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Health-Related Quality Of Life And Physical Activity In University Employees

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by

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Chapter 1: Introduction

1.1 Quality Of Life And Health-Related Quality Of Life

Researchers began to investigate quality of life in the 1970's as a valued component of overall health (Barofsky, 2012). According to The World Health Organization Quality of Life Group (WHOQOL) (1998), quality of life is a "broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life". Currently, researchers struggle to agree upon any one definition for quality of life (Barofsky, 2012). While the definition provided by WHOQOL broadly identifies the overall concept of quality of life, researchers have since attempted to describe it in more detail. Proposed definitions tend to vary in terms of included dimensions used to delineate the concept, and some definitions can be context-specific depending on the population being measured. Other researchers claim that quality of life is such an abstract construct that it is debatable whether it can be truly measured (Barofsky, 2012).

According to the World Health Organization (1993), quality of life is comprised of six dimensions: psychological health, physical health, environment, spirituality, level of independence, and social relationships. Health-related quality of life (HRQL) was developed as a measure in the 1980s to reflect the dimensions of quality of life that relate to health. HRQL is measured using quality-related indices of health to reflect and measure quality of life. Similar to overall quality of life, no one definition has been agreed upon amongst researchers for HRQL (Lox, Martin Ginnis & Petruzzello, 2010, National Center for Chronic Disease Prevention and Health Promotion, 2011). Health-related quality of life is typically made up of five separate dimensions: physical functioning, emotional functioning, social functioning, cognitive

functioning, and health status (Lox, et al. (2010). Other dimensions are occasionally included when deemed relevant to the population in question. For example, sexual functioning may be a valued and relevant dimension to the health-related quality of life of an adult population but irrelevant when evaluating the HRQL of children. While HRQL has been conceptualized using different dimensions, most researchers have agreed that HRQL should include physical, mental and social components (Bize, Johnson & Plotnikoff, 2007).

Each dimension of HRQL identified by Lox et al. (2010) encompasses a variety of concepts related to the individual's health. The first factor, physical functioning often includes measures regarding an individual's perceptions of their strength, endurance, flexibility, balance, and ability to perform activities of daily living. Activities of daily living such as walking, self-care, carrying heavy objects, getting dressed, and climbing stairs are important skills that often allow individuals to remain independent in their lives. Being able to perform activities of daily living is a core component of good quality of life for most individuals and a valuable part of perceptions of physical functioning. Research suggests that physical functioning declines with age, but the rate of decline can vary depending on the individual (Lahti et al., 2010). More specifically, those who are able to maintain their physical functioning and/or perceive their physical functioning as good participate in activities of daily living longer than those who perceive their health is declining.

The second dimension identified by Lox et al. (2010) is emotional functioning and well-being. This dimension is also commonly named "mental health functioning" in HRQL measures such as the SF-36. It includes measurements of depression, anxiety, anger/hostility, feelings of happiness, hope and tranquility. It is important to note that both positive and negative aspects of emotional functioning are recognized as key contributors to this dimension.

The third dimension, social functioning, reflects an individual's ability to fulfill social roles. The roles that exist are dependent on the uniqueness of the individual and will vary in importance to each person. For example, roles can include being a mother/father, a coach, and/or a husband/wife. Individuals will value some roles more than others. Females quite often state that nothing is more important than being a mother, which indicates that the role of mother may surpass the role of wife or career person for some women.

The fourth health-related quality of life dimension is a cognitive dimension. It includes constructs such as attention, memory, concentration, problem-solving and decision-making. These cognitive components are an important part of every day life. For example, an individual with a concussion could experience deficits in all of these components, preventing them from being able to work, read, synthesize complex ideas, and make important decisions. As people age, maintaining cognitive function can allow them to stay independent for much longer, as cognitive skills are critical for activities such of daily living. Multiple cognitive components are crucial to overall health functioning and HRQL.

The final HRQL dimension proposed by Lox (2010), health status, refers primarily to an individual's physical health, focusing on current symptoms and health states (e.g. energy, fatigue, pain, sleep). Health status also refers to any diseases or disorders that an individual may be diagnosed with (e.g. post-traumatic stress disorder, major depressive disorder).

All five dimensions (physical, emotional, social, cognitive, and health status) contribute to the overall health-related quality of life of an individual. By incorporating quality-related indices of health in measurements, a more holistic and representative measure of overall health is obtained. Measuring health with a single objective measure risks the exclusion of influential factors that impact a person's life and experience. Use of health-related quality of life measures

has allowed health professionals to improve the lives of many different populations, such as the elderly, people with disabilities, and people with chronic illnesses (Heller, Hsieh, & Rimmer, 2004; Lox, McAuley, & Tucker, 1995). The inclusion of multiple dimensions of HRQL provides a better reflection of the individual's life and health experience.

When measuring HRQL, data can be collected subjectively or objectively. Although objective measures are less sensitive to self-reporting bias, subjective measures attempt to determine an individual's true feelings about and their perceptions of the quality of their life. The true importance of HRQL is that it **is subjective** and based on one's **own** appraisal of their life. A third party establishing HRQL for an individual cannot accurately ascertain it. When HRQL was first established, it was generally thought that an impairment in any dimension of health would lead to poorer HRQL. However, researchers are now aware that the relationship between impairment and perception of quality of life is not that simple (Gerber & Price, 2012). For example, two women who work full-time, have children, and experience high trait anxiety may have distinctly different subjective levels of health-related quality of life. While one woman may feel that she copes well with her anxiety, functions at a high level, and is able to balance her role as a mother and employee, the other woman may feel as if her anxiety and responsibilities impair her quality of life across several dimensions. Further supporting this idea, a study of older adults found that physical measures and disease severity did not correlate significantly with their self-reported quality of life measures (Covinsky et al., 1999). Findings such as these suggest that obtaining subjective HRQL data allows for a better reflection of the individual's true perceived life quality.

There clearly is a subjective component in the way that individuals perceive their own health, functioning, and satisfaction with life. For this reason, subjective measures of health-

related quality of life have been shown to be significantly more reflective of individuals' health outcomes across various dimensions (Neill et al., 1985). Patient reported outcomes are now recognized as important measures of treatment effectiveness in most clinical research (Gerber & Price, 2012). However, patient reported outcomes still tend to lack health-related quality of life and life satisfaction measures (Gerber & Price, 2012). Bize et al. (2007), recommended that HRQL measurements include perceived health attributes that are valued by individuals, such as the ability to maintain good physical, emotional, and intellectual functions, as well as measures of satisfaction with current life factors. By incorporating an individual's perception of their functioning and satisfaction with their actual functioning, we can account for individual differences in perception and get much closer to measuring the health-related quality of life that is experienced by the individual.

As stated previously health-related quality of life represents an individual's subjective perception. For this reason, individual differences naturally influence reported scores. Of particular note, is the influence of personal values with respect to HRQL. The value that an individual places on a dimension will have an influence on their satisfaction with their functioning (Lox et al., 2010). If a specific dimension is highly valued, impairments to this dimension will cause a significant decrease in overall health-related quality of life. However, if a low-valued dimension is impaired, it is unlikely to have as large of an effect on overall health-related quality of life measures (Lox et al., 2010). This phenomenon was illustrated by Rejeski, Martin, Miller, Ettinger and Rapp (1998), who found that there is a greater negative impact on HRQL when a valued dimension is impaired, compared to a dimension of lower personal value. To increase our understanding of HRQL it is imperative that personal values and beliefs, as well

as perceived functioning and satisfaction with functioning are considered in the overall assessment of HRQL.

1.2 Measurement Of Health-Related Quality Of Life

As previously discussed, there is not a universally accepted definition of HRQL. The problem with this is that multiple definitions may result in multiple methods of measurement. Two main methods have been utilized in previous literature: assessing perceptions of functioning across dimensions and assessing one's satisfaction with functioning across dimensions. Within these two methods there are many different ways to measure HRQL. Measures can be disease-specific or more generic depending on the population and circumstances being studied. Generic instruments such as health profiles can be useful as they can be applied to different populations and allow for broad comparisons (Guyatt, Feeny, & Patrick, 1993). However, these instruments may be unresponsive to changes in specific conditions (such as individuals with chronic illness). Disease-specific measures may eliminate aspects of HRQL that are irrelevant, catering the measure to relate closely to the population (Guyatt et al., 1993). Both types of HRQL measures can be appropriate depending on the purpose of the study. When attempting to determine the range of functioning or disability in a population, more generic measures seem to be the best option. A second consideration when selecting an HRQL instrument should be the goal of the study. A discriminative instrument will enable a researcher to differentiate between people with different levels of HRQL, while an evaluative instrument is designed to reflect differences in HRQL over time. Discriminative instruments are characterized by high reliability as opposed to the high responsiveness of evaluative instruments (Guyatt et al., 1993).

The 36-item Short-Form Health Survey (Ware & Sherbourne, 1992) is one of the most commonly used HRQL measurement tools in research (Lox et al., 2010). This generic

questionnaire is designed to test an individual's perception of their level of functioning across eight dimensions of health: physical functioning, bodily pain, role (physical), role (emotional), mental health, vitality, and social functioning. These dimensions were developed based on instruments that have been used for decades (Ware & Sherbourne, 1992). The Short-Form Health Survey is considered a valid measure for all adult populations (Lox et al., 2010). It can be administered in several different lengths in order to cater to specific research requirements. Between the 36-item, 12-item and 8-item surveys, the 36-item has the greatest measurement precision, highest range of observed scores, and best representation of all eight dimensions (Ware et al., 2008). The SF-36 has also been updated to a second version (SF-36v2) in order to increase range and precision for role-physical and role-emotional scales and simplify the wording and response categories. This new version is less culturally biased and easier for individuals to understand (Ware et al., 2008). This measure of HRQL is very user-friendly as it includes robust procedures for dealing with missing data, procedures for evaluating data quality, and norm-based scoring (Ware et al., 2008).

The SF-36v2 provides scores for the 8 health dimensions as well as overall scores for the Physical Component (PCS) and Mental Component (MCS). While it includes many different measures that encompass most of the relevant components of HRQL, it is not without its limitations. Ware and Sherbourne (1992) noted that their survey does not include: "health distress, family functioning, sexual functioning, cognitive functioning and sleep disorders" (pp. 479). While one may argue the inclusion of more dimensions would strengthen the survey, there is a threat of respondent burden as more dimensions are added. In addition, as this is a general HRQL survey, some dimensions are not applicable to all populations and are therefore excluded. Ware and Sherbourne (1992) identify some HRQL scales that have a higher respondent burden

than the SF-36, which include the Sickness Impact Profile, the full-length MOS health survey, and the HIE survey. Other scales which measure HRQL assess medical treatment outcomes, such as the Functional Status Questionnaire, the McMaster Index, and the Dartmouth Cooperative Measure (Gerber & Price, 2012).

While the SF-36 measures HRQL through perceptions of functioning, it lacks measures of satisfaction with level of functioning. Satisfaction with functioning is only experienced by the individual, making it an important component of HRQL to be measured. The Perceived Quality of Life Scale (PQOL) (Patrick, Danis, Southerland, & Hong; 1988) is one of the most common HRQL satisfaction measurement tools in exercise literature (Lox et al., 2010). The PQOL is a general measurement tool, but satisfaction HRQL can also be measured using scales catered to specific populations. Currently there is no known satisfaction with level of functioning scale that is specific to university employees. University employees have a wide range of occupational responsibilities depending on their job category, so a general measurement tool, such as the PQOL, is a good fit for measuring HRQL in this population.

1.3 Physical Activity Research

In industrialized nations, a general lack of physical activity is both a trend and a problem (Canadian Fitness and Leisure Research Institute, 2010). Both Canada and the United States of America are included in the industrialized countries that show chronic patterns of inactivity in their populations. While this doesn't mean that all adults are completely sedentary, most that engage in some physical activity are still not doing enough to reach levels to gain health improvements. According to the Community Health Measures Survey (CCHS) by Colley et al. (2011), the majority of Canadian adults (85%) do not meet national guidelines for physical activity.

Examination of these industrialized populations has revealed trends related to physical activity and gender, race, socioeconomic status, and age. In terms of gender, both men and women are similarly sedentary. However, men are more active than women on average (Statistics Canada, 2015). When examining the types of physical activity people perform, American women tend to engage in less muscular strength and vigorous intensity activities compared to American men. Globally, domestic housework physical activity is a large portion of daily activity, and women carry the bigger burden of housework in many societies (Leino-Arjas, Solovieva, Riijimaki, Kirjonen, & Telama, 2004). However, in Canada, the most popular types of activity (walking, yard work, home exercise) are shared by both sexes (Lox et al., 2010). On average, 4 hours and 11 minutes are spent physically active each day by Canadian adults aged 18-79 (Statistics Canada, 2015). The majority of this activity is light activity, with only an average of 25 minutes spent in moderate-to vigorous activity, which is typically accumulated in short bouts.

When considering race and physical activity, the research demonstrates a general trend toward lower levels of physical activity in non-Caucasian ethnic groups. This same trend appears when examining sedentary time, with Asian/Pacific Islanders, American Indian/Alaskan Natives, African Americans, and Hispanics showing higher levels than Caucasian Americans (Lox et al., 2010). Socioeconomic status and educational level are additional variables associated with physical activity trends. There is a positive linear relationship between higher income and higher levels of physical activity in Canadian adults (Lox et al., 2010). Higher education levels are also associated with higher levels of physical activity (Lox et al., 2010). When examined together, older adults were much more physically active if they had a higher socioeconomic status and higher level of education compared to lower levels of both these variables (Shankar, McMunn,

Banks, & Steptoe, 2011). The trends associated with age and physical activity are similar all over the world. It is the consensus that physical activity decreases with age (Leino-Arjas et al., 2004). According to Statistics Canada (2015), age is one of the most dependable predictors of physical activity levels in adults. Similar to global trends, Canadian physical activity levels generally decrease with age. Epidemiological research suggests that levels of activity are not uniform across populations. Inactivity is found mostly in industrialized nations, with the lowest levels of activity found with non-caucasian, older, and less financially affluent individuals.

