Examining the Associations Between Relatedness and Motivational Regulations Within Different Exercise Contexts: A Self-Determination Theory Perspective

by

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Abstract

There are numerous forms of exercise in which an individual can partake. Some individuals will persist at one activity while others will persist at another activity. Research has been limited in exploring motivational characteristics of participants in different activities, with some past research not clearly specifying what activity their sample performs. The present research, grounded in self-determination theory, was an examination of the motivational characteristics of individuals who participate in 5 activities of interest: yoga (n=116), Crossfit (n=156), running (n=138), walking (n=92), and spin (n=133). Participants ranged in age from 18-83, were predominantly Caucasian females. Crossfitters, yogis, and spinners were recruited from private facilities. Walkers and runners were recruited from facilities that organized a place and time for the exercisers to meet. Using cross sectional methods, it was found that yogis endorsed greater revitalization goals than other activities while people in primarily aerobic activities tended to endorse body image goals more than other activities. People in activities with greater interaction reported greater relatedness satisfaction than other activities. Needs for competence and autonomy were differentially satisfied among participants of the activities. Endorsement of the motivational regulations was similar across the activities, walkers endorsed less self-determined motives more than other activities. Effect sizes varied from small-medium revealing some substantial between activity group differences, particularly in reference to superiority goals, weight management goals, social goals, and relatedness. The research may be used to design programs that encourage individuals with certain motives for exercising to select activities that would be consistent with their motives so as to be surrounded with like-minded individuals. Additionally, the findings inform future research of the importance of clearly defining the physical activities being examined.

Preface

This thesis is an original work by Eric Mathieu. The research project, of which this thesis is a part, received research ethics approval from the University of Alberta Research Ethics Board, Project Name “Examining the Associations Between Relatedness and Motivational Regulations Within Different Exercise Contexts: A Self-Determination Theory Perspective”, ID. Pro00050182, November 5, 2014.

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Chapter 1: Introduction

Exercise Behaviour

Exercise is a behaviour that, when performed regularly, affords the individual a host of benefits including prevention of cardiovascular disease, diabetes, cancer, hypertension, obesity, depression, and osteoporosis (Warburton, Nicol, & Bredin, 2006). Not only are there benefits for engaging in exercise, there are numerous negative side effects of living an inactive lifestyle including increased risk of cardiovascular disease, heart attack, type 2 diabetes, obesity, and all-cause mortality except cancer (Hamilton, Hamilton, & Zderic, 2008; Proper, Singh, van Mechelen, & Chinapaw, 2011).

Despite the numerous benefits that are associated with exercise participation and the negative consequences of an inactive lifestyle, the majority (85%) of Canadian adults do not participate in physical activity to an extent that is consistent with the Canadian recommendation of 150 minutes of moderate-to-vigorous physical activity per week in bouts of ten minutes or more (Canadian Society for Exercise Physiology, 2013; Colley et al., 2011). Furthermore, even though exercise may be initiated, individuals tend to cease participation within the first six months of initiating an exercise program (Rose, Parfitt, & Williams, 2005). There is a need to understand how motivation may influence participation in different activities.

Exercise is considered planned, structured, and repetitive bodily movement to increase or maintain at least one component of physical fitness (Caspersen et al., 1985). This would be different to physical activity which is any bodily movement produced by skeletal muscles that expends energy (Powell, Paluch, & Blair, 2011). Many different exercise activities exist which affords the individual the opportunity to select an activity that is perceived as satisfying and enjoyable. Perhaps characteristics of the different activities, such as social motives, influence

maintenance of exercise. Within some activities, socializing and creating bonds with co-exercisers is highly encouraged while in other situations interaction with co-exercisers may be discouraged. Additionally, some environments may promote comparisons between co-exercisers. It is possible that relatedness, social affiliation, and social comparison are three prominent factors within exercise environments that could differentially influence exercise engagement. Limited research addresses these social factors within different exercise contexts, therefore; there is a need to conduct theory based research to assess how social motives within different exercise activities may influence exercise participation.

Theory, broadly defined, is a set of related variables that can be formed into propositions or hypotheses regarding the relationships between theoretical variables (Creswell, 2003). Theory provides the lens through which a researcher can view the research question (Costley, 2006). Grounding research in theory is beneficial since it can be used to explain the determinants of behaviour and provide insight into factors that contribute to individuals' engagement in the behaviour of interest (Painter, Borba, Hynes, Mays, & Glanz, 2008), which in turn, provides targets for interventions to increase exercise participation.

One theory that could be used to help explain how environments could differentially influence individuals, and why individuals choose and persist at different exercise, is self-determination theory (SDT) (Ryan & Deci, 2000). SDT has frequently been used in behaviour research and has demonstrated utility at explaining exercise behaviour (Teixeira, Carraça, Markland, Silva, & Ryan, 2012; Wilson, Rodgers, Loitz, & Scime, 2006).

Overview of Self-Determination Theory **Literature**

Self-Determination Theory has been applied to the exercise domain with various samples, activity monitoring, activity levels, and activities considered. The samples of individuals have

consisted of males and females ranging in age from youth (Gagne, Ryan, & Bargmann, 2003) to older adults over the age of 70 years (Beauchamp, Carron, McCutcheon, & Harper, 2007). Additionally, the extent of activity monitoring has varied between studies as some studies objectively measured activity with accelerometers (Standage, Sebire, & Loney, 2008) while others utilised self-report measures such as the GLTEQ (Bryan & Rocheleau, 2002; Sebire, Standage, & Vansteenkiste, 2009). Samples have varied in the extent to which participants were active prior to study enrolment: including individuals who were active prior to enrollment (Harley et al., 2009), inactive prior to enrolment (McAuley, Lox, Rudolph, & Travis, 1994), and sometimes both those who were active and those who were inactive prior to enrollment (Duncan, Hall, Wilson, & O, 2010). The exercise contexts that self-determination theory has been applied to have varied from team activities, such as dragon boat racing, involving an abundance of interpersonal interaction (McDonough & Crocker, 2007) to group activities with less interaction such as a running club (Wilson et al., 2006), to individual exercise in a gym with minimal interpersonal interactions (Podlog & Dionigi, 2009). Despite the application of SDT to multiple exercise contexts, it is still unclear how context can influence motives for exercise and how social motives differentially influence behaviour relative to the exercise context. An in-depth examination of the literature, organized by relevance to SDT mini theories, will illustrate what has been conducted while highlighting where future research is required. In addition to consulting foundational literature on self-determination theory, a review of the literature was conducted to ensure inclusion of all studies examining motivation in specific exercise contexts.

Exercise Motivation Literature Search Procedure

A detailed literature search on the topic of motivation and exercise context was completed through a search of EBSCO Discovery Service (University of Alberta) and a search

restricted to articles published from 1987-3rd week of November 2013 of PsycINFO, two of the largest accessible databases relevant to psychological research. All searches looked for the keywords within the text, author, title, subject terms, journal title/source, abstract, ISSN, or ISBN. Within each database, the terms [(exercis*) n2 (strength*OR resistanc* OR aerobic*) AND (motivat*OR need n2 satisf*, OR intrinsic n2 motivat*)] were used. Another search was conducted using the terms [(train*) n2 (interval* OR circuit* OR intens*, OR high intens*) AND (motivat*OR need n2 satisf*, OR intrinsic n2 motivat*)]. As well, the keyterms 'AND setting*' and 'And context*' were added to each of the above searches to limit results to studies that focussed on the setting or context in which exercise took place. A manual search of the references of the retrieved articles was completed to search for relevant articles. Studies were excluded if they were related to youth, children, students, adolescents, or goal-setting. In total 62 articles were retrieved.

Irrelevant articles

Of the 60 retrieved articles, 5 were deemed to be not relevant to the present research for the following reasons:

Youth. Despite the search restrictions, two retrieved studies examined how motivation influences youth (Mage=13 and 15.6) exercise participation (Pelletier, Fortier, Vallerand, & Brière, 2001). These studies were considered to be not relevant to present research since they were conducted with a youth sample that faces facilitators and barriers to physical activity that are substantially different than those faced by adults. Some of the different facilitators could include a lack of autonomy due to parental pressure to participate or lack of self-determined motivation due to participating in activities as the result of peer pressure/following the "popular kids". As well, this group would also face barriers not experienced by an older sample such as:

dependence upon others to provide transportation or body shyness due to being under/over developed relative to peers.

Course credit. Similarly, a study (Vansteenkiste, Simons, Soenens, & Lens, 2004) assessed the impact of an autonomy supportive environment in highschool physical education. This study was considered not relevant since the participants receive course credit for participation which could undermine autonomy. Additionally, if grades are awarded based on ability, feedback is provided that would not be provided to adults, consequently different factors would influence competence. Youth who receive a failing grade would likely feel incompetent whereas those receiving a passing grade would likely feel more competent.

Theoretical incongruence. Four of the retrieved studies were considered irrelevant due to theoretical incongruence with the present research. The purpose of one study was to evaluate the distinct role of self-motivation and self-efficacy using a social cognitive theory approach (Garcia & King, 1991). Another study, utilized Achievement Goal Theory to determine the motivational and goal orientations of individuals who participate in "Crossfit" exercise (Partridge, Knapp, & Massengale, In press). One study assessed changes in feeling states as the result of participation in exercise combined multiple theories (Social-cognitive Models, expectancy-value decision making theories, and Transtheoretical model) to make the theoretical argument of the relationship between feeling states and exercise adherence (Annesi, 2002). Finally, an article was retrieved that aimed to determine whether aerobics class participants were high or low sensation seekers was deemed irrelevant due to a lack of theoretical foundation (Babbitt, Rowland, & Franken, 1990). Since neither of these studies used SDT or any constructs associated with SDT, they were considered not relevant to the present investigation.

Creation of theory. Of the retrieved articles, two aimed to create different theoretical frameworks to explain exercise behaviour. Since the research did not consider presently existing theory but rather aimed to create a unique theory, the studies were considered irrelevant. One article aimed to combine the Achievement Goal Theory and Self-Determination Theory (Moreno, González-Cutre, Sicilia, & Spray, 2010) based on theoretical relationships. Another study created a model highlighting the process of integrating physical activity into daily life (Harley et al., 2009). This study was deemed irrelevant since psychological characteristics of individuals moving through the integration process were not considered.

In total 55 studies were retrieved that were relevant to SDT and exercise. A full list of these papers is provided in Appendix A. Further discussion will highlight each mini-theory's theoretical implications, relationship to exercise behaviour, and their interrelatedness to each other so as to understand how exercise context may influence behaviour.

Brief Overview of Self-Determination Theory

Self-determination theory (SDT) is a macro theory of motivation that comprises 5 mini-theories: cognitive evaluation theory (CET), organismic integration theory (OIT), causality orientations theory (COT), basic psychological needs theory (BNT) and goal contents theory (GCT) (Vansteenkiste, Niemiec, & Soenens, 2010). The present work is grounded within BNT, OIT, and GCT.

SDT posits that when functioning at an optimal level, individuals have a desire to extend themselves, master new skills, and apply their talents (Ryan & Deci, 2000). To function at an optimal level, it is essential to satisfy the basic psychological needs of competence, autonomy, and relatedness (Ryan & Deci, 2000). Satisfying these needs provides the prerequisites to internalize and persist at the behaviour (McLachlan & Hagger, 2011; Ryan & Deci, 2000). Both

the satisfaction of needs and internalization of behaviour are influenced by the goals of behavioural engagement (McLachlan & Hagger, 2011).

Basic Psychological Needs Theory

According to Basic Psychological Needs Theory (BNT), individuals will be intrinsically motivated to engage in a behaviour when the three basic psychological needs of autonomy, competence, and relatedness are satisfied (Deci & Ryan, 1985). However, in some instances individuals will prefer to have certain needs satisfied instead of others (Deci & Ryan, 2000). The need which people most desire to satisfy will vary depending on multiple factors such as environment, culture, and individual factors (Ryan & Deci, 2000). While basic psychological needs tend to become satisfied as individuals gain exercise experience (Wilson & Rogers, 2008), if basic psychological need satisfaction does not occur, individuals may seek out alternative, potentially unhealthy, behaviours to satisfy their needs (Deci & Vansteenkiste, 2004). It is therefore important to consider the three basic psychological needs and whether or not they can be satisfied via exercise participation.

Autonomy. Autonomy is when an individual believes that behaviour is self-initiated and volitional (Deci & Ryan, 2000). Autonomy can be fostered by creating an autonomy supportive environment through providing choice and meaningful and realistic rationale when choice is constrained (i.e, When rules or norms are enforced) (Vansteenkiste et al., 2010).

Autonomy and behaviour. Autonomy tends to decrease as an exercise program progresses (Wilson, Rodgers, Blanchard, & Gessell, 2003); while this could be a function of exercise itself, it is possible that the decrease is due to individuals being in a study and having few decision making opportunities. This is supported by findings that autonomy increased when a "real-world" study protocol was used (Rahman, Thogersen-Ntoumani, Thatcher, & Doust,

2011). It is therefore likely that contextual factors could influence the extent to which individuals feel autonomous and as such, exercise context could result in differential autonomy satisfaction. Additionally, it is possible that the association between autonomy satisfaction and behaviour is the result of gender. It has been found that satisfaction of autonomy is rated as more important for female involvement in exercise (Vlachopoulos & Neikou, 2007).

Competence. Competence is a sense that an individual has mastery over the behaviour (Deci & Ryan, 2000). Competence is fostered through a structured environment. Structure should be applied so as to provide guidance without sacrificing autonomy (Vansteenkiste et al., 2010). Research has noted that not only can a non-demeaning autonomy-supportive environment foster autonomy, but competence as well (Edmunds, Ntoumanis, & Duda, 2008).

Competence and behaviour. Competence is very important need to satisfy to promote adherence and the development of autonomous motivational regulations (Vlachopoulos & Neikou, 2007; Wilson, Rodgers, Blanchard, & Gessell, 2003). Individuals who reported higher competence at the beginning of a program were more likely to report higher enjoyment and adhere to the program than individuals who reported low competence (Rahman et al., 2011; Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997). Additionally, competence has been linked directly to behavioural engagement (Edmunds, Ntoumanis, & Duda, 2006; Vlachopoulos & Neikou, 2007) (Edmunds, Ntoumanis, & Duda, 2006; Vlachopoulos & Neikou, 2007). However, the extent to which competence is associated with behaviour could be dependent upon the activity. Competence is a stronger predictor of behaviour for a highly technical activity, such as taekwondo relative to aerobics (Ryan et al., 1997). It is therefore possible the importance of competence will vary relative to the activity. Competence can increase in as little as three months; additionally, none of the retrieved articles indicated that competence decreased with

exercise experience. These findings indicate that individuals who exercise will increase competence and will therefore be more likely to maintain their exercise program.

Relatedness. Relatedness is the sense of belonging in society that can be obtained from behavioural engagement (Deci & Ryan, 2000). Relatedness is increased through having a sense of interpersonal support – a feeling of connectedness to others within the environment and feeling empathy from others (Vansteenkiste et al., 2010).

Relatedness and behaviour. Relatedness is the least endorsed need in exercise contexts (Wilson et al., 2006; Wilson et al., 2003) but is of particular importance for the adoption and maintenance of exercise (Springer, Lamborn, & Pollard, 2013). However, no difference in relatedness was observed between adherers and non-adherers who start a program (Rahman et al., 2011). Further, conflicting findings exist regarding the association between relatedness and self-determined motivational regulations. Despite the findings that relatedness is associated with more self-determined regulations (Wilson et al., 2006), it positively predicts extrinsic regulation (Rahman et al., 2011). It is possible that these inconsistent findings are due to the exercise context. When considering team exercise, such as dragon boating, it was found that relatedness was significantly associated with more self-determined forms of motivation and negatively associated with extrinsic regulation (McDonough & Crocker, 2007). Given the theoretical relationships outlined by SDT, relatedness could be more strongly associated with behaviour in highly interactive exercise contexts. Due to the conflicting findings regarding the role of relatedness, it would be beneficial to further study the circumstances when relatedness contributes to self-determined motivational regulations and behaviour.

Organismic Integration Theory

The organismic integration theory (OIT) refers to the 'why' of behaviour, the motivation for participating in behaviour (Deci & Ryan, 2000). Within OIT, motivation is said to lay on a continuum ranging from completely non-self-determined to completely self-determined (Deci & Ryan, 2000). Motivation is said to be non-self-determined if the behaviour is perceived to be regulated by external pressure and self-determined if behaviour is performed under complete volition (Deci & Ryan, 2000). Those who hold more self-determined regulation are more likely to have a physical activity habit (Gardner & Lally, 2013), an intent to exercise (Wilson & Rodgers, 2003), and engage in physical activity (Rodgers, Hall, Duncan, Pearson, & Milne, 2010; Wilson, Rodgers, Fraser, & Murray, 2004) than those with less self-determined motives. An association between self-determined regulations and behaviour has been found in aerobic exercise (Wilson & Rodgers, 2002) and resistance exercise (Kathrins & Turbow, 2010). As individuals gain experience with exercise, they tend to present with more self-determined regulation (Mullan & Markland, 1997; Rose et al., 2005; Thøgersen-Ntoumani & Ntoumanis, 2006). However, these increases in self-determined regulations are not associated with a decrease in less self-determined regulations, suggesting that less self-determined regulations persist for a period of time after the development of self-determined regulations (Gunnell, Crocker, Mack, Wilson, & Zumbo, 2014). OIT posits that motivation can be classified into one of three categories ranging on a continuum from least to most self-determined: amotivation, extrinsic motivation, or intrinsic motivation.

Amotivation. Amotivation is the least self-determined form of motivation and is when an individual has no intention to act or acts without intent (Ryan & Deci, 2000). In instances when an individual is primarily influenced by amotivation acts, the individual will carelessly "go

through the motions" of the activity as opposed to meaningful engagement (Ryan & Deci, 2000). Amotivation may be the result of low value of the activity, the behaviour leading to an undesirable outcome, or the individual having no control over the outcome (E. Deci & Ryan, 2000; Ryan & Deci, 2000). Within the exercise domain, as theoretically predicted, amotivation has been found to be a negative predictor of intention (Thøgersen-Ntoumani & Ntoumanis, 2006) and inversely related to need satisfaction (Markland & Tobin, 2010). Due to the possibility that amotivated individuals will engage in exercise, it is important for current research to measure amotivation so as to help clarify the reason for participation.

Extrinsic motivation. Extrinsic motivation is when an individual engages in a behaviour to obtain a separable outcome such as money or fame (Vansteenkiste et al., 2010). Extrinsic motivation is said to drive behaviour when the behaviour is neither inherently interesting nor enjoyable (Vansteenkiste et al., 2010). Extrinsic motivation can serve as a motivator to engage in exercise as long as the source of extrinsic motivation is present (McLachlan & Hagger, 2011). This is the result of behaviour being driven by an external contingency. If the external pressure/reinforcement is removed, there is no longer an incentive for the individual to perform the behaviour.

Continuum of extrinsic motivation. According to the OIT, extrinsic motivation resides on a continuum ranging from least self-determined motivation (external regulation) to most self-determined motivation (integrated regulation) (Vansteenkiste et al., 2010). SDT stipulates that the regulations ordered in a continuum have relationships consistent with a simplex structure whereby more proximal points on a continuum are more strongly related than distal points (Wilson et al., 2003).

Individuals tend to initiate an exercise program for extrinsic reasons (health, appearance, etc.). Then, as individuals consistently participate in exercise, more self-determined regulations present (McAuley, Wraith, & Duncan, 1991; Mullan & Markland, 1997; Rose et al., 2005). Individuals with a more self-determined regulation are thought to have internalized the behaviour; the individual endorses the value of the extrinsically motivated behaviour (Vansteenkiste et al., 2010). Findings that motivational regulations differentially predict exercise behaviour highlight the importance of considering all regulations separately as opposed to creating a composite score as has been done in the past (Gardner & Lally, 2013; Mullan & Markland, 1997). A closer examination of the categories of extrinsic motivation, starting with the least self-determined form of extrinsic motivation, will help clarify the distinct qualities of each.

External regulation. External regulation is the least self-determined form of extrinsic motivation and occurs when an individual performs a behaviour to comply with external pressure or receive rewards (Ryan & Deci, 2000). Within the exercise domain, external regulation positively predicts relapse (Thøgersen-Ntoumani & Ntoumanis, 2006) and either negatively predicts behaviour (Brunet & Sabiston, 2011; Ingledew & Markland, 2008) or does not predict behaviour (Brunet & Sabiston, 2011). A possible reason for the discrepancy regarding the predictive capacity of external regulation is due to the gender composition of the sample. In samples that were predominantly (over 80%) female, external regulation was not predictive of exercise behaviour whereas samples that were more balanced (<65%female) external regulation was a significant predictor of exercise behaviour. It is possible that the influence of external regulation on exercise behaviour is moderated by gender. As a result of this difference, it is possible that males and females are differentially influenced by external regulation so as males are more likely to exercise for external reasons than females. This would be in conflict with

findings that the relationship between exercise frequency and external regulation is only significant (negatively) in females (Duncan et al., 2010). It may be possible the discrepancy in findings could be explained by age. When considering young adults aged 18-24, extrinsic regulation was found to negatively predict exercise behaviour (Brunet & Sabiston, 2011) whereas when adults older than 24 years were considered, it was found that external regulation was not related to exercise behaviour (Duncan et al., 2010). A possible explanation for this is how individuals perceive the target motive. Specifically, health motives may be perceived as self-determined in that they are reflective of concerns for general health, reducing pain, or increasing capability to perform daily tasks (Teixeira et al., 2012). However, it is also possible that health motives will be perceived as less self-determined if they are perceived as pressures or threats (ie. Advice from the doctor), which could be likely to occur in older adults (Teixeira et al., 2012).

Introjected regulation. The second least self-determined form of extrinsic motivation is introjected regulation. Introjected regulation is when a behaviour is performed to avoid internal feelings of guilt or shame or to gain feelings of worth (Brunet & Sabiston, 2011). Introjected regulation is more self-determined than external regulation since the contingencies for behaviour are internal and the external rewards are no longer required for behaviour to occur, as such, the individual has more internal control over the motives for exercising (Vansteenkiste et al., 2010). The relationship of introjected regulation to exercise behaviour has been inconsistent in past literature. In line with propositions put forth by SDT, some studies found that introjected regulation was a positive predictor of exercise (Podlog & Dionigi, 2009; Thøgersen-Ntoumani & Ntoumanis, 2006) while other studies found that introjected regulation negatively predicted exercise behaviour (Brunet & Sabiston, 2011; Wilson et al., 2004). Additionally, it has been

noted that when interviewed, individuals cited reasons consistent with introjected regulation for not adhering to a program (Huberty et al., 2008). Age of participants may contribute to the variability, young adults aged 18-24 are more likely to endorse introjected regulation than older individuals (Brunet & Sabiston, 2011). It is possible the social context of exercise could influence how introjected regulation associates with exercise. If individuals within the context encourage individuals by giving them a "hard-time" when a session is missed, increased guilt and shame (i.e., introjected regulation) could result even though adherence might be improved (Podlog & Dionigi, 2009). It would therefore be worthwhile to examine how the social context influences feelings of guilt, shame, and introjected regulation. Another factor that could influence the relationship of introjected regulation to behaviour is the level of experience of the exerciser. It has been found that introjected regulation is more important for initiates' behaviour than regular exercisers (Edmunds et al., 2006). This could possibly be the result of peer pressure on the initiate exerciser to attend sessions resulting in feelings of guilt (Podlog & Dionigi, 2009). It would be important to consider the amount of experience an individual has with exercise. Additionally, it is possible that, similar to extrinsic regulation, gender moderates the predictive capacity of introjected regulation to exercise. This is evidenced by findings that introjected regulation was a positive predictor of exercise in women but a negative predictor in men (Wilson et al., 2004). These findings further highlight the importance of careful consideration of gender composition of a sample as well as separate gender analyses or moderator analysis.

Identified regulation. Identified regulation occurs when an individual personally endorses and values the significance of the behaviour (Vansteenkiste et al., 2010). Identified regulation is the next most self-determined regulation since behaviour is guided by the personal values of the individual as opposed to something outside the individual such as guilt (Vansteenkiste et al.,

2010). Unlike less self-determined forms of motivation, it has been found that gender is not a moderator of the identified regulation-exercise behaviour relationship (Duncan et al., 2010). This would be anticipated since it would be unlikely that individuals, irrespective of gender, would participate in an activity that does not align with personal values, whereas it is plausible that there might be gender differences in susceptibility to participate in behaviours due to external pressure. Consistent with the main tenets of SDT, identified regulation is a significant positive predictor of exercise (Duncan et al., 2010; Ingledew & Markland, 2008; Wilson et al., 2004). However, despite SDT positing that intrinsic motivation would be the strongest predictor of behaviour, identified regulation has been found to be the strongest predictor of both intention and behaviour in exercise (Thøgersen-Ntoumani & Ntoumanis, 2006; Wilson & Rodgers, 2002). This is possibly due to exercise not being inherently interesting or enjoyable and therefore an extrinsic motivator is required to participate (Wilson & Rodgers, 2002).

Integrated regulation. Finally, the most self-determined form of extrinsic motivation is integrated regulation. Integrated regulation is when an individual aligns the personally endorsed values and goals of the activity with aspects of the self so as to form a self-identity that is consistent with the activity (Vansteenkiste et al., 2010). Integrated regulation is the final form of extrinsic motivation prior to full internalization (Vansteenkiste et al., 2010). Integrated regulation is a more self-determined form of motivation than identified regulation since the individual not only values the activity, but creates a new identity consistent with the values of the activity. Despite SDT positing that identified and integrated regulations are both important predictors of exercise, the literature has historically not included a measure of integrated regulation (Standage et al., 2008; Wilson & Rogers, 2008). The motivational regulation measure of choice for most self-determination researchers, the Behavioural Regulation in Exercise Questionnaire (BREQ),

did not contain a subscale to measure integrated regulations until recently (Markland & Tobin, 2004; Wilson, Rodgers, & Fraser, 2002; Wilson et al., 2006). Relatively recent research has added a subscale, comprised of four items, to assess integrated regulation (Wilson & Rodgers, 2004). Initial research examining the role of integrated regulation in the exercise domain has found it to explain unique variance toward the prediction of exercise; consequently, integrated regulation should be included in future measurement (Wilson et al., 2006). As a result, it would be important for present research to include a measure of integrated regulation so as to accurately interpret the regulatory continuum of extrinsic motivation.

Intrinsic motivation. Intrinsic motivation is the most self-determined form of motivation. The individual is thought to have fully internalized the behaviour (Vansteenkiste et al., 2010). An individual who is intrinsically motivated engages in a behaviour purely for the satisfaction and enjoyment of the behaviour itself (Deci & Vansteenkiste, 2004). Intrinsic motivation represents the positive potential of human beings, seeking out novelty and challenges to explore and learn (Ryan & Deci, 2000).While intrinsic motivation, consistent with the propositions of SDT, has been found to be positively related to exercise (Kathrins & Turbow, 2010; Rodgers et al., 2010), intrinsic motivation has been found to not be the strongest predictor of exercise, possibly due to the fact that exercise itself is not inherently enjoyable (Wilson & Rodgers, 2002).

Goal Content Theory

Whereas organismic integration theory represents the 'why' of behaviour, the goal content theory represents the 'what' – the outcomes or states that individuals are pursuing or avoiding (Ingledew & Markland, 2008). Within GCT, goals are distinguished as being intrinsic (personal growth, close relationships, social engagement, etc.) or extrinsic (money, fame,

reputation, etc.) (Kasser & Ryan, 1996). Intrinsic goals are those that are likely to satisfy the three basic psychological needs whereas extrinsic goals are unlikely to do so (Deci & Ryan, 2000). Consistent with the tenets of SDT that individuals seek to be intrinsically driven, individuals have a tendency to seek intrinsic goals when the context affords the opportunity (Vansteenkiste et al., 2010). Contexts that support the basic psychological needs will move individuals toward intrinsic goals, conversely, contexts that thwart the basic psychological needs will move individuals toward extrinsic goals (Vansteenkiste et al., 2010). Both intrinsic (positively) and extrinsic (negatively) goals have been found to be predictive of behaviour through the mediating influence of motivational regulations (Ingledew & Markland, 2008; Sebire et al., 2009). Due to the role that goals play in behaviour and their susceptibility to be influenced by the environment, it would be important to consider exercisers goals in future research.

Relationship Between Mini-theories of SDT

Self-determination theory is interested in factors that sustain intrinsic motivation (Ryan & Deci, 2000). To understand how SDT proposes that intrinsic motivation is sustained, the relationships between the mini-theories must be considered.

BPNT-OIT. Self-determination theory argues that individuals who have their needs met are likely to sustain intrinsic motivation and consequently are more likely to explore, assimilate, and master various tasks (Ryan & Deci, 2000). In situations where individuals feel competent, autonomous, and related, the individual is more likely to be intrinsically motivated than if only one of the needs was satisfied (Ryan & Deci, 2000). Validation of this theoretical premise has been found within the literature (Gunnell et al., 2014; Rahman et al., 2011); changes in need satisfaction over a 6-month period is associated with changes in intrinsic motivation over the same period (Rahman et al., 2011). Not only is need satisfaction related with more self-

determined motivation, but it has been found to be negatively associated with less self-determined regulations (Markland & Tobin, 2010; Wilson & Rogers, 2008).

Despite all three needs having the potential to contribute to more self-determined motivational regulation, relatedness has been found to be least associated with the most self-determined motivational regulations (Wilson et al., 2002; Wilson et al., 2006). Competence and autonomy have consistently been found to be associated with more self-determined motivations of identified and intrinsic regulations (Silva et al., 2010; Wilson et al., 2003). Changes in relatedness have been found to be associated with changes in intrinsic regulation over the course of a 12-week exercise program while competence and autonomy are associated with changes in intrinsic and identified regulation over the same period (Wilson & Rogers, 2008).

Associations between need satisfaction and introjected regulation are less clear. In some instances, competence and autonomy contribute to the development of introjected regulation (Silva et al., 2010) while other research has determined that competence and autonomy are only associated with identified and intrinsic regulations (Wilson et al., 2003). It is possible that activity setting could influence this discrepancy. When competence and autonomy were found to positively influence introjected regulation, total activity was considered (Brunet & Sabiston, 2011). When competence and autonomy influenced self-determined regulations, only aerobic stationary bike exercise was considered (Wilson et al., 2003). It would therefore be important to consider factors within these environments and different motives, perhaps social motives, which could influence this relationship.

Given the complex relationship between basic psychological needs and motivational regulations, it would be important to consider the entire continuum of extrinsic motivation as opposed to a composite score of motivation such as ‘relative autonomy index’ (Gardner & Lally,

2013) or dichotomizing motivation as ‘intrinsic’ and ‘extrinsic’ (Standage et al., 2008). Through considering the entire continuum, it is possible to gain a more accurate understanding of how the basic psychological needs influence behaviour. It would therefore be important for present research to consider the entire continuum.

Social Comparison Theory

According to social comparison theory (Festinger, 1954), individuals have an innate drive to compare and evaluate themselves as superior or inferior relative to other individuals in their surroundings (Plante et al., 2011). Preference is to compare to relatively similar others so as to obtain accurate self-appraisals while others avoid social comparison when possible (Datta & Kulik, 2012). Unfortunately, measuring social comparison may be fallacious since much social comparison occurs outside of conscious awareness and thus may be inaccurately reported by participants (Frederick, Havitz, & Shaw, 1994). However, research has demonstrated that social comparison can be reported to a certain extent. Social comparison can either be upwards comparisons or downward comparisons.

Upward social comparisons are when comparisons are made to someone who is perceived as superior (Pila, Stamiris, Castonguay, & Sabiston, 2014). In instances where the superior individual is perceived as an unattainable measure, feelings of jealousy, envy, and low-self-esteem tend to be evoked within the comparer. In these instances, the individual will be unlikely to continue participating in the behaviour (Caltabiano & Ghafari, 2011). However, it is possible for upward comparisons to have positive influences on behaviour. When the upward comparison is viewed as attainable, feelings of inspiration can be evoked which results in increased behavioural engagement (Caltabiano & Ghafari, 2011).

Downward comparisons are when individuals compare themselves to an individual perceived as inferior (Pila et al., 2014). Downward comparisons most often leads to increased feelings of self-esteem and motivation to not be the subject of the downward comparison (Lockwood, Wong, McShane, & Dolderman, 2005). If a downward comparison was demonstrating an undesirable outcome (obesity) that was likely to be achieved from not performing a behaviour (exercise), the downward comparison could positively motivate behaviour (Lockwood et al., 2005). Rarely do downward comparisons result in negative feelings since inferiors are rarely perceived as future selves (Caltabiano & Ghafari, 2011).

Despite the benefits of SCT, there is a limitation to the theory. For instance, it does not state under what circumstances which comparisons are likely to occur (Frederick et al., 1994). SCT alone cannot predict whether comparisons will be appearance, physical skills, or abilities. It would therefore be of value to measure which comparisons are occurring in which environments (Frederick et al., 1994).

Social Comparison Theory and Self-Determination Theory

Social comparison would be beneficial to measure since it is not directly considered within SDT however it could influence variables of interest, particularly relatedness satisfaction. Social comparison is associated with many of the SDT variables – particularly goal contents and basic psychological needs (Sebire, Standage, Gillison, & Vansteenkiste, 2013). Unfortunately there is a lack of information regarding the relationship of social comparison and self-determination theory. It would therefore be beneficial to quantitatively examine the relationships that have been previously observed qualitatively (Sebire et al., 2013).

