Examining the role of goals and motives for physical activity and eating behaviour in commercial weight-loss program participants

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Dedication

For my Mother, Patricia Leigh Grattan.

Whose personable nature and kind
heartedness greatly assisted this project
- and whose encouragement
and confidence in me never faltered.

Abstract

Background: The purpose of this study was to examine the relationships between physical activity and healthy eating behaviour with the participant's motives and goals for each health behaviour.

Methods: Participants ($N = 121$; 93.2% female) enrolled in commercial weight-loss programs at the time of data collection, completed self-reported instruments using a web-based interface that were in accordance with Deci and Ryan's (2002) Self-Determination Theory (SDT).

Results: Multiple linear regression models revealed that motivation and goals collectively accounted for between 0.21 to 0.29 percent and 0.03 to 0.16 percent of the variance in physical and healthy eating behaviours in this sample. In general, goals regarding either behaviour did not appear to have strong predictive relationships with each health behaviour beyond the contributions of motives.

Discussion: Overall, findings from this study suggest that motives seem to mattermore than goals for both physical activity and healthy eating behaviour in clientele of commercial weight-loss programs. Therefore commercial weight-loss program implementers may want to consider placing more attention on motives than goals for their clientele when designing weight-loss and weight-maintenance initiatives.

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Chapter 1

Introduction

The effects of dietary over consumption and lack of physical activity are evident as the rate of obesity in Canada continually escalates. Despite 64.70 percent of the population being able to maintain their body mass index (BMI) from 1994/1995 to 2004/2005, more than one quarter (28.60%) of the population have increased their BMI (Statistics Canada, 2007). It is estimated that more than half of the Canadian population is overweight, 14.90 percent of the population is classified as obese and 2.00 percent are underweight (Katzmarzyk, 2002). However, obesity is no longer an exclusive disease of the adult population, but rather one that is independent of age and is now also apparent in children (Banach, Wade, Cairney, Hay, Faught, & O'Leary, 2007). For example, Banach et al. (2007) indicate that 19.00 percent of nine year old males are overweight, 23.00 percent of nine year old females are overweight, meanwhile 11.00 percent of males are obese and 13.00 percent of females are obese.

Obesity is a direct risk factor for cardiovascular diseases, in addition to a number of other health conditions such as hypertension, Type 2 diabetes, dyslipidemia, gallbladder disease, and some types of cancer (Bouchard, Blair, & Haskell, 2007). Excess bodyweight/fat also appears to reduce a person's quality of life, increases morbidity and could lead to premature death (Birmingham, Muller, Palepu, Spinelli, & Anis, 1999). The direct and indirect financial burden associated with obesity is substantial on the Canadian healthcare system. For example, the direct cost of obesity in 1997 was estimated to be over $1.8 billion (2.40 percent of the total expenditures of that fiscal year; Birmingham et al., 1999). In 2004, the estimated indirect cost was 2.20

percent of the total health care costs (Katzmarzyk & Janssen, 2004) suggesting the economic impact of conditions related to obesity and excessive body fat remain a pervasive public health problem.

There are a number of non-modifiable risk factors that directly affect a person's weight status. These risk factors are not one's that a person is able to change or control. Examples of such factors include, but are not limited to: genetics, age, race, and gender (Bouchard et al., 2007). If a person's parents are obese, they are genetically more likely to also be obese. Age has also been found to be a risk factor for obesity because as people age they are more likely to increase their BMI. Race has also been linked with obesity, where some races (e.g., African-American, Inuit, etc) display more prevalence of obesity compared with other races. And finally, a person's gender has also been shown to predict weight status and it has been found that women are more likely to be obese than men. In short, a person may simply be born with the predisposition to experience obesity (Bouchard et al., 2007).

Two modifiable risk factors that directly affect a person's weight status are diet and physical activity. The combination of practicing both behaviours simultaneously has shown importance in the literature. Shaw and colleagues (Shaw, Gennat, O'Rourke, & Del Mar, 2006) found that combining exercise and diet resulted in more weight-loss than diet exclusively (WMD -1.10 kg; 95.00% confidence interval (CI) -1.50 to -0.60). Similarly, Deforche and colleagues (Deforche, de Bourdeaudhuij, Tanghe, Debode, Hills, & Bouckaert, 2007) found that both physical activity and nutritional habits are important factors for predicting weight maintenance in a sample of obese children that had already displayed an initial weight-loss. In summary, Deforche et al. (2007)

contend that one healthy behaviour cannot substitute or compensate for another unhealthy behaviour.