As previously mentioned, Canada is one of the industrialized countries that demonstrates patterns of inactivity. According to Statistics Canada's Canadian Community Health Survey (CCHS), only 48% of Canadian adults were moderately (or vigorously) active (Colley et al., 2011). This proportion of Canadians who participate in activity has remained consistent since 2003. Data for Ontario is similar to the overall Canadian data, while Newfoundland, New Brunswick, Saskatchewan and the Northern Territories had less adults who were at least moderately active. Researchers at the Canadian Fitness and Lifestyle Research Institute (CFLRI) conducted a pedometer study in 2009 and found that the average steps per day were 8,881. There were no significant differences by sex, age, education, income, or region. However, when adjusting for these variables, women were 49% less likely to reach 10,000 steps daily compared to men. Interestingly, Canadians who were able to cite an amount of activity that was recommended by Canadian Physical Activity Guidelines took 1,132 more daily steps compared to those who did not. Additionally, individuals who were confident in their ability to meet the guidelines took significantly more steps on average. The CFLRI (2010) states in their Bulletin on PA levels in Canada that physical inactivity is a "serious public health concern" in Canada (pp.1).

1.4 Health-Related Quality Of Life And Physical Activity

HRQL can be influenced by a variety of factors, one of which is physical activity. Herman, Hopman, & Sabiston (2012) demonstrated that participation in physical activity was a more important correlate for HRQL than body mass index. In a systemic review of fourteen studies by Bize, Johnson, and Plotnikoff (2007), that utilized multiple types of experimental designs, a consistent positive association was found between self-reported physical activity and HRQL. Lox et al. (2010) also suggested that participation in physical activity has the potential to an increase all dimensions of HRQL. While this may be true, HRQL does not show increases in all dimensions in every study (Lox et al., 2010). However, based on the potential impact that physical activity may have on HRQL and supporting research, physical activity participation is a factor that should be taken into account when measuring HRQL.

While participation in physical activity has been found to be related to HRQL (Bize et al., 2007), sedentary behaviour may also be an important factor to consider. Sedentary behaviour is defined as "any waking behaviour characterized by an energy expenditure of less than or equal to 1.5 METs while in a sitting or reclining posture" (Sedentary Behaviour Research Network, 2012, pp.540). This definition has been expanded to emphasize that sedentary activity is not just the lack of physical activity. Instead, sedentary activity now includes participation in low energy expenditure activities that occur throughout the day, such as occupational sitting, eating, and watching television (Colley, Garriguet, Janssen, Craig, Clarke, & Tremblay, 2011). Inactive and sedentary individuals are much more likely to report poorer health than their active counterparts (Herman et al., 2012).

However, the relationship between physical activity (or sedentary activity) and HRQL is not always so simple. Poor health across any or all of the HRQL dimensions can also restrict an

individual's ability to participate in physical activity. Therefore, while being active or sedentary can influence HRQL, an individual's HRQL can also influence their desire or ability to be physically active. With this in mind, physical activity is still an influential factor that interacts with HRQL, and has been found to have a moderate to large statistical effects (Brand, Schlicht, Grossmann & Duhnsen, 2006). A more sedentary lifestyle has been shown to increase the risk of many health conditions, such as osteoporosis, cardiovascular disease, depression, back aches, certain cancers, strokes, and type 2 diabetes mellitus (Bize et al., 2007, Khubchandani et al., 2009). Interestingly, the negative health outcomes associated with sedentary activity are independent from the negative health outcomes associated with being physically inactive (Tremblay, Colley, Saunders, Healy & Owen, 2010).

In Canada, results from a 2007-2009 survey found that 69% of adult behaviour was spent in sedentary activities (Colley et al., 2011). Many working adults spend the majority of their hours at work sitting. While occupational sitting has a weaker association with obesity than leisure time sitting (Chau et al., 2012), long periods of sedentary activity are also associated with locomotor disability. Sedentary activity clearly has multiple health-related consequences, which are related to HRQL outcomes. When investigating the relationship between HRQL and physical activity in adults, it is therefore important to also consider the possible influence of sedentary activity as well.

While physical activity seems to have an overall positive effect on HRQL, the relationship is not simple or linear. Brown et al. (2003) discovered that HRQL scores were lower in individuals who participated in extended periods of physical activity of 90 minutes or more each day. These results suggest that there is an inverted U relationship between PA and HRQL. For both men and women, those who were either active or moderately active showed

significantly more favourable HRQL scores than those who were inactive or extremely active (>90 min/day). (Feeny et al., 2014). Lahti et al. (2010) suggested that participating in enough daily physical activity at a sufficient intensities provides HRQL benefits such as maintenance of overall health and functioning.

Brown et al. (2004) found that individuals who participated in daily moderate or vigorous physical activity for less than twenty minutes a day reported a poorer HRQL. The same was found for individuals participating in the aforementioned intensities for greater than ninety minutes a day. Reforge et al. (1999), found that differences in self-reported mental health functioning were the strongest when comparing those who engaged in regular physical activity and sedentary individuals. Energy expenditure was also found to be positively correlated with mental health subscales of the SF-36 questionnaire in cross sectional research (Daskapan et al., 2005). The same was also determined for feelings and perceptions of vitality. Herman et al. (2012) confirmed that physical activity was positively related to mental health functioning. Feeny et al., (2014) found that favourable self-reported HRQL tended to be reported by both physically active men and women. The Canadian Fitness and Lifestyle Research Institute (2009) found that individuals who had low levels of daily steps had a lower confidence that they could be active. Herman et al. (2012) observed that individuals who were inactive were more likely to report limits to their ability to participate in activities of daily living, and this trend increased with age (Herman et al., 2012). While functioning naturally decreases with age, the rate of decline in HRQL can be much faster for those who are sedentary. It is also important to recognize that the association between HRQL and physical activity participation is reciprocal. While low perceptions of HRQL can lead to decreased PA, so can poor health status also lead to

a limited ability to participate in physical activity (Lahti, Laaksonen, Lahelma, & Rahkonen, 2010).

The systemic review conducted by Bize et al. (2007) concluded that there is not yet enough RCT evidence to confirm the extent of the relationship between physical activity and specific individual dimensions of HRQL. However, they did indicate that cross-sectional evidence strongly supports the relationship between physical activity and physical functioning as well as feelings of vitality. Vitality is included as a dimension in the SF-36v2, which is the most commonly used HRQL measurement tool currently in use. In 2000, a RCT found significantly higher vitality scores in participants who completed at least 80% of the prescribed walking (Aurilio, 2000). Partonen et al. (1998), using a RCT methodology, failed to find any strong HRQL differences between their placebo group and their physically active group apart from increased feelings of vitality in those who were exercising.

Buffart et al. (2012) found that when using the SF-36 there was a positive association between participation in moderate to vigorous physical activity and physical functioning. This relationship was present in men regardless of BMI status in the cross-sectional US National PA and Weight Loss Study. On the other hand, women did experience some negative effects on their HRQL scores when over what is considered an acceptable BMI weight (Kruger, Bowles, & Jones, 2007). For both mental health functioning and physical functioning, positive correlations were found with energy expenditure (Daskapan et al. 2005). Physical activity is also positively related to health status (Feeny et al., 2014) and it partially mediates the effect of some chronic conditions on reports of overall HRQL as well (Feeny et al., 2014). While there is some research that examines the relationship between physical activity and specific HRQL dimensions, the majority of studies tend to report changes in overall HRQL. There is much more to be learned

about the relationship of specific dimensions and how they relate to different frequencies, intensities, types, and duration of physical activity participation.

The relationship between physical activity and HRQL is well-supported by the literature. Remarkably, there is a very limited amount of existing research that attempts to investigate the relationship between an individual's HRQL and the extent to which they feel physical activity is personally valuable and important to their life. As Ajzen's (1985) Theory of Planned Behaviour (TPB) indicates, positive beliefs and attitudes about exercise (as well as subjective norms) contribute to intent to exercise, which is a strong predictor of change in behaviour (in this case, adopting a physically active lifestyle). According to TPB, attitude about performing a behaviour is influenced by the beliefs an individual carries about the behaviour and their evaluation of the consequences of adopting it. While the model indicates that both attitude and perceived behavioural control have large effects on intention, attitude has a slightly greater effect (Symons Downs & Hausenblas, 2005). Intention has been found to be a strong predictor of exercise behaviour (Symons Downs & Hausenblas, 2005).

Therefore, an individual who carries strong beliefs about the importance of physical activity and who evaluates the consequences of exercising as positive, will have a much stronger intent to be physically active. As exercise has been shown to increase HRQL across dimensions (Lox et al., 2010), individuals who value exercise and consider it important will most likely also be the individuals who exercise regularly and report a higher HRQL. In the pedometer study by CFLRI (2009), individuals with lower degree of belief in the role of physical activity as a method to prevent heat disease, cope with stress and maintain physical functioning over time had significantly lower daily step counts. They also reported lower intentions to be active in the next 6 months. The individuals with high intentions to be active in the next six months took

significantly more daily steps in comparison and had higher levels of confidence that they could be active despite barriers such as time or not feeling up to it. This study is a great example of how beliefs about physical activity are related to intention to exercise.

However, the relationship between perceptions and behaviour is never simple. Many factors influence an individual's exercise behaviour, including reported HRQL, and beliefs and values surrounding exercise. For example, being physically active has been found to increase HRQL scores. Individuals who take more steps daily are much more likely to report their own health as excellent (CFLRI, 2009). However, those who feel exercise is very important but are unable to exercise due to real or perceived barriers may potentially report lower HRQL scores. Value of exercise has not been incorporated in the assessment of the relationship between exercise and HRQL. However, its potential moderating influence should be incorporated in future studies.

1.5 Occupational Physical Activity Research

Physical activity is often divided into two categories in occupational research: occupational physical activity (OPA), which is performed throughout the day at work, and leisure time physical activity (LTPA), which consists of any physical activity performed outside of work hours (Howley, 2001). Wendel-Vos, Schuit, Tijhuis and Kromhout, (2004) examined the research regarding the influence of LTPA on HRQL in the general population. In cross-sectional studies, moderate intensity leisure time physical activity was associated with vitality, physical functioning and decreased role limitations (physical), while total leisure time physical activity lacked any association with HRQL. However, Jurakic, Pedisic, & Greblo, (2010) found a positive association between leisure time PA and HRQL. In longitudinal studies, associations with leisure time physical activity were found in dimensions of HRQL related to mental health.

This differs from the cross-sectional studies which tended to exhibit associations between physical activity and dimensions of HRQL related to physical health.

A longitudinal study by Wendel-Vos et al. (2004) found increases in the social functioning dimension after 5 years of increased LTPA (by one hour a week) in both men and women. This is interesting, as most research tends to focus on overall HRQL or the mental or physical HRQL dimensions. Tessier et al. (2007) found that this same increase of one hour of LTPA per week was associated with increased mental health and feelings of vitality in men. The women in this study reported even greater increases in these dimensions, as well as in social functioning and mental composite score using the SF-36. After a ten year follow-up, Mamlberg et al. (2005) found that men who engaged in low levels of LTPA were at a significantly higher risk of reporting their own health as poor. Additionally, Leino-Arjas et al., (2004) found that individuals who engaged in high levels of LTPA tended to live longer, and had a lower risk of cardiovascular death. They also determined that vigorous LTPA participation was associated with a lower risk of poor physical functioning with age. Various researchers have demonstrated a positive association between LTPA and HRQL, but there is still more to be determined regarding the nature of the relationship and the associations between the different dimensions and the frequency, intensity, duration and type of physical activity performed.

When examining occupational research, white-collar employees were more likely to engage in LTPA that was vigorous compared to blue-collar employees. However, the total amount of physical activity (LTPA and OPA combined) did not differ significantly between the two groups (Leino-Arjas et al., 2004). For all employees, participation in vigorous LTPA was beneficial to HRQL by improving overall functioning, and associated with better physical functioning later in life. However, the protective effect of vigorous LTPA was more prominent in

the white-collar employees. According to Leino-Arjas et al. (2004), the more sedentary white-collar employees seemed to need to participate in physical activity that was higher in energy output to delay or prevent decreases in functioning. Conversely, moderate intensity LTPA was enough to provide the same effect in blue-collar employees. Differences in levels of physical activity outside of work are clearly an important part of determining the relationship between HRQL and physical activity.

Unlike LTPA, OPA has been shown to be inversely related to HRQL (Parkes, 2006). Poor physical functioning is often associated with high levels of strenuous OPA. This is likely due to the increased risk of injuries and musculoskeletal disorders from physical activity at work (Leino-Arjas et al., 2004). Both of these factors can contribute to lower physical functioning. For women, who engage in strenuous OPA, the risk of poor physical functioning is increased compared to men. The same is also true for individuals participating in strenuous OPA with higher BMI, those who smoke, and those with existing chronic disease. In general, lower levels of OPA are linked with improved cardiovascular health. However, when the physical demands of an occupation are strenuous, especially when there are perceptions of low job control, there is a higher risk for cardiovascular disease (Leino-Arjas et al., 2004).

For many occupations, technological advancements and automation have reduced the amount of physical activity required at work each day. However, OPA is still a relevant and important construct to measure, as people spend a large portion of their time at work each week (Barberio & McLaren, 2011). In addition, physical activity at work is of a very different nature compared to LTPA. It tends to be a longer duration and repetitive in nature (Leino-Arjas et al., 2004). On the other hand, LTPA is typically selected by the individual and perceived as more within their control. When considering OPA, it is also of note that varying occupations have

different required levels of OPA. In general, white-collar employees are typically much less active during their hours spent at work compared to blue-collar employees (Fountaine et al, 2014). In cases where OPA exceeds the abilities of an employee, it can lead to negative health outcomes (Leino-Arjas et al., 2004). In order to effectively collect data that represents an individual's physical activity participation, both LTPA and OPA must be considered.