It was noted that individuals will align their social comparison with their goal content. Intrinsic goals tend to lead to social comparisons that are based on fitness and learning from

others while extrinsic goals promote appearance comparisons and less realistic comparisons. When individuals have intrinsic goal pursuits, they are likely to engage in social comparisons that create opportunities for satisfaction of the basic psychological needs (Sebire et al., 2013). Individuals with intrinsic goals use comparison as a motivational tool to drive behaviour (Sebire et al., 2013). Extrinsic goals tend to be associated with upward comparison and focus on appearance and discrepancies between real self and ideal-self. Those with extrinsic goals report short term goals and less confidence in achieving them (Sebire et al., 2013). Additionally, those individuals with short term extrinsic goals are likely to select exercise that allows them to meet these goals with minimal effort (Sebire et al., 2013).

In order to gain an understanding of how social comparison influences exercise behaviour, a second review of the literature was conducted.

Social Comparison Literature Search Procedure

A search of EBSCO Discovery Service (University of Alberta) was conducted to find literature relevant to social comparison in the exercise setting. The searches were restricted to academic journals. All searches looked for the keywords within the text, author, title, subject terms, journal title/source, abstract, ISSN, or ISBN. The search of literature was initiated by a general search of "exercise" followed by a search of "Exercise AND social n2 comparison". To make the search more specific this was followed by a search of Exercis* AND social n2 comparison AND need* which yielded 75 results. Three searches were then carried out with more specific terms and all 3 yielded the same 1 result. The three searches started with "exercis* AND social n2 compari*" with a third term being "need-satisf*" "need n2 satisf*" and "regul*". To broaden the search, the keywords exercis* AND social n2 compari* AND self-determin*" was used yielding 7 results, 4 of which were retrieved while 2 were repeats of previously

retrieved articles. Another search was conducted using the search term "exercis* AND social n2 compari* AND motiv*" and yielded 36 results, 7 of which were relevant and retrieved. Finally, a search away from motivation and a focus on peer comparisons was conducted using the terms "exercis* AND social n2 compari* AND peer*" which yielded 19 results however only 2 were relevant and 1 was new. In total, 12 articles were retrieved. Reasons for articles being deemed irrelevant were: outcome being social identity, social norms, body image, a disease-based sample, related to body issues, validation of a measure, related to eating behaviour, abstract from a conference, comparing activity levels to peers as opposed to comparison that occurs while doing the activity, or a youth sample.

Overview of Literature

Exercise settings, particularly for groups when all participants are performing similar workouts, provide ample opportunity for social comparisons to body shape, appearance, and performance to occur and is therefore an interesting domain to determine how social comparisons influence behaviour (Pila et al., 2014). Though much research has been done regarding social comparison in exercise, behavioural measures such as frequency or duration have rarely been included (Wasilenko, Kulik, & Wanic, 2007). Despite most social comparisons occurring outside of conscious control, participants are capable of reporting their comparisons and report more fitness and appearance comparisons when exercising in groups relative to alone (Ginis, Burke, & Gauvin, 2007). These findings highlight that social comparisons naturally occur within group exercise contexts and individuals are able to report their social comparisons, which indicates that individuals are aware and able to report their comparisons.

Influence of exercise setting on social comparison. Setting of exercise has been found to influence social comparisons. It has been noted that social comparison can be influenced by

the values of the environment, individuals tend to naturally make comparisons that are consistent with the values of the activity (Frederick et al., 1994). For example, those who workout in trendy fitness clubs, as opposed to public facilities, are more likely to compare appearance, skill, or group membership (Frederick et al., 1994) The opportunities to self-compare may vary between fitness clubs, especially 'trendy' fitness clubs where there are public declarations of performance, for example, some groups may require participants to write their score, time, or distance on public display while others may use students as exemplars for the class (Datta & Kulik, 2012). In these instances, individuals will be provided with overt opportunity to compare themselves to others. It would be of interest to assess different exercise contexts to determine if there is indeed a difference in perceived social comparison opportunities that are less overt and how this influences participation and self-determination theory variables.

Social comparison to co-exercisers. Whereas comparisons can influence which exercise facility is attended, exercise behaviour itself might be influenced by comparison to co-exercisers. When placed next to a physically attractive female confederate, women exercise for a significantly less duration; this is possibly the result of an upward comparison creating lower self-esteem and less enjoyment (Wasilenko et al., 2007). Furthermore, research examining this phenomenon found that males and females reported less enjoyment from exercise when exercising next to an attractive female confederate (Plante et al., 2011). It was speculated that decreased enjoyment could be the result of the participant feeling threatened or uncomfortable (Plante et al., 2011).

Similar findings were retrieved when the confederates were systematically varied relative to fitness status. Women demonstrated a tendency to prefer to exercise beside unfit confederates (Datta & Kulik, 2012). This could be due to downward comparisons that would show them as

being superior relative to the confederate co-exerciser or serve as motivation to not be unfit like the confederate (Datta & Kulik, 2012). Contrary to the work of Wasilenko and associates (2007), Datta and Kulik (2012) found that the fitness status of confederates did not influence exercise duration of participants. A possible explanation for this discrepancy is the "real-world" setting of the studies. The work of Wasilenko et al. (2007) was a laboratory setting which may account for the significantly shorter exercise time. Perhaps within the study setting individuals did not feel like they had to continue exercising (perhaps due to just wanting to participate but not feeling an obligation to exercise) whereas in a real world setting individuals may feel more committed to the exercise session (possibly a result of having to pack clothes, schedule time, decide what to do for exercise). It would therefore be important to consider that a laboratory setting may not perfectly mirror 'real-world' setting and consequently research should strive to attain the most 'real-world' setting possible.

However, though the extent to which the setting is 'real-world' could explain the different findings, it is also possible that the focus of the comparison could explain the decreased exercise time. Perhaps comparisons based on fitness are seen as more positive and are less likely to decrease exercise participation whereas comparisons based on appearance are negative and will decrease exercise behaviour. Present research explored individuals' comparisons and motives of exercise.

Research regarding exercise and social comparison has been limited to aerobic exercise. Furthermore, research has noted that social comparisons effects have the potential to vary widely between activities (Frederick et al., 1994). It would therefore be of benefit to study how social comparisons influence exercise behaviour within various exercise contexts. Different aspects of social comparison were considered so as to determine how the direction and frequency of social

comparison, as well as the concern of being evaluated influences individuals in various exercise settings.

Purpose

Therefore, this study examined the satisfaction of basic psychological needs and social comparison within different exercise activity groups. Additionally, the study examined self-determination within various exercise contexts.

Primary purpose

There are two primary purposes:

1) To determine how exercise context associates with the satisfaction of the basic psychological needs, particularly relatedness.
2) To determine between activity group differences in goal contents
3) To determine between activity group differences in motivational regulations.

Primary purpose hypotheses

1) Exercise contexts that encourage and afford greater opportunities to interact with co-exercisers would have significantly greater levels of relatedness satisfaction. Competence and autonomy would be endorsed in all exercise contexts equally due to individuals feeling autonomous to select an activity they feel competent at completing.
2) Goal contents would vary relative to activity group such that aerobic activities would endorse body image goals more than other activities and yogis would endorse intrinsic goals more than other activities.
3) No between activity group differences in motivational regulations would emerge due to the theoretical proposition that individuals are likely to exercise for more intrinsic motives.

Secondary purpose

To explore gender difference in goal content, need satisfaction, and motivational regulation endorsement.

Secondary purpose hypotheses

1) Females would endorse greater weight management goal contents more than males but less superiority goals.
2) Females would endorse relatedness within activity groups greater than males. It is further hypothesised that regardless of gender, autonomy and competence would not be differentially influenced by context.
3) No gender differences would be present relative to motivational regulations.

Tertiary purpose

To determine to what extent the presence and concern of social comparisons influences need satisfaction.

Tertiary purpose hypotheses

Individuals with lower social comparison scores - rarely engage in social comparison, and are not concerned of being evaluated - would demonstrate the highest level of relatedness satisfaction regardless of context.

Individuals who frequently engage in downward social comparison would demonstrate the highest levels of competence satisfaction and would report the lowest relatedness satisfaction.

Autonomy would not be influenced by social comparisons.

Quaternary purpose

The fourth purpose was to examine the theoretical associations between mini-theories put forth by SDT in reference to GCT, BPNT, and OIT, for which specific theoretically based hypotheses are provided. Additionally, to examine how exercise context influences the extent to which goal contents, the basic psychological needs, and motivational regulations are related to exercise behaviour.

Quaternary purpose hypotheses

Independent of activity group, the theoretical tenants of SDT would be supported, although the strength of specific associations may vary with context. Self-determined goals would be more strongly associated with the satisfaction of basic psychological needs. In turn, satisfaction of the basic psychological needs would be more strongly associated with more self-determined regulations.

Due to their theoretically distal relationship with behaviour, goal contents will be unassociated with behaviour across all activity groups. When exercise contexts promote interaction, relatedness would be a stronger predictor of exercise than when minimal interaction occurs. Activity group will not influence the relationship between competence or autonomy and behaviour. More self-determined regulations would be predictors of behaviour such that greater endorsement of the regulation is associated with greater behaviour participation whereas less self-determined regulations would be negative predictors.

Chapter 2: Methods

Selection of activities

Exercise. Activities were only considered if individuals were engaged in structured leisure-time exercise bouts. Exercise was characterized as being planned and structured, as well as involving repetitive bodily movement (Caspersen, Powell, & Christenson, 1985). Additionally, the objective of the movement would be to increase or maintain at least one component of physical fitness (Caspersen et al., 1985). Structured exercise setting was defined as purposeful physical activity done for health reasons where the time, place, and frequency of the exercise were predetermined by someone other than the individuals exercising (Spink, Wilson, & Bostick, 2012). This excludes general physical activity, which is all activity that involves skeletal muscles and increases caloric expenditure above resting, such as walking for transportation or house work (Caspersen et al., 1985). Additionally, this excludes activities that are pursued with the objective of competing, winning, and achieving superiority over others (i.e., competitive or recreational sport league).

Group size. Since an inclusion criterion is that individuals are engaged in group exercise, another variable that should be considered is group size. Group size could influence the motivational regulations and behaviour (Carron, Brawley, & Widmeyer, 1990; Edmunds, Ntoumanis, & Duda, 2008). Small classes or groups (5-17 individuals) have been found to result in better attendance and retention than larger groups (Carron et al., 1990) and possibly promote more introjected regulation (Edmunds, Ntoumanis, & Duda, 2008). It was therefore of importance to consider the group sizes such that the groups were of relatively similar size.

Interaction opportunities. It was important that the selected activities have a theoretical basis for differing in motivational regulations and need satisfaction since research has found that

contexts can differentially support basic psychological need satisfaction (Wilson et al., 2008), it was therefore important to select activities that likely differed in the satisfaction of basic psychological needs. Specifically, activities were systematically selected based on the opportunities and ease of interaction.

Selected Activities Description

Activities that met these criteria and were selected for analysis were:

Spin. Spin class is an activity where individuals exercise in groups on stationary bikes. It has been previously studied within SDT literature (Dimmock, Jackson, Podlog, & Magaraggia, 2013; Wilson et al., 2003). Spin classes are structured activities where the time and place is determined by the host facility. Participants exercise in parallel, there is no need for interaction during the classes. As a result of the loud music, amplified instructor voice, and constant movement, spin class provides minimal opportunities for participants to interact with one another. Consequently, it was thought that relatedness would not be strongly satisfied which would be congruent with past literature (Wilson et al., 2003). In past research, relatedness was not associated with more self-determined forms of motivation when the activity was a spin class (Wilson et al., 2003).

Yoga. Yoga is an activity that requires participants to adopt a specific body position and maintain that position before slowly changing positions (Grabara, 2013). Yoga tends to place a focus on the development of flexibility and range of motion while developing muscular strength and endurance (Grabara, 2013). Yoga is a structured activity scheduled by the facility hosting the class. Quiet, individual, parallel activity is encouraged in yoga classes. Although yoga can be done individually or in a group, only individuals who practice yoga in a group setting were considered for this study. Special interest yoga groups exist that are geared toward meeting new

people (The yoga revolution, 2014), however only traditional yoga classes were considered for the proposed research. Yoga was of particular interest to assess, since similar to other exercise groups, the activity is performed in close proximity, however unlike other activities interaction while participating is discouraged (The yoga revolution, 2014). However, despite the lack of interaction during the activity, yoga historically has revolved around an intense relationship with one's teacher and more recently with one's peers in class settings (Ross, Bevans, Friedmann, Williams, & Thomas, 2013). Social benefits derived from participating in yoga are similar to benefits that could be received when participating in any group exercise class such as spending time with family/friends, feeling comfort being around others, and the opportunity to take part in events with likeminded individuals (Ross et al., 2013). It was therefore of interest to determine the extent to which individuals participate in yoga for social as well as other motives. Women in a yoga class are motivated by the possibility of good health and stress management that can be received through participation (Zajac & Schier, 2011), however it is unclear the effect yoga has on the satisfaction of the basic psychological needs and motivational regulations.

Running. Running is an activity that has seen a 9% increase in popularity in Canada over the last decade (Onstad, 2012). Accompanying the increased popularity of running is the increased number of individuals who engage in the activity to fulfill social desires (Onstad, 2012). The focus of the running group is aerobic capacity development and social support. Running groups were required to meet on a regular basis at a time scheduled by a third party to be considered for the present research. Only individuals who meet and run with a group were considered for analysis. While some running clubs may have participants do various activities at different markers (i.e, 30 burpees every mile, or pushups while waiting for a light to change) (Daniloff, 2013), only groups that focus solely on running were considered since the former is

more representative of “parkour” or “free-running” (O'Loughlin, 2012) which could afford different opportunities for social interactions. It was thought group running would facilitate interaction due to individuals spending time running in packs and having opportunities to interact at natural rests such as traffic lights. When considering a running group, satisfaction of the three basic psychological needs, including relatedness, was positively associated with more self-determined regulations (Wilson et al., 2006).

Crossfit. Crossfit is a training program that aims to use constantly varied functional movements at high intensity to increase work capacity across broad modal domains and times (What is crossfit?; Glassman, 2004). The focus of Crossfit is on creating general preparedness through improving strength and aerobic capacity (Glassman, 2004). Crossfit is a structured activity where the hosting facility will schedule the class. Individuals who practice Crossfit in their home gym or do not regularly take part in structured classes were not included. Crossfit provides members with many opportunities for interaction. Common practice is to have a weightlifting component of the class which includes rest between exercises. During this rest, participants have the opportunity to interact with one another. Additionally, due to the nature of the workouts, members do not all finish at the same time. This provides the opportunity for those individuals who finish early to interact with one another while encouraging the participants who are still completing the workout. Crossfit boasts its effectiveness is partially due to the community that arises when individuals exercise next to each other (Glassman, 2004). Similar to the running group, it is hypothesised that relatedness will contribute to more self-determined forms of motivation in this group due to the multiple opportunities for interaction. No research has been conducted in a Crossfit group in regards to self-determination theory.

Walking. Walking is a popular form of exercise that is easily accessible to a large amount of individuals (Morris & Hardman, 1997). Walking in a group has increasingly become a popular choice of exercise for individuals. For example, The Canadian Volkssport Federation has 34 clubs across Canada with 8 in Alberta. A major benefit of walking is the relatively low risk of injury and the ability to remain active into older age (Kassavou, Turner, & French, 2013; Ogilvie, Foster, Rothnie, Cavill, Hamilton, Fitzsimmons, & Mutrie, 2007). Walking is also a great activity for individuals to participate in to be active at a level consistent with the Canadian Physical Activity Guidelines. Walking at a moderate pace of 5 km/ hour expends sufficient energy to meet the definition of moderate intensity physical activity (Ogilvie, et al., 2007). Only walkers who meet with a specified walking group were considered for the present research. Walkers meet up at a location together, do a warmup then go for a walk for a desired distance. It is thought that group walking would have many opportunities for interaction due to individuals walking in close proximity to eachother and the general older age of the walkers relative to other activities. Older age of walkers may differentiate their motives from other activities.

Measures

Demographics. Demographic measures included single-item measures of age, gender, race, height, weight, total household income, education, occupation, marital status, number of children, and ages of children. See Appendix c for demographics measures.

Exercise. Three levels of exercise participation were considered and assessed: participation in all activities, participation in a primary activity, and participation in the recruitment activity, but only participation in the recruitment activity was used for subsequent analysis. Participation was measured using an adapted version of Godin's alternative questionnaire that assesses exercise frequency (Godin, Jobin, & Bouillon, 1986). Instructions

were adapted to be reflective of participation in group activity, as opposed to 20-30 minute sessions. Participants were asked to respond to the scale in reference to the three levels of activities – all activities participated in, main activity participated in, and the activity where recruitment occurred. Participants were asked to select one of the 7 options that best represented their behaviour ranging from 1 (*never)* to 8 (*7 times or more per week*). Past research has found this scale to be a reliable measure of behaviour with reliability scores of 0.64 (Godin, et al., 1986). Additionally, concurrent validity has been established relative to V02 max, body fat, and muscular endurance (Gionet & Godin, 1989; Godin et al., 1986). See *Appendix* D for measures of behaviour.

Motivational regulations.

Behavioural regulation in exercise questionnaire-3 (BREQ-3). The BREQ-3 measures individuals' external, introjected, identified, integrated, and intrinsic regulation, and amotivation in reference to exercise behaviour. Participants were asked to respond to 30 items on a 5-point Likert type scale of 0 (not true for me) to 4 (very true for me). Higher scores on a subscale indicate higher endorsement of the regulation the subscale is measuring. Reliability and validity of the BREQ-3 is currently in development and the present study will be part of the work to support the reliability and validity of the BREQ-3 (Markland, 2014, personal communication). The BREQ-3 was provided by Dr. David Markland via personal communication. See *Appendix* for the BREQ-3.

The dimensionality of the 30 items designed to assess motivational regulations were analyzed using a confirmatory factor analysis. The purpose of the factor analysis was to determine the underlying factor structure of the items designed to measure motivational regulations. Item 20 "I exercise because I think it is important to make the effort", which was

intended to measure identified regulation, factored most strongly with introjected approach regulation. Additionally its factor loading with identified regulation was not satisfactory (.51). As a result of the theoretical inconsistency, item 20 was eliminated from the results. All other items had acceptable loadings on their theorized constructs. Results of the confirmatory factor analysis indicated that the theorized model was acceptable for all constructs (chi-squared = 1029.38, $p<.001$, RMSEA = .05, CFI = .93, SRMR = .0). All scales had internal consistency greater than .7 indicating their appropriateness for use in subsequent analyses. See Appendix F for results of the confirmatory factor analysis.

Goal contents.

Exercise Motivation Inventory-28item (EMI-2). The EMI-2 is a 28-item measure designed, in consideration of self-determination theory, to assess reasons why individuals exercise (Markland & Ingledew, 1997). The EMI-2 consists of 14 factors including: stress management, revitalisation, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength, nimbleness (Markland & Ingledew, 1997). Participants were asked to respond in reference to a 6-point Likert scale ranging from 0 (*not at all true for me*) to 5 (*very true for me*). Despite the EMI-2 being developed to assess participatory motives, it was selected as a measure of goal content since participation motives have been defined as "the content of individuals' goals for participating in a particular domain of behaviour" (Ingledew & Markland, 2008; Ingledew, Markland, & Ferguson, 2009) which is analogous to the concepts drawn within goal content theory. Additionally, past research has successfully used the EMI-2 for similar reasons as the present study (Ingledew & Markland, 2008; Ingledew et al., 2009). The EMI-2 has been found to have factorial validity measuring exercise motives in adult males and females irrespective of

activity level (Markland & Ingledew, 1997). Additionally, males and females were found to differ in the regulations endorsed on the EMI-2 in a manner that was consistent with theoretical expectations (Markland & Hardy, 1993). The EMI-2 has previously demonstrated internal consistency reliability estimates ranging from .69-.95 (Markland & Ingledew, 1997). Test-retest reliability over a 4-5 week interval yielded alpha coefficients ranging from .59-.88 (Markland & Hardy, 1993). See *Appendix* G for the EMI-2.

The dimensionality of the 28 items from the exercise motivation inventory was analyzed using a principal components exploratory factor analysis with a direct oblimin (oblique) rotation. An oblique rotation was selected due to the theoretical association between the items. Results of the rotated solution yielded 6 interpretable factors of healthy body, weight management, superiority, revitalization, social, and health pressures explaining a total of 62.52% of the total item variance. Although results were not completely consistent with the theorized constructs, all factors were interpretable. No items cross-loaded with a coefficient greater than 0.3. An internal consistency estimate of reliability was computed for each subscale of the EMI-2. All scales, except health pressures, had a satisfactory (Cronbach's alpha >.7) internal consistency indicating they were appropriate for use in subsequent analyses. The health pressures subscale was not retained for future analyses. See *Appendix* for the factor analysis and internal consistency values of EMI-2.

Psychological need satisfaction.

Psychological Need Satisfaction in Exercise Scale (PNSE). The PNSE is an 18-item exercise-specific measure of need satisfaction that is designed within the framework of self-determination theory (Wilson, Rogers, Rodgers, & Wild, 2006). The PNSE contains 3 subscales comprised of 6-items designed to measure the extent to which adults perceive need satisfaction

within a structured exercise context (Wilson et al., 2006). Participants were instructed to respond to each item on a 6-point Likert scale (1=False… 6=True) following the stem "The following statements represent different experiences people have when they exercise. Please answer the following questions by considering how you typically feel while you are exercising". Research using the PNSE has consistently found support for the structural and convergent validity of the PNSE finding an internal consistency greater than .90 for all three subscales (Sebire et al., 2009; Wilson et al., 2006). Furthermore, researchers have found acceptable intraclass correlations of the PNSE when test administrations were separated by a 10-week interval (Wilson & Rogers, 2008). Confirmatory factor analysis has confirmed that the PNSE constructs conform to the theoretically expected model (Gunnell, Wilson, Zumbo, Mack, & Crocker, 2012). While strong support for the PNSE exists, a noted limitation of the measure is that it may focus too much on decisional autonomy (the ability to freely make a choice) and ignore the affective dimension (engaging in activities that provide pleasure and enjoyment) (McDonough & Crocker, 2007). See *Appendix* I for the PNSE.

The dimensionality of the 18 items from the psychological need satisfaction in exercise questionnaire was analyzed using a principal components exploratory factor analysis with a direct oblimin (oblique) rotation. An oblique rotation was selected due to the theoretical association between the items. Results of the rotated solution yielded three interpretable factors of autonomy, relatedness, and competence, explaining a total of 68.88% of the total item variance. Results are consistent with theoretical conceptualizations and all items converged with their theoretical factor. No items cross-loaded with a loading coefficient greater than 0.3.

An internal consistency estimate of reliability was computed for each subscale of the PNSE. All scales had a satisfactory (>.7) internal consistency indicating they were appropriate for use in subsequent analyses. See Appendix J for factor analysis and internal consistency of PNSE.

Relatedness to Others in Physical Activity Scale (ROPAS). The ROPAS is a 6-item measure of the degree to which individuals feel a sense of relatedness when engaging in physical activity (Wilson & Bengoechea, 2010). Participants were asked to respond to a 6-item likert scale ranging from 1 (False) to 6 (True) in respect to how the responder typically feels when participating in physical activity (Wilson & Bengoechea, 2010). Use of the ROPAS in addition to the PNSE will benefit present research by allowing a measure of relatedness that is separate from a measure of competence and autonomy. ROPAS was developed out of findings using self-determination theory that relatedness, when measured in conjunction with autonomy and competence, consistently did not contribute to well-being, positive affect, autonomous regulations, or behavioural outcomes (Wilson & Bengoechea, 2010). Limited evidence is currently available pertaining to the reliability and validity of the ROPAS, however; initial studies have found structural and construct validity for the ROPAS (Wilson & Bengoechea, 2010). Additionally, the ROPAS was found to be a reliable measure with Chronbachs alpha scores ranging between .7-.97 (Wilson & Bengoechea, 2010). See *Appendix* K for the ROPAS.

The dimensionality of the 6 items from the Relatedness to Others in Physical Activity Settings questionnaire was analyzed using a principal components exploratory factor analysis with a direct oblimin (oblique) rotation. An oblique rotation was selected due to the associations between the items. Results of the rotated solution yielded one interpretable factor of relatedness, no items cross-loaded with a loading coefficient greater than 0.3. Satisfactory internal

consistency reliability was found (alpha = .929) indicating the scale is appropriate to use in subsequent analyses. See Appendix L for factor analysis and internal consistency of the ROPAS.

Social comparison.

A dearth of reliability and validity information pertaining to measures of social comparison resulted in a pilot study to determine if the measures would be appropriate for use. See *Appendix* M for description and results of the pilot study.

Presence of social comparison. To determine whether individuals compare themselves to others in a general sense, following the stem "while I do [activity]" individuals responded to a single item measure "I compare myself to others". Participants responded in reference to a 5-point scale with anchors of 1 (*not at all*) to 5 (*extremely*). While this item was not retrieved from the literature, it was implemented to determine if individuals compare themselves in the exercise setting. As a result, it has high face validity and was believed to be an appropriate measure. See *Appendix* N for presence of social comparison

Frequency of social comparison. Frequency of social comparison was measured using two items adapted from (Ginis et al., 2007) to be relevant to all exercise as opposed to the most recent bout.

1) While I exercise, I compare my level of physical fitness to the physical fitness of other people in the room.
2) While I exercise, I compare my physical appearance to the appearance of other people in the room.

Participants responded in reference to a 5-point scale with anchors of 1 (*not at all*) to 5 (*extremely*). These items have demonstrated to represent unique constructs (Ginis et al., 2007). Additionally, they have been found to be differentially endorsed within different exercise

contexts (Ginis et al., 2007). Information regarding the validity or reliability of the measure was not available. In order to ensure validity, researchers with knowledge in questionnaire development and the research area were consulted to ensure a consensus the items are an appropriate measure of social comparison. To ensure reliability, a 2-week test retest pilot study was conducted. Chronbach's alpha (alpha=.782) found the items to be measuring a similar construct, presumably comparison. Additionally, a 2-week test retest procedure found a strong correlation for the appearance comparison measure (r=.699, p<.001) and the fitness comparison measure (r=.729, p<.001) (Cohen, 1988). See *Appendix* O for frequency of social comparison.

Perceived social evaluation. Perceived social evaluation was measured using two items adapted from Martin Ginis et al. (2007) to be relevant to all exercise as opposed to the most recent bout.

1) While I am exercising, I perceive that others are evaluating me on a 7-point likert scale with anchors of 1 (*Other people judge me*) to 7 (*nobody was judging me*).
2) While I am exercising, I am worried that other people are judging me on a 5-point likert scale ranging from 1 (*not at all*) to 5 (*extremely*).

Information regarding the validity or reliability of the measure was not available. In order to ensure validity, researchers with knowledge in questionnaire development and the research area were consulted to ensure a consensus the items are an appropriate measure of concern of evaluation. Chronbachs' alpha indicated that the items were measuring a similar construct (alpha=.775). Reliability of the items was verified via a 2-week test-retest protocol. A strong correlation was found between the responses at the two times for the evaluating item (r=.774, p<.001) and the judging item (r=.734, p<.001). See *Appendix* P for perceived social evaluation.

The dimensionality of the 5 items designed to assess social comparison in the exercise setting were analyzed using a principal components exploratory factor analysis with a direct oblimin (oblique) rotation. An oblique rotation was selected due to the associations between the items. Results of the rotated solution yielded one interpretable factor of "social comparison". No items cross-loaded with a loading coefficient greater than 0.3. Satisfactory internal consistency reliability was found (alpha = .852) indicating the scale is appropriate to use in subsequent analyses. See Appendix Q for results of the factor analysis and internal consistency of all social comparison measures.

Physical Activity Group Environment Questionnaire (PAGEQ). The PAGEQ is a 21-item questionnaire designed to assess four manifestations of group cohesion (Estabrooks & Carron, 2000). Consideration of this scale provides insight into how individuals perceive the presence and importance of interactions with co-exercisers. The PAGEQ is divided into four subscales: individuals attraction to the group – task (6-items), individuals attraction to the group – social (6-items), group integration – task (5-items), and group integration – social (4-items) (Estabrooks & Carron, 2000). For purposes of the present study, only the social subscales were considered. Only the social subscales were used since the task relevant scales were reflective of the activity being done and the satisfaction of the activity which would be a non-SDT repetition of the EMI-2. Participants were asked to respond to each item on a 9-point Likert-type scale ranging from 1 (*very strongly disagree*) to 9 (*very strongly agree*). Past research has found the PAGEQ to have content validity, concurrent validity, and predictive validity (Estabrooks & Carron, 2000). Chronbach alphas of internal consistencies of the social scales have been found to range from .85-.87 (Estabrooks & Carron, 2000). Similarly, reliability estimates presenting

chronbach alphas ranging from .72-.94 (Estabrooks & Carron, 2000). See *Appendix* Appendix S for the PAGEQ.

The dimensionality of the 10 items from the physical activity group environment questionnaire was analyzed using a principal components exploratory factor analysis with a direct oblimin (oblique) rotation. An oblique rotation was selected due to the associations between the items. Results of the rotated solution yielded one interpretable factor of "attraction to group", no items cross-loaded with a loading coefficient greater than 0.3. Satisfactory internal consistency reliability was found (alpha = .951) indicating the scale is appropriate to use in subsequent analyses. See Appendix T for the factor analysis and internal consistency of the PAGEQ.

Procedures

Facilities that hosted a class or group engaged in one of the activities of interest were identified via online searches and personal communication with various individuals. Upon being identified, the researcher contacted the facility via phone or e-mail to introduce the study and ask permission to attend a series of group exercise sessions to recruit participants. If permission to attend was granted, the researcher attended sessions at the agreed upon time(s) to present a brief recruitment presentation to exercise participants prior to the start or immediately following the completion of a class. Some sites volunteered to assist with additional recruitment via a mass e-mail to their members, a post in a facebook group, etc.

When possible, facilities that focussed specifically on the activity of interest (e.g., yoga studios were approached as opposed to recreation centres that offered yoga classes) were included. Yoga, Crossfit, and spin facilities all specialized in their respective activities, which was their business focus. Since no businesses were found that specialized solely in organizing

running or walking, runners and walkers were recruited from facilities that coordinated a place and time for individuals to meet for their respective activity.

Interested participants were asked to provide the researcher with their e-mail addresses. Within 24 hours the researcher e-mailed each participant the information letter and a link to an online questionnaire, containing measures of demographics, behaviour, SDT variables, social comparison, and attraction to group, to be completed at the convenience of the participant. If a survey was not returned within approximately 48 hours of delivery, a prompt was sent to the participant to encourage completion of the questionnaire. If a questionnaire remained unreturned, a final e-mail prompt was sent 4 days after the first prompt.

Following a 2-week period after the participant completed the first questionnaire, a follow-up questionnaire was e-mailed to the participant to measure behaviour in the two-week period between questionnaires. Participants who did not return this follow-up questionnaire after 48 hours were sent a prompt to complete the questionnaire. If it was still unreturned, a final prompt was sent 4 days after the first prompt. This follow-up questionnaire contained a measure of exercise behaviour (Appendix D).

Analyses

All data was analyzed using SPSS 21.

Design statement. This research employed a cross-sectional design with a primary survey followed by a brief assessment of behaviour one week later.

Multivariate Analysis of Variance (MANOVA). To accomplish the primary purpose, MANOVA was used to determine if any of the dependant variables were significantly differed by exercise context. If found that the *F*-scores were statistically significant, Tukey's post-hoc tests were used to determine which groups were significantly different in regards to which

dependent variables. For all analyses, Pillai's Trace is the reported F-statistic. A p value of $p<.05$ will be considered significant.

MANOVA analysis was selected to minimize the likelihood of a type 1 error; a significant finding when no difference is present, which could occur when conducting repeated ANOVAs (Tabachnick & Fidell, 2006).

In order to conduct a MANOVA, three assumptions must be considered:

1) Data collection points must be independent of each other. This was assured through the use of an independent measures design.
2) Responses are normally distributed. However, in large samples (n>200), underestimates of variance associated with kurtosis dissappears (Tabachnick & Fidell, 2006). Additionally, the Central Limit Theorem predicts that normality will be observed with sufficiently large sample sizes regardless of the distribution of variables (Tabachnick & Fidell, 2006). The *F*-test is robust to violations of normality homogenity of variance when 20 degrees of freedom are observed (Tabachnick & Fidell, 2006). It is recommended that with large deviations from homogeneity of variance, an alpha value of .01 be adopted as opposed to .05 (Tabachnick & Fidell, 2006).
3) Outliers are not present within the data. The presence of an outlier can create a type 1 error. As a result, it would be important to identify any outliers within the data. Comparison of variable actual means and 5% trimmed means revealed that no differences greater than .1 were present among any variable except autonomy that had a .11 difference when activity groups were collapsed. Within yoga and run, the difference between the actual mean and 5% trimmed mean

was .11 and .1 respectively. No other activity groups had a discrepancy greater than .1. Due to the relatively small influence outliers had on the means of the groups, in the interest of preserving data and most accurately representing the activities, outliers were not adjusted.

Power Calculations. To ensure this study was statistically powered with $\alpha = .05$, a medium effect size, MANOVA statistical procedures, and 5 sample activities; 39 participants were recommended in each group (Cohen, 1992). Thus, a minimum of 195 participants was required. A medium effect size is in consideration of conflicting findings of relatedness being strongly endorsed in social exercise contexts (McDonough & Crocker, 2007) and unassociated with exercise in other contexts (Markland & Tobin, 2010). To account for missing data and outliers, as well as account for attrition at time 2, the recommended total sample size was increased to 100 participants per group, for a total of $n = 500$.

Chapter 3: Results

Participants

The sample consisted of adult (> 18 years old) exercisers of varying experience levels from a large Canadian city who, at the time of data collection, were active in a minimum of one of the five exercise activities of interest (yoga, spin, running, Crossfit, or walking). Participants who were involved in multiple activities were asked to respond regarding only the specific activity they were recruited from.