The difficulty of restricting caloric intake combined with the inability to expend sufficient calories can often result in obesity (Bouchard et al., 2007). Obesity is present in modern society (Truby, Baic, deLooy, Fox, Livingstone, Logan, et al., 2006; Wyatt, Winters, & Dubbert, 2006) especially when considering Canadian statistics, and it is not surprising that the dominant view within modern society is that obesity is undesirable and unhealthy (Georgiadis, Biddle, & Stavrou, 2006). One option used to combat the negative effects of excessive caloric intake and insufficient caloric expenditure are commercial diets. Georgiadis et al. (2006) claim that forty to seventy percent of adults, at any given time, can be found using some form of weight loss technique (e.g., dieting). However, the success rates of weight loss techniques, such as dieting are short lived, as fifty percent of the body weight that is lost through dieting is regained within one year (Truby et al., 2006). Therefore it is not surprising that market suave entrepreneurs have realized the potential for profits and have created commercial weight loss programs to capitalize on society's 'obesity epidemic'.

Tsai and Wadden (2005) report that the three largest nonmedical commercial weight loss programs in the United States are Weight Watchers, Jenny Craig, and L A Weight Loss (see Table 1 for detailed financial summary). It is not surprising that the cost of these programs is a significant expenditure as the membership fee or initial cost for enrolling in Weight Watchers is $35.00 for the first week, $199.00 for six months, $364.00 for the first year at Jenny Craig, and $88.00 for the initial start-up fee at L A Weight Loss. In addition to the start-up fees at Weight Watchers, the program also has

periodic fees of $12.00/week, on a pay-as-you-go basis. Similarly, L A Weight Loss also has additional periodic fees of upfront costs of $7.00/week multiplied by the number of weeks calculated for the client to reach their goal weight (Tsai & Wadden, 2005).

Nevertheless, obesity is not simply a product of improper eating behaviours, rather it is the combination of poor diet and insufficient physical activity (Bouchard et al., 2007). Nearly half (48.00%) of Canadians aged 12 years or older were not sufficiently active during their leisure time in 2005 (Gilmour, 2007). More specifically for Ontario, it has been estimated that nearly sixty percent of Ontarians do not meet the recommended guidelines for physical activity, and therefore are not engaging in enough physical activity to receive the health benefits (Ministry of Health Promotion Ontario, 2007; Public Health Agency of Canada, 2003). Reduced levels of physical activity results in less caloric expenditure per day which may manifest itself in the form of increased body weight (Bouchard et al., 2007).

While a substantial portion of Canadians are insufficiently active on a daily basis, recent public health data suggest no increase in the daily intake of calories. "Calories are a measure of the amount of energy in food" (Garriguet, 2007, p. 19). The amount of calories a person needs to consume depends upon the amount of energy that he/she needs to stay healthy. The necessary amount of energy is directly affected by the person's age, sex, weight, height, and their physical activity level (Bouchard et al., 2007). In a comparison report comparing data from 1970-1972 to 2004, the "average calorie consumption has not increased" (Garriguet, 2007, p.19). More specifically, Garriguet notes that in 1970-1972 Canadians between the ages of 20 to 39 years were

consuming on average 2001 calories/day (female) and 3374 calories/day (male). In 2004 these values were estimated to be 1899 calories/day and 2660 calories/day for females and males, respectively. Canadians are, however, falling short on their consumption of fruits and vegetables (Garriguet, 2007). Canada's Food Guide at the time when this survey was conducted recommended that Canadian's consume at least five servings of fruits and vegetables a day (Garriguet, 2007). According to this survey, approximately 60.00-70.00 percent of people under the age of eighteen are consuming less than five servings of fruits and vegetables a day and approximately 50.00 percent of adults are also consuming less than the recommended serving (Garriguet, 2007).