1.6 The Importance Of Investigating Health-Related Quality Of Life And Physical Activity in University Employees

Bize et al. (2007) identified the benefit of increased physical activity in reducing chronic diseases in the general adult population. However, the researchers also concluded that there is still much more to learn about the association between HRQL and physical activity. This is true both globally and specifically in Canada. Bize et al. (2007) found that the focus of HRQL and physical activity research has been predominately investigating the relationship of these variables in the elderly or in populations with chronic health conditions such as arthritis, cancer, and cardiovascular disease. These specific populations demonstrate relationships between physical activity and HRQL, but these findings cannot be generalized to the wider population. Further research is required to investigate the relationship between physical activity and HRQL in Canadian adult populations.

Canadian university employees are among the general adult population that have not been well-studied in regard to HRQL and physical activity. This population is of interest for several reasons. The university setting features employees of varied occupational groups, from various faculty categories, management employees, and university administration staff (both academic and physical resources). Occupational and leisure time physical activity has not been evaluated in this varied group, nor has HRQL.

One of the few studies that has investigated these variables in university employees was based in Australia. When investigating quality of life (QoL), Leicht, Sealey, and Devine (2013) found that lower QoL was associated with increased working hours. All academic staff reported high work hours, as did all male university employees in all categories. These same staff also had a higher risk of cardiovascular disease (Leicht et al., 2013). All HRQL dimensions were similar for male and female academic and professional staff. However, when compared to the general Australian population, the university staff as a whole reported lower scores in the mental health dimension, in the "role emotional" dimension (a component of mental health in the SF-36 measurement tool), and the mental health component score. As a whole, the overall HRQL score was similar to the general population.

The relationship between HRQL and PA in university staff has rarely been examined in current research. Leicht et al. (2013) identified the need for this research, admitting that their study was one of the few globally that had documented the quality of life of university staff. No Canadian studies of HRQL and PA in university staff were discovered in the conduction of this review of literature. It is evident that there is a need to contribute descriptive HRQL and PA data to the knowledge base, as well as investigate their relationship in this population of university staff.

In a population with varied occupational responsibilities, such as University employees, there will also be different HRQL dimensions that may be more important for an individual's ability to effectively complete their job. The relationship between an individual's personal value of a dimension and the resulting effects on HRQL has been well-supported by research (Lox et al., 2010). It is therefore important when measuring HRQL to take personal values and beliefs into account in order to fully appreciate differences in HRQL.

While there is a lack of research investigating HRQL and physical activity in university employees, previous researchers have examined physical activity on its own in this population. The most commonly cited barriers to LTPA in university employees were: "time (61%), work assignments (27.7%), cost of gym membership (24.6%), lack of parking (24.6%), and distance from exercise facility (20.5%)" (Khubchandani et al., 2009). It is interesting that time available for exercise is the most common barrier for university employees, as they commonly report long work hours where sedentary activity is abundant. Time was listed as a more common barrier to LTPA by female university employees than males. Levels of university employee participation in LTPA has not yet been well documented.

When examining OPA in university employees, Fountaine et al. (2014) found that it was a very small percentage (12%) of TPA. The female academic staff in this Australian study reported more walking PA compared to male academic staff and female professional staff. When analyzing the data on intensity of OPA, Fountaine et al. (2014) found that male university employees reported more vigorous activity compared to female employees. In the same study, facilities management staff reported the highest levels of OPA, including heavy labor and time spent walking compared to all other university employee categories. Therefore, the limited research in this population has shown factors such as job category and gender can play a role in type and intensity of OPA. While OPA is an important part of total physical activity (TPA), LTPA makes up the majority of their physical activity. Participation in LTPA is most commonly limited by barriers such as time and commitments to work and family. The majority of this OPA and LTPA research comes from Australian universities. In order to better understand OPA and LTPA in Canadian university employees, these variables should be investigated in a Canadian population.

1.7 The Relationship Between Physical Activity, Satisfaction with Functioning at Work, And Health-Related Quality of Life In The Workplace

As previously discussed, researchers sometimes add dimensions or variables to their HRQL measurements depending on the population being studied. This is typically done when researchers determine a dimension or variable that is specifically important to the population in question (Lox et al., 2010). When evaluating workplaces, an individual's satisfaction with their work roles and functioning could have an effect on their HRQL. Traditional job satisfaction has been researched in occupational literature, however, satisfaction with functioning at work has not yet been researched as a key influence upon HRQL.

One of the few studies that evaluated work place satisfaction and physical activity in a University setting was completed by Khubchandani, Nagy, Watkins, Nagy & Balls (2009). High stress levels were shown to negatively influence well being and HRQL (Khubchandani et al., 2009). Ninety percent of University employees reported at least moderate levels of work-related stress as well. Also important was that University employees who found their work environment highly stressful and felt that they did not have the ability to cope reported higher levels of sedentary activity and perceived more barriers to exercise. Conversely, those who reported high stress levels but viewed stressors as challenges and felt satisfied they could cope with their stress were less sedentary. Satisfaction with functioning at work is a variable that should be taken into account when examining physical activity and HRQL of University employees in order to better understand its influence in this complex relationship.

1.8 Objectives Of Current Study

The purpose of this proposed study was to evaluate the relationships among multiple measures of HRQL and physical activity in University employees and provide a descriptive

picture of the University population. The majority of HRQL research tends to be focused on specialized populations with a particular chronic disease. The need to investigate the general adult population's HRQL has been identified by researchers (Bize et al., 2007). In addition to evaluating the relationships between HRQL and physical activity, this study also aimed to determine the workplace and leisure physical activity habits of Canadian university employees. Conducting research in a Canadian University setting allowed for a sample that reflected a variety of employee classifications with different job responsibilities. To date, there has been limited research investigating HRQL and physical activity in university employees. Measuring health-related quality of life in university employees in Canada will be of benefit to both the university employees themselves and the current Canadian occupational knowledge base. This study will also serve to determine how personal beliefs and values, as well as satisfaction with functioning at work variables may interact with physical activity and HRQL.

In addition to providing a descriptive picture of the University employee population, the objective of the current study was to examine how activity or inactivity measures, satisfaction with functioning at work, and beliefs about physical activity were related to health-related quality of life (HRQL) in a University population. It was hypothesized that participants who were more satisfied with their jobs, held positive beliefs about activity and were physically active would also report higher HRQL scores.

Chapter 2: Methods

2.1 Participants

The participants for the present study were employees of Wilfrid Laurier University. According to the Human Resources Department at the university, there are approximately 2100 employees working as either part-time or full-time employees at the time the survey was administrated. The questionnaire was sent out to all employees at all three WLU campuses (Waterloo, Kitchener, and Brantford). Participation in the study was voluntary.

2.2 Measures

2.2.1 Demographic information. General demographic information was collected from participants. This included items such as gender, age, marital status, children, education level, and employment status (see Appendix A).

2.2.2 Physical activity. Participant physical activity was measured using a modified version of the International Physical Activity Questionnaire (IPAQ) in the long 7-day recall self-administered format (Appendix B). The questionnaire was shortened in order to reflect the interests of the study and reduce respondent burden. The IPAQ includes five separate sections with questions pertaining to job-related PA, transport PA, housework and caring for family, recreation/sport and LTPA, and time spent sitting. Each of these sections contain questions about the amount of days per week, hours per day, and minutes per day spent in the outlined activities. These questions are repeated in each section for different intensities (vigorous and moderate) of PA. In the modified version, the questions addressed the same types of physical activity (OPA, transport, housework, LTPA). However, instead of separating the activities into multiple

sections, activity was divided into OPA and LTPA. Several examples of what could be considered physical activity were taken from the IPAQ and included to ensure participants considered activities such as walking and housework which could have been left out without prompting. In the condensed version, participants were only required to list the minutes spent participating in PA for each day of the previous week instead of also recording the hours. Both the IPAQ and the condensed version also address time spent sedentary. Due to the sedentary nature of many occupations at the university and the associated health implications of increased sedentary time, this was an important variable to include.

2.2.3 Health-related quality of life. Health-related quality of life was measured using the SF-36v2 (Ware & Sherbourne, 1992). The SF-36v2 evaluates perceptions of functioning level across eight dimensions (see Appendix C). These dimensions include physical functioning, social functioning, and role functioning (physical & emotional), mental health, general health, bodily pain, and vitality. The SF-36v2 is a seven week recall instrument.

A high score on the physical functioning dimension (PF) indicates that an individual can perform even vigorous physical activity without limitations caused by health. A low score indicates that the individual perceives their health greatly limits them in even the simplest physical activities such as getting dressed. This dimension includes ten items, such as climbing several flights of stairs, lifting heavy objects and bending/kneeling. Individuals rank these ten items on 3-point scales according to how they perceive their health limits their ability to perform these tasks. They can select that their health limits them a lot, a little, or not at all concerning these physical tasks.

The role functioning dimension is comprised of two separate scales: role functioning physical (RP) and role functioning emotional (RE). The scales determine the extent to which an individual perceives limitations in fulfilling roles due to either their physical health or their mental health. Similarly, the social functioning dimension (SF) requires respondents to rank on a 5-point scale whether they feel their physical or emotional health has limited their social functioning over the past week. In all three of these dimensions, respondents indicate whether they feel health limitations have impacted levels of functioning all, most, some, little, or none of the time during the week.

The mental health dimension (MH) is assessed by a 5-item mental health scale (MHI-5). Items incorporated into this scale are related to psychological well-being, anxiety, depression and other mental health indicators. At the point of creation of the SF-36 the MHI-5 had already been in use for 8 years in a multitude of studies (Ware & Sherbourne, 1992). Respondents describe how often in the past week they have been feeling something specific, such as "did you have a lot of energy?". Response options are identical to the social and role functioning dimensions.

Bodily pain (BP) is determined by individuals indicating the frequency of bodily pain they have experienced over the past week. In addition, respondents report how much they feel their bodily pain has interfered with their typical work activities both inside and outside of their home. The vitality dimension (VT) uses 4-items to determine energy level and fatigue. Items are worded both favourably and unfavourably in order to ensure a fair assessment.

The final dimension of the SF-36 is the individual's general health perceptions (GH). It is a modified version of Davies and Ware's (1981) Health Perceptions Questionnaire (HPQ). Respondents rate their perception of their general health on a 5-point scale ranging from

excellent to poor. They rate their current general health compared to a week ago to determine if they perceive improvements, declines, or no change.

The scores from these dimensions are combined to create two composite scores using Quality Metric software. The software automatically computes the Mental Component Score (MCS) and the Physical Component Score (PCS). The Mental Component Score (MCS) is the sum of VT, SF, RE, and MH, while the Physical Component Score (PCS) is the sum of PF, RP, BP, and GH. The SF-36v2 is validated as a generic measure of health-related quality of life for adult populations, and is the most precise of all short-form health surveys (Ware et al., 2008). The SF36v2 also incorporates a norm score, facilitating comparison of results to other research. The SF-36v2 is estimated to take five to ten minutes to complete (Ware et al., 2008). The Quality Metric software also provides a data quality evaluation report which assesses the completeness of data, as well as item internal consistency, discriminant validity, reliability of scales, responses within range, and consistency of responses. The license for use of the SF-36v2 for this project can be found in Appendix D.

2.2.4 Satisfaction with functioning at work. After a review of the literature found no definitive measure of satisfaction with functioning at work, one was developed for the current study. The satisfaction with functioning at work measure contained six statements that were evaluated on 5-point metric scales. The aim of the measure was to determine satisfaction with functioning in an individual's occupational role, and their satisfaction with the amount of physical activity inherent to their job. Respondents reported their level of satisfaction for each item. The measure can be found in Appendix E. A reliability analysis was conducted in order to determine the internal reliability of the satisfaction with functioning at work measure.

Chronbach's alpha was .694 for the 6 items. Nunnaly and Bernstein (1994) suggest that a value of .7 or higher is a good indication that a newly developed scale is reliable. When rounding, the measure fulfills this criteria. Further analysis of this statistical test demonstrated that the corrected item-total correlations all fall within the .20 to .70 range recommended by Ferketich (1991). Satisfaction with functioning at work was calculated as a total of the six satisfaction measures: a higher value represented greater satisfaction with their current job.

2.2.5 Beliefs about physical activity. Similarly, no specific scale evaluating beliefs about physical activity was found in the literature. Therefore, a measure regarding beliefs about physical activity was developed for the present study. Participants rated eleven agreement statements using 5-point Likert scales. Responses rated how much they agreed with each item in their own life. The statements focused on personal values and attitudes about physical activity behaviour. The questionnaire can be found in Appendix F. A reliability analysis was also conducted on the Beliefs about physical activity measure to determine internal reliability. Chronbach's alpha was .897 with all 11 items. This indicates that 89.7% of the variance is internally consistent reliable variance, which is well within the suggested acceptable range (Nunnaly & Bernstein, 1994). Beliefs about physical activity was calculated as a total of the individual statements with a higher score representing a more positive attitude toward physical activity.