Thirty activity groups participated in the research (3 spin studios, 5 yoga studios, 7 walking groups, 5 Crossfit gyms, and 10 running clubs or groups). E-mail addresses were received from 832 individuals following a brief recruitment presentation to each of the 30 groups. It is unknown how many unique individuals listened to the presentation since facilities/groups were visited on multiple occasions and an individual may have heard the presentation multiple times. Also some facilities sent online newsletters containing the study information to their members. The final sample consisted of 635 individuals who completed the first questionnaire; 477 of whom completed the second questionnaire.

Demographic information regarding individuals who participated in study 1 and study 2 including between activity differences can be found in Appendix B.

Between Activity Demographic Differences

To determine if the activities varied on demographic variables of age, BMI, income, or education, a series of MANOVA and ANOVA analyses were conducted. An ANOVA and MANOVA was selected as opposed to one MANOVA due to individuals not completing all demographic data. In particular, less individuals (n=553) indicated income than age (n=630), height and weight (n=628), or education (n=626). A MANOVA utilizing all four variables would

only retain 539 individuals, a loss of 91 (14.45%) individuals who indicated age. A MANOVA including age, height and weight, and education included 614 cases. Due to the relatively low loss of data and decreased likelihood of creating a type 1 error, a MANOVA was selected to analyze between activity differences in age, BMI, and education while a separate ANOVA was conducted to analyze between activity group income differences. Gender differences were also examined via MANOVA and ANOVA.

Main effect of activity group was found for age (F (4, 609)= 140.386, $p < .001$, $\eta^2 = .48$), BMI (F (4, 609)= 5.734, $p < .001$, $\eta^2 = .036$), and education (F (4, 609)= 3.106, $p < .05$, $\eta^2 = .02$), and income (F (4, 552)= 3.737, $p < .01$, $\eta^2 = .021$) at time 1. A main effect for gender was also found at time 1 for BMI (F (1, 609)= 30.799, $p < .001$, $\eta^2 = .048$) and income (F (1, 549)= 5.34, $p < .05$, $\eta^2 = .01$). No main effect of gender was found at time 1 for age (F (1, 609) = .166, $p>.05$, $\eta^2 = .000$) or education (F (1, 609)= .049, $p > .05$, $\eta^2 = .000$).

At time 2 a main effect of activity group was found for age (F (4, 458)= 114.555, $p < .001$, $\eta^2 = .5$), BMI (F (4, 458)= 5.467, $p < .001$, $\eta^2 = .046$), education (F (4, 458)= 3.476, $p < .01$, $\eta^2 = .029$), and income (F (4, 419)= 3.208, $p < .05$, $\eta^2 = .03$). A main effect for gender at time 2 was found for BMI (F (1, 459)= 19.99, $p < .001$, $\eta^2 = .042$) and income (F (1, 417)= 3.952, $p < .05$, $\eta^2 = .009$). No main effect of gender was found for age (F (1, 459)= .357, $p >.05$, $\eta^2 = .001$) or BMI (F (1, 459)= .000, $p >.05$, $\eta^2 = .000$) at time 2.

Comparison of individuals who completed time 1 questionnaire and those who only completed time 1 questionnaire revealed those who completed time 2 questionnaire tended to be older (F (1, 612)= 5.608, $p < .05$, $\eta^2 = .009$). No other demographic differences were found. Complete demographic information is presented in Table 1.

Gender and Ethnicity. It was found that despite all groups being predominantly female, crossfit and to a lesser extent running had a more even gender ratio than any of the other activities. The sample predominantly consisted of individuals who identified as Caucasian.

Missing Values Analysis

A missing value analysis was conducted to determine if responses were missing at random. Variables were considered missing if there was greater than 5% missing data and response differences were only explored if there was a response differential greater than 5%. A cutoff of 5% was utilized due to recommendations that imputing data would be minimally beneficial if less than 5% of a large data set is missing (Tabachnick & Fidell, 2006).

Drop off. A number of respondents ceased participation prior to completing the questionnaire. Sixty individuals did not contribute data beyond demographics, 80 individuals did not contribute data beyond PNSE, 94 individuals did not contribute data beyond the BREQ, 95 individuals did not contribute data beyond PAGEQ, and 98 individuals did not contribute data past social comparison. This pattern is consistent with items later in the questionnaire having a lower response rate than items at the beginning of the questionnaire. This may indicate that the questionnaire was too long.

Individual sub-scales. Individual Little's MCAR tests were conducted for each sub-scale to determine if variables were randomly missing within each questionnaire. For this analysis, each scale was considered separately and only cases where individuals completed atleast 1 question of the scale was considered. No sub-scales were missing for greater than 5% of cases.

Single items. An examination of within questionnaire, between item responses was conducted. There was no difference in response rate to the individual items of the EMI, PNSE, ROPAS, or PAGEQ. BREQ item 24 "I exercise because it is consistent with my values" was the

only item that was unanswered in more than 5% of cases, however; it was not unanswered in 5% more cases than any of the other BREQ items. Individuals were less likely to respond to the social comparison question "While I do [activity], I compare myself to others" than to the other social comparison questions. This is possibly due to participants perceiving this item redundant to the more specific questions regarding fitness and appearance comparison that immediately followed.

Demographics influence on missing data. Older individuals and females tended to have the least missing data. Individuals who reported a yearly income less than 15,999$ were less likely to complete all items (approximately 73% completed data) compared to compared to individuals of higher income (90-100% completed data). Individuals who reported higher educational obtainment tended to have higher completion rates than individuals who reported lower educational obtainment. Those who indicated their relationship status as "separated" or "no response" had a lower response rate than any other category, however, this may be a result of the low sample sizes for each group resulting in the percent of incomplete data being drastically increased as the result of one individual not completing the questionnaire. BMI was unassociated with response rate.

Independent samples t-tests were conducted to determine if there was a mean difference in age, BMI, income, or education between the group of individuals who only completed demographic measures and the group of individuals who completed items beyond the demographics. A t-test was selected as opposed to a MANOVA in an effort to preserve data. Through the use of a t-test, all cases with relevant data would be analyzed whereas a MANOVA would only consider the case if all variables had scores. Conducting a MANOVA with age, BMI, and education would result in the loss of 7 (11.48%) individuals who only completed

demographics. To reduce the likelihood of a type 1 error, a value of $p<.01$ was considered significant.

Between the demographic only and beyond demographic groups, no difference was found relative to age $t(693) = 1.777$, $p>.05$, income $t(606) = .28$, $p>.05$, education $t(687) = -.615$, $p>.05$, or BMI $t(690) = -.14$, $p>.05$. A lack of difference between groups indicates that of those individuals who initiated the questionnaire, a response bias relative to demographic variables was unlikely present and individuals who responded were likely representative of the activity. Descriptive statistics of these groups are presented in Table 1.

Table 1

Descriptive Statistics of Demographics of Participants Who Completed Items Beyond Demographics and Who Only Completed Demographics

	Contributed data beyond demographics	Only completed demographics
Sample size	635	58
% female	70.8	66.7
Age M (SD)	40.13 (13.84)	43.53 (12.77)
BMI M (SD)	24.78 (4.14)	24.78 (4.21)
Marital Status		
Single	165 (25.98%)	10 (17.24%)
Legal Relationship	396 (62.36%)	36 (62.06%)
No longer legal relationship	66 (10.39%)	12 (20.68%)
No response	4 (0.63%)	0 (0.00%)
Education		
High school/College	227 (35.74%)	22 (37.93%)
Bachelors Degree	255 (40.15%)	21 (36.20%)
Beyond Bachelors	125 (19.68%)	11 (18.96%)
Missing	24 (3.77%)	4 (6.89%)
Income		
<100k	250 (39.37%)	17 (29.31%)
>100k	304 (47.87%)	31 (53.44%)
Undeclared	82 (12.91%)	10 (17.24%)

Purpose 1

Purpose 1: To determine if there is a between activity group difference in goal contents, need satisfaction, and motivational regulations. Age, BMI, income, and education were entered as covariates for all analyses due to the previously noted between activity group demographic differences.

Between activity differences in goal content. A 5 (goal content) x 5 (activity group) one-way MANOVA was conducted. A main effect for activity was found (F (20, 2280) = 18.10, p<.001, η^2 = .137). MANCOVA controlling for age and BMI was significant (F (20, 2232) = 12.87, p<.001, η^2 =.103). Income and education were not significant covariates.

Covarying for age and BMI, activity groups differed in endorsement of healthy body goals (F (4,559) = 5.76, p<.001, η^2 =.04), superiority goals (F (4, 559) = 16.78. p<.001, η^2 =.107), weight management goals (F (4, 559) = 11.49, p<.001, η^2 =.076), revitalization goals (F (4, 559) = 3.12, p<.05, η^2=.022), and social goals (F (4, 559) = 19.17, p<.001, η^2 =.121). Generally, yogis were least likely to endorse superiority and weight management goals. Yogis and spinners were least likely to endorse social goals. Runners were least likely to endorse healthy body goals. Tukey's post-hoc tests revealing between group differences are reported in Table 2.

Follow up univariate analysis indicated that age was a significant covariate for superiority goals (F (1,559) = 24.297, p<.001, η^2 = .042) such that older individuals endorsed superiority goals less than younger individuals (r= -.300, p<.001). BMI was a significant covariate of weight management goals (F (1, 559) = 36.961, p<.001, η^2 = .062) such that higher BMI was associated with stronger endorsement of weight management goals (r= .261, p<.001).

Between activity group differences in psychological need satisfaction in exercise. To determine differences between activity groups in psychological need satisfaction, a 3 (psychological needs) x 5 (activity group) one-way MANOVA was conducted. A main effect for activity was found (F (12, 1755) = 12.566, p<.001, η^2 = .08). MANCOVA controlling for age, income, education, and BMI was significant (F (12, 1470) = 7.989, p<.001, η^2 = .061).

Covarying for age, income, education, and BMI, univariate statistics determined the needs for competence (F (4, 490) = 4.225, p<.01, η^2 =.033), autonomy (F (4, 490) = 8.87, p<.001, η^2 = .068), and relatedness (F (4, 490) = 11.615, p<.001, η^2 =.087) were differentially satisfied in each exercise context. Generally, yoga and spin had the lowest satisfaction of the need for relatedness. Yoga and Crossfit had lower satisfaction of the need for competence than running and spin. Crossfit had the lowest satisfaction of the need for autonomy. Tukey's post-hoc tests identifying between group differences are reported in Table 2.

Age was a significant covariate of the satisfaction of the need for competence (F (1, 490) = 5.122, p<.05, η^2 = .01) such that younger individuals had greater satisfaction of the need for competence (r= -.069) than older individuals. BMI was a significant covariate of the need for relatedness (F = (1, 490) = 4.662, p<.05, η^2 = .009) and competence (F (1, 490) = 10.714, p<.01, η^2 = .021) such that individuals of higher BMI had lower satisfaction of the need for relatedness (r= -.024) and competence (r= -.12). Education was a significant covariate of the satisfaction of the need for relatedness (F (1,490) = 7.744, p<.01, η^2 = .016) and competence (F (1,490) = 4.642, p<.05, η^2 = .009) such that more highly educated individuals had lower satisfaction of the need for relatedness (r=-.126) and competence (r= -.069). Income was a significant covariate of the need for competence (F (1, 490) = 8.16, p<.01, η^2 = .016) such that those with higher income had greater satisfaction of the need for competence (r=.079).

Between activity group differences in attraction to group. To determine between activity differences in attraction to group, a 1 (PAGEQ) x 5 (activity group) one-way ANOVA was conducted. A main effect of group was present (F (4, 577) = 46.046, p<.001, η^2 =.242). Age, income, education, and BMI were not significant covariates of attraction to group. Runners, crossfitters, and walkers had greater attraction to group than yogis and spinners. Tukey's post-hoc tests identifying between groups differences are reported in Table 2.

Between activity group differences in relatedness (ROPAS). To determine between activity differences in the satisfaction of the need for relatedness, as measured by the ROPAS questionnaire, a 1 (ROPAS) x 5 (activity group) one-way ANOVA was conducted. A main effect of activity was found (F (4, 583) = 27.216, p<.001, η^2 = .157). Age, income, education, and BMI were not significant covariates. Runners, crossfitters, and walkers reported greater relatedness satisfaction than yogis and spinners. Tukey's post-hoc tests identifying between groups differences are reported in Table 2.

Between activity group differences in motivational regulations. To determine between activity differences in motivational regulation endorsement, a 7 (motivational regulations) x 5 (activity group) one-way MANOVA was conducted. A main effect of activity was found (F (28, 2216) = 2.88, p<.001, η^2 = .035). MANCOVA controlling for age and BMI was significant (F (28, 2160) = 2.973, p<.001, η^2 = .038). Income and education were not significant covariates.

Covarying for age and BMI, univariate statistics revealed activity groups differed in endorsement of external regulation (F (4, 543) = 5.729, p<.001, η^2 =.04), introjected avoidance regulation (F (4, 543) = 4.268, p<.01, η^2 =.03), introjected approach regulation (F (4, 543) = 2.697, p<.05, η^2 = .019), integrated regulation (F (4, 543) = 3.517, p<.01, η^2 =.025), and intrinsic regulation (F (4, 543) = 2.781, p<.05, η^2 =.02). Amotivation (F (4, 543) = 1.926, p>.05, η^2 =.014)

and identified regulation (F (4,543) = 1.768, p>.05, η^2 = .013) were not differentially endorsed relative to activity. Tukey's post-hoc tests revealing between group differences are reported in Table 2.

Age was a significant covariate for amotivation (F (1, 543) = 4.363, p<.05, η^2 = .008), external regulation (F (1, 543) = 10.964, p=.001, η^2 = .02), and introjected avoidance regulation (F (1, 543) = 36.016, p<.001, η^2 = .062) such that older individuals had lower endorsement of those regulations; (r= -.09, p<.05, r= -.009, p>.05, and r= -.244, p<.001 respectively).

BMI was a significant covariate for amotivation (F (1,543) = 6.541, p<.05, η^2 = .012) and external regulation (F (1,543) = 7.792, p<.01, η^2 = .014) such that individuals with a higher BMI had higher endorsement of these regulations, (r= .11, p<.01 and r= .111, p<.01 respectively). BMI was negatively associated with identified regulation (F (1,543) = 8.845, p<.01, η^2 = .016), integrated regulation (F (1,543) = 15.084, p<.001, η^2 = .027), and intrinsic regulation (F (1, 543) = 15.494, p<.001, η^2 = .026) such that individuals of higher BMI had lower endorsement of these regulations (r= -.114, p<.01, r= -.166, p<.001, and r= -.163, p<.001 respectively).

Table 2

Means, Standard Deviations, and Multivariate and Post-hoc Tests of Between Groups Differences on EMI variables.

	Yoga M (SD)	Crossfit M (SD)	Run M (SD)	Walk M (SD)	Spin M (SD)	Tukey's *post hoc*
EMI	n=101	n=140	n=117	n=85	n=123	
Healthy body goals	4.61 (.44)	4.60 (.44)	4.35 (.56)	4.63 (.51)	4.51 (.59)	y > r*** c > r*** w > r*** s > r*
Superiority goals	2.49 (.79)	3.21 (.77)	3.27 (.77)	2.83 (.83)	3.06 (.89)	c > y*** r > y*** w > y* s > y*** c > w** r > w*** r > s*
Weight management goals	3.51 (1.27)	3.78 (1.02)	4.08 (.99)	4.03 (1.14)	4.36 (.76)	c > y* r > y*** w > y** s > y*** r > c* s > c*** s > r*
Revitalization goals	4.45 (.66)	4.32 (.67)	4.05 (.76)	4.05 (1.01)	4.13 (.89)	y > r* y > w** y > s**

	Yoga M (SD)	Crossfit M (SD)	Run M (SD)	Walk M (SD)	Spin M (SD)	Tukey's *post hoc*
Social goals	2.54 (1.24)	3.62 (1.07)	3.71 (1.01)	3.75 (1.28)	3.04 (1.25)	c > y*** r > y*** w > y*** s > y*** c > s*** r > s*** w > s***
PNSE	n=94	n=124	n=106	n=70	n=105	
Competence	5.05 (.73)	5.13 (.68)	5.39 (.60)	5.28 (.87)	5.34 (.59)	r > y*** s > y** r > c** s > c*
Autonomy	5.01 (1.07)	4.65 (1.20)	5.34 (.84)	5.43 (.63)	5.27 (.90)	r > y* w > y* y > c** r > c*** w > c*** s > c***
Relatedness	4.48 (1.23)	5.28 (.73)	5.06 (.81)	5.10 (1.08)	4.67 (1.0)	c > y*** r > y*** w > y*** c > s*** r > s** w > s*

	Yoga M (SD)	Crossfit M (SD)	Run M (SD)	Walk M (SD)	Spin M (SD)	Tukey's *post hoc*
PAGEQ	n=104	n=146	n=121	n=88	n=123	
Attraction to group	4.58 (2.26)	7.02 (1.75)	6.75 (1.57)	6.58 (1.98)	4.57 (2.23)	c > y*** r > y*** w > y*** c > s*** r > s*** w > s***
ROPAS	n=106	n=148	n=123	n=87	n=124	
Relatedness	4.13 (1.22)	4.96 (.88)	5.00 (.93)	5.01 (.87)	4.06 (1.13)	c > y*** r > y*** w > y*** c > s*** r > s*** w > s***
BREQ	n=100	n=132	n=120	n=79	n=119	
Amotivation	1.05 (.20)	1.00 (.10)	1.05 (.16)	1.07 (.20)	1.78 (.35)	
External regulation	1.20 (.45)	1.18 (.42)	1.31 (.47)	1.61 (.72)	1.34 (.62)	s > c* w > y*** w > c*** w > r*** w > s**
Introjected avoidance regulation	2.04 (1.00)	2.22 (1.03)	2.49 (.99)	2.63 (.99)	2.45 (1.00)	r > y*** w > y** s > y** r > c* w > c*

	Yoga M (SD)	Crossfit M (SD)	Run M (SD)	Walk M (SD)	Spin M (SD)	Tukey's *post hoc*
Introjected approach regulation						
	3.49 (.89)	3.71 (.82)	3.76 (.77)	3.55 (.92)	3.82 (.88)	r > y* s > y**
Identified regulation						
	4.65 (.48)	4.79 (.41)	4.72 (.50)	4.82 (.40)	4.77 (.46)	
Integrated regulation						
	4.00 (1.02)	4.29 (.85)	4.26 (.71)	3.84 (1.00)	4.10 (.95)	c > y* r > y* c > w** r > w**
Intrinsic regulation						
	4.45 (.64)	4.58 (.66)	4.41 (.68)	4.20 (.77)	4.34 (.80)	c > w** c > s**

Note: y=yoga, c=crossfit, r=run, w=walk, s=spin
*p<.05; **p<.01; ***p<.001

Purpose 2

Purpose 2: To examine gender differences collapsed across groups (purpose 2.1); gender differences within activities (purpose 2.2); and gender x activity (purpose 2.3) differences in goal content, psychological need satisfaction, and motivational regulations. Age, BMI, income, and education were entered as covariates for all analyses due to the previously noted between activity demographic differences. The sample was predominantly female, see Table 4 and Table 5 for a breakdown of activity gender composition. For all analyses, Pillai's Trace is the reported F-statistic. A *p* value of $p<.05$ was considered significant.

Purpose 2.1

Gender Differences in Goal Content. A 5 (goal content) x 2 (gender) one-way MANOVA was conducted. A significant main effect of gender was found (F (5, 567) = 5.103, $p<.001$, $\eta^2 = .043$). MANCOVA covarying age, BMI, and income was significant (F (5, 487) = 5.702, $p<.001$, $\eta^2 = .055$). Males endorsed superiority goals more than females and weight management goals less than females. Healthy body, revitalization, and social goals were not differently endorsed by men and women. Means, standard deviations, *F*-statistics, significance, and effect sizes are presented in Table 3.

Covarying age, income, and BMI, univariate analysis revealed age was a significant covariate for healthy body goals (F (1, 491) = 5.011, $p<.05$, $\eta^2 =.01$) and social goals (F (1, 491) = 15.992, $p<.001$, $\eta^2 =.032$) such that older individuals had higher endorsement of the goals ($r=.095$, $p<.05$ and $r=.177$, $p<.01$ respectively). Age was a significant covariate for superiority goals (F (1, 491) = 42.311, $p<.001$, $\eta^2 =.079$) and revitalization goals (F (1, 491) = 4.911, $p<.05$, $\eta^2 =.01$) such that older individuals had less endorsement of these goals ($r= -.3$, $p<.01$ and $r= -.103$, $p<.05$ respectively).

BMI was a significant covariate of weight management goals (F (1, 491) = 42.304, p<.001, η^2 =.079) such that individuals with a larger BMI endorsed greater weight management goals (r= .261, p<.001). Income was a significant covariate for healthy body goals (F (1,491) = 5.239, p<.05, η^2 =.011) such that those of higher income endorsed healthy body goals less (r=-.086, p=.051).

Gender Differences in Satisfaction of Basic Psychological Needs. A 3 (basic psychological needs) x 2 (gender) one-way MANOVA was conducted to examine gender differences in need satisfaction. A main effect of gender was found (F (3, 583) = 2.767, p<.05, η^2 =.014). Univariate statistics indicated no gender difference in satisfaction of basic psychological needs. MANCOVA covarying age, income, education, and BMI was not significant (F (3, 488) = 2.63, p=.05, η^2 = .016). Means, standard deviations, F-statistics, significance, and effect sizes are presented in Table 3.

Age was a significant covariate for the satisfaction of the need for competence (F (1, 490) = 4.612, p<.05, η^2 = .009) such that older individuals had less perceived satisfaction of competence (r= -.069, p>.05). Age was a significant covariate of the satisfaction of the need for autonomy (F (1, 490) = 11.172, p=.001, η^2 =.022) such that older individuals had greater perceived satisfaction of autonomy (r= .171, p<.001).

BMI was a significant covariate of the satisfaction of the need for competence (F (1, 490) = 12.762, p<.001, η^2 =.025) such that individuals of a greater BMI had lower satisfaction of the need for competence (r= -.12, p<.01).

Income was a significant covariate of the satisfaction of the need for competence (F (1, 490) = 8.435, p<.01, η^2 = .017) such that individuals of a higher income had greater satisfaction of the need for competence (r= .079, p>.05).

Education was a significant covariate of the satisfaction of the need for relatedness (F (1, 490) = 9.098, p<.01, η^2 = .018) and the satisfaction of the need for competence (F (1, 490) = 6.508, p<.05, η^2 = .013) such that individuals of higher education reported less satisfaction of each psychological need (r= -.126, p<.01 and r= -.069, p>.05 respectively).

Gender Differences in Attraction to Group. A 1 (PAGEQ) x 2 (gender) one-way ANOVA was conducted to examine gender differences in attraction to group. No gender difference was found (F (1, 577) = 1.463, p>.05, η^2 =.003). A null finding persisted when age was entered as a covariate (F (1, 572) = 1.021, p>.05, η^2 = .002). Income, education, and BMI were not significant covariates. Means, standard deviations, F-statistics, significance, and effect sizes are presented in Table 3.

Age was a significant covariate (F (1, 572) = 7.691, p<.01, η^2 = .013) such that older individuals had greater attraction to group (r= .114, p<.01).

Gender Differences in ROPAS Responses. A 1 (relatedness) x 2 (gender) one-way ANOVA was conducted to examine gender differences in the satisfaction of the need for relatedness as measured by the ROPAS. No gender difference was found (F (1, 583) = .627, p>.05, η^2 = .001). A null finding persisted when age was entered as a covariate (F (1, 577) = .404, p>.05, η^2 =.001). Income, education, and BMI were not significant covariates. Means, standard deviations, F-statistics, significance, and effect sizes are presented in Table 3.

Age was a significant covariate such that older individuals had greater satisfaction of the need for relatedness (r=.14, p=.001) than younger individuals.

Gender Differences in Motivational Regulations. A 7 (motivational regulations) x 2 (gender) one-way MANOVA was conducted to examine gender differences associated with endorsement of motivational regulations. A main effect for gender was found (F (7, 552) =

2.077, $p<.05$, $\eta^2 = .026$). This effect persisted when covarying age, income, and BMI (F (7, 470)= 2.76, $p<.01$, $\eta^2 =.039$). Education was not a significant covariate.

Covarying age, income, and BMI, univariate statistics indicated females had greater endorsement of identified regulation than males. Amotivation, external regulation, introjected avoidance, introjected approach, integrated regulation, and intrinsic regulation were not differentially endorsed relative to gender. Means, standard deviations, F-statistics, significance, and effect sizes are presented in Table 3.

Age was a significant covariate for introjected avoidance regulation (F (1, 476) = 24.174, $p<.001$, $\eta^2 = .048$) such that older individuals endorsed the regulation less than younger individuals ($r= -.244$, $p<.001$).

BMI was a significant covariate of amotivation (F (1, 476) = 4.001, $p<.05$, $\eta^2 = .008$), external regulation (F (1, 476) = 4.596, $p<.05$, $\eta^2 = .01$), and introjected approach regulation (F (1, 476) = 4.513, $p<.05$, $\eta^2 = .009$) such that higher BMI was associated with greater endorsement of these regulations ($r= .11$, $p<.01$, $r=.111$, $p<.01$, and $r= .025$, $p>.05$ respectively). BMI was a significant covariate of integrated regulation (F (1, 476) = 8.559, $p<.01$, $\eta^2 = .018$) and intrinsic motivation (F (1, 476) = 9.876, $p<.01$, $\eta^2 = .02$) such that individuals of higher BMI had less endorsement of these regulations than lower BMI individuals ($r= -.166$, $p<.001$ and $r= -.163$, $p<.001$ respectively).

Income was a significant covariate of external regulation (F (1, 476) = 8.353, $p<.01$, $\eta^2 = .017$) and introjected avoidance regulation (F (1, 476) = 5.527, $p<.05$, $\eta^2 =.011$) such that individuals of higher income endorsed these regulations less than lower income individuals ($r= -.13$, $p<.01$ and $r= -.139$, $p=.001$ respectively).

Table 3

Gender Differences in Responses to EMI, PNSE, PAGEQ, ROPAS, and BREQ

	Gender	Mean (SD)	*F*	η^2
EMI				
Healthy body goals			.511	.001
	Male	4.51 (.56)		
	Female	4.54 (.51)		
Superiority goals			6.87**	.014
	Male	3.17 (.88)		
	Female	2.94 (.88)		
Weight management goals			7.576**	.015
	Male	3.76 (1.01)		
	Female	4.05 (1.09)		
Revitalization goals			2.423	.005
	Male	4.14 (.85)		
	Female	4.27 (.80)		
Social goals			.784	.002
	Male	3.24 (1.20)		
	Female	3.35 (1.28)		
PNSE				
Competence			3.334	.007
	Male	5.32 (.67)		
	Female	5.20 (.70)		
Autonomy			1.436	.003
	Male	5.02 (1.04)		
	Female	5.14 (1.00)		
Relatedness			.16	.000
	Male	4.96 (.98)		
	Female	4.92 (1.02)		

	Gender	Mean (S.D)	F	η^2
PAGEQ			1.021	.002
Attraction to Group				
	Male	6.12 (1.98)		
	Female	5.92 (2.32)		
ROPAS			.404	.001
Relatedness				
	Male	4.69 (.97)		
	Female	4.63 (1.13)		
BREQ				
Amotivation			.425	.001
	Male	1.06 (.33)		
	Female	1.04 (.18)		
External Regulation			1.343	.003
	Male	1.36 (.6)		
	Female	1.30 (.52)		
Introjected Avoidance			.175	.000
	Male	2.34 (.95)		
	Female	2.38 (1.04)		
Introjected Approach			2.935	.006
	Male	3.56 (.78)		
	Female	3.71 (.87)		
Identified Regulation			5.217*	.011
	Male	4.66 (.51)		
	Female	4.77 (.44)		
Integrated Regulation			.006	.000
	Male	4.10 (.84)		
	Female	4.11 (.95)		
Intrinsic Regulation			1.47	.003
	Male	4.47 (.64)		
	Female	4.38 (.74)		

*p<.05; **p<.01; ***p<.001

Purpose 2.2

A series of MANCOVAs were conducted to examine differences between genders within activities (e.g., are male crossfitters different than female crossfitters?).

Within Activity Gender Differences in Goal Content. A 5 (goal content) x 2 (gender) one-way MANOVA was conducted separately for each activity. A main effect of gender was present within Crossfit (F (5, 142) = 4.491, p=.001, η^2 =.14). No gender differences were found within yoga (F (5, 103) = .492, p>.05, η^2 =.024), running (F (5, 115) = 2.003, p>.05, η^2 =.083), walking (F (5, 83) = .895, p>.05, η^2 =.054), or spinning (F (5, 120) = 2.031, p>.05, η^2 =.081). Covarying age and BMI, main effects of gender were present within Crossfit (F (5, 132) = 3.991, p<.01, η^2 = .131), running (F (5, 109)= 2.927, p<.05, η^2 =.118), and spinning (F (5, 113)= 2.554, p<.05, η^2 = .102). No differences were found for yoga (F (5, 93) = .853, p>.05, η^2 = .044) and walking (F (5, 76) = .899, p>.05, η^2 =.056). Income and education were not significant covariates.

Univariate statistics, in combination with examination of means, revealed female runners (F (1, 113) = 7.196, p<.01, η^2 = .071) and spinners (F (1,121) = 9.338, p<.01, η^2 =.074) endorsed weight management goals more than their male counterparts. Female crossfitters endorsed revitalization goals more than males (F (1, 136) = 5.6914, p<.05, η^2 = .04). Descriptive statistics and Tukey's post-hoc tests identifying between gender differences within activity groups are reported in Table 4.

Age was a significant covariate of superiority goals in yoga, running, and spin such that older individuals held less superiority goals within each activity (r= -.177, p>.05, r= -.37, p<.001, r= -.216, p<.05 respectively). Within walking, age was a significant covariate for social

goals such that older individuals held greater social goals (r= .27, p=.01) than younger individuals.

BMI was a significant covariate of weight management goals in yoga, Crossfit, and running such that a higher BMI was associated with greater weight management goals in these activities (r= .264, p<.01, r=.279, p=.001, and r=.247, p<.01 respectively). Within running, BMI was also a significant covariate of superiority goals such that a higher BMI was associated with less superiority goals (r= -.179, p<.05).

Within Activity Gender Differences in Psychological Need Satisfaction. A 3 (psychological needs) x 2 (gender) one-way MANOVA was conducted separately for each activity. A main effect of gender was found within spin (F (3, 115) = 2.723, p<.05, η^2 =.066). No gender difference was found within yoga (F (3, 106) = .994, p>.05, η^2 =.027), Crossfit (F (3, 140) = 1.947, p>.05, η^2 =.04), running (F (3, 124) = .226, p>.05, η^2 =.005), or walking (F (3, 82) = .705, p>.05, η^2 =.025).

These results persisted when age and BMI were entered as covariates. A main effect of gender was found within spin (F (3,111) = 3.701, p<.05, η^2 =.091) such that females reported greater autonomy satisfaction than males (F (1, 113) = 5.237, p<.05, η^2 = .044). No difference was found for the satisfaction of the need for competence (F (1, 113) = 1.737, p>.05, η^2 = .015) or relatedness (F (1, 113) = 1.502, p>.05, η^2 = .013). Multivariate gender differences were not found within yoga (F (3, 100) = 1.227, p>.05, η^2 =.036), Crossfit (F (3, 134) = 2.05, p>.05, η^2 =.044), running (F (3, 121) = .506, p>.05, η^2 =.012), or walking (F (3, 79) = 1.00, p>.05, η^2 =.037). Income and education were not significant covariates. Descriptive statistics and Tukey's post-hoc tests identifying gender differences within activity groups are reported in Table 4.

Within yoga, BMI was a significant covariate of satisfaction of the needs for relatedness (F (1, 102) = 9.867, p<.01, η^2 = .088) and competence (F (1, 102) = 5.473, p<.05, η^2 =.051) such that higher BMI was associated with less need satisfaction (r= -.205, p<.05 and r= -.249, p<.01 respectively).

Within spin, BMI was a significant covariate of satisfaction of the need for competence (F (1, 113) = 9.389, p<.01, η^2 = .077) such that higher BMI was associated with less competence satisfaction (r= -.245, p<.01).

Within Activity Gender Differences in Responses to ROPAS. A 1 (relatedness) x 2 (gender) ANOVA was conducted within each activity group. No gender differences were found for yoga (F (1, 104) = 1.00, p>.05, η^2 = .01), Crossfit (F (1, 146) = .279, p>.05, η^2 = .002), running (F (1, 121) = 1.521, p>.05, η^2 = .012), walking (F (1, 184) = .123, p>.05, η^2 = .001), or spinning (F (1, 120) = .083, p>.05, η^2 = .001). After controlling for age, education, and BMI, no gender differences were found for yoga (F (1, 96) = 3.183, p>.05, η^2 = .032), Crossfit (F (1, 135) = .863, p>.05, η^2 =.006), running (F (1, 116) = 1.089, p>.05, η^2 = .009), walking (F (1, 79) = .225, p>.05, η^2 =.003) or spinning (F (1, 115) = .241, p>.05, η^2 = .002). Income was not a significant covariate. Descriptive statistics and Tukey's post-hoc tests identifying between groups differences are reported in Table 4.

Within yoga, BMI (F (1, 96) = 11.695, p=.001, η^2 = .109) was a significant covariate such that greater BMI was associated with less relatedness satisfaction as measured by ROPAS (r= -.262, p<.01).