Demographic correlates of physical activity and eating behaviours

A recent Health Report (Gilmour, 2007) revealed that men are more likely to be physically active in their leisure time than females. Fifty-eight percent of males reportedly engaged in leisure time physical activity, whereas only 44.00 percent of females were physically active outside of the work environment. The amount of leisure-time physical activity that one performs was also dependent upon age (Gilmour, 2007). Independent of gender, the data suggest that the amount of people that are physically active in their leisure time declines after the age of seventeen (Gilmour, 2007). Socio-economic status also has its implications because in comparison to high income groups, people in lower income groups are less likely to engage in leisure-time physical activity (Gilmour, 2007). Being an immigrant in Canada has also been linked to lower levels of leisure time physical activity when compared with Canadian residents (Gilmour, 2007). Physical activity levels are also dependent upon geographic location. Canadians residing in the western provinces in addition to Ontario are more likely to be physically

active than those residing in Quebec, Nunavut, Manitoba, Saskatchewan, and the eastern provinces. In British Columbia, 59.00 percent of the residents are physically active, whereas in Prince Edward Island only 44.00 percent are physically active (Gilmour, 2007).

Current research by Deshmukh-Taskar, Nicklas, Yang, and Berenson (2007) has indicated that the types of foods that young adults consume are affected by socioeconomic, demographic, and lifestyle factors. Young adults (aged 20 to 38 years) that have higher income levels consume fewer burgers, sandwiches, and mixed dishes, meanwhile they are more likely to consume more servings of breads and cereals, dairy products, fruits, 100% fruit juices, and vegetables (Deshmukh-Taskar et al., 2007). Independent of other demographic factors measured, males reported consuming more burgers, sandwiches, and alcoholic beverages than females (Deshmukh-Taskar et al., 2007). Conversely, females were more likely to consume more servings of yogurt, fruits, 100% fruit juices, vegetables, mixed dishes, and fats than men (Deshmukh-Taskar et al., 2007). According to the study by Deshmukh-Taskar and colleagues (2007), ethnicity was also a factor for eating behaviour. Deshmukh-Taskar et al. (2007) found that European-American young adults consumed more dairy products, vegetables, fats, mixed dishes, and sweetened beverages than African-American young adults. While African-Americans consumed more fruits, 100% fruit juices, snacks, desserts, and alcoholic beverages than European-Americans. Interestingly, the number of snacks and desserts consumed was greater for married couples than unmarried adults, whereas unmarried adults consumed more alcoholic beverages (Deshmukh-Taskar et al., 2007). In another study by Hart, Tinker, Bowen, Longton, and Beresford (2006), support was

shown for the relationship between fat intake and demographics, such as age, ethnicity, gender, and education.

Demographic information is valuable when it comes to predicting or accounting for physical activity and eating behaviours with commonalities noted (Deshmukh-Taskar et al., 2007; Gilmour, 2007). Participant gender and immigrant status are common predictors of both health behaviours. A previous study of physical activity behaviour also consistently identified age, occupation, and geographic location as predictors (Gilmour, 2007), whereas socioeconomic status, marital status, and ethnicity appear to be consistent predictors of eating behaviour (Deshmukh-Taskar et al., 2007).

Limitations of Demographic Data

Admittedly, certain limitations exist for using demographic data to support predictions about physical activity behaviour and eating behaviour. Demographic information can help a researcher predict an outcome, but cannot explain why the actual outcome occurs (Pedhazur, 1997). Pedhazur (1997) sought to distinguish between prediction and explanation in his research. If a researcher is seeking to explain a phenomenon they should rely on a theoretical framework for answers, not demographic variables. Scriven (1959, as cited in Pedhazur, 1997) stated that "prediction requires only a correlation, the explanation requires more" (p. 480). Therefore, one can make certain predictions based on the associations found between variables, but explanation can only be drived with theory (Pedhazur, 1997).

Importance of Theory

Ninety percent of individuals who lose weight through restrictive means (e.g., dieting) are initially successful, however, ultimately they return to their original weight

(Friedman, 2000). In order to engage in healthy eating behaviour and increase physical activity levels it is first important to gain an understanding of the theoretical mechanisms that encourage or dissuade a person from participating in physical activity and healthy eating. In brief, the major practical question of interest to health promoters is as follows: What motivates a person to consume a healthy diet and engage in enough physical activity for health? Applying relevant theory to a practical question such as this is invaluable as it provides a framework to answer the question and should lead to an effective intervention that ultimately changes behaviour (Pedhazur, 1997). A good theory is one that is testable, is falsifiable, has broad applicability, has a level of specificity, can predict behaviour, and is parsimonious. Noar and Zimmerman (2004) remind us what Rimer (1997) claimed, 'Theory is not theology. Theory needs questioners more than loyal followers' (p. 146). By testing the applicability of relevant theory we can progress toward understanding complex behaviours, such as physical activity and healthy eating. Furthermore, by testing the applicability of theory across multiple content areas (i.e., physical activity, diet) and populations (e.g., commercial weight loss program consumers) we will be able to modify and improve theory while concomitantly addressing health promotion questions of practical importance. Without theory the interventionist is left with little more than speculation as to the means via which to develop an intervention.