2.3 Procedure

Contact was made with the Human Resources Department at WLU in order to determine if they would assist with the distribution of the questionnaire to all WLU employees. A copy of the initial contact with the HR Department can be found in Appendix G. After meeting with the

researcher and reviewing the questionnaire, the WLU HR Department agreed to distribute the questionnaire via e-mail to all university employees across three campuses (approximately 2100 employees). Ethical approval for the questionnaire was obtained (REB file #4020) and a consent letter was approved (Appendix H). The initial contact e-mail (Appendix I) was sent out to employees of WLU by the main contact at the HR department: Cindy Gruhl, CHRP (Health & Disability Management Specialist, HR). Three days later, a second e-mail was sent to all employees to remind them of their opportunity to participate in the research (Appendix J). The questionnaire was accessible to all potential participants online via the Survey Monkey website. It remained open for one month in order to allow participants ample time to respond to the questions. Data was downloaded from SurveyMonkey by the primary researcher and stored in encrypted files accessible to the primary researcher. Data was analyzed using the current version of SPSS. SPSS analysis included descriptive data and linear regression analysis using the stepwise method. Scoring software provided by Quality Metric was used to calculate the HRQL scores and compare them to American general population norms for the SF36v2.

Chapter 3: Results

Data was collected from participants during the period of June 2014 to August 2014. Results are discussed in three sections: description of participants, evaluation of the measures, and relationship analyses.

3.1 Description Of Participants

The online questionnaire was answered by University of Wilfrid Laurier employees (n=337). While 337 participants gave their consent to participate, only 325 of those participants filled out at least part of the questionnaire. One participant was removed from the study because they had inputted impossible values for physical activity measures, leaving 324 participants who completed at least one section. The reporting of results includes all participants who have completed the input for the particular variable(s) in question.

The age of participants in the study ranged from 20 to 68 years (n=296, M= 41.07, SD= 11.379). The majority of participants were female (n=228, 70.6%) with less identifying as male (n=93, 28.8%) and 2 participants who preferred not to answer (0.6%). Most participants surveyed had a significant other, with 64.5% married (n=209), 9.6% common law (n=31) and 8% in a relationship (n=26). The remaining 17.9% participants were single (n=38, 11.7%), divorced or separated (n=17, 5.2%), widowed (n=2, 0.6%), or preferred not to answer (n=1, 0.3%). When asked if they had children (n=324), 60.2% selected “yes”, 39.2% said “no”, and 0.6% preferred not to answer. When responding to the highest level of education obtained, a university undergraduate degree was the most common response (34.6%), while 24.4% had obtained a graduate degree and 25.3% had completed a doctoral degree. This data shows that the sample population was well-educated, and more educated than the general population. The

participants were primarily full-time workers (n=301, 93.5%), with only 6.5% part-time workers in the sample. Additionally, 86.1% of participants worked a regular Monday to Friday schedule with consistent hours, while shift workers were less common (13.9%). A wide variety of university job categories were represented, which are outlined in Table 1. Participants were analyzed together as a group because the diverse collection of occupations represented the reality of employees at a University campus. This approach was consistent with work by Leicht et al. (2013), one of the only University employee studies which also researched HRQL.

Table 1

University job category

Job Category	Percentage (%)
Administration	14.02
Librarian	3.74
Full Professor	5.92
Associate Professor	9.96
Faculty Assistant Professor	6.23
Faculty Limited Term Appointment	1.25
Faculty Contract Appointment	0.62
Academic Support Management	4.67
Academic Support Personnel	10.28
University Support Services Management	3.12
University Support Services Personnel	6.54
Student Services Management	3.74
Student Services Personnel	16.20
Other	13.71
Total	100

3.2 Evaluation Of Measures

3.2.1 Activity measures. The physical activity measures that were calculated were the total number of minutes spent in leisure time physical activity (LTPA), occupational activity (OPA), and a combined total of all physical activity (TPA) completed in one week. In addition to these three physical activity measures, minutes of sedentary activity (SA) during one week were also measured. The means and standard deviations for the four activity variables are presented in table 2. Frequency distributions for the four activity measures are presented in figures 1-4. A bar chart comparing the four means is presented in figure 5. It is clear that sedentary activity (SA) levels are much higher on average compared to any of the three activity measures.

Table 2

Mean and standard deviation of activity and sedentary measures

	LTPA	OPA	SA	TPA
n	166	159	161	156
Mean	928.81	174.21	3140.0124	1088.21
Standard Deviation	563.32	378.08	1561.76	743.92

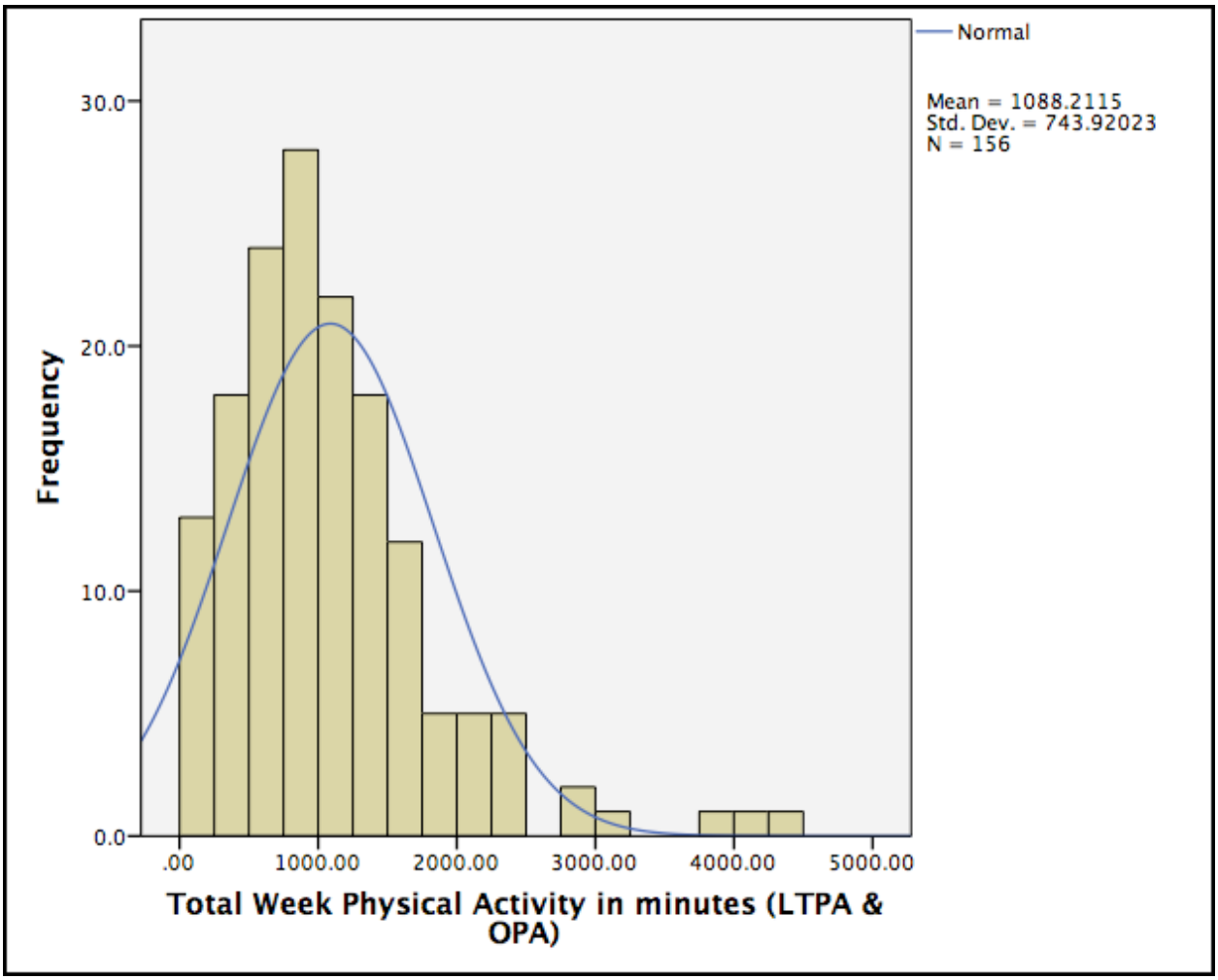

Figure 1: Frequency Distribution of Total week Physical Activity (TPA= LTPA + OPA)

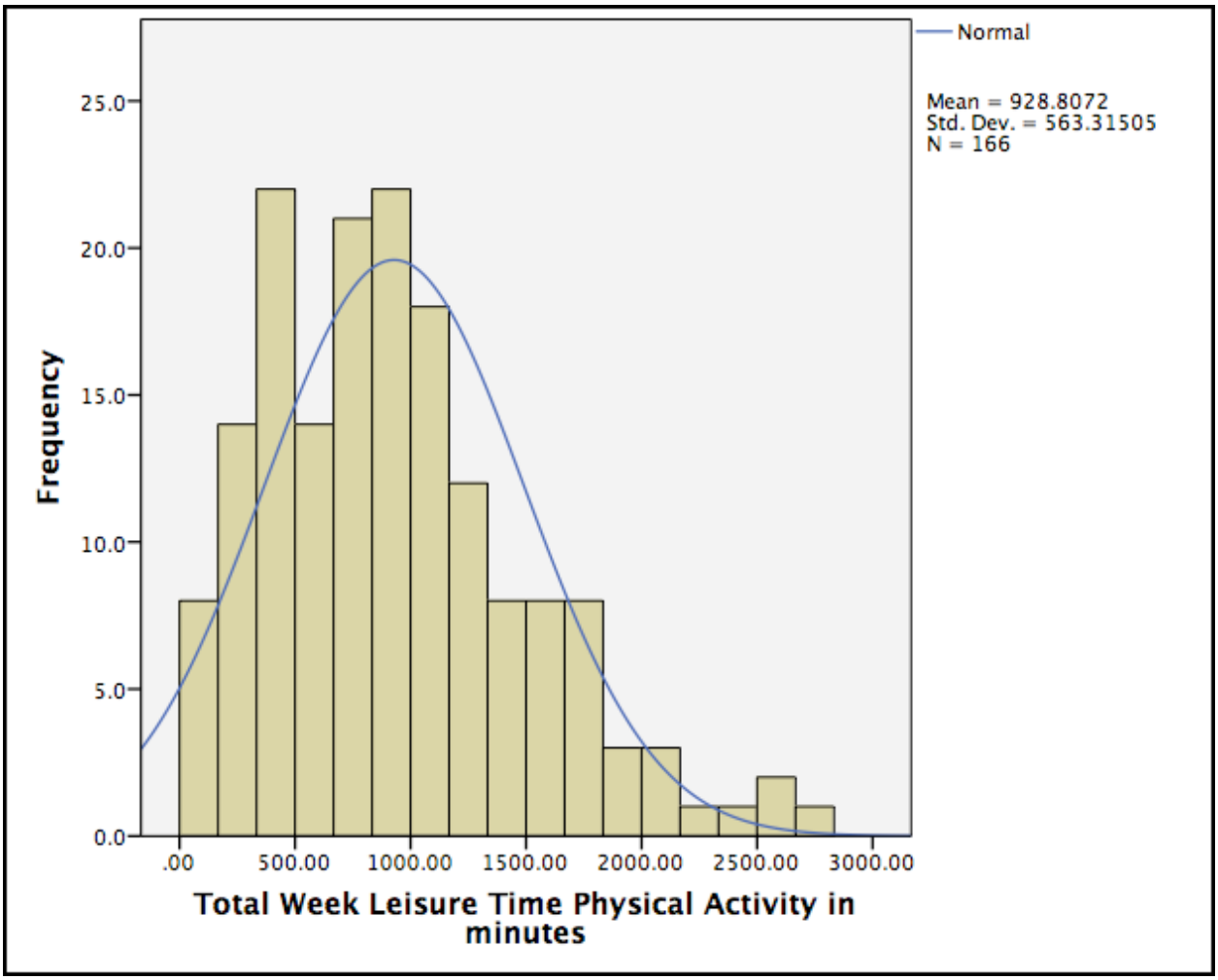

Figure 2: Frequency Distribution of Leisure Time Physical Activity (LTPA)

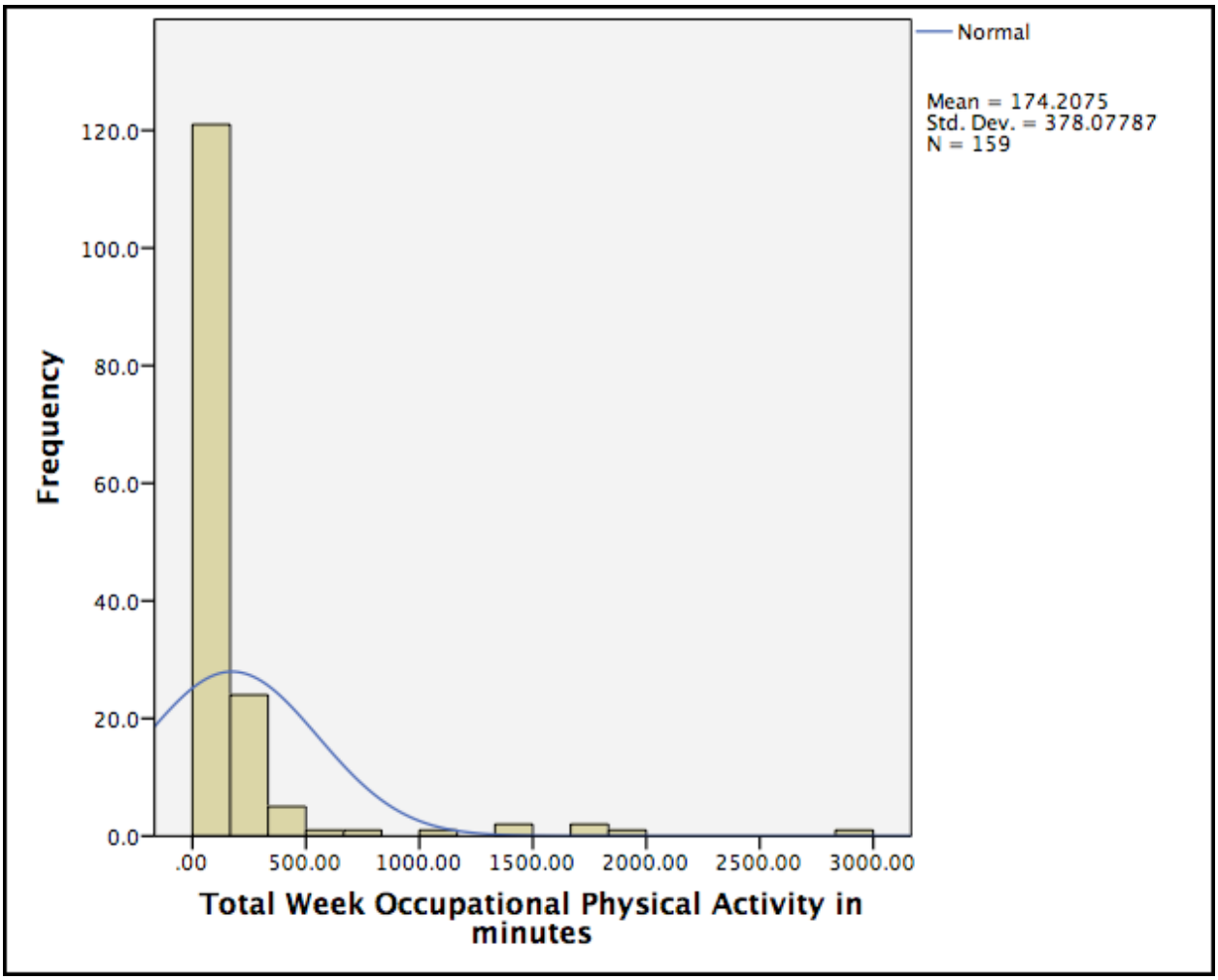

Figure 3: Frequency Distribution of Occupational Physical Activity (OPA)

