. I'm always willing to admit it when I make a mistake.	T	F
8. I sometimes try to get even rather than forgive and forget.	T	F
9. I am always courteous, even to people who are disagreeable.	T	F
10. I have never been irked when people expressed ideas very different from my own.	T	F
11. There have been times when I was quite jealous of the good fortune of others.	T	F
12. I am sometimes irritated by people who ask favours of me.	T	F
13. I have never deliberately said something that hurt someone's feelings.	T	F

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

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

    _____ **days per week**

    ☐ No vigorous physical activities ➡ **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

    _____ **hours per day**

    _____ **minutes per day**

    ☐ Don't know/Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

    _____ **days per week**

    ☐ No moderate physical activities ➡ **Skip to question 5**

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

    _____ **hours per day**

    _____ **minutes per day**

    ☐ Don't know/Not sure

Think about the time you spent **walking** in the **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you **walk** for at least 10 minutes at a time?

_____ **days per week**

☐ No walking ➡ **Skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

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

_____ **hours per day**

_____ **minutes per day**

☐ Don't know/Not sure

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