Within Crossfit, age (F (1, 135) = 3.997, p<.05, η^2 = .029) and education (F (1, 135) = 4.75, p<.05, η^2 = .034) were significant covariates such that older individuals (r= .154, p>.05)

and less educated individuals (r= -.197, p<.05) indicated greater relatedness satisfaction as measured by ROPAS.

Within walking, age (F (1, 79) = 5.071, p<.05, η^2 = .06) was a significant covariate such that older individuals indicated greater relatedness satisfaction as measured by ROPAS (r= .263, p<.05).

Within Activity Gender Differences in Attraction to Group. A 1 (PAGEQ) x 2 (gender) one-way ANOVA was conducted separately within each activity group. No main effects of gender were present for yoga (F (1, 102) = 2.423, p>.05, η^2 =.023), Crossfit (F (1, 144) = 3.05, p>.05, η^2 = .021), running (F (1, 119) = .669, p>.05, η^2 = .006), walking (F (1, 85) = .003, p>.05, η^2 = .000), and spinning (F (1, 119) = .483, p>.05, η^2 = .004).

Covarying BMI, different effects were found. No main effect of gender was found for running (F (1, 117) = .723, p>.05, η^2 = .006), walking (F (1, 84) = .052, p>.05, η^2 = .001), or spinning (F (1, 118) = .333, p>.05, η^2 = .003). A main effect for gender was found within yoga (F (1, 99) = 5.435, p<.05, η^2 =.022) such that male yogis had greater attraction to group than female yogis. A main effect for gender was found within Crossfit (F (1, 140) = 3.895, p=.05, η^2 = .027) such that female crossfitters had greater attraction to group than male crossfitters. Age, income, and education were not significant covariates. Tukey's post-hoc tests identifying between groups differences are reported in Table 4.

Within yoga, BMI was a significant covariate (F (1, 99) = 8.298, p<.01, η^2 = .077) such that greater BMI was associated with less attraction to group (r= -.225, p<.05).

Within Activity Gender Differences in Motivational Regulations. A 7 (motivational regulations) x 2 (gender) one-way MANOVA was conducted for each activity separately. Main effects of gender were found for running (F (7, 113) = 2.444, p<.05, η^2 =.132), walking (F (7, 72)

= 2.582, $p<.05$, $\eta^2 = .201$), and spinning (F (7, 111) = 2.262, $p<.05$, $\eta^2 = .125$). No main effect for gender was present within yoga (F (7, 96) = .341, $p>.05$, $\eta^2 = .024$) and Crossfit (F (7, 128) = 1.449, $p>.05$, $\eta^2 = .073$).

MANCOVA covarying BMI was significant within running (F (7, 111) = 2.297, $p<.05$, $\eta^2 = .127$), walking (F (7, 71) = 2.451, $p<.05$, $\eta^2 = .195$), and spinning (F (7, 109) = 2.508, $p<.05$, $\eta^2 = .139$). A main effect for gender was not present within yoga (F (7, 93) = .437, $p>.05$, $\eta^2 = .032$) and Crossfit (F (7, 124) = 1.384, $p>.05$, $\eta^2 = .072$).

Covarying BMI within running, examining univariate statistics in conjunction with examination of means, a gender difference was found relative to introjected approach regulation (F (1, 117)= 5.316, $p<.05$, $\eta^2 = .043$) and identified regulation (F (1, 117)= 9.487, $p<.01$, $\eta^2 = .075$) such that females had greater endorsement of each regulation than males. No difference was found for amotivation (F (1, 117)= 2.335, $p>.05$, $\eta^2 = .02$), external regulation (F (1, 117)= .389, $p>.05$, $\eta^2 = .003$), introjected avoidance regulation (F (1, 117)= 2.047, $p>.05$, $\eta^2 = .017$), integrated regulation (F (1, 117)= 1.715, $p>.05$, $\eta^2 = .014$), or intrinsic motivation (F (1, 117)= .315, $p>.05$, $\eta^2 = .003$).

Covarying BMI within walking, examining univariate statistics in conjunction with examination of means, a gender difference was present such that males endorsed introjected avoidance (F (1, 77) = 6.096, $p<.05$, $\eta^2 = .073$) and introjected approach regulation (F (1, 77) = 5.502, $p<.05$, $\eta^2 = .067$) more than females. No difference was found for amotivation, (F (1,77) = .542, $p>.05$, $\eta^2 = .007$), external regulation (F (1, 77) = .834, $p>.05$, $\eta^2 = .011$), identified regulation (F (1, 77) = .496, $p>.05$, $\eta^2 = .006$), integrated regulation (F (1,77) = 3.892, $p>.05$, $\eta^2 = .048$), or intrinsic regulation (F (1, 77) = .338, $p>.05$, $\eta^2 = .004$).

Covarying BMI within spin, examining univariate statistics in conjunction with examination of means, determined a gender difference was found. Females endorsed introjected approach more than males (F (1,115) = 11.222, p=.001, η^2 = .089). No main effect was found for amotivation (F (1, 115) = 1.131, p>.05, η^2 = .01), external regulation (F (1, 115) = .97, p>.05, η^2 =.008), introjected avoidance regulation (F (1,115) = 3.092, p>.05, η^2 = .026), identified regulation (F (1, 115) = .213, p>.05, η^2 = .002), integrated regulation (F (1,115) = .542, p>.05, η^2 = .005), and intrinsic regulation (F (1,115) = .001, p>.05, η^2 = .000).

Within spin, BMI was a significant covariate for amotivation (F (1, 115) = 3.937, p=.05, η^2 =.033) such that individuals with a higher BMI had greater amotivation (r= .185, p<.05). BMI was a significant covariate of identified regulation (F (1, 115) = 16.781, p<.001, η^2 =.127), integrated regulation (F (1, 115) = 10.70, p=.001, η^2 =.085), and intrinsic motivation (F (1, 115) = 6.147, p<.05, η^2 =.051) such that individuals of higher BMI had lower endorsement of the regulations (r= -.44, p<.001, r= -.318, p<.001, and r= -.201, p<.05 respectively)

Within running, BMI was a significant covariate of integrated regulation (F (1, 117) = 12.966, p<.001, η^2 =.1) and intrinsic motivation (F (1, 117) = 9.469, p<.01, η^2 = .075) such that individuals of higher BMI had lower endorsement of the regulations (r=-.402, p<.001 and r= -.325, p<.001 respectively).

Table 4

Means, Standard Deviations, and Activity Group x Gender Comparisons of EMI, PNSE, ROPAS, PAGEQ, and BREQ

	Yoga M (SD)		Crossfit M (SD)		Run M (SD)		Walk M (SD)		Spin M (SD)		Tukeys Post hoc
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
EMI											
	n=19	n=82	n=58	n=82	n=33	n=84	n=15	n=69	n=32	n=89	
Healthy body goals											
	4.66	4.58	4.65	4.51	4.19	4.41	4.71	4.68	4.41	4.52	
	(.33)	(.47)	(.39)	(.47)	(.64)	(.51)	(.36)	(.54)	(.65)	(.57)	
Superiority goals											
	2.77	2.53	3.44	3.24	3.33	3.2	2.74	2.41	3.16	3.15	
	(.99)	(.73)	(.82)	(.73)	(.75)	(.78)	(1.01)	(.79)	(.84)	(.91)	
Weight management goals											
	3.3	3.46	3.74	3.96	3.63	4.23	4.19	3.9	4.03	4.52	r**
	(1.24)	(1.28)	(1.01)	(1.03)	(1.06)	(.92)	(.97)	(1.16)	(.91)	(.68)	s**
Revitalization goals											
	4.51	4.47	4.15	4.43	4.12	4.2	4.04	4.03	3.94	4.23	c*
	(.68)	(.65)	(.76)	(.57)	(.68)	(.79)	(1.25)	(.97)	(.98)	(.83)	
Social goals											
	2.92	2.45	3.37	3.69	3.62	3.77	3.59	3.98	2.82	3.1	
	(1.21)	(1.24)	(1.11)	(1.04)	(.91)	(1.04)	(1.43)	(1.21)	(1.2)	(1.26)	
PNSE											
	n=23	n=83	n=60	n=80	n=39	n=88	n=16	n=69	n=30	n=87	
Relatedness											
	4.69	4.41	5.18	5.29	4.99	5.07	5.25	5.14	4.5	4.78	
	(1.05)	(1.25)	(.83)	(.68)	(.82)	(.82)	(1.22)	(1.00)	(.99)	(.96)	
Competence											
	4.99	5.11	5.29	5.09	5.35	5.35	5.36	5.05	5.41	5.34	
	(.74)	(.70)	(.70)	(.66)	(.55)	(.64)	(.94)	(.85)	(.52)	(.67)	

	Yoga M (SD)		Crossfit M (SD)		Run M (SD)		Walk M (SD)		Spin M (SD)		Tukeys Post hoc
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
PNSE (Cont'd)											
	n=23	n=83	n=60	n=80	n=39	n=88	n=16	n=69	n=30	n=87	
Autonomy											
	4.92	5.05	4.74	4.58	5.36	5.28	5.49	5.46	4.95	5.37	s*
	(1.02)	(1.05)	(1.21)	(1.21)	(.65)	(.94)	(.59)	(.69)	(1.15)	(.74)	
ROPAS											
	n=19	n=82	n=56	n=84	n=35	n=86	n=16	n=68	n=32	n=88	
Relatedness											
	4.39	4.09	4.91	5.03	4.83	5.09	5.07	4.96	4.14	4.07	
	(1.27)	(1.20)	(.84)	(.86)	(.76)	(.98)	(.56)	(.93)	(1.03)	(1.17)	
PAGEQ											
	n=19	n=83	n=57	n=86	n=34	n=86	n=17	n=70	n=32	n=89	
Attraction to group											
	5.31	4.40	6.75	7.27	6.53	6.83	6.61	6.58	4.85	4.53	y*
	(2.09)	(2.29)	(1.65)	(1.70)	(1.39)	(1.64)	(1.86)	(2.03)	(2.30)	(2.19)	c*
BREQ											
	n=18	n=82	n=53	n=79	n=36	n=84	n=15	n=64	n=30	n=87	
Amotivation											
	1.01	1.06	1.03	1.01	1.08	1.03	1.0	1.04	1.17	1.05	
	(.06)	(.22)	(.14)	(.04)	(.25)	(.11)	(.00)	(.22)	(.62)	(.19)	
External regulation											
	1.24	1.22	1.29	1.21	1.32	1.27	1.63	1.42	1.48	1.32	
	(.38)	(.47)	(.45)	(.39)	(.47)	(.47)	(.84)	(.69)	(.83)	(.53)	
Introjected avoidance regulation											
	2.18	2.15	2.37	2.42	2.21	2.52	2.66	1.96	2.33	2.65	w*
	(1.07)	(.99)	(1.06)	(1.01)	(.83)	(1.05)	(1.12)	(.92)	(.82)	(1.06)	
Introjected approach regulation											
	3.6	3.47	3.64	3.8	3.5	3.86	3.98	3.36	3.38	3.99	w*
	(.83)	(.91)	(.82)	(.82)	(.8)	(.73)	(.93)	(.88)	(.73)	(.88)	s***
											r*

	Yoga M (SD)		Crossfit M (SD)		Run M (SD)		Walk M (SD)		Spin M (SD)		Tukeys Post hoc
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
BREQ (cont'd)											
	n=18	n=82	n=53	n=79	n=36	n=84	n=15	n=64	n=30	n=87	
Identified regulation											
	4.68	4.67	4.73	4.8	4.5	4.82	4.88	4.71	4.66	4.8	r**
	(.44)	(.49)	(.44)	(.38)	(.6)	(.41)	(.19)	(.43)	(.52)	(.43)	
Integrated regulation											
	4.18	3.98	4.12	4.27	4.08	4.37	4.4	3.87	3.84	4.14	
	(.79)	(1.06)	(.86)	(.84)	(.75)	(.68)	(.73)	(1.03)	(.9)	(.96)	
Intrinsic regulation											
	4.58	4.45	4.55	4.5	4.42	4.43	4.18	4.31	4.23	4.34	
	(.51)	(.67)	(.59)	(.66)	(.65)	(.7)	(.85)	(.75)	(.69)	(.84)	

y=yoga, c=crossfit, r=run, w=walk, s=spin
*p<.05; **p<.01; ***p<.001

Purpose 2.3

A series of MANCOVAs were conducted to determine if within gender, between activity differences were present (e.g., do male crossfitters differ from male spinners).

Between Activity Gender Differences in Goal Content. A 5 (goal content) x 5 (activity group) one-way MANOVA was conducted separately for men and women. A main effect was found for males (F (20, 612) = 3.842, p<.001, η^2 = .112) and females (F (20, 1632) = 14.951, p<.001, η^2 =.155). MANCOVA covarying age, education, and BMI was significant for males (F (20, 580) = 3.281, p<.001, η^2 = .102) and females (F (20, 1568) = 9.544, p<.001, η^2 = .109). Income was not a significant covariate.

Covarying age, education, and BMI, univariate statistics revealed males in different activities differentially endorsed healthy body goals of (F (4,146) =5.923, p<.001, η^2 =.14), superiority (F (4,146) =2.782, p<.05, η^2 =.071), and social (F (4,146) = 3.754, p<.01, η^2 = .093). No effect was found for males endorsement of weight management (F (4, 146) =1.762, p>.05, η^2 = .046) and revitalization goals (F (4, 146) = 1.548, p>.05, η^2 =.041). Runners were least likely to hold healthy body goals. Spinners were least likely to hold social goals. Yogis were least likely to hold superiority goals. Tukey's post-hoc tests revealing the male between groups differences are presented in Table 5.

Covarying age, education, and BMI, univariate statistics revealed females goal content differed by activity in reference to superiority (F (4,393) = 14.20, p<.001, η^2 =.126), weight management (F (4, 393) = 11.88, p<.001, η^2=.108), revitalization (F (4, 393) = 2.559, p<.05, η^2 =.025), and social goals (F (4, 393) = 16.384, p<.001, η^2 =.143). No effect was found for females endorsement of healthy body goals (F (4,393) =1.537, p>.05, η^2 =.015). Yogis endorsed all goals less than the other activity groups. Walkers least endorsed the superiority goals. Yogis and

spinners least endorsed social goals. Tukey's post-hoc tests revealing female between group differences are reported in Table 5.

Within males (F (1, 146) = 21.426, p<.001, η^2 =.128) and females (F (1, 393) = 22.08, p<.001, η^2 = .053), BMI was a significant covariate for weight management goals such that individuals of higher BMI endorsed weight management goals less than individuals of lower BMI (r= -.38, p<.001 and r= -.245, p<.001 respectively). Within females, BMI was a significant covariate of superiority goals (F (1, 393) = 4.355, p<.05, η^2 = .011) and revitalization goals (F (1, 393) = 6.307, p<.05, η^2 = .016) such that individuals of higher BMI endorsed these regulations less then individuals of lower BMI (r= -.077, p>.05 and r= -.141, p<.01 respectively).

Within males (F (1, 146) = 13.824, p<.001, η^2 = .086) and females (F (1, 393) = 12.657, p<.001, η^2 = .031) age was a significant covariate for superiority goals such that older individuals held less superiority goals than younger individuals (r= -.319, p<.001 and r= -.302, p<.001 respectively). Within females, age was a significant covariate for healthy body goals (F (1, 393) = 5.066, p<.05, η^2 = .013) such that older females endorsed healthy body goals more than younger females (r= .155, p<.01).

Education was a significant covariate for males but not for females. Within males, education was a significant covariate for social goals (F (1, 146) = 8.281, p<.01, η^2 = .054) such that individuals who were more educated endorsed less social goals (r= -.18, p<.05).

Between Activity Gender Differences in Psychological Need Satisfaction. A 3 (basic psychological needs) x 5 (activity group) one-way MANOVA was conducted separately for men and women. A main effect was found for males (F (12, 498) = 3.305, p<.001, η^2 =.074) and females (F (12, 1233) = 10.127, p<.001, η^2 = .09). MANCOVA covarying age, education, and

BMI was significant in males (F (12, 471) = 2.50, p<.01, η^2 =.06) and females (F (12, 1179) = 7.468, p<.001, η^2 = .071). Income was not a significant covariate.

When controlling for age, education, and BMI, univariate statistics revealed males differed in satisfaction of the need for relatedness (F (4, 157) = 4.268, p<.01, η^2 = .098) but not competence (F (4, 157) = 1.852, p>.05, η^2 = .045) or autonomy (F (4, 157) = 1.246, p>.05, η^2 = .031). Females differed in satisfaction of the needs for competence (F (4, 393) = 3.396, p=.01, η^2 = .033), autonomy (F (4, 393) = 9.479, p<.001, η^2 =.088), and relatedness (F (4, 393) = 9.943, p<.001, η^2 = .092). Tukey's post-hoc tests revealing between group differences are reported in Table 5.

Within males, education was a significant covariate of the satisfaction of the need for competence (F (1, 157) = 4.789, p<.05, η^2 = .03) and relatedness (F (1, 157) = 9.134, p<.01, η^2 = .055) such that a higher education was associated with less satisfaction (r= -.163, p<.05 and r= -.194, p=.01).

Relative to females, BMI was a significant covariate of competence (F (1, 393) = 13.065, p<.001, η^2 = .032) and relatedness satisfaction (F (1, 393) = 4.05, p<.05, η^2 = .01) such that a higher BMI was associated with lower satisfaction (r= -.19, p<.001 and r= -.018, p>.05 respectively).

Between Activity Gender Differences in Responses to ROPAS. A 1 (relatedness) x 5 (activity group) one-way ANOVA was conducted separately for men and women. Between activity group differences were found for males (F (4, 159) = 5.242, p=.001, η^2 =.117) and females (F (4, 416) = 21.038, p<.001, η^2 =.168). These effects persisted for males (F (4, 151) = 6.186, p<.001, η^2 = .141) and females (F (4, 406) = 21.108, p<.001, η^2 =.172) when covarying education and BMI. Age and income were not significant covariates. Within males and females,

crossfitters, runners, and walkers had greater relatedness satisfaction than yogis and spinners. Tukey's post-hoc tests revealing the between groups differences are reported in Table 5.

BMI and education were negatively associated with ROPAS such that higher BMI and education was associated with less relatedness satisfaction (r= -.17, p<.05 and r= -.206, p<.01 respectively).

Between Activity Gender Differences in Attraction to Group. A 1 (attraction to group) x 5 (activity group) one-way ANOVA was conducted separately for men and women. Between activity group differences were found for males (F (4, 157) = 6.992, p<.001, η^2 = .151) and females (F (4, 412) = 3.964, p<.001, η^2 = .273). This effect persisted for males (F (4, 149) = 7.882, p<.001, η^2 = .175) and females (F (4, 401) = 38.351, p<.001, η^2 = .277) when covarying BMI and education. Age and income were not significant covariates. Within males and females, crossfitters, runners, and spinners endorsed higher attraction to group than yogis and spinners. Tukey's post-hoc tests revealing the between groups differences are reported in Table 5.

BMI was a significant covariate for males (F (4, 149) = 6.106, p<.05, η^2 = .039) but not females (F (4, 401) = .603, p>.05, η^2 = .002). Education was a significant covariate for males (F (4, 149) = 7.675, p<.01, η^2 = .049) but not females (F (4, 401) = .389, p>.05, η^2 = .001). BMI and education were negatively associated with PAGEQ in males such that higher BMI and education were associated with less attraction to group (r= -.128, p>.05 and r= -.153, p>.05 respectively).

Between Activity Gender Differences in Motivational Regulations. A 7 (motivational regulations) x 5 (activity group) one-way MANOVA was conducted separately for men and women. A main effect was found for males (F (28, 588) = 1.683, p<.05, η^2 =.074) and females (F (28, 1588) = 3.082, p<.001, η^2 = .052). When covarying for age, BMI, and income, a main

effect disappeared for males (F (28, 492) = 1.33), p>.05, η^2 =.07) but persisted for females (F (28, 1344) = 3.115, p<.001, η^2 = .061). This finding suggests there were no differences in regulations across activities in men that are unrelated to the covariates. Education was not a significant covariate.

Covarying age, income, and BMI, univariate statistics revealed females in the various activity groups differentially endorsed external regulation (F (4, 339) = 3.969, p<.01, η^2 = .045), introjected avoidance regulation (F (4, 339) = 3.762, p<.01, η^2 = .043), introjected approach regulation (F (4, 339) = 7.889, p<.001, η^2 = .085), and integrated regulation (F (4, 339) = 4.834, p=.001, η^2 = .054). There were no between-activity differences within females in terms of amotivation (F (4, 339) = 2.232, p>.05, η^2 = .026), identified regulation (F (4, 339) = 2.199, p>.05, η^2 = .025), or intrinsic motivation (F (4, 339) = 1.777, p>.05, η^2 = .021).

Yogis and walkers tended to have a lower endorsement of self-determined motivational regulations than crossfitters, runners and spinners. Walkers had a greater endorsement of external regulation than all other activity groups. Tukey's post-hoc tests revealing the between groups differences are reported in Table 5.

Age was not a significant covariate for males but was for females. Within females, age was a significant covariate for amotivation (F (1, 339) = 4.232, p<.05, η^2 = .012), external regulation (F (1, 339) = 6.389, p<.05, η^2 = .018), and introjected avoidance regulation (F (1, 339) = 11.971, p=.001, η^2 = .034) such that older individuals endorsed these regulations less (r= -.098, p<.05, r= -.003, p>.05, and r= -.272, p<.001). Within females, age was also a significant covariate for integrated regulation (F (1, 339) = 6.808, p<.01, η^2 =.02) such that older individuals endorsed the regulation more than younger individuals (r= .016, p>.05).

BMI was only a significant covariate for females. Within females, BMI was a significant covariate for amotivation (F (1, 339) = 6.822, p<.01, η^2 =.02) and external regulation (F (1, 339) = 6.516, p<.05, η^2 =.019) such that individuals of higher BMI endorsed these regulations more than individuals of lower BMI (r= .151, p<.01 and r=.148, p<.01 respectively). BMI was also a significant covariate for identified regulation (F (1, 339) = 6.091, p<.05, η^2 = .018), integrated regulation (F (1, 339) = 10.287, p=.001, η^2 = .029), and intrinsic motivation (F (1, 339) = 11.775, p=.001, η^2 = .034) such that individuals of higher BMI had lower endorsement of these regulations (r= -.139, p<.01, r= -.19, p<.001, and r= -.212, p<.001 respectively).

Income was only a significant covariate for females. Within females, income was a significant covariate of external regulation (F (1, 339) = 7.281, p<.01, η^2 =.021) and introjected avoidance regulation (F (1, 339) = 6.2, p<.05, η^2 = .018) such that individuals of higher income had a lower endorsement of the regulations (r= -.178, p=.001 and r= -.142, p<.01 respectively).

Table 5

Mean, Standard Deviations, of EMI, PNSE, ROPAS, PAGEQ, and BREQ x Activity x Gender

	Males						Females					
	Yoga	Crossfit	Run	Walk	Spin	Tukeys post hoc	Yoga	Crossfit	Run	Walk	Spin	Tukey's post hoc
EMI												
	n=19	n=55	n=33	n=15	n=32		n=81	n=81	n=83	n=68	n=88	
Healthy body goals												
	4.65	4.62	4.17	4.76	4.38	y > r**	4.62	4.56	4.43	4.55	4.56	
	(.33)	(.39)	(.64)	(.36)	(.65)	c > s*	(.47)	(.48)	(.51)	(.54)	(.56)	
						c > r***						
						w > r***						
Superiority goals												
	2.64	3.21	3.37	3.35	2.99	c > y**	2.45	3.15	3.27	2.73	3.11	s > y***
	(.99)	(.82)	(.75)	(1.01)	(.84)	r > y**	(.74)	(.74)	(.78)	(.79)	(.9)	c > y***
						w > y*						r > y***
												c > w*
												r > w***
												s > w*
Weight Management Goals												
	3.55	3.77	3.74	4.38	4.04		3.48	3.84	4.22	3.86	4.49	s > y***
	(1.24)	(1.0)	(1.06)	(.97)	(.91)		(1.28)	(1.03)	(.93)	(1.16)	(.68)	c > y*
												r > y***
												s > c***
												r > c*
												s > w**
Revitalization goals												
	4.42	4.06	4.19	4.28	3.86		4.44	4.46	4.23	4.0	4.27	y > w**
	(1.25)	(.98)	(.68)	(.77)	(.68)		(.66)	(.57)	(.80)	(.97)	(.83)	c > w**

	Males						Females					
	Yoga	Crossfit	Run	Walk	Spin	Tukeys post hoc	Yoga	Crossfit	Run	Walk	Spin	Tukey's post hoc
EMI												
	n=19	n=55	n=33	n=15	n=32		n=81	n=81	n=83	n=68	n=88	
Social goals												
	2.78	3.35	3.68	3.73	2.75	w > y*	2.52	3.76	3.79	3.79	3.16	c > y***
	(1.21)	(1.11)	(.91)	(1.43)	(1.2)	r > y**	(1.24)	(1.04)	(1.04)	(1.21)	(1.27)	r > y***
						c > s*						w > y***
						r > s**						s > y***
						w > s*						c > s***
												r > s***
												w > s*
PNSE												
	n=23	n=57	n=39	n=16	n=30		n=82	n=78	n=87	n=68	n=86	
Competence												
	4.99	5.32	5.35	5.36	5.41	s>y*	5.21	5.09	5.37	5.04	5.36	s>y**
	(.74)	(.67)	(.55)	(.94)	(.52)	r>y*	(.70)	(.66)	(.63)	(.85)	(.64)	r>y**
												s>c*
												r>c*
Autonomy												
	4.92	4.81	5.36	5.49	4.95	r>c*	5.05	4.56	5.29	5.45	5.39	s>y*
	(1.02)	(1.14)	(.65)	(.59)	(1.15)		(1.05)	(1.22)	(.94)	(.69)	(.72)	w>c***
												s>c***
												y>c**
												r>c***
Relatedness												
	4.69	5.18	4.99	5.25	4.5	w>s**	4.41	5.3	5.08	5.13	4.78	c>s***
	(1.05)	(.84)	(.82)	(1.22)	(.99)	c>s**	(1.26)	(.68)	(.82)	(1.00)	(.96)	w>y**
						r>s**						s>y*
						w>y*						c>y***
						c>y*						r>y***

												c>r*
	Males						Females					
	Yoga	Crossfit	Run	Walk	Spin	Tukeys post hoc	Yoga	Crossfit	Run	Walk	Spin	Tukey's post hoc
ROPAS												
	n=19	n=56	n=35	n=16	n=32		n=84	n=85	n=86	n=69	n=89	
Relatedness												
	4.39	4.91	4.83	5.07	4.14	w > s***	4.08	5.01	5.09	4.97	4.07	w > s***
	(1.27)	(.84)	(.76)	(.56)	(1.03)	r > s***	(1.22)	(.87)	(.98)	(.92)	(1.17)	r > s***
						c > s***						c > s***
						w > y*						w > y***
						c > y*						c > y***
						r > y*						r > y***
PAGEQ												
	n=19	n=54	n=34	n=17	n=32		n=82	n=84	n=85	n=69	n=88	
Attraction to Group												
	5.31	6.77	6.53	6.61	4.85	w > s***	4.40	7.26	6.84	6.56	4.52	w > s***
	(2.09)	(1.64)	(1.39)	(1.86)	(2.30)	c > s***	(2.30)	(1.72)	(1.65)	(2.04)	(2.20)	r > s***
						r > s***						c > s***
						w > y*						w > y***
						c > y**						c > y***
						r > y**						r > y***
BREQ												
	n=16	n=50	n=29	n=11	n=28		n=73	n=69	n=74	n=57	n=74	
Amotivation												
	1.02	1.03	1.09	1.00	1.18		1.07	1.00	1.03	1.04	1.05	
	(.06)	(.15)	(.26)	(.00)	(.64)		(.23)	(.03)	(.11)	(.24)	(.2)	
External Regulation												
	1.25	1.29	1.36	1.57	1.5		1.23	1.19	1.31	1.46	1.31	w > y***
	(.4)	(.46)	(.5)	(.81)	(.85)		(.49)	(.39)	(.49)	(.72)	(.5)	w > c***
												w > r**
												w > s**

	Males						Females					
	Yoga	Crossfit	Run	Walk	Spin	Tukeys post hoc	Yoga	Crossfit	Run	Walk	Spin	Tukey's post hoc
BREQ (Cont'd)												
	n=16	n=50	n=29	n=11	n=28		n=73	n=69	n=74	n=57	n=74	
Introjected avoidance regulation												
	2.18	2.41	2.2	2.57	2.38		2.14	2.42	2.54	2.02	2.69	r > y**
	(1.08)	(1.07)	(.76)	(.92)	(.83)		(.98)	(1.02)	(1.07)	(.92)	(1.08)	s > y**
Introjected approach regulation												
	3.64	3.66	3.47	3.93	3.4		3.4	3.76	3.86	3.36	4.02	c > y*
	(.8)	(.78)	(.74)	(.95)	(.75)		(.92)	(.82)	(.72)	(.9)	(.84)	r > y**
												s > y***
												c > w**
												r > w***
												s > w***
Identified regulation												
	4.67	4.72	4.43	4.86	4.67		4.65	4.82	4.82	4.78	4.81	
	(.47)	(.45)	(.63)	(.21)	(.53)		(.5)	(.37)	(.42)	(.45)	(.42)	
Integrated regulation												
	4.2	4.08	4.01	4.49	3.87		3.94	4.27	4.34	3.88	4.15	c > y*
	(.78)	(.86)	(.78)	(.71)	(.92)		(1.1)	(.85)	(.69)	(1.05)	(.97)	r > y*
												c > w***
												r > w***
												s > w**
Intrinsic regulation												
	4.58	4.53	4.41	4.23	4.28		4.45	4.51	4.39	4.27	4.39	
	(.52)	(.59)	(.68)	(.79)	(.67)		(.68)	(.69)	(.7)	(.77)	(.74)	

y=yoga, c=crossfit, r=run, w=walk, s=spin

*p<.05; **p<.01; ***p<.001

Purpose 3

Purpose 3: To determine whether social comparison occurred to different extents between the activity groups (purpose 3.1), between men and women (purpose 3.2), and if social comparison was differentially associated with goal content, need satisfaction, motivation regulations, and behaviour (purpose 3.3). Age, BMI, income, and education were entered as covariates for all analyses due to the previously noted activity group differences in these demographic differences.

Between Activity Differences in Social Comparison. A 1 (social comparison) x 5 (activity group) one-way ANOVA was conducted. A main effect was found for social comparison (F (4, 552) = 15.977, p<.001, η^2 = .104). This effect persisted when covarying age and BMI (F (4, 541) = 10.449, p<.001, η^2 = .072). Education and income were not significant covariates. Generally, yogis endorsed less social comparison than other activities while runners endorsed greater social comparison than other activities. Tukey's post-hoc tests identifying between group differences are presented in Table 6.

Age (F (1, 541) = 29.803, p<.001, η^2 = .052) and BMI (F (1, 541) = 4.156, p<.05, η^2 = .008) were significant covariates of social comparison such that older individuals tended to engage in less social comparison (r= -.273) than younger individuals and individuals with greater BMI endorsed more comparison (r= .092).

Gender Differences in Social Comparison. To look for gender differences in social comparison, a 1(social comparison) x 2(gender) one-way ANOVA comparing genders collapsed across all activity groups was conducted. No difference was found in the extent to which genders endorsed social comparison (F (1, 552) = .2.048, p>.05, η^2 = .004). This null finding persisted

when covarying age and BMI (F (1, 541) = .839, p>.05, η^2 = .002). Income and education were not significant covariates of social comparison.

Age (F (1, 541) = 44.915, p<.001, η^2 = .077) was a significant covariate such that older individuals engaged in less social comparison (r= -.273, p<.001) than younger individuals. BMI (F (1, 541) = 6.076, p<.05, η^2 = .011) was a significant covariate such that a higher BMI was associated with greater social comparison (r= .092, p<.05).

Correlation Between Social Comparison and Self-Determination Theory Variables. Partial correlation analyses, using pairwise deletion, controlling for the influence of age, BMI, income, and education were conducted to determine the association between social comparison and self-determination theory variables. Generally, higher levels of social comparison were associated with greater weight management goals, superiority goals, and stronger endorsement of less self-determined regulations. Social comparison was generally negatively associated with relatedness satisfaction. Correlations are presented in Table 7.

Table 6

Means, Standard Deviations, and Between Activity Differences in Social Comparison

	Yoga M (SD)	Crossfit M (SD)	Run M (SD)	Walk M (SD)	Spin M (SD)	Tukey's *post hoc*
Social Comparison						
	n=97	n=131	n=122	n=84	n=114	
	2.14 (.89)	2.73 (.86)	2.90 (.93)	2.60 (.86)	2.60 (.99)	c > y***
						r > y***
						w > y**
						s > y***
						r > w*
						r > s*

y=yoga, c=crossfit, r=run, w=walk, s=spin
*p<.05; **p<.01; ***p<.001

Table 7

Partial Correlations Between Social Comparison and EMI, PNSE, ROPAS, PAGEQ, and BREQ Controlling for Age, BMI, Income, and Education

	Social Comparison				
	Yoga	Crossfit	Run	Walk	Spin
EMI					
Healthy body goals	.04	-.068	-.063	.126	-.173
Superiority goals	.196	.374***	.163	.324**	.135
Weight management goals	.297**	.246**	.135	.292*	.248*
Revitalization goals	-.104	-.093	-.129	-.06	-.079
Social goals	-.092	-.066	-.146	.074	-.033
PNSE					
Relatedness (PNSE)	-.218*	-.214*	-.154	.151	.069
Competence	-.233*	-.106	-.074	.008	-.135
Autonomy	-.027	-.151	-.153	-.128	-.202*
ROPAS					
Relatedness	-.162	-.166	-.249*	-.071	.065
PAGEQ					
Attraction to group	-.151	-.141	-.068	.062	-.011
BREQ					
Amotivation	.082	-.009	.088	-.063	.022
External regulation	.057	.27**	.131	.316**	.064
Introjected avoidance regulation	.169	.277**	.273**	.373**	.405***
Introjected approach regulation	.104	.077	.02	.239	.083
Identified regulation	-.01	-.056	-.139	-.002	-.269**
Integrated regulation	-.162	-.002	.013	.155	.045
Intrinsic regulation	-.121	-.112	-.235*	-.007	-.16
Behaviour	-.109	.031	-.04	-.089	.221*

*p<.05; **p<.01; ***p<.001

Purpose 4

Purpose 4: To examine associations between goal content, need satisfaction, motivational regulations, and behaviour in each activity (purpose 4.1). To examine which variables explain a significant amount of variance in behaviour (purpose 4.2). Due to their influence on previous analyses, age, income, education, and BMI were entered as covariates for purpose 4.1 and 4.2. Behaviour was measured over the two-week period between completion of the first questionnaire and the second questionnaire.