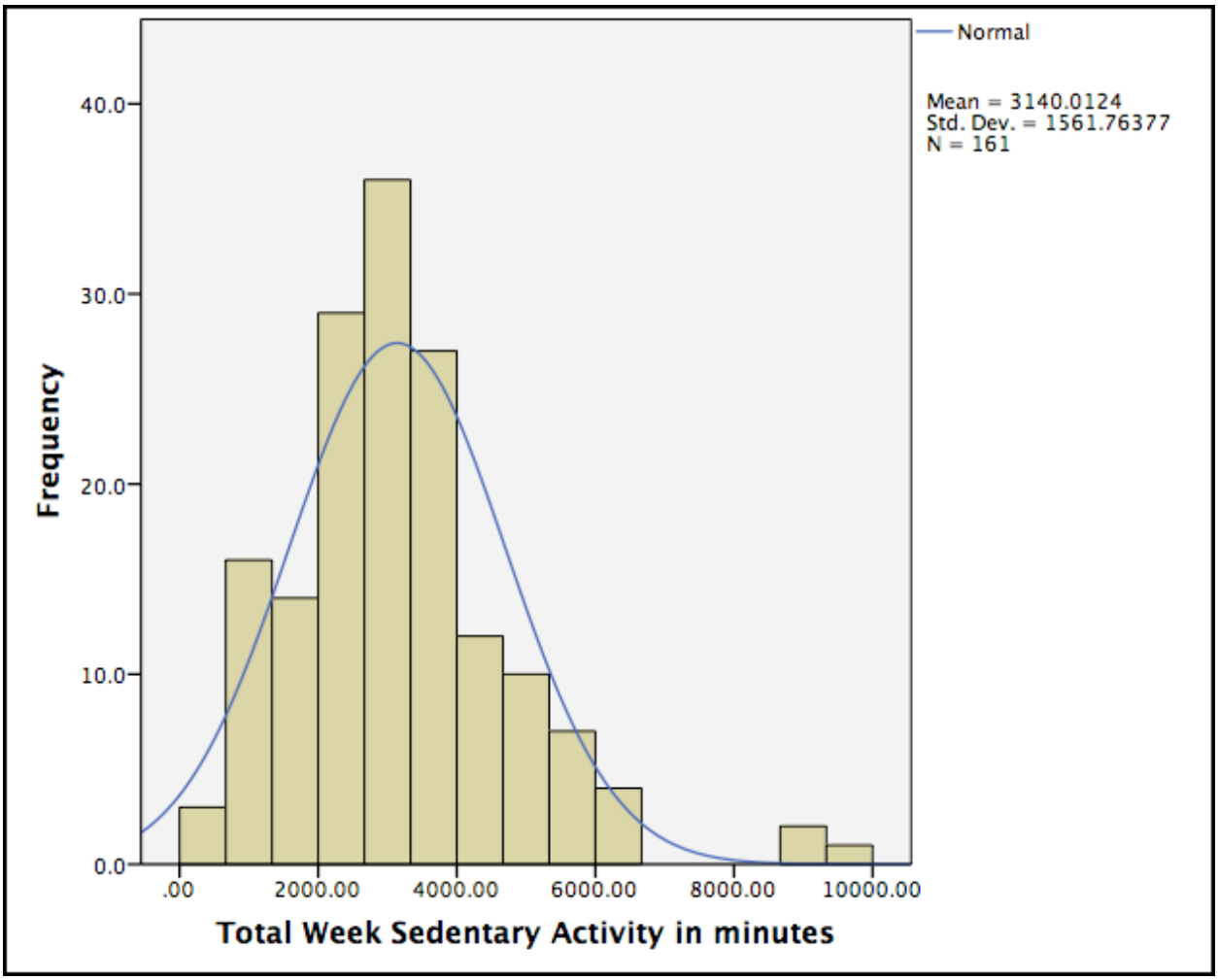

Figure 4: Frequency Distribution of Sedentary Activity (SA)

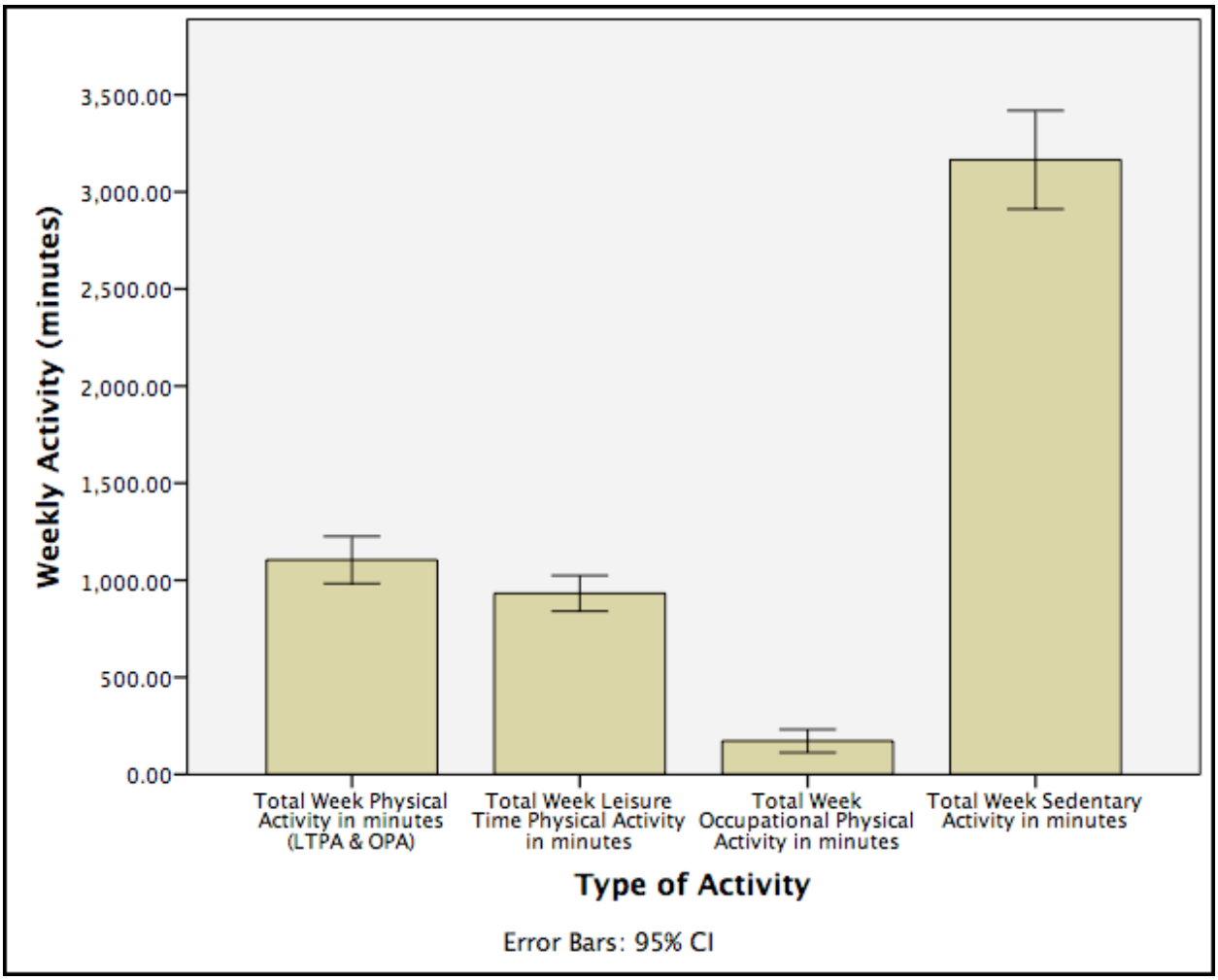

Figure 5: Comparison of Means for types of activity

In order to get a clearer picture of when individuals were active, two additional PA variables were assessed using work schedule data: average minutes of physical activity on a work day and average minutes of physical activity on a day off. The mean of the average amount of PA (on a work day) was 123.70 (n=180, SD=109.16), while the mean of the average amount of PA (on a day off) was much higher at 217.71 minutes (n=180, SD=162.65). Evidently, participants were more active on their days off compared to days where some time was spent at work.

3.2.2 Health-related quality of life measures. The HRQL measures obtained from the SF36v2 included two composite scores. The Mental Composite Score (MCS) was comprised of the following four HRQL dimensions: Vitality (VT), Social Functioning (SF), Role Emotional (RE), and Mental Health (MH). The Physical Component Score (PCS) was comprised of the following four HRQL dimensions: Bodily Pain (BP), Physical Functioning (PF), Role Physical (RP), and General Health (GH). The means and standard deviations of these HRQL measures are reported in table 3.

Table 3

Mean and Standard Deviation of HRQL Measures (n=174)

HRQL Dimension	Mean	Standard Deviation
MCS	49.07	8.83
VT	57.33	18.670
SF	87.57	19.407
RE	87.36	19.002
MH	75.27	15.409
PCS	54.27	6.57
BP	77.20	19.862
PF	91.32	14.56
RP	91.20	15.96
GH	69.85	19.712

The SF36v2 scoring software by Quality Metric also provided comparisons between the HRQL measures obtained in this sample and normative data obtained from their 2009 American general population sample. The use of U.S. norm-based scoring for HRQL has been shown to have little impact on results in Canada and other Western European countries, and is considered common practice with the SF36v2 (Ware et al., 1998). In the current sample of 174 individuals, 53% scored above norms for PCS and 30% scored above norms for MCS. In addition, 25% of participants scored below norms for MCS, while 9% scored below norms for PCS. Interestingly, a normative comparison suggested that 17% of the current participants had met the criteria for first stage depression screening which was comparable to the general population Quality Metric sample, which reported 18% of individuals who met the same criteria for positive depression screening. The most notable differences between the sample population and the general public were that more than half of current participants scored above the PCS norms, while a quarter of participants scored below norms for MCS. Apart from these differences, the sample population was comparable to the general public. The data quality evaluation report provided by the Quality Metric software reported that all data quality indicators were satisfactory and above the quality norms.

3.2.3 Satisfaction with functioning at work. The total score for satisfaction with functioning at work in the current sample had a mean of 19.90 and a standard deviation of 3.8 (n=173). The median was 20 and the range of actual scores was 8-29. Higher scores on the satisfaction with functioning at work measure indicated a higher level of satisfaction with an individual's occupation, satisfaction with one's ability to fulfill roles at work, and satisfaction with opportunities to participate in OPA. The possible range of scores was from 6-30. With an

average score of 19.90 and a moderate standard deviation, it suggests the majority of employees were satisfied (but not extremely satisfied) with their current job.

3.2.4 Beliefs about physical activity. The scores for the Beliefs about Physical Activity measure were totaled and averaged. The mean score was 45.36 and the standard deviation was 6.94 (n=176). The median was 46 and the range of actual scores was 13-55. Higher scores from this measure indicated stronger beliefs that physical activity was important and valued. The range of possible scores was from 11-55. Therefore, a mean of 43.56 with a moderate standard deviation, reflects that the majority of the sample felt positively about physical activity.

3.3 Relationship Analysis

All statistical analyses were evaluated at a probability level of .05. A correlation analysis was run using Pearson's correlation coefficient for the following variables: beliefs about PA, satisfaction with functioning at work, physical activity (TPA, LTPA, OPA), sedentary activity (SA), and HRQL (MCS, PCS). This information is presented in table 4.

Table 4

Correlations and Key Variables (Beliefs about Physical Activity, Satisfaction with Functioning at Work, Total Physical Activity, Sedentary Activity, Leisure Time Physical Activity, Occupational Physical Activity, Physical Component Score, Mental Component Score)

		B	SFW	TPA	SA	LTPA	OPA	PCS	MCS
Beliefs about physical activity (B)	Pearson correlation	1	.315**	.221**	-.305**	.221**	.085	.381**	.101
	Sig. (2-tailed)		.000	.000	.000	.005	.290	.000	.186
	N	176	172	163	158	163	156	173	173
Satisfaction with Functioning at Work (SFW)	Pearson correlation	.315**	1	-.080	.112	-.088	.029	.186*	.496**
	Sig. (2-tailed)	.000		.333	.164	.270	.720	.015	.000
	N	172	173	150	155	160	153	171	171
Total physical activity (TPA)	Pearson correlation	.221**	-.080	1	-.159	.882**	.675**	.140	-.020
	Sig. (2-tailed)	.006	.333		.053	.000	.000	.086	.811
	N	153	150	156	149	156	156	151	151
Sedentary activity (SA)	Pearson correlation	-.305**	.112	-.159	1	-.112	-.183	-.110	.046
	Sig. (2-tailed)	.000	.164	.053		.162	.024	.170	.573
	N	158	155	149	161	158	152	156	156
Leisure time physical activity (LTPA)	Pearson correlation	.221**	-.088	.882**	-.112	1	.249**	.201*	-.047
	Sig. (2-tailed)	.005	.270	.000	.162		.002	.011	.551
	N	163	160	156	158	166	156	161	161
Occupatio-nal physical activity (OPA)	Pearson correlation	.085	.029	.675**	-.183*	.249**	1	-.030	.063
	Sig. (2-tailed)	.290	.720	.000	.024	.002		.715	.439
	N	156	153	156	152	156	159	154	154
Physical component score (PCS)	Pearson correlation	.381**	.186*	.140	-.110	.201*	-.030	1	-.119
	Sig. (2-tailed)	.000	.015	.086	170	.011	.715		.119
	N	173	171	151	156	161	154	174	174
Mental component score (MCS)	Pearson correlation	.101	.496**	-.020	.046	-.047	.063	-.119	1
	Sig. (2-tailed)	.186	.000	.811	.573	.551	.439	.119	
	N	173	171	151	156	161	154	174	174

***. Correlation is significant at the 0.01 level (2-tailed), p<.001*

**. Correlation is significant at the 0.05 level (2-tailed), p<.001*

Regressions were run using the stepwise method due to the exploratory nature of the research. The stepwise method was also selected so that the individual contribution of variables could be determined. The predictor and outcome variables for the 8 linear regressions that are presented in this thesis are listed in table 5. The hypothesized relationships are that physical activity/inactivity, beliefs about physical activity, and satisfaction with functioning at work were related to HRQL. For the reason that the relationship between physical activity and HRQL has been identified, satisfaction with functioning at work and beliefs about PA variables were entered first into SPSS ahead of the physical activity measures. This order of variable entry in the stepwise method was chosen in order to determine if these first variables were truly influencing the outcome variables. Physical activity/inactivity measures were divided into total, leisure, occupational and sedentary activity, while HRQL was separated into mental and physical components. This approach yielded eight separate regression analyses to evaluate the proposed relationships among physical activity/inactivity, beliefs about physical activity, satisfaction with functioning at work, and health-related quality of life.

Minimum sample size requirements were met for both overall model analysis (minimum of 74 individuals) and individual predictor analysis (minimum of 107 individuals) according to the criteria outlined in Green (1991). The statistical assumptions required to draw conclusions about a population (Berry, 1993) were met. These include the variable types, which were quantitative and continuous, and the assumption of non-zero variance. The "no perfect multicollinearity" assumption was examined using VIF and tolerance, and was met for all 8 regressions. Predictors were uncorrelated with external variables. Only TPA and LTPA had a correlation value above 0.8, however the correlation coefficient did not exceed 0.9 which is identified as a cause for concern for running regressions in Field's statistical guide (2009). The

Durbin-Watson statistic was close to 2 for all regressions, which met the requirements for testing for independent errors. Homoscedasticity was evaluated using plots of *ZRESID against *ZPRED as is recommended for regressions (Field, 2009), while the normality of residuals was tested using P-P plots and histograms of residuals. All 8 regressions had histograms with normal distribution curves and P-P plots of residuals where the data points didn't deviate far from the normal distribution line. Further testing of residuals is detailed below. The assumption of independence was also met.

The Kolmogorov-Smirnov test was run on the dependent variables (PCS, MCS) to determine more accurately whether distribution was normal. The test indicated that there was a significant deviation from normality for both PCS ($D(174)= 0.116$, $p< .001$) and MCS ($D(174)=0.126$, $p < .001$). Due to the large sample size, Q-Q plots were also interpreted which confirmed the findings of the K-S test. The PCS scores had a skewness of -1.209 (Std. Error = 1.84) and a kurtosis of 2.020 (Std. Error = 0.366). The MCS scores had a skewness of -1. 470 (Std. Error = 0.184) and a kurtosis of 2.669 (Std. Error = 0.366).

The outliers and residuals of each linear regression were examined in order to detect the error present in the models. Casewise diagnostics were run to identify cases where the standardized residuals were greater than 2. In regressions where there was cause for concern due to a residual that did not lie between -3.29 and 3.29, Cook's distance was used to determine the influence of the case on the model. For all 8 regressions, Cook's distance ranged from 0.007 and 0.009, which is well under 1. Values over 1 are considered by Cook & Weisburg (1982) to have a strong overall influence on the model. Additionally, cases were examined in each regression model to determine if 95% of cases fell within standard residuals of -1.96 and 1.96, as well as if 99% of cases fell within standard residuals of -2.58 and 2.58. The results are presented in table 6.

While the Cook's distance values assure that one particular case hasn't had a strong influence on any of the models, it should still be acknowledged that all the regressions had more cases outside of what is considered a normal residual distribution for the 99% and 100% intervals. Interestingly, all of the regression models with MCS as an outcome variable (#1-4) fit the criteria for a normal residual distribution for the 95% interval.

Table 5

Linear regression variables entered using the stepwise method

Regression no.	Predictor Variables	Outcome Variable	Sample Size (n)
1	SFW + B + TPA	MCS	146
2	SFW + B + LTPA	MCS	156
3	SFW + B + OPA	MCS	149
4	SFW + B + SA	MCS	151
5	SFW + B + TPA	PCS	146
6	SFW + B + LTPA	PCS	156
7	SFW + B + OPA	PCS	149
8	SFW + B + SA	PCS	151

SFW= Satisfaction with functioning at work score, B= Beliefs about PA score, TPA= Total weekly PA in minutes, LTPA= Weekly Leisure time PA in minutes, OPA= Weekly occupational PA in minutes, SA= Weekly sedentary activity in minutes, MCS=Mental Component Score, PCS= Physical Component Score

Table 6

Evaluating Standard Residuals

Regression #	% of sample outside - 3.29 and 3.29	% of sample outside - 2.58 and 2.58	% of sample outside - 1.96 and 1.96
Normal Residuals	0	1	5
1	0.57*	1.72*	3.45
2	0.57*	1.91*	3.82
3	0.57*	2.30*	4.02
4	0.57*	2.30*	4.60
5	1.15*	2.30*	6.32*
6	1.15*	2.30*	6.32*
7	1.15*	2.30*	5.75*
8	1.15*	2.30*	5.75*

** values exceed what is considered normal distribution for residuals*

Overall, all eight regression analyses were statistically significant. The complete results of these linear regressions are reported in table 7. However, not all variables were included in the models after they were inputted. The stepwise method excludes variables that are not significant contributors (and instead keeps them constant) even if they are originally inputted into the model. The statistical information for individual variables can be found in Appendix K. The individual variables that were significant and contributed to the most explained variance are identified in the following paragraphs.

Table 7

Linear Regression Models

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	0.486	0.236	0.231	7.890	0.236	44.784	1	145	0.000	1.875
2	0.477	0.228	0.223	7.940	0.228	45.652	1	155	0.000	1.857
3	0.491	0.241	0.236	7.811	0.241	46.900	1	148	0.000	1.857
4	0.433	0.188	0.182	7.896	0.188	34.643	1	150	0.000	1.874
5	0.387	0.150	0.144	6.125	0.150	25.599	1	145	0.000	1.932
6	0.400	0.160	0.155	5.987	0.160	29.541	1	155	0.000	1.936
7	0.380	0.144	0.138	6.107	0.144	24.902	1	148	0.000	1.929
8	0.382	0.146	0.140	6.031	0.146	25.558	1	150	0.000	1.933

a. *Included Predictors: 1- (Constant), Satisfaction with Functioning at Work, 2- (Constant), Satisfaction with Functioning at Work, 3- (Constant), Satisfaction with Functioning at Work, 4- (Constant), Satisfaction with Functioning at Work, 5- (Constant), Beliefs, 6- (Constant), Beliefs, 7- (Constant), Beliefs, 8- (Constant), Beliefs*

b. *Dependent Variables: 1-4: MCS, 5-8: PCS.*

In the regressions predicting for MCS (1-4), satisfaction with functioning at work (SFW) was the sole significant predictor variable. These regressions (1-4) reported significant F values: $F(1,145)=44.784$, $p < .001$, $F(1,155)=45.652$, $p < .001$, $F(1,148)=46.900$, $p< .001$, $F(1,150)=34.643$, $p < .001$. R^2 values describe how much variance is accounted for by the predictor (SFW score) and other variables which are kept constant. Regression 1 (TPA) accounted for 23.6% of the variance in MCS, regression 2 (LTPA) accounted for 22.8%, regression 3 (OPA) accounted for 23.6% and regression 4 (SA) accounted for 18.8%. The adjusted R^2 values were very similar to the R^2 values, indicating that we can be more confident when generalizing these four models.

Conversely, the Beliefs about PA score was the only significant predictor variable for regressions 5-8 which are predicting for PCS. All four of these regressions reported significant F values: $F(1,145)=25.599$, $p < .001$, $F(1,155)=29.541$, $p < .001$, $F(1,148)=24.902$, $p < .001$, $F(1,150)=25.558$, $p < .001$. Physical activity variables and sedentary activity were excluded from the regressions models and kept constant through the stepwise process for all 8 regressions due to their lack of significance. R^2 values accounted for the following variance in PCS: 15% (regression 5), 16% (regression 6), 14.4% (regression 7), and 14.6% (regression 8). Adjusted R^2 values were very similar to the R^2 values, once again indicating that it may be possible to generalize these models.

Chapter 4: Discussion

The overall objective of the current study was to evaluate satisfaction with functioning at work, personal beliefs about activity, and activity measures related to multiple measures of HRQL in university employees. It was hypothesized that participants who were more satisfied with their jobs, held positive beliefs about activity and were physically active would also report higher HRQL scores. The results of the analysis of the hypothesized relationships are discussed in the following paragraphs.

Study participants spent much more of their time sedentary than they did participating in physical activity. On average, participants were spending 3,140 minutes a week engaging in sedentary activity (not including sleeping). That is equivalent to 7 hours and 29 minutes a day of sedentary time during an average week. Interestingly, this is only slightly lower than the sedentary levels of the average Canadian adult, who spends 9 hours and 48 minutes sedentary each day (Statistics Canada, 2015). However, the Statistics Canada finding was obtained using activity monitor data, while the current study used self-report methods.

The discrepancy could be due to the fact that the participants in the current study were not consciously aware of how much time was really spent being sedentary, causing underestimation or that they were aware that sedentary behavior is not socially desirable and intentionally underestimated their behavior. Conversely, university employees may be less sedentary than the average Canadian adult. While no studies were found examining the discrepancy between activity trackers and self-reporting sedentary activity, research has shown that Canadians who self-report their physical activity overreported their activity compared to accelerometer data (Garriguet, Tremblay, & Colley, 2015).

According to the Canadian Health Measures Survey (CHMS) from 2012-2013, the average adult Canadian spends 4 hours and 11 minutes engaging in physical activity (TPA) each day (Statistics Canada, 2015). Participants in this current study, who were 70.6% female, spent an average of 2 hours and 35 minutes being physically active each day. When comparing these weekly averages, participants in the current study reported an average of 11 hours and 12 minutes less than the CHMS weekly average. Physical activity trends have shown that while men and women are similarly sedentary, men are more active than women on average (Statistics Canada, 2015). Findings from the CHMS would indicate that the largely female sample in the current study would have inflated physical activity rates. However, this was not the case. Again, the CHMS data was obtained from activity trackers while this current study used a self-report modified IPAQ to measure physical activity. Interestingly, Garriguet, Tremblay, & Colley (2015) found that Canadians tended to overreport their physical activity levels when using the IPAQ compared to activity tracker data. This may suggest that the current group of participants may have actually engaged in less activity than they reported.

When examining the types of physical activity performed, the participants in this study were much more active in their leisure time compared to their time spent at work. While many positions at a University require movement across campus or standing while lecturing, many university positions require a significant amount of time spent sedentary at a desk. An average of 15 hours and 29 minutes of LTPA were accumulated in one week, while the average OPA weekly minutes reported were only 2 hours and 54 minutes. This equates to a daily average of 2 hours and 12.6 minutes of LTPA and 24.6 minutes of OPA. However, it should be noted that the typical employee doesn't work 7 days a week, and therefore considering a weekly average is a better representation of OPA. Regardless, the average amount of LTPA is greater than the

amount of OPA. The LTPA reported by participants in the current study is more than the average Canadian adult according to CMHS data from 2007-2011. Depending on age, the average Canadian adult spends around 25-35 minutes engaged in LTPA daily according to self-report methods (Statistics Canada, 2011). OPA averages can vary quite a bit depending on job category. Overall, it appears that the sample population was more active in their leisure time than at work, and they participated in more LTPA than the average Canadian.

When analyzing the scores for the total sample, all 8 HRQL dimensions and 2 composite scores were very close to the general population norms. The majority of these scores were slightly better than the norm, with only the role emotional dimension scoring slightly below the norm, which caused the mental composite score (MCS) to also be just below the norm. The highest scoring dimensions (when compared to the norms) were physical functioning and role physical. These contributed to the physical composite score (PCS) being above the general population norm. The Quality Metric score also provided a "first stage positive depression screening" which identified the percentage of the sample considered at possible risk for depression. 17% of the sample met the criteria, compared to 18% which is the general population norm. These results suggest that overall the sampled population of Canadian university employees present very similar HRQL results to the general adult population.