Correlation Between Self-Determination Theory Variables. Partial correlations controlling for age, BMI, income, and education were produced first collapsed across all activities and then separately within each activity group to determine the associations among self-determination theory variables. Correlations and significance levels are reported in Tables 8a-f.

Satisfaction of basic psychological needs was positively associated with healthy body goals, superiority goals, revitalization goals, and social goals. Weight management goals tended to be unassociated with psychological need satisfaction.

Satisfaction of the basic psychological needs was also associated with more self-determined motivational regulations. Endorsing weight management goals tended to be associated with less self-determined motivational regulations. However, the most self-determined motivational regulations were associated with all goals.

Self-reported behaviour, assessed on average 14-21 days after the initial assessment, tended to be positively associated with relatedness as measured by PNSE and ROPAS, attraction to group, social goals, revitalization goals, integrated regulation, identified regulation, and intrinsic regulation. Behaviour was negatively associated with external regulation.

Table 8a

Correlations Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour Collapsed across Activity Groups

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.44 ***	1															
Relate PNSE	.34 ***	.16 ***	1														
Relate ROPAS	.27 ***	.14 ***	.67 ***	1													
Att. to Grp.	.20 ***	.03	.62 ***	.75 ***	1												
Hlthy. Body	.25 ***	.13 **	.17 ***	.07	.00	1											
Supty.	.25 ***	.12 **	.31 ***	.26 ***	.23 ***	.31 ***	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	.07	.04	.08	-.03	-.06	.34 ***	.34 ***	1									
Revit.	.24 ***	.17 ***	.22 ***	.17 ***	.12 **	.47 ***	.3. ***	.29 ***	1								
Social	.18 ***	.12 **	.59 ***	.61 ***	.68 ***	.13 **	.31 ***	.15 ***	.22 ***	1							
Amot.	-.09 *	-.07	-.12 **	-.11 *	-.11 *	-.25 ***	-.05	.01	-.15 ***	-.04	1						
Ext. Reg.	-.05	-.02	.05	.011	-.05	-.09 *	.10 *	.18 ***	-.07	.06	.31 ***	1					
Introj. Avoid. Reg.	.02	-.03	.07	.00	.03	.08	.32 ***	.43 ***	.06	.07	.09 *	.31 ***	1				
Introj. App. Reg.	.22 ***	.14 ***	.23 ***	.12 **	.09	.32 ***	.45 ***	.36 ***	.27 ***	.12 ***	-.10 *	.09 *	.46 ***	1			
Ident. Reg.	.30 ***	.18 ***	.22 ***	.15 ***	.11 *	.55 ***	.23 ***	.25 ***	.37 ***	.15 ***	-.35 ***	-.13 **	.12 **	.38 ***	1		
Integ. Reg.	.34 ***	.13 **	.29 ***	.27 ***	.20 ***	.39 ***	.48 ***	.20 ***	.47 ***	.24 ***	-.24 ***	-.11 **	.18 ***	.43 ***	.61 ***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.42 ***	.22 ***	.33 ***	.33 ***	.22 ***	.35 ***	.32 ***	.1 *	.57 ***	.29 ***	-.28 ***	-.15 ***	.03	.35 ***	.56 ***	.65 ***	1
Behav	.083	-.06	.17 ***	.26 ***	.23 ***	.07	.05	-.10	.14 **	.10 *	-.02	-.18 ***	-.06	.00	.13 **	.15 **	.20 ***

*p<.05; **p<.01; ***p<.001

Table 8b

Correlations Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour: Crossfit

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.59 ***	1															
Relate PNSE	.35 ***	.32 ***	1														
Relate ROPAS	.35 ***	.31 ***	.70 ***	1													
Att. to Grp.	.22 *	.21 *	.62 ***	.69 ***	1												
Hlthy. Body	.31 ***	.14	.11	.17 *	.01	1											
Supty.	.29 ***	.23 **	.27 **	.25 **	.15	.26 **	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	-.06	-.13	-.05	-.22 *	-.03	.11	.06	1									
Revit.	.13	.16	.14	.14	.16	.29 ***	.26 **	.23 **	1								
Social	.16	.23 **	.55 ***	.54 ***	.63 ***	.06	.17	.12	.25 **	1							
Amot.	.01	-.03	.03	-.11	-.10	-.27 **	-.16	-.08	-.18 *	.00	1						
Ext. Reg.	-.06	-.04	-.03	.01	-.11	-.16	.11	.00	-.26 **	-.07	.13	1					
Introj. Avoid. Reg.	-.11	-.18	-.03	-.09	.10	.00	.13	.35 ***	.02	-.07	.05	.08	1				
Introj. App. Reg.	.04	.08	.13	.03	.06	.17 *	.31 ***	.17 *	.12	.12	-.01	-.06	.42 ***	1			
Ident. Reg.	.28 ***	.12	.11	.12	.09	.30 ***	.13	-.02	.29 ***	.09	-.12	-.20 *	.08	.28 **	1		
Integ. Reg.	.35 ***	.24 **	.17	.21 *	.19 *	.22 *	.44 ***	-.05	.45 ***	.17	-.09	-.17	.12	.31 ***	.68 ***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.39***	.29***	.29***	.27**	.18*	.22*	.37***	-.06	.44***	.26**	-.08	-.19*	.07	.32***	.67***	.72***	1
Behav	.25*	.06	.14	.19	.25**	-.04	.18	.01	.14	.07	.04	-.20*	.08	.07	.33***	.28**	.28**

*p<.05; **p<.01; ***p<.001

Table 8c

Correlations Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour: Running

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.47 ***	1															
Relate PNSE	.36 ***	.24 *	1														
Relate ROPAS	.39 ***	.33 ***	.63 ***	1													
Att. to Grp.	.27 **	.31 **	.51 ***	.62 ***	1												
Hlthy. Body	.14	.17	.04	-.04	-.05	1											
Supty.	.23 *	.19	.28 **	.14	-.04	.39 ***	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	-.08	.07	-.04	-.07	-.10	.52***	.31**	1									
Revit.	.23*	.23*	.29**	.29**	.12	.38***	.37***	.17	1								
Social	.26**	.33***	.48***	.66***	.59***	.04	.18	.03	.39***	1							
Amot.	-.04	-.11	-.04	-.15	-.02	-.21*	-.03	-.08	-.22*	.01	1						
Ext. Reg.	-.07	-.03	.17	.10	.00	-.01	.16	.21	-.06	.11	.36***	1					
Introj. Avoid. Reg.	.01	.09	.12	-.01	-.06	.19	.42***	.52***	.15	.10	.03	.20*	1				
Introj. App. Reg.	.22*	.27**	.14	.12	.08	.35***	.40***	.31**	.29**	.18	-.23*	-.04	.41***	1			
Ident. Reg.	.14	.11	.04	.09	-.05	.49***	.14	.26**	.23*	.01	-.42***	-.17	.13	.37***	1		
Integ. Reg.	.25**	.13	.2*	.25*	-.01	.33***	.41***	.21*	.42***	.16	-.42***	-.09	.27**	.48***	.58***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.45 ***	.34 ***	.33 ***	.47 ***	.20 *	.13	.17	.03	.50 ***	.42 ***	-.36 ***	-.12	.06	.34 ***	.36 ***	.56 ***	1
Behav	.12	-.03	.18	.20	.06	.05	-.03	.08	.02	.12	-.12	-.14	.07	.00	.07	.08	.11

*p<.05; **p<.01; ***p<.001

Table 8d

Correlations Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour: Walking

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.48 ***	1															
Relate PNSE	.69 ***	.40 ***	1														
Relate ROPAS	.37 **	.44 ***	.64 ***	1													
Att. to Grp.	.38 ***	.38 **	.60 ***	.55 ***	1												
Hlthy. Body	.32 **	.16	.31 **	.14	.11	1											
Supty.	.29 *	.12	.21	.12	.22	.39 ***	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	.23	-.05	.21	.02	.05	.54 ***	.40 ***	1									
Revit.	.37 ***	.25 *	.32 **	.21	.24	.52 ***	.35 **	.52 ***	1								
Social	.23	.21	.52 ***	.52 ***	.63 ***	.26 *	.14	.16	.29 *	1							
Amot.	.07	-.12	.14	.09	.02	.12	.02	.13	.13	.19	1						
Ext. Reg.	-.09	-.15	.05	.05	.12	.01	.09	.18	.15	.13	.26 *	1					
Introj. Avoid. Reg.	.14	-.02	.09	.11	.09	.13	.22	.36 **	.09	-.03	.18	.53 ***	1				
Introj. App. Reg.	.41 ***	.17	.28 *	.17	.14	.32 **	.45 ***	.48 ***	.35 **	.12	.17	.19	.50 ***	1			
Ident. Reg.	.39 ***	.33 **	.23	.07	.21	.79 ***	.12	.35 **	.39 ***	.16	.00	-.20	.06	.26 *	1		
Integ. Reg.	.40 ***	.23	.40 ***	.20	.17	.49 ***	.49 ***	.42 ***	.49 ***	.23	-.02	-.15	.15	.41 ***	.52 ***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.57***	.35**	.55***	.46***	.32**	.44***	.21	.33**	.58***	.41***	.09	-.12	.02	.63**	.54***	.64***	1
Behav	-.06	.17	.18	.13	-.04	.19	.14	.08	-.09	.17	.15	-.23	.01	.21	.23	.04	.00

*p<.05; **p<.01; ***p<.001

Table 8e

Correlations Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour: Yoga

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.28**	1															
Relate PNSE	.31**	.06	1														
Relate ROPAS	.27**	.08	.65***	1													
Att. to Grp.	.25*	-.14	.60***	.79***	1												
Hlthy. Body	.30**	.19	.32**	.17	.15	1											
Supty.	.21*	.15	.35***	.15	.06	.39***	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	.04	.16	.12	.10	-.10	.47***	.52***	1									
Revit.	.26*	.18	.24**	.20	.16	.48***	.22*	.32**	1								
Social	.29**	-.06	.60***	.62***	.73***	.29**	.31**	.20	.26*	1							
Amot.	-.19	.01	-.34***	-.25*	-.33**	-.29**	-.09	.02	-.13	-.19	1						
Ext. Reg.	-.05	.04	.07	-.06	-.16	-.03	.12	.26	.03	-.03	.23*	1					
Introj. Avoid. Reg.	.04	.01	.07	-.09	-.10	.17	.47***	.54***	.16	.06	.11	.35***	1				
Introj. App. Reg.	.27**	.14	.33**	.18	.08	.38***	.54***	.46***	.26*	.21*	-.05	.23*	.51***	1			
Ident. Reg.	.35***	.23*	.40***	.26*	.24*	.58***	.36***	.40***	.45***	.29**	-.40***	-.01	.17	.38***	1		
Integ. Reg.	.46***	.19	.44***	.34***	.33**	.54***	.38***	.22*	.43***	.37***	-.36***	-.08	.08	.40***	.71***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.41 ***	.14	.44 ***	.36 ***	.36 ***	.43 ***	.31 **	.22 *	.56 ***	.40 ***	-.37 ***	-.12	.10	.30 **	.66 ***	.69 ***	1
Behav	.2	.10	.23	.39 ***	.46 ***	-.03	-.13	-.18	.13	.31 **	.01	-.23	-.24 *	-.08	.04	.07	.11

*p<.05; **p<.01; ***p<.001

Table 8f

Correlation Between Need Satisfaction, Attraction to Group, Goal Contents, Motivational Regulations, and Behaviour: Spin

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Comp	1																
Auton	.35***	1															
Relate PNSE	.18	.21*	1														
Relate ROPAS	.17	.06	.60***	1													
Att. to Grp.	.11	.00	.48***	.71***	1												
Hlthy. Body	.33***	.25**	.15	.07	-.03	1											
Supty.	.22*	.03	.18*	.28**	.23*	.39***	1										

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Wt. Mgmt	.01	.01	.14	.04	-.15	.32***	.36***	1									
Revit.	.28**	.24*	.29**	.21*	.12	.62***	.56***	.49***	1								
Social	-.04	.11	.59***	.51***	.62***	.14	.33***	.11	.19	1							
Amot.	-.17	-.27**	-.15	-.08	-.05	-.37***	.04	.03	-.22*	-.04	1						
Ext. Reg.	-.11	-.16	-.061	-.06	-.13	-.26**	.03	.10	-.16	.02	.43***	1					
Introj. Avoid. Reg.	-.07	-.06	-.02	.03	-.02	.01	.27**	.28**	.05	.09	.08	.26**	1				
Introj. App. Reg.	.15	.13	.24*	.13	.06	.41***	.47***	.29**	.38***	.09	-.18	.04	.40***	1			
Ident. Reg.	.36***	.35***	.27**	.16	.07	.67***	.30**	.24*	.57***	.11	-.51***	-.23*	.04	.46***	1		
Integ. Reg.	.23*	.04	.18	.22*	.10	.48***	.55***	.26**	.59***	.11	-.24*	-.19*	.19	.47***	.58***	1	

	Competence	Autonomy	Relatedness (PNSE)	Relatedness (ROPAS)	Attraction to Group	Healthy Body	Superiority	Weight Management	Revitalization	Social	Amotivation	External	Introjected Avoidance	Introjected Approach	Identified	Integrated	Intrinsic
Intrin. Reg.	.40***	.29**	.19*	.28**	.13	.55***	.52***	.19	.70***	.15	-.38***	-.18	.00	.41***	.66***	.65***	1
Behav	.08	-.11	.04	.26*	.09	.04	.22*	.2*	.23*	-.06	.13	-.06	-.01	.00	.03	.06	.19

*p<.05; **p<.01; ***p<.001

Regression Analyses Predicting Behaviour. A linear regression analysis was conducted separately within each activity to determine which variables explained significant amounts of variance in behaviour. Behaviour was measured as the frequency of exercise sessions engaged in during the two-week period between completing the first questionnaire and the second questionnaire. Participants were instructed to only respond in reference to the activity they were recruited from. Group similarities discovered in purpose 1 were considered with the intent of collapsing groups so as to ensure adequate power for analyses. Examination of the univariate statistics revealed multiple important between group differences. As a result, groups were not collapsed. In order to maximize power in the analysis, correlations between behaviour and self-determination theory variables presented in Tables 8b-f were examined within each activity, variables correlated $r<.1$ with behaviour were not included in the regression analyses.

Predictors were not consistent between activities. Within running, walking, and yoga, no variables predicted behaviour. Within Crossfit, identified regulation and competence were the only predictors of behaviour. Within spinning, relatedness (ROPAS) was the only predictor of behaviour. Results of the regression analyses are presented in Table 9a-9f.

Table 9a

Linear Regression Analysis with Behaviour as Dependent Variable: Crossfit

Variable	Model 1	Model2	Model 3	Model 4
n=96	Beta	Beta	Beta	Beta
Revitalization goal	.126	.104	.051	.04
Superiority goal	.174	.094	.136	.142
Competence		.269*	.254*	.263*
Relatedness (PNSE)		.057	.088	.058
External regulation			-.101	-.092
Identified regulation			.371**	.377**
Integrated regulation			-.078	-.071
Intrinsic regulation			-.094	-.102
PAGEQ				.119
ROPAS				-.081
R^2	.06	.136	.238	.244
F	2.973	3.582**	3.398**	2.745**
Significance of F change	.056	.022	.026	.713

*p<.05; **p<.01; ***p<.001

Table 9b

Linear Regression Analysis with Behaviour as Dependent Variable: Running

Variable	Model 1	Model2	Model 3	Model 4
n=91	Beta	Beta	Beta	Beta
Social	.134	.064	.109	.056
Relatedness (PNSE)		.176	.21	.144
Competence		-.038	-.022	-.051
Amotivation			-.08	-.044
External regulation			-.157	-.159
Intrinsic regulation			-.109	-.124
ROPAS				.17
R^2	.018	.039	.076	.086
F	1.624	1.178	1.147	1.119
Significant *F* change	.206	.323	.342	.359

*p<.05; **p<.01; ***p<.001

Table 9c

Linear Regression Analysis with Behaviour as Dependent Variable: Walking

Variable	Model 1	Model2	Model 3	Model 4
n=57	Beta	Beta	Beta	Beta
Healthy body goal	.215	.192	.06	.059
Superiority goal	.029	.026	-.021	-.023
Social goal	.142	.112	.161	.169
Relatedness (PNSE)		.06	-.009	.01
Autonomy		.07	.065	.066
Amotivation			.211	.211
External regulation			-.255	-.257
Introjected approach regulation			.235	.232
Identified regulation			.098	.095
ROPAS				-.033
R^2	.088	.098	.17	.171
F	1.705	1.11	1.069	.946
Significance of *F* change	.177	.753	.408	.861

*p<.05; **p<.01; ***p<.001

Table 9d

Linear Regression Analysis with Behaviour as Dependent Variable: Yoga 1

Variable	Model 1	Model2	Model 3	Model 4	Model 5
n=75	Beta	Beta	Beta	Beta	Beta
Superiority Goal	-.089	-.172	-.155	-.137	-.165
Weight Management Goal	-.236	-.177	-.098	-.035	-.081
Revitalization Goal	.059	-.051	.089	.125	.142
Social Goal	.428***	.278*	.228	-.014	-.04
Relatedness (PNSE)		.222	.355*	.185	.208
Competence		.231	.273*	.271*	.301*
External Regulation			-.268*	-.178	-.168
Introjected Avoidance Regulation			.051	.018	.032
Intrinsic Regulation			-.287	-.333*	-.335*
Relatedness (ROPAS)				.081	.12
PAGEQ				.367	.357
Social Comparison					.129
R^2	.21	.292	.361	.407	.418
F	4.661**	4.682***	4.076***	3.927***	3.71***
Significant *F* change	.002	.024	.084	.095	.279

*p<.05; **p<.01; ***p<.001

Results of the yoga linear regression can be seen in Table 9d. Counter-intuitively and theoretically inexplicably, the beta coefficient for intrinsic motivation was negative (*b*= -.335), indicating an increase in intrinsic motivation was associated with a decrease in behaviour. This is of particular interest since the partial correlation between intrinsic motivation and behaviour was positive.

Due to the beta coefficient of intrinsic motivation being negative and the intrinsic motivation – behaviour partial correlation (Table 8e) being positive, a suppression effect was thought to be present. Due to the possibility of suppression occurring due to collinearity between predictors, partial correlations (see table 8e) were examined, and variables with correlation coefficients > .7 (variables that were possibly collinear) were identified and removed from the regression analysis. PAGEQ, ROPAS, and social goals were eliminated from the regression. Superiority goals, weight management goals, relatedness (PNSE), competence, external regulation, introjected avoidance regulation, and social comparison were entered into model 1 and intrinsic motivation was entered in model 2. A negative beta coefficient (*b*= -.227) was found for intrinsic motivation. Consequently, a systematic process (outlined below) of adding and eliminating variables to the analysis was conducted with all variables which were correlated with behaviour greater than *r*=.1.

Superiority goals, weight management goals, and revitalization goals were entered in model 1 and intrinsic motivation was entered in model 2.[1] Intrinsic motivation had a positive beta coefficient (*b*=.143) and thus all goal contents were retained. Relatedness satisfaction

[1] An analysis following the procedure of systematically entering and eliminating variables was conducted with social goals included in model 1. Including social goals resulted in a positive beta coefficient, however, excluding social goals resulted in the inclusion of more variables in the final analysis and was considered to be theoretically stronger. Excluding social goals was explored due to its strong correlation with variables that were excluded from subsequent analysis – most notably relatedness (PNSE), ROPAS, and PAGEQ.

(PNSE) and competence satisfaction were then entered into step 2 and intrinsic motivation was entered in step 3. Intrinsic motivation had a negative beta coefficient (*b*= - .146) which persisted even when relatedness (*b*= -.026) and competence (*b*= -.005) were individually entered in step 2. As a result, the PNSE was not retained for subsequent analyses. Next, external regulation and introjected avoidance regulation were placed in model 2 and intrinsic motivation was placed in model 3. This resulted in a positive beta coefficient for intrinsic motivation (*b*= .074), as a result the two items from the BREQ were retained for future analyses. Next, ROPAS and PAGEQ were entered in step 3 and intrinsic motivation was entered in step 4. A negative beta coefficient was present (*b*= -.151) which persisted when ROPAS (*b*= -.045) and PAGEQ (*b*= -.157) were individually entered into the model. As a result, ROPAS and PAGEQ were not retained for future analyses. Finally, social comparison was entered in step 3 and intrinsic motivation was entered in step 4. A positive beta coefficient was present (*b*= .022), as a result social comparison was retained for future analysis. Results of the final regression analysis, conducted with variables that did not result in a negative beta coefficient for intrinsic motivation, are presented in Table 9e.

Table 9e

Linear Regression Analysis with Behaviour as Dependent Variable: Yoga 2

Variable	Model 1	Model2	Model 3
n=80	Beta	Beta	Beta
Superiority Goal	-.041	.004	.029
Weight Management Goal	-.195	-.066	-.027
Revitalization Goal	.168	.125	.107
External Regulation		-.166	-.194
Introjected Avoidance Regulation		-.168	-.158
Intrinsic Regulation		.043	.022
Social Comparison			-.126
R^2	.061	.119	.132
F	1.643	1.648	1.562
Significant *F* change	.187	.193	.311

*p<.05; **p<.01; ***p<.001

Table 9f

Linear Regression Analysis with Behaviour as Dependent Variable: Spinning

Variable	Model 1	Model2	Model 3	Model 4	Model 5
n=87	Beta	Beta	Beta	Beta	Beta
Superiority Goal	.143	.138	.128	.05	.023
Weight Management Goal	.147	.142	.126	.075	.053
Revitalization Goal	.019	.062	.078	.158	.178
Autonomy		-.144	-.139	-.151	-.141
Amotivation			.266*	.219	.202
Intrinsic Regulation			.127	.068	.077
Relatedness (ROPAS)				.337*	.335*
PAGEQ				-.203	-.207
Social Comparison					.077
R^2	.061	.08	.135	.183	.188
F	1.786	1.779	2.085	2.191*	1.98
Significant *F* change	.156	.194	.083	.107	.517

*p<.05; **p<.01; ***p<.001

Chapter 4: Discussion

The primary purpose of the research was to examine self-determination theory variables within various exercise activities. The primary outcomes were goal contents, psychological need satisfaction, and motivational regulations. Secondary questions concerned gender differences and social comparison. It was hypothesised that (1.2) aerobic activity participants would endorse body image goals more than people in other activities, and yogis would most strongly endorse goals that are traditionally perceived as more self-determined. It was hypothesised (1.1) that activities with greater opportunities for interaction would have greater relatedness satisfaction whereas competence and autonomy would not be differentially satisfied across activities. It was also hypothesized (1.3) that motivational regulations would not be differentially endorsed relative to the activity. In partial support of the hypothesis (1.2), yogis endorsed greater revitalization goals than other activities but not greater healthy body goals. Consistent with the hypothesis (1.2), people in primarily aerobic activities did tend to endorse body image goals more than in other activities. Consistent with the hypothesis (1.1), people in activities with greater interaction reported greater satisfaction of the need for relatedness. Contrary to the hypothesis (1.1) the needs for competence and autonomy were differentially satisfied among participants of the activities. Partially consistent with the hypothesis (1.3), endorsement of the motivational regulations was similar across the activities, however walkers endorsed the least self-determined regulations more than the participants in the other activities

Influence of Gender on Between Activity Differences

Goal content and gender. Greater endorsement of superiority goals within running and Crossfit may be the result of the gender composition of those samples; they had a higher proportion of male participants than the other activity groups. Past research has found males

endorse superiority goals more than females (Markland & Hardy, 1993), a finding that was duplicated in the present research when activities were collapsed.

Runners endorsed health body goals less than participants in most other activities, a finding that may be explained by gender. Males endorsed healthy body goals less than females. Also, males have previously been found to be more competitive than females (Gill, Williams, Dowd, Beaudoin, & Martin, 1996). Running is a competitive environment where social comparison seems to be more highly endorsed than in other activities. Perhaps competitive males, which make up a relatively large proportion of the run sample, are less concerned with participating for health related reasons and more for competition and superiority. This is consistent with Crossfitters, a sample that comprised relatively more men, endorsing superiority goals more than other activities.

Spinners and runners generally endorsed weight management goals more than people in the other activities. Past research has found that females endorse exercising for appearance goals more than males (Ryan, et al., 1997). Present research revealed women in spin and running endorsed greater weight management goals more than men in those activity groups. Furthermore, differences between activity groups in weight management goals were only present for females in a pattern that is consistent with between activity differences collapsed across genders (purpose 1 findings). That is, women endorse weight management goals more strongly than men, and activities with large numbers of women had, on average, stronger endorsement of weight management goals. These findings suggest that the differences between activities related to weight management goals is probably spurious and is really reflective of the gender balance in the activities.

Basic psychological need satisfaction and gender. Consistent with past literature and theoretical underpinnings, no gender differences were found relative to need satisfaction (Wilson, Mack, Gunnell, Oster, & Gregson, 2008; Ryan & Deci, 2000). This is likely the result of individuals feeling autonomous in selecting which activity to participate in. Additionally, individuals are more likely to select an activity at which they feel competent. Since these were naturally occurring groups, this is likely the case in the current study. It is possible that assigning people to unfamiliar activities might produce a different pattern of results.

Motivational regulations and gender. When activity groups were collapsed, no gender differences were found relative to motivational regulations with the exception of identified regulation. These findings are consistent with past reviews that concluded males and females do not differentially endorse regulations and if a difference is found, the effect size is small (Guerin, Eva, Bales, Sweet, & Fortier, 2012). However, examining differences between activities within gender revealed that males endorsed motivational regulations similarly across all activities, but females differentially endorsed motivational regulations in a pattern similar to the between activity findings collapsed across gender (see Table 5). While it is possible walking promotes the endorsement of external regulations, these findings provide evidence that males' behavioural regulations may not influence activity selection, but females' behavioural regulations might such that females who are not self-determined may participate in walking more than other activities. A possible explanation is that walking is an activity that is accessible to almost everyone and most individuals are capable of walking. Consistent with findings of the present study, females tend to exercise for more external reasons than males. Perhaps females would select a relatively simple activity for which they feel competent to appease the external pressure to exercise whereas males

would not. However, it is also possible that externally regulated male walkers are as prominent as females, however, they did not participate in the present research.

Association between mini-theories and gender. The influence of goal contents and basic psychological need satisfaction on motivational regulation endorsement varied between activities. Despite endorsing goal contents and basic psychological needs similarly to other groups, walkers more strongly endorsed external regulation than participants in other activities. Examination of between-activity, within-gender differences revealed that males did not differentially endorse external regulation across activities, whereas female walkers endorsed the external regulation more than females in all other activity groups. Women endorsing external regulation more than men is consistent with previous literature (Duncan et al., 2010), and possibly the result of women's greater desire to exercise to appease an external source such as a physician, friends, or family, or self-imposed but non-self-determined goals. Walkers endorsing external regulation may not necessarily be problematic since walkers also endorse the more self-determined regulations that have been shown to be positively associated with behaviour (Ingledew & Markland, 2008). There is some indication, however, that walking is more strongly associated with non-self-determined regulation than any of the other activities, especially for women.

A general influence of age and BMI on goal content appeared to be present. In particular, gender differences in goal content among runners and spinners were only present when covarying age and BMI. This finding indicates a possible moderator influence of age and BMI on goal content such that goal contents are differentially endorsed by individuals of a particular age and BMI category. A moderator analysis is beyond the scope of the present research, however an examination of correlations revealed that within running and spin, younger

individuals tend to endorse more superiority goals. Within running, a greater BMI was positively associated with weight management goals suggesting that those with a higher BMI participated to manage their weight. Future research may examine these possibilities further to determine the specific influence that age and BMI have on goal contents.

Influence of BMI on Activity Differences

Generally, lower BMI was associated with greater need satisfaction and greater endorsement of self-determined motivational regulations. Within females, BMI was negatively associated with revitalization goals, a goal traditionally viewed as self-determined, which would be consistent with the endorsement of less self-determined motivation.

Generally, a greater BMI was associated with stronger endorsement of weight management goals. However, crossfitters had a relatively higher BMI than other activities but a relatively lower endorsement of weight management goals. A possible explanation is the weight lifting component of Crossfit may result in participants striving to increase muscle mass as opposed to losing weight. This is consistent with individuals perceiving resistance training as a method to 'bulk up' (Guess, 2012) and consequently do not endorse participating for weight management goals.

A negative correlation between BMI and PAGEQ, which was only found within yoga, suggested that greater BMI was associated with less attraction to that group. A possible explanation for this finding is the relatively close proximity of yogis during the activity, the tight clothing worn, and their concentration on their own bodies. Demographic analysis of yogis (see appendix B) revealed that they generally had lower BMI (M = 23.31, SD = 4.49) than all other groups. Over 50% of Canadians reported a BMI greater than 25 (Statistics Canada, 2015). This reveals that the majority of yogis report a BMI that is at or below the Canadian average.

Suggesting that individuals of a relatively average size may be considered large within a yoga setting which might result in not feeling attracted to the group. It is also possible that yoga is difficult for larger bodies resulting in those individuals not feeling like they belong.

Influence of Age on Activity Differences

There was a generalized effect of age such that older individuals endorsed more self-determined regulations than younger individuals. A possible explanation is that as people age, they begin to perceive external contingencies (doctor pressure, peer pressure, etc.) in a less self-determined manner than when they were younger. This is of particular interest given that walkers, the oldest activity group, endorsed external regulation more than the other activities. A possibility is that due to the relative simplicity of walking, individuals who are no longer able to participate in more complicated high impact activities but still feel pressured to exercise choose to walk.

The finding that age was a covariate of superiority goals such that younger individuals had greater endorsement of the goal is consistent with past research (Markland & Hardy, 1993). This may be the result of individuals' self-esteem being more strongly established in older age or individuals' exercising for other personal goals (Gavin, Keough, Abravanel, Moudrakovski, Mcbrearty, 2014). Consistent with past research, age was not associated with weight management goals (Guess, 2012) revealing that individuals across the entire age span have comparable interest in weight management. The present research extends past research in finding that, even in non- clinical settings, age groups endorse weight management goals similarly.

Older individuals generally reported less competence satisfaction than younger individuals. A possible explanation is that as individuals age, they still feel like they should exercise, however, due to age and 'mileage' from years of previous activity, they may be forced

to participate in activities that are perceived as simpler and less physically challenging which would not satisfy the need for competence as would performing more complex activities.

Evidence for this proposition comes from findings with walkers, the oldest activity group, that competence satisfaction was not different from other activities. Similar to running and spin, walking is a well-learned, relatively simple activity that can be performed with low technical abilities. Whereas this simplicity may increase satisfaction of the need for competence in some activities, particularly for novices, the opposite may be true in walking. Through personal communication with the walking groups, many walkers indicated their participation emerged from no longer being able to participate in higher impact/intensity activities. Given that participants perceive walking as a less demanding activity in terms of exertion and possibly skill, and that they have adopted it in part due to an inability to continue participating in more demanding activities, the need for competence may not be as strongly satisfied as it might be in other activities.

Social Comparison Association with SDT

Generally, across all activities, individuals' participation and concern of social comparison was below the mid-point of the scales, suggesting low overall endorsement. Despite the minimal reported presence of social comparison, some associations emerged. Runners generally reported higher social comparison than all other groups while yogis reported lowest social comparison. This finding is consistent with the yoga value of focussing on oneself as opposed to other individuals. Running groups were preparing for various races that were in the near future. Perhaps due to these impending races, runners were comparing themselves more to others in an attempt to gain feedback regarding their ability and expected race outcome.

Need satisfaction and social comparison. Social comparison was generally not associated with need satisfaction suggesting that, regardless of the extent to which an individual participates in social comparison, basic psychological needs were not differentially satisfied, albeit social comparison was relatively low in all activities. Perhaps stronger social comparison endorsement would influence need satisfaction, which would be consistent with past literature (Sebire et al., 2013). Sebire et al. noted that social comparison negatively influenced need satisfaction when exercisers were pursuing goals traditionally viewed as self-determined (health or affiliation). A possible explanation for these findings is differing research methodology and assessment of social comparison. In the Sebire et al. (2013) study, qualitative methods were used and social comparison emerged as a general theme. The authors did not specifically measure social comparison, which could possibly have yielded different analysis and results.

While there was no direct influence of social comparison on need satisfaction within the present research, there may be an indirect effect. Social comparison was generally associated with weight management and superiority goals, two goals that within the present study were likely internalized. Within the present research superiority goals were generally positively associated with need satisfaction and weight management goals were not associated.

Motivational regulations and social comparison. Overall, social comparison appears to be associated with less self-determined motivational regulations, most notably introjected avoidance regulation, that is, exercising to avoid feelings of guilt and shame; a relationship that has been previously noted within the literature (Podlog & Dionigi, 2009). Individuals may compare themselves to co-exercisers and feel guilt or shame for not exercising when the target of comparison is exercising; an “if they can do it so should I” effect. Alternatively, individuals may feel they need to exercise to avoid being like a target of comparison who has undesirable

characteristics. Despite the association of less self-determined regulations with social comparison, behaviour may not be influenced by this association. The least self-determined regulations were found not to be associated with behaviour in this study. Consequently, an indirect influence of social comparison on behaviour does not seem likely.

In some instances however, behaviour may be associated with social comparison. A positive association between social comparison and behaviour was found only within spin. This is possibly the result of the inherent difficulty of comparing oneself with others in spin. While it is possible to approximate co-exerciser pedalling cadence, it is not readily apparent at what resistance or intensity the target of comparison is pedalling. Therefore individuals who wish to engage in comparison would have to invest substantial effort to compare themselves to others. It is possible that within spin, individuals use comparison as a motivational tool to drive their effort (Sebire et al., 2013).

Influence of Goal Content on Motivational Regulations

Generally, across all activity groups, superiority and weight management goals were associated with more self-determined regulations. Goals traditionally seen as "not self-determined" such as superiority and weight management would be expected to thwart need satisfaction and consequently the development of self-determined motivational regulations (Kasser & Ryan, 1996; Deci & Ryan, 2000). No such effect was found, particularly within runners and spinners who, despite relatively higher endorsement of these goals, reported need satisfaction and motivational regulation endorsement similar to other activity group participants. A possible explanation is that superiority and weight management goals are not experienced in a controlling manner by these groups, but they have internalized and integrated these goals (McLachlan & Hagger, 2011; Teixeira et al., 2012). These individuals may personally value

superiority and weight management. These findings provide evidence that the goal content is not necessarily as important as how an individual perceives the goal, and believes the activity will allow fulfillment of the goal (Vansteenkiste et al., 2010). This supports the idea that it is important for goals and expected outcomes to be congruent in order for individuals to endorse self-determined motivational regulations.

Another possible explanation for why runners have greater self-determined regulations despite greater endorsement of goals that are traditionally seen as non-self-determined could be the competitive environment. This is consistent with crossfitters' greater endorsement of self-determined regulations despite endorsing similar goal content as runners. Competition and superiority seemed to be perceived as self-determined within these activity groups. Previous research (Frederick-Recascino & Schuster-Smith, 2003) found that individuals in a competitive environment endorsed more self-determined motivations than non-competitive exercise groups. As Frederick-Recascino and Schuster-Smith noted, activity groups that endorse competition may result in individuals accepting competition as a part of the activity and perceiving the outcomes in an informational manner; encouraging improvement and consequently supporting self-determined motivation. Alternatively, individuals who derive pleasure and enjoyment from competition may be attracted to these activities (Vansteenkiste et al., 2010). The cross-sectional nature of this study precludes examination of whether individuals accepted competition within the settings or individuals who derive pleasure and enjoyment from competition being attracted to the activity. Regardless, the results indicate that competition within these activities does not undermine self-determined motivation.

Influence of Psychological Need Satisfaction on Motivational Regulations

Although some activities may have relatively lower satisfaction of basic psychological needs than other activities, this may not necessarily be detrimental to internalization (Deci & Ryan, 2000). As indicated by Deci & Ryan (2000), in instances where two of the basic psychological needs are satisfied, an individual is able to internalize the behaviour and derive value and enjoyment from the activity. Such an effect was found in the present research as demonstrated by the activity participants endorsing the self-determined regulations relatively similarly, despite differences in need satisfaction – a finding that suggests that within these particular activities, satisfaction of all three basic psychological needs is not as strongly required to internalize the behaviour. It should be noted however that despite differences in the extent to which activities were reported to achieve needs satisfaction, all activity participants reported need satisfaction on the higher end of the scale.

Between Activity Differences in Goal Contents

Numerous differences emerged in goal content endorsement between activities. Spinners and runners generally endorsed weight management goals more than people in the other activities. This is consistent with previous research that found individuals involved in aerobic activities endorsed body image related goals more strongly than participants in less aerobic focussed activities (Ryan, et al., 1997). A possible explanation is that (despite not necessarily being true) individuals perceive that aerobic activities are the optimal activity for weight loss. Consequently, individuals with weight loss goals might be more likely to pursue activities they think will accomplish the goal.

Activity values influencing goal content response. There appeared to be a trend, congruent with theoretical expectations, that activity participants endorsed goal contents that

were consistent with the values of the activity (Sebire, Standage, & Vansteenkiste, 2008). Yogis endorsed superiority goals and weight management goals less than all other activity participants. This is consistent with yoga being practiced for reasons consistent with balancing one's inner energy and improving oneself holistically. Since yoga places a value on focussing on the self, yogis would not be expected to endorse less self-determined goals. However, given the value placed on self-reflection and not being concerned with co-exercisers in yoga, a response bias may be present such that individuals avoided endorsing external goals or motives for participation in an attempt to respond in a manner that is socially desirable and consistent with the values of yoga.

Further, crossfitters and runners generally endorsed superiority goals more strongly than other activities. Within Crossfit, each workout is a mini-competition where individuals' scores are recorded and publicly displayed for co-exercisers to compare themselves to. The majority of runners were preparing for a race in the near future. As a result, it is likely that runners were competitive, trying to improve their times and do the best they could during the races. Participation in both these activities places value on individuals demonstrating superiority over others.

While there are differences in endorsement of goal contents, it appears that all activities have similar endorsement of self-determined motivational regulation. This infers that it is not necessarily important what goal contents individuals endorse, but whether the exerciser perceives that goal in a self-determined manner and if the goal can be achieved in the context of the activity (Vansteenkiste et al., 2010).

Between Activity Differences in Basic Psychological Need Satisfaction

Between activity differences in social measures. Consistent with the primary hypothesis, social indicators (social goals, and relatedness as measured by PNSE and ROPAS, and PAGEQ) were more strongly endorsed by crossfitters, runners, and walkers than yogis and spinners. Yoga and spin are carried out in a parallel fashion such that interaction with co-exercisers does not occur, and is even discouraged, during the activity. Consequently individuals do not have an opportunity to form social bonds with one another or pursue social goals. Individuals with social goals would likely pursue activities that afford greater opportunity to accomplish that goal (Vansteenkiste et al., 2010).

Effect sizes for between activity differences in social measures were rather large. This implies that there is a meaningful difference between the extent to which social connections and the need for relatedness are satisfied between activity groups. This would be of particular note if an individual placed a particular emphasis on social connection, because certain activities may be better suited to meeting such goals.

Despite the lower level of relatedness satisfaction within yoga and spin, levels of need satisfaction were consistent with past findings (Wilson & Rogers, 2008; Gunnell, et al., 2014) revealing that relatedness satisfaction, although lower relative to other activities, was not much lower than expected in general exercise settings. These findings suggest that yoga and spin do not necessarily thwart relatedness satisfaction but do not satisfy the need to the same extent as other activities.

Between activity differences in competence satisfaction. Generally, Crossfit and yoga reported the lowest satisfaction of the need for competence. Walking was not different from any other activity in competence satisfaction. These findings may be explained by the skill level

demand of the activities. Crossfit and yoga are both relatively more demanding of skill in comparison to running or spin. Within Crossfit and yoga, there are multiple complex movements or poses that individuals must learn and master in order to progress. Running and spin are uni-dimensional activities, with one movement that can be performed with minimal regard for technique. Despite the statistically significant difference, the absolute mean scores of competence satisfaction within yoga and Crossfit lay within the upper end of possible scores and were similar to other activities and consistent with previous literature (Wilson & Rogers, 2008; Gunnell, et al., 2013) implying competence satisfaction is not as strongly satisfied within Crossfit and yoga, but is still not thwarted. Despite crossfitters' relatively lower satisfaction of the need for competence, consistent with past research, competence satisfaction explained a significant amount of variance in behaviour (Vlachopoulos & Neikou, 2007). This finding is consistent with the idea that individuals participating in an activity that requires skill are likely to participate if they believe they are capable of performing the task. However, another possibility is that these individuals seek out opportunities to satisfy their need for competence whereas other individuals do not.

Between activity differences in autonomy satisfaction. Yogis and crossfitters generally reported lower satisfaction of the need for autonomy than other activities, possibly the result of the multi-dimensionality of these activities. A previous study of dragon boaters reported lower levels of autonomy satisfaction, (McDonough & Crocker, 2007). However, studies of general exercisers have also reported higher autonomy satisfaction (Wilson & Rogers, 2008; Gunnell, et al., 2014). Perhaps the extent to which a need to coordinate with other participants is present within an activity influences autonomy satisfaction. Activities that require participants to work

together, or do the same thing, may afford less autonomy satisfaction due to individuals feeling pressured to perform the same activity as co-exercisers.

Yoga contains many different types of poses (balance, hip opening, etc.) and Crossfit has different modalities (weight lifting, gymnastics, etc.). Within uni-dimensional activities such as running, spin, and walking individuals would attend being aware of specifically what activity they are performing (ie. running, spinning, or walking). In this sense, individuals may feel autonomous in the selection of the uni-dimensional activity and then allow other individuals, with higher expertise, to make decisions regarding their exercise program (McDonough & Crocker, 2007). Surrendering autonomy may occur in multi-dimensional activities as well, such that individuals choose to participate in Crossfit but then choose to follow instruction on which component is conducted, in which case another explanation for the different autonomy satisfaction would be necessary.

It is possible that the findings are the result of a measurement effect. Items on the autonomy scale of PNSE focus on which exercises are conducted (i.e.: "I feel like I have a say in choosing the exercises that I do"). Perhaps a greater focus on higher order decisions such as "I choose which activity I participate in" might have revealed different endorsements of autonomy satisfaction among activities. A similar effect could be due to a previously noted limitation of the PNSE autonomy subscale (McDonough & Crocker, 2007). It was noted that the PNSE focuses on decisional autonomy – opportunity for choice - and neglects affective autonomy – feeling volitional. Crossfitters and yogis may experience affective autonomy, feeling volitional in their engagement with the acctivity, but minimal decisional autonomy because a coach is selecting the exercises. Perhaps a measure of affective autonomy would reveal crossfitters and yogis are high

in autonomy and explain why need satisfaction and motivational regulations are uninfluenced by a lack of autonomy as assessed by the PNSE.

Between Activity Differences in Motivational Regulations

Generally, across the activities, there was no difference in the extent to which participants endorsed motivational regulations. Notable exceptions were walkers who endorsed external regulation greater than other activities and yogis who endorsed introjected avoidance regulation less than other activities.

Walkers' endorsement of external regulation was likely the result of the gender composition and age of the sample as previously discussed. Yogis' lower endorsement of introjected avoidance regulation – exercising to avoid feelings of guilt and shame – is likely the result of the yoga environment endorsing practicing for oneself as opposed to external contingencies, a conclusion that would be consistent with yogis' relatively lower endorsement of all goal contents except revitalization goals, and yogis' lesser endorsement of all extrinsic motivational regulations. Findings that participants in the various activity groups differentially endorsed motivational regulations supports the theoretical proposition that all the motivational regulations are present all the time, but are not all equally associated with performance of the behaviour (Deci & Ryan, 2000).

Effect sizes associated with differences between activity groups' endorsement of motivational regulations, and absolute differences in scores, were small. This finding is of interest and implies that motivational regulations show little variance across activities and thus may not necessarily be a factor influencing individuals' selection of one activity over another. Conversely, once selected, all the activities have the potential to be supported by self-determined regulation. However, medium-large effect sizes were present for differential endorsement of

motivational regulations between men and women, revealing a possible moderator influence such that women participate for less self-determined reasons than men. This is consistent with previously noted research that women may feel more obligated to exercise to appease an external source or less self-determined goals.

Intrinsic versus Identified regulation and exercise participation. As anticipated, these regularly physically active participants, regardless of activity group, endorsed the self-determined regulations more strongly than the less self-determined regulations. However, intrinsic motivation was never the most strongly endorsed motivational regulation. Consistent with past findings (Edmunds, et al., 2006; Wilson, et al., 2002), identified regulation was the most strongly endorsed regulation across all activities. Greater endorsement of identified regulation was associated with greater behavioural engagement across all activities; also consistent with past research (Standage, et al., 2008). This supports the idea that exercise is not necessarily inherently interesting or enjoyable, but is valued and consistent with people's goals and identities (Wilson & Rodgers, 2003). Furthermore, identified regulation was endorsed across all activities at levels consistent with past research (Wilson, et al., 2006; Standage, et al., 2008).

Simplex Structure

Within SDT, the motivational regulations are theorized to follow a simplex structure such that regulations more proximal to each other on the motivational continuum have a stronger association to each other than to more distal regulations (Wilson, et al., 2003). Across all activity groups, the simplex structure was present, consistent with past literature (Wilson, et al., 2006), upholding the theorized continuum underpinning the motivational regulations.

Impact Potential

Despite the significantly different endorsement of goal contents, need satisfaction, and motivational regulations between activity groups, the effect sizes corresponding to between activity group differences were generally only small to medium (cf. Cohen, 1988). A small to medium effect size implies that the amount of between activity group variance in the dependent variables that can be attributed to activity groups is rather small. Despite the small effect sizes, the results could have meaningful practical implications regarding activity selection such that individuals with particular goals or desires would be best suited to activities that afford opportunities to fulfill those goals. The large sample size provides confidence that the results are robust, and indeed representative of the participants in all the activities. However, it could be that there are non-meaningful differences as a result of the large sample size coupled with small effect sizes. Regardless, it would be important for these results to be replicated to ensure robustness of the findings.

Strengths and Limitations

This research has several strengths, including congruence between measures of self-determination theory variables and behaviour. In accordance with previous recommendations (Vallerand, Donahue, & Lafreniere, 2012), behaviour and theoretical variables were measured on the same level of generality in reference to a specific activity as opposed to different frames of reference (i.e., general exercise and specific activity). A strength of the study is the use of a representative sample selected from relevant activity communities. Through the use of appropriate samples participating at the typical activity sites, the external validity of the research is strengthened. Using multiple facilities for each activity increases the external validity of the findings. Privately owned facilities might present each activity differentially. As a result of

recruiting from multiple facilities, the influence of facility differences on results could be minimized.

Though this study has many strengths, some limitations were also present. As with all self-report research, responses were subject to participants responding in a socially desirable manner (Shephard, 2003). Individuals are likely to respond in a manner that is socially desirable and consistent with how they may perceive they are supposed to respond. Responses were also subject to bias of participant motivation. Individuals who completed the questionnaire may have internalized the behaviour more than individuals who only completed a portion of the questionnaire, or did not respond at all. Additionally, participants completed the questionnaire on their own time. It is possible that some participants wanted to help out and contribute to the research, but did not want to put effort into their responses (i.e., complete the questionnaire as fast as possible). The length of the questionnaire may be another limitation. Many individuals did not complete the entire questionnaire. It is also possible that fatigue influenced the responses of those individuals who completed the questionnaire, possibly leading to disingenuous responses. Additionally, the order of questions was not varied; they were always the same. An order effect is not impossible. The cross-sectional design (despite the single follow up assessment of behaviour) also limits the possible inferences that can be made from the data. A longitudinal research design would serve to better understand how motivation influences behaviour as well as how behaviour might influence motivation. While conducting multivariate analyses reduces the likelihood of creating a type 1 error compared to conducting multiple ANOVAs, conducting multiple MANOVAs may still create a type 1 error.

Delimitations include restricting the findings to individuals older than 18 who were involved in an exercise group engaging in one of the specified activities. Due to these

delimitations, the results are not generalizable to individuals who may pursue the activities on their own (outside an organized group) or who are younger than 18.

Future Research

This research raises questions for future research. First, it would be of interest to examine different styles of yoga to determine if motivation to participate is consistent across all practices. As well, it would be of interest to examine each activity separately to determine between facility differences. Within running particularly, it would be of interest to examine how motivation is influenced by season. Individuals who run outdoors in the winter may have different motivation than runners who only participate during the summer. Additionally, the robustness of an individual's motivation is worth considering. Do individuals have different motivation for participating in different activities or is motivation consistent across all activities that an individual participates in? This would help in the understanding of how motivation may influence activity selection in addition to how activity experiences might influence motivation. Cross-cultural studies would also be of interest to determine if motives are similarly endorsed in the same activity across cultures. Finally, future research should use a longitudinal design to determine if individuals with a particular subset of motives adhere better to one activity than another.

Conclusion

In conclusion, endorsement of goal contents, need satisfaction, and motivational regulations varied by activity, and were consistently associated with participant gender, age, and BMI. Participants in aerobic activities tended to endorse weight management goals more than other activities, while participants in activities with interaction opportunities endorsed social goals more than other activities. Women and people with a larger BMI were more likely to

endorse less self-determined regulation than men; and walkers endorsed less self-determined regulation than other activity participants. Finally, older individuals endorsed superiority motives less than younger individuals. These findings provide evidence that different activities are associated with different motives and reasons for participating, but there are some potentially systematic differences associated with age, BMI, and gender. However, as evidenced by the small effect sizes, the absolute influences of these differences on psychological needs satisfaction and on quality of motivation appeared minimal. The extent to which these differences might influence adherence is unknown.

Given these findings, future researchers are advised to clearly specify the nature of the activity they are studying to help clarify discrepant findings in the literature. As well, health practitioners can be informed by the research to consider their patients' motivation and suggest activities that would be consistent with the motivation of the patient. To the author's knowledge, this was the first study that systematically examined motivation within different activity groups and consequently provides evidence that different activities may be pursued for different motives and ensuring congruence between goals and possible outcomes of an activity may improve enjoyment and adherence.

References

Annesi, J. J. (2002). Relationship between changes in acute exercise-induced feeling states, self-motivation, and adults' adherence to moderate aerobic exercise. *Perceptual & Motor Skills, 94*(2), 425-439.

Babbitt, T., Rowland, G., & Franken, R. (1990). Sensation seeking and participation in aerobic exercise classes. *Personality and Individual Differences, 11*(2), 181-183.

Beauchamp, M. R., Carron, A. V., McCutcheon, S., & Harper, O. (2007). Older adults' preferences for exercising alone versus in groups: Considering contextual congruence. *Annals of Behavioral Medicine, 33*(2), 200-206.

Brunet, J., & Sabiston, C. M. (2011). Exploring motivation for physical activity across the adult lifespan. *Psychology of Sport & Exercise, 12*(2), 99-105.

Bryan, A. D., & Rocheleau, C. A. (2002). Predicting aerobic versus resistance exercise using the theory of planned behavior. *American Journal of Health Behavior, 26*(2), 83-94.

Caltabiano, M., & Ghafari, N. (2011). The effect of social comparison processes, athletic prototypes, perceived behavioural control and perceived threat on physical activity. *International Journal of Health Promotion and Education, 4*(2), 44-52.

Canadian Society for Exercise Physiology. (2013). Canadian physical activity guidelines: For adults 18-64 years. Retrieved 05/02, 2014, from http://www.csep.ca/CMFiles/Guidelines/CSEP_PAGuidelines_adults_en.pdf

Carron, A. V., Brawley, L. R., & Widmeyer, W. N. (1990). The impact of group size in an exercise setting. *Journal of Sport & Exercise Psychology, 12*(4), 376-387.

Caspersen, C., Powell, K., & Christenson, G. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports, 100*(2), 126-131.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* New York, New York: Lawrence Erlbaum Associates.

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*(1), 155-159.

Colley, R., Garriguet, D., Janssen, I., Craig, C., Clarke, J., & Tremblay, M. (2011). Physical activity of canadian adults: Accelerometer results from the 2007 to 2009 canadian health measures survey. *Health Reports, 22*(1) doi:82-003-x

Costley, K. (2006). *Why do we have theories?* Unpublished manuscript.

Creswell, J. (2003). The use of theory. *Research design: Qualitative, quantitative, and mixed method approaches* (4th ed., pp. 49-71). Thousand Oaks, California: SAGE Publications.

Daniloff, C. (2013). Running rogue. *Runner's World, 48*(12), 64-67.

Datta, N., & Kulik, J. (2012). Women's approach and avoidance of social comparison opportunities when exercising. *Basic and Applied Social Psychology, 34*, 467-473.

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

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

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

Dimmock, J., Jackson, B., Podlog, L., & Magaraggia, C. (2013). The effect of variety expectations on interest, enjoyment, and locus of causality in exercise. *Motivation & Emotion, 37*(1), 146-153. doi:10.1007/s11031-012-9294-5

Duncan, L. R., Hall, C. R., Wilson, P. M., & Jenny, O. (2010). Exercise motivation: A cross-sectional analysis examining its relationships with frequency, intensity, and duration of exercise. *International Journal of Behavioral Nutrition & Physical Activity, 7*(7), 7-15. doi:10.1186/1479-5868-7-7

Edmunds, J., Ntoumanis, N., & Duda, J. (2008). Testing a self-determination theory-based teaching style intervention in the exercise domain. *European Journal of Social Psychology, 38*(2), 375-388.

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. doi:10.1111/j.0021-9029.2006.00102.x

Estabrooks, P., & Carron, A. (2000). The physical activity group environment questionnaire: An instrument for the assessment of cohesion in exercise classes. *Group Dynamics: Theory, Research, and Practice, 4*(3), 230-243.

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*, 117-140.

Frederick, C., Havitz, M., & Shaw, S. (1994). Social comparison in aerobic exercise classes: Propositions for analysing motives and participation. *Leisure Sciences, 16*, 161-176.

Frederick-Recascino, C. M., & Schuster-Smith, H. (2003). Competition and intrinsic motivation in physical activity: A comparison of two groups. *Journal of Sport Behavior*, *26*, 240-254.

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

Garcia, A. W., & King, A. C. (1991). Predicting long-term adherence to aerobic exercise: A comparison of two models. *Journal of Sport & Exercise Psychology, 13*(4), 394-410.

Gardner, B., & Lally, P. (2013). Does intrinsic motivation strengthen physical activity habit? modeling relationships between self-determination, past behaviour, and habit strength. *Journal of Behavioral Medicine, 36*(5), 488-497. doi:10.1007/s10865-012-9442-0

Gavin, J., Keough, M., Abravanel, M., Moudrakovski, T., & Mcbrearty, M. (2014). Motivations for participation in physical activity across the lifespan. *International Journal of Wellbeing. 4*(1). 46-61. doi:10.5502/ijw.v4i1.3.

Gill, D., Williams, L., Dowd, D., Beaudoin, C., & Martin, J. (1996). Competitive orientations and motives of adult sport and exercise participants. *Jounral of Sport Behavior. 19*(4), 307-318.

Ginis, K., Burke, S., & Gauvin, L. (2007). Exercising with others exacerbates the negative effects of mirrored environments on sedentary women's feeling states. *Psychology & Health, 22*(8), 945-962. doi:10.1080/14768320601070571

Gionet, N., & Godin, G. (1989). Self-reported exercise behavior of employees: A validity study. *Journal of Occupational Medicine, 31*, 969-973.

Glassman, G. (2004). What is crossfit? *The Crossfit Journal,* (19)

Guess, N. (2012). A qualitative investigation of attitudes towards aerobic and resistance exercise amongst overweight and obese individuals. *BMC Research Notes.* doi: 10.1186/1756-0500-5-191.

Godin, G., Jobin, J., & Bouillon, J. (1986). Assessment of leisure time exercise behavior by self-report: A concurrent validity study. *Canadian Journal of Public Health, 77*, 359-361.

Godin, G., & Shephard, R. J. (1985). A simple method to assess exercise behavior in the community. *Canadian Journal of Applied Sport Sciences, 10*(3), 141-146.

Grabara, M. (2013). Effects of 8-months yoga training on shaping the spine in people over 55. *Biomedical Human Kinetics, 5*(1), 59-64.

Gravetter, F. J., & Wallnau, L. B. (2009). Statistics for the behavioral sciences (8th Ed.) Belmont, CA: Thomson Wadsworth.

Guerin, Eva, Bales, Elena, Sweet, Shane N., & Fortier, M. S. (2012). A meta-analysis of the influence of gender on self-determination theory's motivational regulations for physical activity. *Canadian Psychology*, *53*, 291-300. doi:10.1037/a0030215

Gunnell, K. E., Crocker, P. R. E., Mack, D. E., Wilson, P. M., & Zumbo, B. D. (2014). Goal contents, motivation, psychological need satisfaction, well-being and physical activity: A test of self-determination theory over 6 months. *Psychology of Sport & Exercise, 15*(1), 19-29. doi:10.1016/j.psychsport.2013.08.005

Gunnell, K. E., Wilson, P. M., Zumbo, B. D., Mack, D. E., & Crocker, P. R. E. (2012). Assessing psychological need satisfaction in exercise contexts: Issues of score invariance, item modification, and context. *Measurement in Physical Education & Exercise Science, 16*(3), 219-236.

Hamilton, M. T., Hamilton, D. G., & Zderic, T. W. (2008). Role of low energy expenditure and sitting in obesity, metabolic syndrome, type 2 diabetes, and cardiovascular disease. *Metabolic Syndrome and Related Disorders,* (1), 81.

Harley, A. E., Buckworth, J., Katz, M. L., Willis, S. K., Odoms-Young, A., & Heaney, C. A. (2009). Developing long-term physical activity participation: A grounded theory study with african american women. *Health Education & Behavior, 36*(1), 97-112.

Huberty, J. L., Ransdell, L. B., Sidman, C., Flohr, J. A., Shultz, B., Grosshans, O., & Durrant, L. (2008). Explaining long-term exercise adherence in women who complete a structured exercise program. *Research Quarterly for Exercise and Sport, 79*(3), 374-384.

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

Ingledew, D. K., Markland, D., & Ferguson, E. (2009). Three levels of exercise motivation. *Applied Psychology: Health & Well-Being, 1*(3), 336-355. doi:10.1111/j.1758-0854.2009.01015.x

Kassavou, A., Turner, A., & French, D. (2013). Do interventions to promote walking in groups increase physical activity? A meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity, 10*(18), doi: 10.1186/1479-5868-10-18

Kasser, T., & Ryan, R. M. (1996). Further examining the american dream: Differential correlates of intrinsic and extrinsic goals. *Personality & Social Psychology Bulletin,* (3), 280.

Kathrins, B. P., & Turbow, D. J. (2010). Motivation of fitness center participants toward resistance training. *Journal of Strength & Conditioning Research, 24*(9), 2483-2490. doi:10.1519/JSC.0b013e3181e27488

Lockwood, P., Wong, C., McShane, K., & Dolderman, D. (2005). The impact of positive and negative fitness exemplars on motivation. *Basic and Applied Social Psychology, 27*(1), 1-13.

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. K. (1997). *The measurement of exercise motives: Factorial validity and invariance across gender of a revised exercise motivations inventory*

Markland, D., & Tobin, V. (2004). A modification to the behavioural regulation in exercise questionnaire to include an assessment of amotivation. *Journal of Sport & Exercise Psychology, 26*(2), 191-196.

Markland, D., & Tobin, V. J. (2010). Need support and behavioural regulations for exercise among exercise referral scheme clients: The mediating role of psychological need satisfaction. *Psychology of Sport & Exercise, 11*(2), 91-99.

McAuley, E., Lox, C., Rudolph, D., & Travis, A. (1994). Self-efficacy and intrinsic motivation in exercising middle-aged adults. *Journal of Applied Gerontology, 13*(4), 355-370.

McAuley, E., Wraith, S., & Duncan, T. E. (1991). Self-efficacy, perceptions of success, and intrinsic motivation for exercise. *Journal of Applied Social Psychology, 21*(2), 139-155.

McDonough, M., & Crocker, P. R. E. (2007). Testing self-determined motivation as a mediator of the relationship between psychological needs and affective and behavioral outcomes. *Journal of Sport & Exercise Psychology, 29*(5), 645-663.

McLachlan, S., & Hagger, M. S. (2011). Do people differentiate between intrinsic and extrinsic goals for physical activity? *Journal of Sport & Exercise Psychology, 33*(2), 273-288.

Miller, D. J., Freedson, P. S., & Kline, G. M. (1994). Comparison of activity levels using the caltrac accelerometer and five questionnaires. *Medicine & Science in Sports & Exercise, 26*(3), 376-382.

Moreno, J. A., González-Cutre, D., Sicilia, Á, & Spray, C. M. (2010). Motivation in the exercise setting: Integrating constructs from the approach–avoidance achievement goal framework and self-determination theory. *Psychology of Sport & Exercise, 11*(6), 542-550.

Morris, J., & Hardman, A. (1997). Walking to health. *Sports Medicine, 23*(5), 306-332.

Morton, K. L., Biddle, S. J. H., & Beauchamp, M. R. (2008). Changes in self-determination during an exercise referral scheme. *Public Health, 122*, 1257-1260. doi:10.1016/j.puhe.2007.11.006

Mullan, E., & Markland, D. (1997). Variations in self-determination across the stages of change for exercise in adults. *Motivation & Emotion, 21*(4), 349-362.

Ogilvie, D., Foster, C., Rothnie, H., Cavill, N., Hamilton, V., Fitzsimons, C., & Mutrie, N. (2007). Interventions to promote walking: A systematic review. *British Medical Journal. doi:10.1136/bmj.39198.722720.BE*

O'Loughlin, A. (2012). A door for creativity – art and competition in parkour. *Theatre, Dance & Performance Training, 3*(2), 192-198. doi:10.1080/19443927.2012.689131

Onstad, K. (2012). Why I run alone (and sprint away from running groups). Retrieved 05/05, 2014, from http://www.theglobeandmail.com/life/health-and-fitness/fitness/running/why-i-run-alone-and-sprint-away-from-running-groups/article4186771/

Painter, J., Borba, C., Hynes, M., Mays, D., & Glanz, K. (2008). The use of theory in health behavior research from 2000 to 2005: A systematic review. *Annals of Behavioral Medicine, 35*(3), 358-362. doi:10.1007/s12160-008-9042-y

Partridge, J. A., Knapp, B. A., & Massengale, B. D. (2014). An investigation of motivational variables in crossfit facilities. *Journal of Strength and Conditioning Research, 28*(6),1714-1721. doi: 10.1519/JSC.0000000000000288.

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

Pila, E., Stamiris, A., Castonguay, A., & Sabiston, C. (2014). Body-related envy: A social comparison perspective in sport and exercise. *Journal of Sport & Exercise Psychology, 36*, 93-106.

Plante, T., Gregg, S., Rubbo, J., Favero, T., Morisako, A., & Cuadra, J. (2011). Impact of exercise partner attractiveness on mood, enjoyment, and exertion. *International Journal of Exercise Science, 4*(4), 265-272.

Podlog, L., & Dionigi, R. A. (2009). Psychological need fulfillment among workers in an exercise intervention: A qualitative investigation. *Research Quarterly for Exercise and Sport, 80*(4), 774-787.

Proper, K., Singh, A., van Mechelen, W., & Chinapaw. (2011). Sedentary behaviors and health outcomes among adults: A systematic review of prospective studies. *American Journal of Preventative Medicine, 40*(2), 174-182. doi:10.1016/j.amepre.2010.10.015.

Rahman, R., J., Thogersen-Ntoumani, C., Thatcher, J., & Doust, J. (2011). Changes in need satisfaction and motivation orientation as predictors of psychological and behavioural outcomes in exercise referral. *Psychology & Health, 26*(11), 1521-1539. doi:10.1080/08870446.2010.538849

Rodgers, W. M., Hall, C. R., Duncan, L. R., Pearson, E., & Milne, M. I. (2010). Becoming a regular exerciser: Examining change in behavioural regulations among exercise initiates. *Psychology of Sport & Exercise, 11*(5), 378-386.

Rose, E. A., Parfitt, G., & Williams, S. (2005). Exercise causality orientations, behavioural regulation for exercise and stage of change for exercise: Exploring their relationships. *Psychology of Sport and Exercise, 6*(4), 399-414.

Ross, A., Bevans, M., Friedmann, E., Williams, L., & Thomas, S. (2013). "I am a nice person when I do yoga!!!": A qualitative analysis of how yoga affects relationships. *Journal of Holistic Nursing,*

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist, 55*(1), 68-78.

Ryan, R. M., Frederick, C. M., Lepes, D., Rubio, N., & Sheldon, K. M. (1997). Intrinsic motivation and exercise adherence. *International Journal of Sport Psychology, 28*(4), 335-354.

Sebire, S. J., Standage, M., Gillison, F. B., & Vansteenkiste, M. (2013). "Coveting thy neighbour's legs": A qualitative study of exercisers' experiences of intrinsic and extrinsic goal pursuit. *Journal of Sport & Exercise Psychology, 35*(3), 308-321.

Sebire, S., Standage, M., & Vansteenkiste, M. (2008). Development and validation of the goal content for exercise questionnaire. *Journal of Sport and Exercise Psychology*, *30*, 353-377.

Sebire, S. J., Standage, M., & Vansteenkiste, M. (2009). Examining intrinsic versus extrinsic exercise goals: Cognitive, affective, and behavioral outcomes. *Journal of Sport & Exercise Psychology, 31*(2), 189-210.

Silva, M. N., Markland, D., Vieira, P. N., Coutinho, S. R., Carraça, E. V., Palmeira, A. L., . . . Teixeira, P. J. (2010). Helping overweight women become more active: Need support and motivational regulations for different forms of physical activity. *Psychology of Sport & Exercise, 11*(6), 591-601.

Spink, K., S., Wilson, K., S., & Bostick, J., M. (2012). Theory of planned behavior and intention to exercise: Effects of setting. *American Journal of Health Behavior, 36*(2), 254-264.

Springer, J. B., Lamborn, S. D., & Pollard, D. M. (2013). Maintaining physical activity over time: The importance of basic psychological need satisfaction in developing the physically active self. *American Journal of Health Promotion, 27*(5), 284-293.