Further analysis of HRQL scores suggest that the percentage of participants who scored above, at or below the general population norms for each score. The composite scores include all of the dimensions, and therefore reflect overall HRQL of the sample. For PCS, 53% scored above the norm, and 38% scored at the norm. This left only 9% of the sample scoring below the norm. Evidently, the PCS of this sample is average or better than average for the large majority of participants (91%). The MCS, which was overall slightly lower than the norm, also had more

individuals scoring below the norm (25%) than PCS. Of the dimensions in the MCS, many more individuals scored at or above the norm for social functioning compared to the other three dimensions.

These findings suggest that while individuals had better social functioning scores, it was not always enough to keep their mental composite scores at the norm. Role emotional scores were the most diminished dimension, scoring just below the norm. Interestingly, one of the few studies that has measured HRQL in university employees also found that MCS and role emotional scores were lower in this population. Considering all of these norm comparisons, the sampled population for HRQL (n=175) scored well in all dimensions, with PCS higher than the norm and MCS just slightly below the norm. The sampled participants in the current study are very similar to the general population with respect to the HRQL Quality Metric which is used for comparisons.

All eight regression models reported significant F values. The models that account for the most variance in MCS were regression 1 and 3, which used satisfaction with functioning at work score as a predictor while keeping total PA/OPA and beliefs about PA constant. These results for MCS are interesting, as they indicate that an individual's satisfaction with functioning in their role at work as well as their satisfaction with functioning at work are related to their self-reported MCS. The satisfaction with functioning at work questionnaire measures an individual's satisfaction with social support received at work, their ability to cope with work-related stress, the amount of physical activity they are able to complete at work and outside of work, the amount of challenge and opportunity within their job, and their current career choice. This analysis shows that satisfaction with these job-related variables is more significant to an

individual's MCS HRQL than the amount of physical activity or sedentary activity they engage in.

While the physical activity variables were not significant predictors of MCS, it is interesting to note that in this study there was both a diminished level of physical activity and a diminished MCS compared to general population norms. Daskapan et al. (2005) determined that energy expenditure was found to be positively correlated with MCS and the vitality dimension (VT) in cross-sectional research. Future research should aim to investigate this relationship further with the use of activity monitors in order to determine if these variables are significant when physical activity is measured directly.

The model accounting for the most variance in PCS was the model which included beliefs about PA as the predictor variable while keeping the other inputted variables (LTPA and SFW) constant. It is interesting that an individual's positive beliefs about physical activity were significant predictors for PCS considering Ajzen's Theory of Planned Behaviour (TPB) (1985). In TPB, positive beliefs about physical activity lead to positive attitudes about the consequences of participation in physical activity, which in turn lead to intention to exercise. Intention to exercise is a strong predictor of actually performing exercise. What this means is that an individual who believes in the value of exercise and wants to perform it, is much more likely to do so. Performing exercise is also a predictor for higher reported levels of HRQL (Bize et al., 2007). It appears that when these individuals who believe exercise is important and intend to perform it actually engage in exercise, they also report higher levels of HRQL. With these connections in mind, it is no surprise that the beliefs about physical activity scale is linked to physical HRQL outcomes like general health. The individuals holding positive beliefs about PA are more likely to be physically active, which makes them more likely to report higher physical

HRQL scores. The significance of the beliefs about physical activity scale accounting for variance in PCS is a particularly interesting finding due to the clear links established in physical activity research between beliefs and exercise behaviour (Ajzen, 1985), as well as physical activity and HRQL (Bize et al., 2007).

The purpose of the current study was to examine the relationships among physical activity, satisfaction with functioning at work, beliefs about physical activity, and HRQL. One strength of the study was that the HRQL measurement tools assessed not only perception of functioning, but satisfaction with functioning as well. While HRQL is an integral part of human functioning, few studies have evaluated its relationship with physical activity and measures of satisfaction with functioning at work. The exploratory nature of the analysis conducted is an important first step in understanding more about the HRQL and physical activity behaviours in targeted workplaces such as universities.

However, no study is without its limitations. While self-report measures are the best method to determine HRQL, measuring physical activity indirectly can introduce error. The discrepancy between self-reported PA and the use of activity monitors has been documented (Garriguet, Tremblay, & Colley, 2015, Garriguet & Colley, 2014), and activity monitors would be preferable in order to obtain more accurate results. A second limitation of the study was the length of the questionnaire. While shorter measurement tools were selected when possible, the questionnaire was still long enough to cause some respondent burden. This is likely the reason that many participants stopped filling out the questionnaire after the first few sections. While some participant dropout is expected, perhaps a shorter questionnaire could have reduced it further. A third limitation of this research was that the satisfaction with functioning at work scale and beliefs about physical activity scale were being used for the first time. While these measures

were piloted with similar participants, future validation is required to authenticate the reliability of the measures. The final limitation of the study was that a cross-sectional experimental design was utilized. While new and interesting information was obtained from the questionnaire, administering the questionnaire multiple times throughout the year to the participants could have yielded results that truly reflected their activity levels and HRQL which may fluctuate from week to week or season to season.

Future research in the HRQL field should aim to continue to investigate the relationships between beliefs about physical activity, satisfaction with functioning at work, and HRQL. These relationships are especially interesting in the university employee population as they have not yet been thoroughly examined. In order to determine the true significance of these relationships, these variables should be measured using a longitudinal experimental design to gain further insight. Future studies should also aim to examine the occupational differences that exist between the job categories at a university. Conducting a study at multiple universities could provide a large enough sample size to determine the differences in relationships between the discussed variables in different job categories. This could prove to be beneficial when determining what support services could be offered to different university staff in order to enhance and protect HRQL in the workplace in the future.

The aim of the current study was to describe the physical activity habits of employees of a Canadian university and to evaluate how satisfaction with functioning at work, beliefs about physical activity and how activity levels influence both the physical and mental component of HRQL. The study contributed to our understanding of the physical activity behaviours of Canadian employees. It was determined that when using self-report methods, this population was less sedentary and less physically active than the general population when considering total

physical activity. However, much more time was spent participating in leisure time physical activity compared to the average Canadian, while occupational physical activity participation was limited.

New relationships were examined, and contributed to our understanding in the following ways. First, the HRQL for the university employees was very similar to the general population, with only a slightly lower score in the mental health dimensions. Secondly, the best predictor variable for variance in MCS was satisfaction with functioning at work while the best predictor variable for variance in PCS was beliefs about physical activity. Overall this study has been able to identify key predictor variables for HRQL and describe the physical activity levels of university employees, contributing to the knowledge base and deepening our understanding of this population.

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APPENDIX A: Questionnaire Demographic Information

Instructions
We would like to take this opportunity to thank you for participating in our research study. Please complete this questionnaire to the best of your ability. **Check** or **type** your response where applicable.

Please provide the most appropriate answer to each of the following questions:

1. Are you?
□ Male
□ Female
□ Prefer not to answer

2. What is your age? _____
□ PREFER NOT TO ANSWER

3. What is your marital status? *(please check one)*

□ Prefer not to answer
□ Single
□ In a Relationship
□ Married
□ Common Law
□ Divorced or separated
□ Widowed

4. Do you have children:
□ Prefer not to answer
□ No
□ Yes (*please complete table below)*

	Age of child	**Lives at your home *(yes/ no)***
Child 1		
Child 2		
Child 3		
Child 4		
Child 5		

5. What is the highest level of education you have completed? *(please check one)*

□ High School
□ Trade, technical or vocational school
□ Diploma from a community college or non-university certificate
□ University undergraduate degree
□ Graduate degree (e.g., MSc, MA, MBA)
□ Doctoral degree (e.g. PhD)
□ Other *(please specify)*: _____
□ Prefer not to answer

6. What is your current employment status at Wilfrid Laurier University?

□ Full-time
□ Part-time

7. How long have you been employed in this position at Wilfrid Laurier University? (e.g., 1 year, 2 months)

_____

8. What is your work schedule in your position at Wilfrid Laurier University?

□ Monday – Friday (regular work day hours)
□ A varied shift schedule

9. What job category would you consider your current position at WLU to be in? (please check)

- □ Librarian
- University Support Services (eg. Parking, printing, HR, custodial, physical plant)
  Are you:
  □ Management
  □ Personnel
- Academic Support (e.g. lab instructor, administrative assistant)
  Are you:
  □ Management
  □ Personnel
- Student Services (e.g. writing center, accessible learning, health services)
  Are you:
  □ Management
  □ Personnel
- □ Administration
- Faculty:
  □ Contract Appointment
  □ Limited Term Appointment
  □ Assistant Professor
  □ Associate Professor
  □ Full Professor

10. Do you have an administrative position in addition to your faculty position?

□ Yes □ No

•If we haven't captured your position, please provide:

_____

APPENDIX B: Physical Activity Questionnaire

Please complete the following questions by reflecting on your activity **yesterday**.

1. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **yesterday**?

2. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **yesterday**?

3. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job yesterday**?

4. What was the average **intensity** of your activity **yesterday**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

5. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **2 days ago.**

6. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) on **2 days ago?**

7. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **2 days ago?**

8. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job 2 days ago?**

9. What was the average **intensity** of your activity **2 days ago?** Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

10. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **3 days ago.**

11. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **3 days ago**?

12. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **3 days ago**?

13. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job 3 days ago**?

14. What was the average **intensity** of your activity **3 days ago**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

15. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **4 days ago.**

16. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **4 days ago**?

17. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **4 days ago**?

18. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job 4 days ago**?

19. What was the average **intensity** of your activity **4 days ago**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

20. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **5 days ago.**

21. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **5 days ago**?

22. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **5 days ago**?

23. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job 5 days ago**?

24. What was the average **intensity** of your activity **5 days ago**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

25. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **6 days ago.**

26. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **6 days ago**?

27. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **6 days ago**?

28. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job** **6 days ago**?

29. What was the average **intensity** of your activity **6 days ago**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

30. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity **7 days ago.**

31. How many **minutes** did you spend engaging in **sedentary behaviour** (sitting, watching TV, using the computer, eating) **7 days ago**?

32. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) in your **leisure time** (not at work) **7 days ago**?

33. How many **minutes** did you spend engaging in **physical activity** (e.g. walking, lifting weights, mowing the lawn, running) as part of your **job** **7 days ago?**

34. What was the average **intensity** of your activity **7 days ago**? Please rate it on a scale from 1 to 9. (1 being light intensity and 9 being heavy intensity).

35. Was this a work day or a day off? □ Work Day □ Day Off

Please complete the following questions by reflecting on your activity over the past **7 days.**

36. Does this represent the typical amount of activity you complete in a week?

Yes____ No ____

If No, this week was: Less than typical_____ More than typical _____

37. Were any of your daily functioning activities limited this week (e.g. carrying groceries, climbing stairs)?

Yes____ No ____

If Yes, what activities were limited and how were they limited?

_____

38. Does this represent the typical amount of sedentary activity you complete in a week?

Yes____ No ____

If No, this week was: Less than typical_____ More than typical _____

39. How many hours of screen time do you experience during a **typical work day**?

_____

40. How many hours of screen time do you experience during a **typical weekday (outside of work)**?

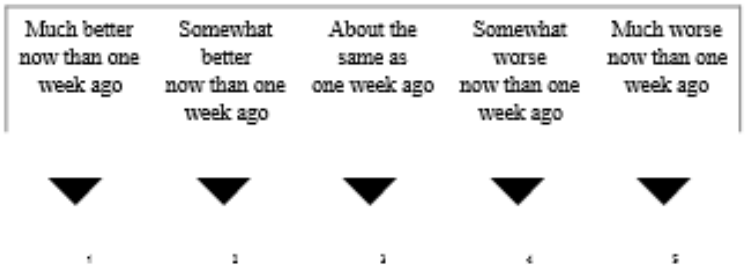
_____

APPENDIX C: Quality Metric Standard Form 36-Item Health Survey Version 2 (SF-36v2)

This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. *Thank you for completing this survey!*
For each of the following questions, please mark an in the one box that best describes your answer.

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

2. **<u>Compared to one week ago</u>, how would you rate your health in general <u>now</u>?**



3. **The following questions are about activities you might do during a typical day. Does <u>your health now limit you</u> in these activities? If so, how much?**

	Yes, limited a lot	Yes, limited a little	No, not limited at all
<u>Vigorous activities,</u> such as running, lifting heavy objects, participating in strenuous sports			
<u>Moderate activities,</u> such as moving a table, pushing a vacuum cleaner, bowling, or playing golf			
Lifting or carrying groceries			
Climbing <u>several</u> flights of stairs			
Climbing <u>one</u> flight of stairs			
Bending, kneeling, or stooping			
Walking <u>more than a kilometre</u>			
Walking <u>several hundred metres</u>			
Walking <u>one hundred metres</u>			
Bathing or dressing yourself			

4. During the past week, how much of the time have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
. Cut down on the amount of time you spent on work or other activities	1	2	3	4	5
. Accomplished less than you would like	1	2	3	4	5
. Were limited in the kind of work or other activities	1	2	3	4	5
. Had difficulty performing the work or other activities (for example, it took extra effort)	1	2	3	4	5

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

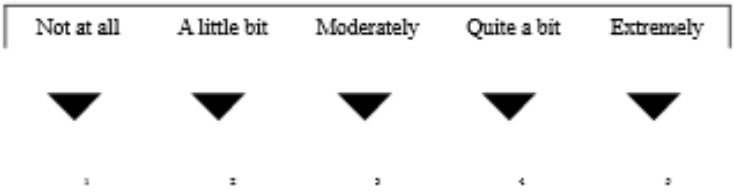
	All of the time	Most of the time	Some of the time	A little of the time	None of the time
. Cut down on the amount of time you spent on work or other activities	:	:	:	:	:
. Accomplished less than you would like	:	:	:	:	:
. Did work or other activities less carefully than usual	:	:	:	:	:

6. During the past week, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours, or groups?

Not at all	Slightly	Moderately	Quite a bit	Extremely
:	:	:	:	:

7. **How much bodily pain have you had during the past week?**

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



9. **These questions are about how you feel and how things have been with you during the past week. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past week...**

	All of the time	Most of the time	Some of the time	A little of the time	None of the time
Did you feel full of life?					
Have you been very nervous?					
Have you felt so down in the dumps that nothing could cheer you up?					
Have you felt calm and peaceful?					
Did you have a lot of energy?					
Have you felt downhearted and depressed?					
Did you feel worn out?					
Have you been happy?					
Did you feel tired?					

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

All of the time	Most of the time	Some of the time	A little of the time	None of the time
▼	▼	▼	▼	▼
1	2	3	4	5

11. How TRUE or FALSE is each of the following statements for you?

	Definitely true	Mostly true	Don't know	Mostly false	Definitely false
	▼	▼	▼	▼	▼
a. I seem to get sick a little easier than other people	1	2	3	4	5
b. I am as healthy as anybody I know	1	2	3	4	5
c. I expect my health to get worse	1	2	3	4	5
d. My health is excellent	1	2	3	4	5

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License Number: QM018004

Effective Date: 05/01/13

Licensee Name: Meghan Hoefs

Licensee Address: Wilfrid Laurier University Bricker Academic Building, BA501 75 University Ave West Waterloo, ON N2L 3C5

Approved Purpose: Non-commercial academic research and/or thesis – Unfunded Student.

Study Name: HRQoL and PA in Firefighters

Royalty Fee: None, because this License is granted in support of the non-commercial Approved Purpose

Other Definitions: As indicated on Appendix B "License Agreement – Details", including without limitation: Licensed Surveys, Modes, Fees, Administrations, Services, Approved Languages and (if applicable) License Term

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Capitalized terms used in this Agreement shall have the meanings assigned to them above, or in Appendices A and B attached hereto. Appendices A and B attached hereto are incorporated into and made a part of this Agreement for all purposes.

EXECUTED, as of the Effective Date, by the duly authorized representatives as set forth below.

OptumInsight Life Sciences, Inc. [OptumInsight]	**Meghan Hoefs** [Licensee]
Signature: Michelle White	Signature: Meghan Hoefs
Name: Michelle White	Name: Meghan Hoefs
Title: Director of Consulting Science	Title: MSc Candidate
Date: 6 MAR 2013	Date: March 1st, 2013

APPENDIX E: Satisfaction with Functioning at Work Measure

Rate the following statements on a 5-point Likert scale as they relate to **your satisfaction with the following items in your life**. Please **select** the appropriate number for each statement.

(1- Extremely dissatisfied, 2- Dissatisfied, 3- Neither Satisfied or Dissatisfied, 4-Satisfied, 5-Extremely Satisfied)

	Your current job/career choice.	1	2	3	4	5
	The current amount of physical activity you complete outside of work.	1	2	3	4	5
	The current amount of physical activity you complete within work hours.	1	2	3	4	5
	Your ability to cope with the stress inherent in your job.	1	2	3	4	5
	The amount of challenge and opportunity within your job.	1	2	3	4	5
	The social support received in your current job.	1	2	3	4	5

APPENDIX F: Beliefs about Physical Activity Measure

Rate the following statements on a 5-point Likert scale as they relate to **your life and beliefs about physical activity**. Please **select** the appropriate number for each statement.

(1- Strongly disagree, 2- Disagree, 3- Neither agree nor disagree, 4-Agree, 5-Strongly agree)

	Physical activity is an important part of my life.	1	2	3	4	5
	Being physically active is important to my ability to fulfill roles in my life (E.G., being a husband/wife, a parent etc.)	1	2	3	4	5
	Performing physical activity is important to my health.	1	2	3	4	5
	Being physically active is important for helping me complete the obligations of my job.	1	2	3	4	5
	I think performing physical activity is valuable to my life.	1	2	3	4	5
	I think performing physical activity is valuable to my quality of life.	1	2	3	4	5
	I feel that physical activity provides me with valuable physical benefits.	1	2	3	4	5
	I feel that physical activity provides me with valuable emotional benefits.	1	2	3	4	5
	I feel that physical activity is a valuable contributor to my health.	1	2	3	4	5
	I regularly schedule physical activity into my life.	1	2	3	4	5
	I structure my life around my physical activity.	1	2	3	4	5

APPENDIX G: Initial Contact with Wilfrid Laurier HR

Hello Pamela,

I am a graduate student in the department of Kinesiology at WLU working under the supervision of Dr. Kim Dawson. I am very interested in health, quality of life, and physical activity in occupational settings. I am hoping that I may get the opportunity to measure these variables in the WLU faculty and staff. I think that this would be a great opportunity for the University to better understand the range of health (mental and physical), satisfaction with life and participation in physical activity. This information could be used by the University to help with the development of future wellness programming and to optimize health in WLU staff and faculty. If the University is interested in this research, we will apply for ethical approval and ensure all steps are taken to ensure confidentiality.

I'm not sure if you are the correct person to contact regarding the University's interest in this research, but if not, please let me know if there is someone else I should be in touch with. I look forward to hearing back from you. I would be happy to meet with you in person should you want to discuss the opportunity in more detail.

Thank you,

Meghan Hoefs

APPENDIX H: Consent Letter

Wilfrid Laurier University, Informed Consent Statement

[An Examination of Health-Related Quality of Life and Physical Activity in Wilfrid Laurier University Employees]

Researchers: Meghan Hoefs (hoef7010@mylaurier.ca), Dr. Kim Dawson, Dr. Pam Bryden, and Dr. Paula Fletcher

You are invited to participate in a research study. The purpose of the study is to collect information that will help to develop a summary of the range of current health of those working at Wilfrid Laurier University.

A graduate student and several professors in the Department of Kinesiology and Physical Education at Wilfrid Laurier University are conducting this research. Researchers involved in the project are Meghan Hoefs (hoef7010@mylaurier.ca), Dr. Kim Dawson, Dr. Pam Bryden, and Dr. Paula Fletcher.

INFORMATION

Participation in this study requires that you read this informed consent statement (5 minutes). If you choose to continue, you will complete an online questionnaire (15-20 minutes) which asks about perceptions and issues relevant to your health including; satisfaction with functioning at work, quality of life, physical activity, and other related issues. To participate in this study you must be an employee of Wilfrid Laurier University. This survey is available to staff across all Laurier campuses and will be provided to approximately 2500 employees.

RISKS

There are minimal potential psychological and emotional risks associated with participation in this study. They may include boredom, disruption of your personal time and regret over the revelation of personal information. All personal information will be kept confidential and your responses will be anonymous. With the exception of the last item where you have the option of providing additional comments, all results will be reported in the aggregate. Quotations from the final question may be used in reporting of results. However, information that may identify an individual will not be included. Additionally, you may choose to skip this question while still completing the study. Please feel free to contact Meghan Hoefs, Kim Dawson, or the WLU research office (see contact information below) in the event that you have concerns/questions.

BENEFITS

The information that will be collected as part of this study will help to better understand the relationships between health-related quality of life and physical activity in employees at Wilfrid Laurier University. This information may be used to help optimize health and wellness at Wilfrid Laurier University.

CONFIDENTIALITY

Confidentiality and anonymity of your responses will be ensured by the researchers. Your questionnaire responses will never be associated with your name at any point in the research process. Because this project employees e-based data collection techniques, the confidentiality of participant data cannot be guaranteed during web-based transmission. The research project coordinator, Meghan Hoefs, will collect the completed questionnaire data. The only researchers who have access to the data are the individuals listed above. The researchers acknowledge that the host of the online survey (Survey Monkey) may automatically collect participant data without their knowledge (i.e., IP addresses). Although this information may be provided or made accessible to the researchers, it will not be used or saved without participant's consent on the researchers' systems. Data will be kept in securely encrypted files. Any publication or communication of the study's results will focus on combined data from all participants. There will be no presentation of individual results. Data will be kept for approximately two years when all information will be destroyed.

CONTACT

If you have questions at any time about the study or the procedures, (or you experience adverse effects as a result of participating in this study) you may contact the research coordinator, Meghan Hoefs (hoef7010@mylaurier.ca) or Dr. Kimberley Dawson (kdawson@wlu.ca) within the department of Kinesiology & Physical Education at Wilfrid Laurier University (Bricker Academic Building, BA501, 75 University Avenue West, Waterloo, ON, N2L3C5). This project has been reviewed and approved by the University Research Ethics Board (REB file #4020). If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. Robert Basso, Chair, University Research Ethics Board, Wilfrid Laurier University, (519) 884-1970, extension 4994 or rbasso@wlu.ca

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study,

every attempt will be made to remove your data from the study, and have it destroyed. You have the right to omit any question(s)/procedure(s) you choose.

FEEDBACK AND PUBLICATION

It is anticipated that the results of this study will be communicated at academic conferences and within written journal articles. A summary of the completed study results will be sent to the Human Resources Department at Wilfrid Laurier University.

CONSENT

In order to maintain your confidentiality, completion and return of the questionnaire is considered consenting to including your information in the study.

You may participate in the study as a whole without consenting to have quotations used in the final report. You will be provided with this option at the end of the questionnaire. You should retain a copy of the information letter for reference.

I HAVE READ THE CONSENT FORM AND BY CLICKING ON THE LINK BELOW, I AGREE TO PARTICIPATE IN THIS STUDY.

APPENDIX I: Initial Contact E-mail with University Employees

Hello,

You are invited to participate in a research study with the Department of Kinesiology and Physical Education at WLU. The purpose of the study is to collect information that will serve to develop a summary of the overall health, health-related quality of life, and physical activity behaviour of staff at Wilfrid Laurier University. The study consists of an informed consent statement and an online questionnaire. It should take about 20 minutes to complete. The questionnaire is anonymous and confidential. Your participation is greatly appreciated and will help to contribute to a deeper understanding of relationships between health-related quality of life and physical activity in Wilfrid Laurier University employees.

This study has been reviewed by the Laurier Research Ethics Board (File #4020). It is being conducted by Meghan Hoefs, a graduate student in Kinesiology and Physical Education, in conjunction with faculty advisor Dr. Kim Dawson.

If you are an employee of Wilfrid Laurier University and are interested in participating in the study, please click the link below.

https://www.surveymonkey.com/s/Lauriersurvey

Thank you.

APPENDIX J: Reminder E-mail Sent to Potential Participants

Hello,

This is a friendly reminder that the WLU research study outlined below is still looking for participants to complete a questionnaire. We greatly appreciate your participation should you choose to do so. You will find more information below:

You are invited to participate in a research study with the Department of Kinesiology and Physical Education at WLU. The purpose of the study is to collect information that will serve to develop a summary of the overall health, health-related quality of life, and physical activity behaviour of staff at Wilfrid Laurier University. The study consists of an informed consent statement and an online questionnaire. It should take about 20 minutes to complete. The questionnaire is anonymous and confidential. Your participation is greatly appreciated and will help to contribute to a deeper understanding of relationships between health-related quality of life and physical activity in Wilfrid Laurier University employees.

This study has been reviewed by the Laurier Research Ethics Board (File #4020). It is being conducted by Meghan Hoefs, a graduate student in Kinesiology and Physical Education, in conjunction with faculty advisor Dr. Kim Dawson. If you are an employee of Wilfrid Laurier University and are interested in participating in the study, please click the link below.

https://www.surveymonkey.com/s/Lauriersurvey

Thank you.

APPENDIX K: Individual Variable Statistics

Model	Variable	Beta	t	Sig.	Collinearity Statistics	
					Tolerance	VIF
1	SFW*	.486	6.692	.000	1.000	1.000
	B	-.043	-.572	.568	.921	1.086
	TPA	.019	.266	.791	.994	1.0006
2	SFW*	.477	6.757	.000	1.000	1.000
	B	-.063	-.854	.39	.920	1.087
	LTPA	-.005	-.077	.939	.993	1.007
3	SFW*	.491	6.848	.000	1.000	1.000
	B	-.042	-.567	.571	.920	1.087
	OPA	.049	.687	.493	.999	1.001
4	SFW*	.433	5.886	.000	1.000	1.000
	B	-.092	-1.207	.229	.938	1.067
	SA	-.001	-.009	.993	.988	1.012
5	SFW	.079	.994	.332	.921	1.086
	B*	.387	5.060	.000	1.000	1.000
	TPA	.072	.916	.361	.956	1.046
6	SFW	.077	.999	.319	.920	1.087
	B*	.400	5.435	.000	1.000	1.000
	LTPA	.139	1.858	.065	.956	1.046
7	SFW	.082	1.034	.303	.920	1.087
	B*	.380	4.990	.000	1.000	1.000
	OPA	-.065	-.852	.395	.994	1.006
8	SFW	.076	.979	.329	.938	1.067
	B*	.382	5.056	.000	1.000	1.000
	SA	-.001	-.008	.994	.904	1.107

**Variable was significant and included in the model as a predictor variable*

APPENDIX L: Glossary of Acronyms

B -	Beliefs about physical activity
BP-	Bodily pain dimension
GH-	General health dimension
HRQL-	Health-related quality of life
LTPA-	Leisure time physical activity
MCS-	Mental component score
MH-	Mental health dimension
OPA-	Occupational physical activity
PA-	Physical activity
PCS-	Physical component score
PF-	Physical functioning dimension
QoL-	Quality of life
RE-	Role emotional dimension
RP-	Role physical dimension
SA-	Sedentary activity
SF-	Social functioning dimension
SFW –	Satisfaction with functioning at work
TPA-	Total physical activity
VT-	Vitality dimension