Standage, M., Sebire, S. J., & 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), 337-352.

Statistics Canada. (2015). Body mass index, overweight or obese, self-reported, adult, by sex, provinces and territories (Percent). Retrieved 19/07, 2015, from http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/health82b-eng.htm

Tabachnick, B., & Fidell, L. (2006). *Using multivariate statistics* (5th ed.). Boston: Pearson.

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 & Physical Activity, 9*(1), 78-107. doi:10.1186/1479-5868-9-78

Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *Journal of Sports Sciences, 24*(4), 393-404.

Vallerand, R., Donahue, E., Lafreniere, M. (2012). Intrinsic and extrinsic motivation in sport and exercise. In G. Tenenbaum, R. Eklund, & A. Kamata (Eds.), Measurement in sport and exercise psychology (pp.279-292). Champaign, IL: Human Kinetics.

Vansteenkiste, M., Niemiec, C., & Soenens, B. (2010). The development of the five mini-theories of self-determination theory: An historical overview, emerging trends, and future directions.*16A*, 105-165. doi:10.1108/S0749-7423(2010)000016A007

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 & Exercise Psychology, 26*(2), 232-249.

Vlachopoulos, S. P., & Neikou, E. (2007). A prospective study of the relationships of autonomy, competence, and relatedness with exercise attendance, adherence, and dropout. *Journal of Sports Medicine & Physical Fitness, 47*(4), 475-482.

Warburton, D. E. R., Nicol, C. W., & Bredin, S., S.D. (2006). Health benefits of physical activity: The evidence. *Canadian Medical Association Journal, 174*(6), 801-809.

Wasilenko, K., Kulik, J., & Wanic, R. (2007). Effects of social comparison with peers on women's body satisfaction and exercise behavior. *International Journal of Eating Disorders, 40*(8), 740-745.

What is crossfit? Retrieved 05/05, 2014, from http://www.crossfit.com/cf-info/what-is-crossfit.html

Wilson, P. M., & Bengoechea, E. G. (2010). The relatedness to others in physical activity scale: Evidence for structural and criterion validity. *Journal of Applied Biobehavioral Research, 15*(2), 61-87. doi:10.1111/j.1751-9861.2010.00052.x

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., & Rodgers, W. M. (2003). The relationship between perceived autonomy support, exercise regulations and behavioral intentions in women. *Psychology of Sport and Exercise, 5*(3), 229-242. doi:10.1016/S1469-0292(03)00003-7

Wilson, P. M., & Rodgers, W. M. (2004). The relationship between perceived autonomy support, exercise regulations and behavioral intentions in women. *Psychology of Sport and Exercise, 5*(3), 229-242.

Wilson, P., & Rogers, T. (2008). Examining relationships between perceived psychological need satisfaction and behavioral regulations in exercise. *Journal of Applied Biobehavioral Research, 13*(3), 119-142. doi:10.1111/j.1751-9861.2008.00031.x

Wilson, P. M., Rodgers, W. M., & Fraser, S. N. (2002). Examining the psychometric properties of the behavioral regulation in exercise questionnaire. *Measurement in Physical Education & Exercise Science, 6*(1), 1-21.

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.

Wilson, P. M., Rodgers, W. M., Fraser, S. N., & Murray, T. C. (2004). Relationships between exercise regulations and motivational consequences in university students. *Research Quarterly for Exercise and Sport, 75*(1), 81-91.

Wilson, P., Rodgers, W. M., Loitz, C. C., & Scime, G. (2006). "It's who I am … really!' the importance of integrated regulation in exercise contexts. *Journal of Applied Biobehavioral Research, 11*(2), 79-104.

Wilson, P. M., Rogers, W. T., Rodgers, W. M., & Wild, T. C. (2006). The psychological need satisfaction in exercise scale. *Journal of Sport & Exercise Psychology, 28*(3), 231-251.

Wilson, P. M., Mack, D. E., Gunnell, K., Oster, K., & Gregson, J. P. (2008). Analyzing the measurement of psychological need satisfaction in exercise contexts: Evidence, issues, and future directions. In M. P. Simmons & L. A. Foster (Eds.), *Sport and exercise psychology research advances* (pp. 361-391). Hauppauge, NY: Nova Science.

The yoga revolution. (2014). *Yoga Journal,* (262), 68-75.

Zajac, A. U., & Schier, K. (2011). Body image dysphoria and motivation to exercise: A study of canadian and polish women participating in yoga or aerobics. *Archives of Psychiatry & Psychotherapy, 13*(4), 67-72.

Appendix A

Retrieved articles

Reference	Purpose and Variables	Sample and Activity	Theory and Design	Analysis	Findings
Frederick-Recascino & Schuster-Smith, 2003	Test how competitiveness (cyclist group) effects motivation and the resultant impact on exercise adherence Age Gender Days/week of exercising Hrs/wk exercise Motives for exercise Motives for exercise - (Motivation for PA measure) Trait competiveness in sport domain (Sport competition trait inventory) Trait competitive (Competitive – Cooperative attitude scale)	58competitive bikers (19-56y.o – M=36.16) 65 general exercisers - got course credit for completing measure (16-72y.o M=25.03) Competitive group was bikers, Recreation group was strength and aerobic training (specifics not provided)	SDT 2x2x2 (physical activityxhigh vs low sport competiveness x high vs low general competitivness) Cross-sectional	MANCOVA	Cycling group positively related to interest/enjoyment motivation, appearance motivation, and days per week of participation Exercise group sport competition was related to interest/enjoyment motivation, appearance motivation, and competence motivation Cyclists had higher intrinsic-oriented motives and lower extrinsic motives than other group.
Partride, Knapp, & Massengale, 2013	Examine achievement motivation and goal	88female 56male from 2 crossfit facilities	AGT	MANOVA was used splitting	Males and females have different ways of demonstrating

	orientations of crossfit members Achievement goals (achievement goals questionnaire for sport) – how ppl define competence (mastery approach, mastery avoidance, performance approach, performance avoidance). Perceived motivational climate in sport questionnaire	18-71y.o (M=34.4) members of crossfit gyms and the surveys were administered immediately after exercise.	Cross-sectional, filled out 3surveys at one time point	groups up into gender and time of membership Time of membership was created using a median split (6months).	competence(F-mastery avoidance . M-Performance Approach) Anova was conducted and found that people who have been attending for less than 6 months score higher on both mastery-oriented goals.
Edmunds, Ntoumanis, & Duda (2006)	Basic need satisfaction at work Questionnaire (adapted for exercise) BREQ GLTEQ Healthcare climate questionnaire (for perceived autonomy support)	N=369 (173 male 192female) aged 16-64 (M= 30.24) recruited from fitness, community, andretail settings Any level/modality of exercise was include, those who did regular group classes did the PAS questionnaire.	SDT Cross sectional. Measured at one time point	Pearson – between BREQ and other variables MANOVA to determine Regression analysis to determine total and strenuous ex from need satisfy and	A most highly satisfied need Intrinsic and ident most endorsed motivation Small "-" correlation between needs and external regulation A and introjected were negative correlated

				motiv regulation	Small to moderate positive correlation with needs and ident and intrins motivation small-mod + relationship between needs and stren and total exercise Autonomy correlated +with mod ex No relationship between needs and mild ex Regulations not correlated with mild or mod ex Age and introjected reg predicted total ex B Gend,age,C,ext reg, int reg, and iden reg predicted strenuous B PAS was associated with self-determined motives

1

Wilson, Rodgers, Loitz, & Scime, 2006	Study 1- Measure convergenta nd divergent validity of BREQ (including new Integrated reg items) Study2-examine expanded BREQ in exercisers and relation of integ to NS Study3-test the criterion validity of items developed in study 1and2 Study1- BREQ, Integrated regulation items adapted from other measurs, Exercise motivation scale Study2-BREQ, Psychological need satisfaction Study3-extrinsic motivation from BREQ and 4 integrate regulation, GLTEQ, Physical self description questionnaire	Study 1- 61M 146F undergrad psyc students Study2- 126F 6M –Mage 47.5 from a running club Study 3- 89female Mage 19.35 50M Mage20.06 Study 1 and 3 were various activities Study 2 was a running group	SDT New data collection for each study with ptp completing one survey each time **study 3 had a two week follow up for stability of scores**	Study1-CFA Study2- Simultaneous multiple regression analyses done to determine contribution of of C A and R to regulations Study3- SMRA estimate contribution of motive to behaviour Structure coefficients evaluated contribution of motives to behaviour	Study1-Factorially different but not mutually exclusive (which is congruent with the notion of a continuum) Study2- NS was associate + with auonomous motives Study 3-integrated motive helps explain behaviour

Standage, Sebire, & Loney, 2008	Use motivation to predict engagement in moderate intensity exercise Exercise motivation (BReQ) Exercise behaviour (accelerometer)	26M 26F Mage 22.27 No specific activity, participants wore acceleromters for 8 days and activity was measured.	SDT Participants completed a questionnaire about their motivation, 7 days later came back to lab and got an accelerometer to wear for 8days	Independent sample t test (gender diff between mean values) Regression analysis to determine if motivates predict B above that of genderand Bmi/waist circumference	All bouts of exercise (>10min, >20min, >10min contirbuting to guidelines) autonomous motivation was the only predictor (gender aswelly for all but >20min)
Wilson, Rodgers, Blanchard, & Gessell, 2003	Examine relation between NS, exercise regulations, and motivational consequences in exercise B, A, and fitness Changes in NS and MR across time Activity Feeling scale (Measures NS) BREQ LTEQ Attitude scale (also used in big study) Physical fitness	44F 9M people from the community (Mage 41.75) Ptp came into lab to workout under supervision of exercise specialist Biked for a set period of time at a set resistance for a set frequency (3x/wk)	SDT Ptp exercised 3x/week for 12wks. Measures were done before and after the 12wk	Square root procedure to normalize external regulation and METS NS-MR relationship examined by pearson MR-exercise B relationship examined by pearson	C and intrinsic regulation significantly related (.53) Identified R related to A (.33) and C (.29) Identified (.5) and intrinsic (.45) regulation were the only correlate of beahviour (independent of BMI and age) A significantly decreased C and R

	Bicycle V02 max test			Changes in NS, MR, and fitness was examined using paired-sample t test Regression analysis to see what MR predicts B	significantly increased at end of 12wk
Springer, Lamborn, & Pollard, 2012	Investigating adults perception of long term maintenance of PA and its relation to self identity *quantitative, didn't have variables in mind*	12 adults exercisers (age 29-73 years old) who had been exercising for atlest 3 years Various gym activities (misc cardio, weights, baseketball, running)	SDT – grounded theory approach Qualitative study with a 90min interview at T1 then 2wks later a followup interview to ensure clarity reflective journal reecorded over 14days regarding adoption and maintenance of PA	Grounded theory approach	Relatedness was important at adoption (majority were active all their life or starting in late teens/early 20's – 3ppl start in 40's or later) – R was needed throughout adherence - supports by social group of activity minded individuals C and A also appeared as themes that were important to exercise maintenance
Spink, Wilson, & Bostickm 2012	To explore whether structured or unstructured could moderate the	122 university students from a kines class *no gender	TPB Cross sectional study conducted at the	Multi leveling modelling was used to look at setting	PBC was moderated by exercise setting – predictor in unstructured but not

	relationship between TPB constructs and intention Dep – exercise intention/B In- TPB constructs Modifiable activity questionnaire (for B in structured and unstructured setting) Attitude – a 6item scale with instrumental and affective items SN-5itemsdescriptive and injunction PBC- measuring SE and controllability	breakdown provided* Done right before exams Intention – 3items	beginning of one of the students academic class Any activitiy either in a structured or unstructured environment	as a moderator	structured environment
Wilson & Rogers, 2008	Examine the relationship between NS and MR Examine changes in NS and MR across time Ind - PNSE	34M 257F Mage 26.15 Self selected group based exercise class	SDT Did PNSE and BREQ 10wks apart	Structural equation modelling (predict MR from NS) Paired sample t tests, intra	At 10wks CAR ident regulation and intrinsic reg all significantly increased

	Dep- BREQ	Aerobic classes		class correlation and effect size	Greater NS was associated with more autonommotivati Cpredicted ident reg and intrin reg A predicted ident regulation R predicted Ex and Intr reg
Bryan & Rocheleau, 2002	Relationship of TPB variables to exercise B TPB scale developed for the study 3 questions regarding past ex B for weight/aerobic over last 3 months (frequencyand days/wk), last week (days/wk	210 college students Mage 18.59 30%M Aerobic activity – any activity done for atlesat 20min that causes breathing to be heavy and HR to be faster Wt training – activity involving resistance that is done for at least 20min in which moderate to heavy weight is lifted	TPB Did a survey at time 1 then 3mths later did a phone survey	SEM	All theoretical relationships were verified by the model. A-int was stronger in wt Sn-int stronger in aero PBC-int was uneffected PBC-B Much stronger in Wt Int-B was stronger in Aerob

Vlachopoulos & Neikou, 2007	Investigate the relative contribution of NS to ex B Predicting participation based off NS scores BPNES (psychological needs) Attendance – total number of visits over 6 months AND if ptp were still attending at end of 6 mths	228 exercise participants 108M 120F Mage 27.38 Combo of weight and aerobic but they were not differentiated, was not considered within analysis Said organized exercise programs, unsure what exactly that is	SDT At time 1 ptp did the questionnaire, 6months later their attendance data was retrieved from the facility.	Latent variable SEM	In males, C was the only variable sig related to B In females A and C were both significant (.05) related to B Competence was only variable to predict attendance in M and F Greater C resulted in less likely ptp would dropout
Thogersen-Ntoumani & Ntoumanis, 2006	Whether amotivation, autonomous/controlled motivation will differentially predict exercise intention BREQ Relapse (dep variable) – defined as not exercising for 3 or	246F 121M Mage 38.7 Gym goers, didn't discriminate by activity type	SDT Ptp took a questionnaire and completed at convenience then brought it back in.	Correlations Binary logistic regression (predict B from MR)	Intention was negatively related to amotivation Extern and introj regulation – positively related to ident and intrin regulation Relapse positively predicted by external reg, negatively by ident reg.

	more months in last 5yrs Intention				Amot neg predicted ex int. Introject and ident reg positively predicted behaviour
McDonough & Crocker, 2007	How NS predicts behavioural outcomes and whether the relationship is mediated by motivation PNSE, BREQ, LTEQ	558 dragon boat paddlers 19-83years old (Mage 45.09) Dragon Boating (it is a sport and I'd argue very different than regular exercise, result not exactly comparable)	SDT Cross sectional design, distributed questionnaires then had ptp mail them back	PEarson CFA (structural validity of questionnaires) Structural equation modeling	Relatedness was found to bea stronger predictor of B than past studies NS was a predictor of motivation Self determined motivation did not predict B Motivation was found to not mediate the NS-B relationship
Huberty, Ransdell, Sidman, Flohr, Shultz, Grosshans, & Durrant, 2008	Qualitatively examine factors related to womens PA or exercise following completion of a structured exercise program Motivation emerge as a theme between adheres and non adherers	19 women attended focus groups 26-66 yers old (mean 46) who just finished another study that was aimed at increasing exercise	Grounded theory guidelines were used Focus groups were create so as individuals in the group had similar adherence level, had a combo group of adhereres and nonadherers	Grounded Theory	Motivation was a common theme that emerge for adherers (ideas related to identified regulation) And for nonadherers (lack of C, felt guilty if they worked out – Mormon faith makes them think they

		The 12week intervention the ptp came from was a combo of strength and cardio training	An individ from each group was selected to verify the information		should be taking care of family)
Wilson, Rodgers, Fraser, & Murray, 2004	Examine the predictive role of each regulation in men and women as it relates to exercise behaviour BREQ2 LTEQ Intention	276 (98men) undergrad students 18-48y/o (Mage-20.37 for men 20.75 females) No specific activity	SDT Cross sectional – collected data in groups of 25	Bivariate correlations Multiple regression	Intention – identified in men was predictor in women introjected identified and intrinsic predicted. For METS introjected was negatively predicted men and identified positively In women introjected and identified positively predicted B
Markland, 1999	To determine if autonomy (labelled self-determination) and competence have independent effects on intrinsic motivation or is competence is moderate by autonomy IMI competence was	146women Mage 31.51 Aerobic dance classes for women	SDT Cross section, participants were approached after a class and completed the questionnaire before leaving	Moderated hierarchical regression ANOVA used to determine there was no difference between the 4classess analyzed	Competence only had an influence on intrinsic motivation when autonomy was low

	measured with IMI aswell, Locus of causality for exercise scale – degree to which ptp feel they have choice in exercising				
Vlachopoulos & Karageorghis, 2005	Examine nature of interaction between int and ext motivation and test the additive relationship hypothesis in an exercise context with respect to enjoyment BREQ 4 questions asking about enjoyment	516 exercise 18-64y/o Mage 33.08 Participants took part in a varies of activity Various activities, predominately aerobics basd	SDT Did demographics and motive then a week later did a questionnaire about enjoyment	Linear regression	Found that the more self-determined types of motives were related to more exercise enjoyment. Highlight that the types of motivations interact with eachother and can exert influencing
Gunnell, Crocker, Mack, Wilson, & Zumbo, 2013	Examine a model where changes in goal content will lead to changes in motivation leading to changes in NS leading to changes in behaviour Goal content in exercise questionnaire	203 (68%female) from 17-65y/o (Mage 32.57). 149 used for analysis Internet based recruitment from websites and email and	SDT Did a questionnaire then six months later did the identical online questionnaire	Structural path model	Changes in autonomous motivation were positively related to changes in NS but controlled had no relation to NS Only changes in competence predicted

	BREQ PNSE LTEQ	university poster boards Leisure time activity – not specific			increase in PA behaviour
Wilson, Markey, & Markey, 2012	Examine relationship between motives and exercise frequency 1q to ask frequency Reasons for exercise invention	114 adult males 19-56y/o Mage31.43 Military personelle in their training, involving running and body weight calisthenics	SDT Cross sectional, did survey package at one time point	Partial correlation	It was found that the relationship between health motives and exercise behaviour was significant and remained so when obligatory motives was controlled for
Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997	Explore how different motives for initiating exercise relate to sustained participation MPAM Attendance (ptp kept a log of the days they attended)	College sample (n=40 18-24y/o Mage 21) individuals who signed up for a taekwando or aerobics class Taekwando and aerobics	No theory - looked at competence, enjoyment, body-related motives Ptp did the survey, then attended classes and logged it	Correlations between motives MANOVA (to find if ppl differ in their motives) Hierarchical regression to determine if group differences were a function of	Taek higher on competence and enjoyment Aerobic higher on body image Enjoyment was only sig predictor of attendance/dropout (pbbly due to shared variance with competence) Taek more likely to attend more sessions

				the motivation variables	and lesslikely to drop out Found that this was explained by enjoyment

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Ryan, Frederick, Lepes, Rubio, & Sheldon, 1997 (study 2 from same paper)	Look at the relation between initial exercise motivation, motive to continue, and adherence MPAM Indicated enjoyment and challenge after every workout	155 (66ales) Mage19.5y/o 17-39 Ptp are new ppl who signed up to a uni exercise facility Workoing out in a exercise facility, not specified	No Theory Ptp did a baseline questionnaire then did a mini one after every workout for 1month	Correlation were run between MPAM and sessions attended	Females more motivate to exercise for appearance and fitness Enjoyment, competence, and social differentiated adherers from non adherence
Gunnell, Wilson, Zumbo, Mack, & Crocker, 2012	Validate the PNSPA				
Kathrins & Turbow, 2010	Extent to which demographics and health self-determinism are related to resistance training levels Demographics, Health self-determinism index	185subjects 18-63 Mage 39.1 Active at a fitness facility for last 3 months Weight training	SDT (loosely, not stated as SDT but the constructs are essentially same) Cross sectional	Correlations see relationship between demographics and amount of weight training Stepwise multiple regression to determine variables related to amount of weight training	Ptp with intrinsic health self-determinism did more resistance training than extrinsically motivate individuals When adjusting for age, no relation between demographics and weight training Intrinsically motivate were older and higher educated

Brunet & Sabiston, 2011	Explore motivation for PA across adult lifespan BREQ LTEQ	349young adults (18-24y/o Mage18.38) 118adults (25-44 Mage31.14) and 80 middle aged adults (45-64 Mage 55.91) 63 86 86% female respectively General PA, no specific type of activity	SDT Cross sectional study, questionnaires were completed online by ptp		Across all ages identified and intrinsic motivation were highly correlate (consistent with simplex structure) – formed an autonomous variable Autonomous motivation in adults and middle age adults Autonomous, introjected, and external regulation (negatively) in young adults Gender only predicted B in young adults
Sebire, Standage, & Vansteenkiste, 2009	Associations between intrinsic goals and leisure time participation/ NS If NS mediates relationship between goals and behaviour Goal content for exercise questionnaire	410 (292females) age 20-67 Mage 41.39 Any acitivity	SDT Cross Sectional	Bivariate correlations	Exercise B was significantly related to NS

	BREQ PNSE – they created a composite score of NS GLTEQ				
Rose, Parfitt, Williams, 2005	Determine if stage of change can be predicted based on motivational regulation BREQ Visual analogue stage of change ladder	184 (101 females), 17-60 y/o (male Mage-33.99, female Mage – 28.85 Sample was secondary school teachers, members of a health and fitness center, and undergrads Various activities, exercise defined as swimming jogging, weight training, aerobics 2-3times per week	SDT Cross-sectional	MANOVA, anova, correlations	Intrinsic reguation greater in action compared to preparation. External reg greater at preprep than maintenance. Introjected greater at action compared to prep No sig diff between action and maintenace
Podlog & Dionigi, 2009	Explore perveived factors affecting workers participation in an exercise intervention	10ppl participated in group interviews	SDT Qualitative – interviews at start and end of the program	Data was interpreted with and SDT framework in mind	Behavioural engagement can increase when indivduals feellike they,and those around

	Did interview then interpreted data within a SDT framework	25-51y/o (Mage 38) Varied in activity level prior to start in study Sample was taken from a larger group of people doing an exercise study 3 sessions per week (45 min each session), first two sessions were aerobic third session was resistance training			them (trainers) are competent Providing emotional support, interacting, assisting eachother with exercise contributed to relatedness Ptp noted that factors like not wanting to let others down, being bugged when they missed,a nd commitment to trainer decreased autonomy but increased adherence. This could be important for me and group exercise adherence that perhaps autonomy isn't the most important. Ptp emphasised the importance of choice and variety in activities and settings on exercise involvement

Wilson, Mack, & Grattan, 2008	Discuss issues relevant to the use of SDT within the exercise domain	None	SDT Special issue discussion paper		NS is important for intrinsic motivation but mixed results are present for manipulating enviro to enhance NS
Guerin, Bales, Sweet, & Fortier, 2012	Determine if gender is a moderating variable within the SDT framework Gender and motivational regulations (using BREQ or BREQ-2)	27 studies with mean ages ranging from 18-56 Various activities	SDT Meta-analysis		It was found that no significant gender differences exist in the motivational regulation
Mullan & Markland, 1997	Explore the relationship between behavioural regulation and stage of change Visual analogue scale of the stages of change BREQ	314 (156females) Females Mage-36.04 Males Mage-39.07 All from a worksite or a bridge club Not specified what activity was done	SDT and transtheoretical Cross section	Discrimminant function analysis to determine if stage of change could be discriminated on basis of BREQ ANOVA to compare male and female RAI scores across stages of change	Those in preparation had greater RAI than those is preprep, action and maint had higher RAI than those in prep No diff between action and maintenance

Rahman, Thogersen-Ntoumani, Thatcher, & Doust, 2011	If changes in NS and motivational regulation during and 6months following exercise referral predict changes in behaviour BREQ-2 Psychological need satisfaction scale Baeckes questionnaire of habitual physical activity	293 (age 18-82) Mage- 54.49 Sessions were twice a week and focussed on improving cardio, strength, and balance	SDT Assessment done prior to joining referral class, at end of referral class (12wks after baseline) and at end of 6months after referral	Hierarchical linear regression to control for age gender and pa lvl at entry	A and R did not vary from completers and noncompleters at baseline, completers had higher C. Intrinsic motiv was only one that predicted adherence Autonomy predicted B from exit to 6months Amotivation introjected regulation and intrinsic motivation fromt exit-6mth predicted behaviour over same time NS change from exit-6mths predicted MR over same time – A predicted intrinsic motive(+) and introjected reg (-). C predict (+) introjected identified and intrinsic regulation and R predict (-)

					amotivation and external reg NS and self-determined motivation decreased from exit to followup
Gardner & Lally, 2013	The role of self-determination in reinforcing the link between repetition and habit strength Behaviour was mesured at both timepoints using 2 items PA habit measured using a subscale of self report habit index, looking at automaticity BREQ-2 used to create a RAI Intention was measured using 2items at baseline	192ptp 146female 18-30y/o Mage 22.05 undergrads for course credit Any leisure time physical activity	SDT Prospective Complete a time point at time 1then 7 days later ptp were sent a questionnaire regarding their B over the last 7 days.	Bivriate correlations SD to habit strength contribution was done using a three-step regression model	Self determination predicted PA habit strength independently and moderated relationship between past B and habit strength.
Hong, Hughes, Prohaska, 2008	Factors affecting exercise attendance and completion in sedentary older adults	37rct Various exercise programs	No theory Meta-analysis	Block-entry, weighted, hierarchical meta-regression	

Brunet & Sabiston 2011	Mean differences in and relationships among motivational regulations and PA in diff age groups Demographics BREQ LTEQ	349 (63%female, Mage19.38 18-24y/o) 118(86%femaleM age 31.14 25-44y/o) 80(86%female, Mage55.91 45-64y/o) Any type of activity	SDT Cross sectional	MANCOVA followed by ANCOVA used to determine if there was a difference in motivation across age	Identified regulation was highly correlated to Ba cross age groups Middle age reported lower intrinsic, introjected, and PA than youngest group Intrinsic motivation was lowest in oldest group Within adults and middle age, Autonomous motivation (identified and intrinisic was only significant factor) Autonomous and introjected motiv significant in young adults, exernal negatively related
McAuley, Wraith, & Duncan, 1991	Test if diff lvls of SE have diff effects on motivation	254females 11males from diff aerobics classes	Social Cognitive Teory	One way-ANOVA to test if groups	Advanced group was more efficacious

	Degree to which success and personal efficacy related to intrinsic motivation IMI 5 items to measure SE Perception of success was a single item	(beginners n=100 – intermediate n=109 – advanced n=56) Mage=20.73 Aerobics class	Ptp did the questionnaire at the first session of the final week of classes	differ in efficacy One-way anova to see if groups differed in motivation MANOVA done to see if SE differed effects on intrinsic motivation	Int mot not related to aerobic group Individuals whoa re more efficacious have higher intrinsic motivation than less efficacious individuals Hierarchical regression found that SE sig predicted all components of IM
Pelletier, Fortier, Vallerand, & Briere, 2002	Influence of autonomy support vs. control effect on motivate regul at the start and end of competitive seasons 8 item measure of autonomy support Sport motivation scale (for regulation) Persistence – measured by checking at teach time point who was still active and identifying when ppl dropped	174male 195 female 13-22y/o Mage 15.6 Competitive swimmers	SDT Questionnaires were completed at the beginning of a competivie season then at the end of that season and the next season	SEM	Females scored higher on identified and lower on external regualtion Persistent athletes significantly higher in intrin and ident reg and sig lower in amot and extern reg (ext and amot sig related to dropout at time2) Persistent athlete Perceived coaches behaviour as more autonomy supportive

					Coach control associated with amot, ext, and intro reg. Autonomy support associated with intro, ident, intri regulation
Wilson, Rodgers, & Fraser, 2002	Phase 1 – Test factor structure of BREQ, simplex structure of BREQ, relation of BREQ to NS and exercise B Phase2- examine construct validity of BREQ by examining relationship between BREQ and other variables associate with exercise Phase 1- BREQ 3single items for NS (1item for each need) LTEQ Phase2- BREQ life orientation, PBC measure	Phase 1- n=500 81.2%female, MMage=33.63 FMage=28.43) University-based exercise classes emphasis on cardio training Phase2- n51 (76.8% female) Male Mage=42.85 FMage=41.47) Aerobic class and cross-training – emphasis on improving cardiovascular ability	SDT Cross sectional for both phases	Phase 1 – CFA, SEM (to test simplex structure), internal consistency calculated, bivariate correlation (between BREQ NS and exercise B) Phase 2- internal consistency, pearson correlations	Phase 1- support latent structure and simplex structure of BREQ Phase 2-Theoretical relation were validated
Rodgers, Hall, Duncan, Pearson, & Milne, 2010	Examine patterns of change in regulation	6 studies of ptp with varying ages.	SDT	MANOVA was used in studies 3-6 to	Initiate exercisers increase in intrinsic and identified

	over the course of an exercise program Examine differences between initiates and regular exercisers motivational profile All studies had the following BREQ LTEQ	Predominantly aerobic based activity	Took result from 6 studies to form the sample	look at if regulations changed If different, ANOVA was done to see where change occurred.	regulation with exercise Initiate exercisers score lower than regular exercise on identified and intrinsic regulation even after 10 and 24 weeks From 6wks-6mts controlled doesn't change much but identified intrinsic increase (iden faster) Quick changes to ident and intr in first 8 weeks
Annesi, 2002	Examine associations between changes in feeling states induced by a moderate amount and intensity of cardiovascular exercise and adherence to a new exercise program Attendance (%of sessions atended)	75members of a fitness center 21-60y/o Mage 37.9 *similar male/female ratio* Biking ons tationary exercise bikes in a fitness center	Not grounded in theory Formed 3 groups of slef motivtions (high med low)	ANOVA to check if age groupings had an effect on EIFI Spearman rank difference correlation Multiple regressions to	Low self motivation showed that attendance was graeter if larger discrepancy between pre and post positive engagement, revitatlization, tranquility and negatively with exhaustion

	Exercise induced feeling inventory Self motivation inventory	50-74%V02max for 20-30min		determine if SMI moderated EIFI scores	Opposite pattern for those with high self-motivation EIFI accounted for less than 1% of variance in attendance Self motivation could moderate EIFI
Harley, Buckworth, Katz, Willis, Odoms-Young, & Heaney, 2007)	Develop a theoretical framework for African woman that results in women integrating PA into life	African american females (n=15) 25-45y/o with some post secondary education. Currently active at levels above recommendations for atleast one year Any form of activity as long as guideline was met	Grounded theory approach Focus groups and interviews		Resulted in physical activity evolution model to explain how people adopt PA into daily life
McAuley, Lox, Rudolph, Travis, 1994)	Examine the relationship between SE and perceptions of IM.	70 males (33)and females (37) in a 5mth exercise program	Social Cognitive Theory	Correlational and regression analyses (sex and age	Those who exercise more were more efficacious at the end, enjoyed exercise

	How does SE contribute to IM and how IM influences later SE SE – 10item reflecting confidence in ability to be physically active Intrinsic motivation inventory Exercise B – sessions attended in first 3months of program	45-64 years old, sedentary for past 6 months, healthy Aerobic exericse Group setting	SE taken after first month of PA SE retaken at end of 4 months. IM taken at beginning and end	controlled fro in hierarchical regression)	more, , and perceived themselves to be more competent and put forth moreeffort. Initiail Efficacy related to 4components of intrinsic motivation enjoyment (.4) effort (.29) and tension (-.3) 4mth efficacy related to enjoyment (.44) effort (.5) and competence (.44) Hierarchical regression – initial efficacy predicted IM and end of program SE was predicted by effort.
Spink, Wilson, & Priebe, 2010	Examine relationship between groupness and the self reported adherence behavior of individuals exercising with others	86 Kinesiology students who reported participating in a structured exercise setting with others in the last 6months 18-	Crossectional	Structural equation modeling – relationsip between latent factors o f groupness and adherence	Groupness was positively associated with adherence. Individuals who have the aspects of groupness in the

	ADherence - %of sessions attended and sessions/month Groupness – Single item measures of common fate, social structure, mutual benefit, group processes,a dn self categorization was used	41 (Mage=22.9) 72%female. Various activity, structured exercise setting with others			variable column adhere better
Dimmock, Jackson, Podlog, & Magaraggia, 2012	How initial appraisal of exercise can be influenced to create intrinsic motivation BREQ-2 IMI Locus of causality for exercise scale .	90male 97female 18-40 Mage20 from a physical activity course Spin class of 20minutes for one group and a spin clas (10min) followed by cycling simulation (10min) for another group Each group did both of these but in counterbalanced order	Cross Sectional	MANOVA to determine any gender differeces in IMI constructs MANOVA if the two groups differed in IMI	Those who received variety message demonstrated more interest and said they were more likely to choose the activity in the future. Those with low level of IM showed higher interest with variety expectation High IM ppl showed high interest regardless of condition
Babbitt, Rowland, & Franken, 1988)	Determine if structured and formal exercise	177female volunteers	Cross sectional – ptp were to return the	Controlled for age (sensation	High SS did more activities and used

	was more attractive to high or low sensation seekers Aerobic exercise questionnaire Sensation seeking scale form 5	Aerobic exercise	questionnaires via mail	seeking and age negatively correlated) Series of correlations – doesn't indicate what type of correlation	aerobic as training for other activities Social opportunities inherent in the class were rated as an unimportant factor in participation.
Wilson & Rodgers, 2002	Examine relationship between autonomous exercise moties and PSE in female exercise participants Demographics BREQ Ohysical self-esteem (Pysical self description questionnaire) -– physical self concept sub scale	114women in campus rec classes (Mage=25.98) 15week exercise class designed primarily to improve cardiovascular fitness (2x/week – 50min each)	SDT Measures at week 2 and week 12 Extreme groups design	Descriptive statistics and internal consistency stimates, pearson correlations Predictive discriminant functiona analysis	Identified and intrisinic regulations were most reported reasons for exercising Identified and intrinsic regulations predicted PSE group membership – those in high PSE group had more intrinsic and identified regulation
Laverie, 1998	What motivate individuals to participate in a fitness activity regularly	14women 1man Participation ranged from5mths to 13years 21-42y/o	Social identity theory Indepth interviews – unstructured interviews		4 distinct groups of participants formed Individuals who have aerobics as a strong part of their identity Socially influencing, identity partially

		Aerobics class (since it is individual but done with others could have both individual and group characteristics for participation)			formed but do it for personal and social reasons Another group does aerobics for purely the physical results and outcomes Another group has no social connections but just values the outcome, theydeny how involved they are
Markland & Tobin, 2004	Test factorial validity of BREQ2 BREQ2 LTEQ	Individuals who participate in a referral scheme during previous 3 years 201questionnaires were mailed back 68%women Mage54.24 and30%maleMage 56.33 Any for of activity	SDT Mailed out 580 questionnaires, did study with the 201 they received back	Listwise deletion left 194 cases CFA was done to test factor structure	Found excellent support for the factor validity
beauchamp, Carron,	Examine the exercise preferences of older adults for involvement	947 Mage52.56 30-91y/o	SDT	4 one-way ANOVA were doncudcted to	No difference with respect to exercising alone

McCutcheon, harper, 2007	in standard exercise classes populate by participants in categories across the age spectrum Various questions about health and physical activity status Series of questions regarding preferred exercise setting (and if they prefer to exercise in a group of people in varying ages)	No specific exercise, just reporter duration and frequency of activity (possible some participants were not active at all)	Individuals over 30 were approached and asked to complete a questionnaire – not sure where these people were stopped from (mall, gym, etc)	determine the extent to which people from the various categories prefeed to exercise in the different settings	People tended to prefer to exercise in groups of people that were similar age to themselves. Men and women did not differ on their group selective preference No preference to exercise alone than in age-matched groups
Wilson & Rodgers, 2003	Looking at a model of exercise regulation influencing intention Perceived autonomy support-friends (PAS-F) BREQ2 Ehavioural intention	232 staff and students age 17-31 Mage20.86 Regular exercisers28% enrolledin an exercise class 40.4% had completed one in past 6 months No activity, used measure of intention to exercise	SDT Cross sectional	Internal consistencyy and desc stats Pearson correlations SEM-relationship between perceived autonomy suppose from friend, regulations, and intention	Identified regulations trongst predictor of intention More autonomy support result in more autonomous motive for exercise

Trost, Owen, Bauman, Sallis, & Brown, 2002	To update the systematic on factors influencing exercise adherence Exercise and exercise adherence was of interest, did not look into indirect measures of exerciser or intention	Studies from 1998-2000 were included if a measure of PA was taken, adults. 38 studies retrieved Usually leisure time activity but did not discriminate to specific modality/type of exercise	No theory guided their search Systematic review of factors contributing to adult PA		Demographic and biological factors Psychological, cognitive, emotional factors Behavioural attributes and skills Social and cultural factors Physical environment factors
Edmunds, Ntoumanis, & Duda, 2008	Influence of autonomysupportive wel structure and interpersonally involving teaching style one xercise class participants NS, MR, B, I, and affect Psychological need satisfaction scale Perceived environmental supportiveness scale (autonomy support,	Female uni staff and students 18-53y/o Mage21.26 One class manipulated SDT another class did not Mix of boxing choreography and step aerobics	SDT Did a questionnaire at week1 then again at week5 and week 9 did autonomy suppose, tructure and interpersonal involvement At weeks 6 and 10 participatns rater NS, MR, I, and affect	Internal consistencies, bivariate correlations Multilevelling modelling (express dep variable as a function of predictor variables) between person and within person	Competence only need to change in control group RC increasing significantly more in the manipulation group Individuals in manipulation group started study with lower levels of autonomous regulation

	structure, and interpersonal involvement) BREQ-2 Attendance Intention to continue in the clas then at week 10 intention to take a course by same instructor Positive affect and negative affect scale				Groups did not differ in regards to rate of change Intention decrased in control group Attendance was better in manipulation group
Silva, Markland, Vieira, Coutinho, Carraca, Palmeira, Minderico, Matos, Sardinha, & Teeixeira, 2010	Confirm the causal processes and mechanisms byu whi treatment promoted different formof physical activity during a one year obesity treatment intervention based on SDT Health care climate questionnaire (need support from intervention staff)	Premenopausal women (n=239) 23-50years old (Mage=38) Overweight or obese women enrolled in a trail looking at weight management Not exactly sure what type of PA was engaged in during the intervention	SDT Part of a 1year behaviour change intervention focused on increasing exercise self motivation and exercise adherence This study only considered the assessment at the 1year point	Partial least square analysis	Need support enviro significantly predicted autonomy and C C significantly (+) predicted introject identified and intrinsic motivation A sig (-) predicted external reg and (+) predicted intro ident and intri regulation Intrinsic regulation was only regulation

	Locus of causality for exercise scale (perceived autonomy) IMI – competence Exercise self regulation questionnaire Seven day physical activity recall Lifestyle physical activity index				to predict activity, positively predicted MVPA.
Ingledew & Markland, 2008	Look at factors that could influence behavioural regulations International personality item pool NEO FFI EMI2 BREQ2 A measure analagous to LTEQ	252 office workers Mage40.36 52%male Any form of actiivty	Not a theory based – testing a proposed model Cross sectional	Structural equational modeling	External (-)and identifie (+)d regulation only regs to predict exercise participation Appearance motives related to controlling regulation Health/fitnessmotive related to identified Social engagement motive related to intrinsic regulation

					Motives are influencing by personality
Vallerand, 2000	Applying SDT to a hierarchical model of motivation				
Markland & Tobin, 2010	Assess if perceptions of need support are related to autonomous regulation and if that relationship is mediated by NS 15 items to measure need support provided by the staff Locus of causality for exercise scale (autonomy) IMI (competence) 8items to measure relatedness BREQ2 LTEQ	N=136adults women 23-80 y/o Mage 54.51 who had taken part in a 10week exercise referral scheme in last year Any activity	SDT 7leisure studies provided names of participants and questionnaires were mailed out, 31%returned	Regression analyses were conducted with each behavioural regulation Need suppose independent variable BR dependent variable Bootstrapping technique used for mediation	Ned support related to all four mediators (social assimilation was fourth) In all cases, need satisfaction and sociala ssimilation completely mediate the relationship between need support and motivation regulation
Morton, Biddle, & Beauchamp, 2008	Examine the extent to which self-determined motivation is fostered through an exercise	30 patients Mage 51.9 22female 8m	SDT Relatively Cross sectional 6weeks of	Repeated measures ANOVA	SD was higher for adherers than nonadherers

	referral scheme as well as extent to which motives are related to exercise adherence BREQ2 Adherence- sessions attended Categorized as adherers if attended atleast 1session/week	Patients refered to exercise scheme Aqua aerobics, taichi, exercise ti music, pilates or individual exercise session Doesn't elaborate on where focus is cv or strength	sessions, 2sessions/week Did questionnaire at beginning and end		Self determined motivation increased over the 6week program. Barriers to participation were health and time related but those more self determined are likely to overcome the barriers
Duncan, Hall, Wilson, & Jenny, 2010	Examine how exercise motivation contributes to different aspects of exercise behaviour LTEQ BREQ2	460males and 594females Mage24.15 regular exercisers (2exercise sessions of any kind each week for past 6months) 75%students Running Weights Sports Walking Cardio	SDT	Mean scores of regulations t-test to see if males/females differed on anything Correlation between BREQ and measures of PA Simultaneous multiple regression	Identified, intrinsic, integrated, introjected, external, amotivation were the order of most-least endorsed motivation type Males reported exercising for significantly longer Males- identified had strongest relation to exercise intensity and integrated strongest to frequency

		All of these were reporter by ptp, running most commonly, cardio equipment least commonly			In females identified was strongest related to both Integrated and identified regulations were sig predictors of exercise greq for male and female Integrated was sig predictor of duration (+) for males nad females Introject (+)predictor of intensity for females only

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Appendix B

Demographic characteristics and between group demographic differences for questionnaire 1 and questionnaire 2.

	Crossfit	Run	Walk	Yoga	Spin	Collapsed Activity Groups			Tukey's Post Hoc	
							Male	Female	Time 1	Time 2
Individuals e-mailed	201	155	113	176	187	832	-	-		
T1 responses	156	138	92	116	133	635	183	444		
T2 responses	115	102	78	84	98	477	132	343		
Age										
Time 1	33.36	42.01	61.91	34.96	35.36	40.09	40.49	39.87		y>c*
M (SD)	(9.06)	(11.82)	(9.03)	(10.17)	(9.71)	(13.81)	(13.36)	(13.99)	r>s***	r>s***
									r>c***	r>c***
									r>y***	r>y***
									w>y***	w>y***
Time 2	33.52	42.34	61.85	36.22	35.16	40.89	41.48	40.58	w>c***	w>c***
M (SD)	(9.10)	(11.60)	(8.87)	(10.56)	(9.70)	(14.01)	(13.31)	(14.28)	w>r***	w>r***
									w>s***	w>s***
									s>c*	
									m>f*	m>f**
BMI										
Time 1	25.65	24.49	25.41	23.31	24.92	24.77	26.2	24.20	c>y**	c>y**
M (SD)	(3.83)	(3.82)	(4.5)	(4.49)	(3.92)	(4.14)	(3.89)	(4.12)	c>r*	
									w>y*	w>y**
Time 2	25.59	24.75	25.23	22.94	25.01	24.76	26.12	24.25	s>y*	s>y**
M (SD)	(3.85)	(4.07)	(4.29)	(3.7)	(4.12)	(4.09)	(3.51)	(4.18)		r>y*
									m>f***	m>f***

	Crossfit	Run	Walk	Yoga	Spin	Collapsed Activity Groups		Tukey's Post hoc	
							Male	Female	Time 1	Time 2
Marital Status										
Single										
Time 1	48	37	8	33	39	165	54	111		
Time 2	35	30	8	19	30	122	34	88		
Legal Relationship										
Time 1	93	84	62	71	86	396	114	279		
Time 2	68	61	52	57	61	299	86	211		
No longer legal relationship										
Time 1	13	14	20	11	8	66	12	54		
Time 2	11	10	16	8	7	52	10	42		
No response										
Time 1	2	3	2	1	0	8	3	5		
Time 2	0	1	2	0	0	4	2	2		
Education										
Highschool/College										
Time 1	63	52	38	25	61	239	74	164		
Time 2	46	41	33	16	46	182	51	130		
Bachelors Degree										
Time 1	59	56	34	58	55	262	60	200		
Time 2	46	42	30	42	40	200	50	149		
Beyond Bachelors										
Time 1	29	29	19	32	16	125	46	79		
Time 2	20	18	14	25	12	89	29	60		
Missing										
Time 1	5	1	1	1	1	9	3	6		
Time 2	3	1	1	1	0	6	2	4		

	Crossfit	Run	Walk	Yoga	Spin	Collapsed Activity Groups		Tukey's Post hoc	
						Male	Female	Time 1	Time 2
Income									
								m>f*	
<100k									
Time 1	65	47	36	57	44	249	63	185	
Time 2	50	38	29	40	34	191	44	146	
>100k									
Time 1	77	69	40	46	72	304	99	203	
Time 2	56	51	34	34	54	229	72	156	
Undeclared									
Time 1	14	22	16	13	17	82	21	61	
Time 2	9	13	15	10	10	57	16	41	

Note: y=yoga, c=crossfit, r=run, w=walk, s=spin, m=male, f=female
*The mean difference is significant at the .05 level
**The mean difference is significant at the .01 level
***The mean difference is significant at the .001 level

Appendix C

Demographics measures

Name: _____

Gender: Male Female

Age: _____

Ethnicity: _____

Weight (please complete one): _____ (pounds) OR _____ kg)

Height (please complete one): _____ (feet) OR _____(cm)

Please state your combined family income over the past 12 months:

□ less than $5,000 □ $5,000 – 11,999 □ $12,000 – 15,999

□ $16,000 – 24,999 □ $25,000 – 34,999 □ $35,000 – 49,999

□ $50,000 – 74,999 □ $75,000 – 99,999 □ $100,000+

□ Don't know □ No response

Education:

□ High school diploma □ College diploma □ Bachelor's degree

□ Master's degree □ Doctorate degree □ Professional (MD, LLB etc)

□ Other: _____ □ None of the above

Occupation: _____

Marital Status:

□Single □Separated □ Married □ Common Law

□Divorced □Widowed □No response

Do you have children?

□No

□Yes ➔ Please indicate ages (separated by comma)

_____

Appendix D

Behavioural measures

A) What activities do you regularly participate in? _____

B) How often have you participated in **any** physical activities during your free time in the last 2 weeks

1. never

2. Between 1-2 times

3. Between 3-4 times

4. Between 5-6 times

5. Between 7-8 times

6. Between 9-10 times

7. Between 11-12 times

8. Between 13-14 times

9. Greater than 14 times

C) What is your **main** activity? _____

D) How often have you participated in your **main** activity during your free time in the last 2 weeks?

1. never

2. Between 1-2 times

3. Between 3-4 times

4. Between 5-6 times

5. Between 7-8 times

6. Between 9-10 times

7. Between 11-12 times

8. Between 13-14 times

9. Greater than 14 times

E) How long is a typical session of your main activity?

1. 30 minutes or less

2. 31-40 minutes

3. 41-50 minutes

4. 51-60 minutes

5. 61-70 minutes

6. 71-80 minutes

7. 81-90 minutes or more

Please respond to the following questions only in reference to [***activity***].

F) How long have you been participating in [*activity*] (please note if you used to participate in [the activity] at another facility, that should be considered). Please respond only in reference to your participation in exercise classes. Please be as accurate as possible.

Days:_____

Months:_____

Years:_____

F) How often have you participated in [*activity*] during your free time in the last 2 weeks?

1. never

2. Between 1-2 times

3. Between 3-4 times

4. Between 5-6 times

5. Between 7-8 times

6. Between 9-10 times

7. Between 11-12 times

8. Between 13-14 times

9. Greater than 14 times

Appendix E

Behavioural regulations in exercise questionnaire – 3

	Why do you exercise? The following list identifies reasons why people exercise. Please indicate on the scale provided **how true each statement is for YOU**: (0) = Not true for me and (4) = Very true for me.	**Not true for me**	**Sometimes true for me**	**Moderately true for me**	**Often true for me**	**Very true for me**
1	I exercise because it is important to me to stay healthy	0	1	2	3	4
2	I exercise because other people say I should	0	1	2	3	4
3	I exercise because I feel guilty when I don't do it	0	1	2	3	4
4	I don't see why I should have to exercise	0	1	2	3	4
5	I exercise regularly to prove to myself that I can persist	0	1	2	3	4
6	I exercise because it is consistent with my life goals	0	1	2	3	4
7	I exercise because it is fun	0	1	2	3	4
8	I exercise because my friends/family/partner say I should	0	1	2	3	4
9	I exercise because I feel ashamed when I miss a session	0	1	2	3	4
10	I exercise because it is part of my identity	0	1	2	3	4
11	I exercise because I enjoy it	0	1	2	3	4
12	I exercise because I value the benefits it gives me	0	1	2	3	4
13	I exercise because I feel proud of myself when I persist	0	1	2	3	4
14	I can't see why I should bother exercising	0	1	2	3	4
15	I exercise because others will not be pleased with me if I don't	0	1	2	3	4
16	I exercise because it's important for me to keep fit	0	1	2	3	4
17	I exercise because I feel like a failure when I haven't exercise in awhile	0	1	2	3	4
18	I exercise because it is a fundamental part of who I am	0	1	2	3	4
19	I exercise because I find it a pleasurable activity	0	1	2	3	4
20	I exercise because I think it is important to make the effort	0	1	2	3	4
21	I exercise because I can only be proud of myself when I continue to participate	0	1	2	3	4

		Not true for me	Sometimes true for me	Moderately true for me	Often true for me	Very true for me
22	I exercise because I feel under pressure from my friends/family to exercise	0	1	2	3	4
23	I don't see the point in exercising	0	1	2	3	4
24	I exercise because it is consistent with my values	0	1	2	3	4
25	I exercise because I feel better about myself when I continue to participate	0	1	2	3	4
26	I exercise because I get pleasure and satisfaction from participating	0	1	2	3	4
27	I exercise because being an exerciser is an integral part of my life	0	1	2	3	4
28	I think exercising is a waste of time	0	1	2	3	4
29	I exercise because I would feel bad about myself if I was not making time to do it	0	1	2	3	4
30	I exercise because the benefits are important to me	0	1	2	3	4

Appendix F

Factor Loadings for Confirmatory Factor Analysis of BREQ-3

	Amotivation	External Regulation	Introjected-Approach Regulation	Introjected-Avoidance Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Eigenvalue							
%variance explained							
Chronbach's Alpha	.771	.764	.84	.685	.814	.879	.898
I don't see why I should have to exercise	.78						
I can't see why I should bother exercising	.78						
I don't see the point in exercising	.54						
I think exercising is a waste of time	.47						
I exercise because other people say I should		.76					
I exercise because my friends/family/partner say I should		.78					
I exercise because others will not be pleased with me if I don't		.5					
I exercise because I feel under pressure from my friends/family to exercise		.72					
I exercise because I feel like a failure when I haven't exercised in a while			.81				
I exercise because I feel guilty when I don't do it			.76				
I exercise because I feel ashamed when I miss a session			.75				

I exercise because I would feel bad about myself if I was not making time to do it			.69				
	Amotivation	External Regulation	Introjected-Approach Regulation	Introjected-Avoidance Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Eigenvalue							
%variance explained							
Chronbach's Alpha	.771	.764	.84	.685	.814	.879	.898
I exercise because I feel proud of myself when I persist				.77			
I exercise regularly to prove to myself that I can persist				.63			
I exercise because I can only be proud of myself when I continue to participate				.59			
I exercise because I feel better about myself when I continue to participate				.62			
I exercise because the benefits are important to me					.78		
I exercise because it is important to me to stay healthy					.65		
I exercise because I value the benefits it gives me					.8		
I exercise because it's important to me to keep fit					.77		
I exercise because it is a fundamental part of who I am						.83	
I exercise because it is consistent with my life goals						.81	
I exercise because it is part of my identity						.74	

I exercise because it is consistent with my values						.76	
I exercise because being an exerciser is an integral part of my life						.87	
	Amotivation	External Regulation	Introjected-Approach Regulation	Introjected-Avoidance Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
Eigenvalue							
%variance explained							
Chronbach's Alpha	.771	.764	.84	.685	.814	.879	.898
I exercise because I find it a pleasurable activity							.91
I exercise because it's fun							.89
I exercise because I enjoy it							.90
I exercise because I get pleasure and satisfaction from participating							.66

Appendix G

Exercise motivation inventory – 28item

The following is a list of a number of statements concerning the reasons people often give when asked why they exercise. ***Whether you currently exercise regularly or not,*** please read each statement carefully and indicate, by circling the appropriate number, whether or not each statement is *true* for you personally, or *would be true* personally if you did exercise.

Remember, **we want to know why *you personally* choose to exercise** or might choose to exercise, not whether you think the statements are good reasons for anybody to exercise.

	Personally, I exercise (or might exercise) . . .	**Not at all true for me**					**Very true for me**
1	To avoid ill-health.	0	1	2	3	4	5
2	To show my worth to others.	0	1	2	3	4	5
3.	To have a healthy body.	0	1	2	3	4	5
4.	To build up my strength.	0	1	2	3	4	5
5.	Because I enjoy the feeling of exerting myself.	0	1	2	3	4	5
6.	To spend time with friends.	0	1	2	3	4	5
7.	Because I like trying to win in physical activities.	0	1	2	3	4	5
8.	To stay/become more agile.	0	1	2	3	4	5
9.	To give me goals to work towards.	0	1	2	3	4	5
10.	To prevent health problems.	0	1	2	3	4	5
11.	Because I find exercise invigorating.	0	1	2	3	4	5
12.	To have a good body.	0	1	2	3	4	5
13.	Because it helps to reduce tension.	0	1	2	3	4	5
14.	To increase my endurance.	0	1	2	3	4	5
15.	To enjoy the social aspects of exercising.	0	1	2	3	4	5
16.	To help prevent an illness that runs in my family.	0	1	2	3	4	5
17.	To give me personal challenges to face.	0	1	2	3	4	5
18.	To help control my weight.	0	1	2	3	4	5
19.	To recharge my batteries.	0	1	2	3	4	5
20.	To improve my appearance.	0	1	2	3	4	5
21.	To gain recognition for my accomplishments.	0	1	2	3	4	5
22.	To help manage stress.	0	1	2	3	4	5
23.	To feel more healthy.	0	1	2	3	4	5
24.	For enjoyment of the experience of exercising.	0	1	2	3	4	5
25.	To help recover from an illness/injury	0	1	2	3	4	5
26.	Because I enjoy physical competition.	0	1	2	3	4	5
27.	To stay/become flexible.	0	1	2	3	4	5
28.	Because exercise helps me to burn calories.	0	1	2	3	4	5

Appendix H

Factor Loadings for Exploratory Factor Analysis with Oblique Rotation of EMI-2

	Healthy Body	Superiority	Weight Management	Revitalization	Social	Health Pressures
Eigenvalue	6.601	2.546	2.051	1.635	1.585	1.213
%variance explained	26.405	10.185	8.202	6.54	6.34	4.851
Chronbachs Alpha	.806	.787	.822	.815	.872	.447
To stay/become more agile	.772					
To have a healthy body	.761					
To build up my strength	.689					
To prevent health problems	.690					
To stay/become flexible	.642					
To feel more healthy	.578					
To increase my endurance	.418					
Because I like trying to win in physical activities		.830				
Because I enjoy physical competition		.819				
To gain recognition for my accomplishments		.634				
To show my worth to others		.566				
To give me personal challenges to face		.544				
To give me goals to work towards		.486				
To help control my weight			-.858			
Because exercise helps me to burn calories			-.834			
To improve my appearance			-.725			
To have a good body			-.526			

	Healthy Body	Superiority	Weight Management	Revitalization	Social	Health Pressures
Eigenvalue	6.601	2.546	2.051	1.635	1.585	1.213
%variance explained	26.405	10.185	8.202	6.54	6.34	4.851
Chronbachs Alpha	.806	.787	.822	.815	.872	.447
Because it helps to reduce tension				.874		
To recharge my batteries				.775		
For enjoyment of the experience of exercising				.574		
To spend time with friends					.944	
To enjoy the social aspects of exercising					.925	
To help recover from an illness/injury						.718
To help prevent an illness that runs in my family						.615

Appendix I

Psychological need satisfaction in exercise scale

The following statements represent different experiences people have when they exercise. Please answer the following questions by **considering how you typically feel** while you are exercising.

		False	Mostly False	More False than True	More True than False	Mostly True	True
1	I feel that I am able to complete exercises that are personally challenging	1	2	3	4	5	6
2	I feel attached to my exercise companions because they accept me for who I am	1	2	3	4	5	6
3	I feel like I share a common bond with people who are important to me when we exercise together	1	2	3	4	5	6
4	I feel confident I can do even the most challenging exercises	1	2	3	4	5	6
5	I feel a sense of camaraderie with my exercise companions because we exercise for the same reasons	1	2	3	4	5	6
6	I feel confident in my ability to perform exercises that personally challenge me	1	2	3	4	5	6
7	I feel close to my exercise companions who appreciate how difficult exercise can be	1	2	3	4	5	6
8	I feel free to exercise in my own way	1	2	3	4	5	6
9	I feel free to make my own exercise program decisions	1	2	3	4	5	6
10	I feel capable of completing exercises that are challenging to me	1	2	3	4	5	6

		False	Mostly False	More False than True	More True than False	Mostly True	True
11	I feel like I am in charge of my exercise program decisions	1	2	3	4	5	6
12	I feel like I am capable of doing even the most challenging exercises	1	2	3	4	5	6
13	I feel like I have a say in choosing the exercises that I do	1	2	3	4	5	6
14	I feel connected to the people who I interact with while we exercise together	1	2	3	4	5	6
15	I feel good about the way I am able to complete challenging exercises	1	2	3	4	5	6
16	I feel like I get along well with other people who I interact with while we exercise together	1	2	3	4	5	6
17	I feel free to choose which exercises I participate in	1	2	3	4	5	6
18	I feel like I am the one who decides what exercises I do	1	2	3	4	5	6

Appendix J

Factor Loadings for Exploratory Factor Analysis with Oblique Rotation of PNSE

	Autonomy	Relatedness	Competence
Eigenvalue	6.725	3.511	2.163
%variance explained	37.362	19.504	12.016
Chronbachs Alpha	.928	.902	.882
I feel like I have a say in choosing the exercises that I do	.921		
I feel free to make my own exercise program decisions	.902		
I feel like I am the one who decides what exercises I do	.892		
I feel free to choose which exercises I participate in	.851		
I feel like I am in charge of my exercise program decisions	.846		
I feel free to exercise in my own way	.701		
I feel attached to my exercise companions because they accept me for who I am		.867	
I feel connected to the people who I interact with while we exercise together		.854	
I feel a sense of camaraderie with my exercise companions because we exercise for the same reasons		.84	
I feel like I share a common bond with people who are important to me when we exercise together		.835	
I feel close to my exercise companions who appreciate how difficult exercise can be		.816	
I feel like I get along well with other people who I interact with while we exercise together		.688	
I feel like I am capable of doing even the most challenging exercises			.846
I feel capable of completing exercises that are challenging to me			.84
I feel confident I can do even the most challenging exercises			.838
I feel confident in my ability to perform exercises that personally challenge me			.826
I feel good about the way I am able to complete challenging exercises			.744
I feel that I am able to complete exercises that are personally challenging			.65

Appendix K

Relatedness to others in physical activity scale

The following statements represent different feelings people have when they engage in physical activity. Please answer the following question by **considering how you typically feel** when participating in physical activity using the scale provided.

		False	Mostly False	More False than True	More True than False	Mostly True	True
1	I feel like I have developed a close bond with others	1	2	3	4	5	6
2	I feel like I fit in well with others	1	2	3	4	5	6
3	I feel like I am included by others	1	2	3	4	5	6
4	I feel like I am part of a group who share my goals	1	2	3	4	5	6
5	I feel like I am supported by others in this activity	1	2	3	4	5	6
6	I feel like others want me to be involved with them	1	2	3	4	5	6

Appendix L

Factor Loadings for Exploratory Factor Analysis with Oblique Rotation of ROPAS

Eigenvalue	4.532
%variance explained	75.534
Chronbachs Alpha	.929
I feel like I have developed a close bond with others	.81
I feel like I fit in well with others	.845
I feel like I am included by others	.904
I feel like I am part of a group who share my goals	.883
I feel like I am supported by others in this activity	.886
I feel like others want me to be involved with them	.882

Appendix M

Pilot Study

In order to determine the reliability of the social comparison measures frequency of comparison, preferred direction of comparison, and perceived social evaluation, a 2-week test-retest pilot study occurred.

Participants. Participants were recruited from a first year introduction to health and wellness course offered by the University of Alberta. Regardless of age or gender, all individuals were asked to participate. In total, 215 individuals completed the questionnaire at the first time point while 75 individuals completed the first and second questionnaire.

Measures. All measures of social comparison were included (see appendix N-Q) as well as anonymous identifying information (first two letters of their highschool, day of the month the participant was born, and last initial of participants first name) so as to match questionnaires.

Procedures. The primary instructor of a health and wellness course was approached and informed of the desire to conduct research. Upon receiving permission to attend the class for research, the researcher attended a class at an agreed upon time and provided the students with an introduction to the research as well as inform the participants of their rights.

Questionnaires were distributed to the class and completed prior to the start of lecture. Following a 2-week period, the researcher returned to the same class and students completed the same questionnaires. Participant responses from the second survey were matched to their first survey responses using a unique identifier.

Data Analysis. Pearson correlation statistical techniques were used in addition to Chronbachs' alpha. Following recommendations of Gravetter & Wallnau (2009), $r = 0.7$ or greater was considered acceptable. To ensure the pilot study is statistically powered with $\alpha = .05$

and a medium effect size, using Pearson correlation statistical procedures, 85 participants are recommended in each group (Cohen, 1992).

Results. Chronbachs' alpha for the frequency of social comparison items was strong and measuring the same construct (alpha=.782), presumably comparison. Additionally, a 2-week test retest procedure found a strong correlation for the appearance comparison measure (r=.699, p<.001) and the fitness comparison measure (r=.729, p<.001) (Cohen, 1988). As a result, these items were retained for the main study.

Chronbachs' alpha for the perceived social evaluation items indicated the items were measuring a similar construct (alpha=.775). Results of the two-week test-retest protocol indicated a strong correlation between the responses at the two times points for the evaluation item (r=.774, p<.001) and the judging item (r=.734, p<.001). As a result, these items were retained for the main study.

Preferred direction of comparison yielded an acceptable Chronbachs' alpha of .734. Results of the 2-week test-retest of direction of comparison found the items regarding comparison preference of individuals to be unsatisfactorily correlated (r=.58) as well as preference to exercise with people who are fit or unfit relative to the individual weakly correlated (r=.428). As a result of the low correlations, these items were not included in the main study.

Discussion. As a result of the findings, the two frequency of social comparison items and the two perceived social evaluation items were retained for the main study. Preferred direction of comparison items were not added to the final questionnaire due to their poor test-retest reliability. It is possible the items did not have strong test-retest reliability due to the unspecific questions. It may be possible that preference of comparison direction may not be consistent. If individuals are feeling low competence, they may wish to exercise with those who are inferior,

whereas if they are feeling highly competent and striving to improve, they may compare to superior others.

Conclusion. In order to determine the reliability of social comparison measures, a 2-week test-retest procedure was followed using an undergraduate sample from a large Canadian university. It was found that 4 of the items (2-item frequency of comparison and 2-item perceived social evaluation) were acceptable to use while 2 of the items (direction of comparison) were not satisfactory. Items retained for use in the thesis have demonstrated acceptable internal consistency and reliability over a 2-week period, therefore; the researcher can be assured that the 2-item measures of constructs do indeed measure the same construct and individuals will respond similarly across the two time points.

Appendix N

Presence of social comparison

While I do [activity], I compare myself to others

Not at all				Extremely
1	2	3	4	5

Appendix O

Frequency of social comparison

1) While I exercise, I compare my level of **physical fitness** to the physical fitness of other people in the room.

Not at all				Extremely
1	2	3	4	5

2) While I exercise, I compare my **physical appearance** to the appearance of other people in the room.

Not at all				Extremely
1	2	3	4	5

Appendix P

Perceived social evaluation

1) While I am exercising, I perceive that **other people** are evaluating me.

Nobody judges me				Other people judge me
1	2	3	4	5

2) While I am exercising, I am worried that **other people** are judging me.

Not at all				Extremely
1	2	3	4	5

Appendix Q

Preferred Direction of Social Comparison

Please select the answer that most accurately represents your thoughts toward the following questions:

1) If I were to join an exercise group, I would prefer to have people in my group who are…

Very Inactive									Very active
1	2	3	4	5	6	7	8	9	10

2) If I were to join an exercise group, I would prefer to have people in my group who **relative to me** are …

Very Inactive									Very active
1	2	3	4	5	6	7	8	9	10

Appendix R

Factor Loadings for Exploratory Factor Analysis with Oblique Rotation of All Social Comparison Measures

	Social comparison
Eigenvalue	3.151
%variance explained	63.018
Chronbachs Alpha	.852
I compare myself to others	.876
I compare my physical appearance to the appearance of other people in the room	.867
I compare my level of physical fitness to the physical fitness of other people in the room	.853
While I do [activity] I perceive other people are evaluating me	.699
While I do [activity], I am worried that other people are judging me	.646

Appendix S

Physical Activity Group Environment Questionnaire

Individual Attraction to the Group – Social Subscale

	Very Strongly Disagree							Very Strongly Agree	
Members of our physical activity group often socialize during exercise time.	1	2	3	4	5	6	7	8	9
Members of our physical activity group would likely spend time together if the program were to end.	1	2	3	4	5	6	7	8	9
Members of our group sometimes socialize together outside of activity time.	1	2	3	4	5	6	7	8	9
We spend time socializing with each other before and after our activity sessions.	1	2	3	4	5	6	7	8	9

Group Integration –Social Subscale

	Very Strongly Disagree							Very Strongly Agree	
This physical activity group is an important social unit for me.	1	2	3	4	5	6	7	8	9
I enjoy my social interactions within this physical activity group.	1	2	3	4	5	6	7	8	9
I like meeting the people who come to this physical activity group.	1	2	3	4	5	6	7	8	9
If this program was to end, I would miss my contact with the other participants.	1	2	3	4	5	6	7	8	9
In terms of the social experiences in my life, this physical activity group is very important.	1	2	3	4	5	6	7	8	9
The social interactions I have in this physical activity group are important to me.	1	2	3	4	5	6	7	8	9

Appendix T

Factor Loadings for Exploratory Factor Analysis with Oblique Rotation of PAGEQ

	Attraction to Group
Eigenvalue	7.014
%variance explained	70.142
Chronbachs Alpha	.951
Members of our physical activity group often socialize during exercise time	.707
Members of our physical activity group would likely spend time together if the program were to end	.795
Members of our group sometimes socialize together outside of activity time	.801
We spend time socializing with each other before and after our activity session	.795
This physical activity group is an important social unit for me	.889
I enjoy my social interactions within this physical activity group	.853
I like meting the people who come to this physical activity group	.829
If this program was to end, I would miss my contact with the other people	.882
In terms of the social experiences in my life, this physical activity group is very important	.895
The social interactions I have in this physical activity group are important to me	.907