Self-Determination Theory: A framework to understand physical activity and eating behaviours

One theoretical framework that has been used to examine both physical activity and healthy eating is Self-Determination Theory (SDT; Deci & Ryan, 1985; 2002). SDT

is a macro-level theory that is focused on human motivation and development with reference to the degree of volition (or self-determination) regulating human behaviours. To date, SDT has been used as a framework for understanding and explaining a variety of health behaviours (including smoking practices, safe sex practices, and alcohol consumption; Deci & Ryan, 1985) and this consistency has justified its application to other health behaviours such as eating/diet (Pelletier, Dion, Slovinec-D'Angelo, & Reid, 2004) and physical activity (Hagger & Chatzisarantis, 2007). Deci and Ryan (2002) use SDT to examine human behaviours and the extent to which they are volitional (or controlled) in nature. Deci and Ryan (2002) postulate that there are two types of motivation that can influence the maintenance of behaviour. The two types of motivation are labelled autonomous and controlling motivation. Motives that are autonomously endorsed stem from a person's true self, volition, and their sense of freedom (Deci & Ryan, 2002). Whereas motives that are controlling are perceived to be from some external force and therefore have an external locus of causality (Georgiadis et al., 2006).

The motivational continuum that an individual's behaviour falls along ranges from amotivation to intrinsic motivation (Deci & Ryan, 1985; 2002; see Figure 1). Amotivation is the state of lacking the intention to act or no motivation (Deci & Ryan, 2002). For example, an amotivated person would see no reason for participating in physical activity or engaging in healthy eating. This is seen as the least favourable form of motivation that has been identified. At the opposite end of the self-determination continuum is intrinsic motivation. An intrinsically regulated individual would participate in physical activity or healthy eating simply for his/her inherent interest and

enjoyment (Deci & Ryan, 2002). Neatly situated in between amotivation and intrinsic motivation are four regulations that fall under the broad classification of extrinsic motivation. These four regulations are external, introjected, identified, and integrated regulation. External regulation would be characterized by a person participating in physical activity or healthy eating because of some external demand or reward (e.g., rewarding him/herself with a bowl of ice cream after going out for a run) (Deci & Ryan, 2002). Whereas a person displaying introjected regulation would participate because he/she associate physical activity and/or healthy eating with positive psychological outcomes and also because by participating in such behaviours he/she are able to avoid any feelings of guilt and/or increase his/her own ego (Deci & Ryan, 2002). Identified regulation occurs in individuals who participate in physical activity or healthy eating because it is of a personal value to them (Deci & Ryan, 2002). Finally, integrated regulation occurs when an individual participates in a behaviour, such as engaging in physical activity and healthy eating regularly because it is consistent with their identity and their other life goals (Deci & Ryan, 2002). As you move from left to right along the continuum you are increasing the self-determination of the individual and therefore he/she are more likely to engage in that specific behaviour. When the motivation to engage in a behaviour falls closer to the intrinsic end of the continuum, the more self-determined the motivational orientation and the more likely the behaviour will be able to be maintained over time (Deci & Ryan, 2002; see Figure 1).

An article by Wilson, Rodgers, Fraser, and Murray (2004) showed support for Deci and Ryan's (2002) proposition that increased self-determined motives are

associated with variation in behaviour in the exercise domain. Empirical evidence from this study indicates that self-determined motivation accounted for a significant amount of variance in exercise behaviour (R^2adj values ranged from 0.20 to 0.53). Similarly, Pelletier et al. (2004) showed support for this notion in the healthy eating domain. Regression analysis revealed that increased self-determined regulation of diet was a significant predictor of percent calories from total dietary fat (r = -0.32) and from saturated fat (r = -0.18) across time (Pelletier et al, 2004). In contrast, less self-determined motives decreased behaviour in a sample of midlife women (mean age = 45.6 years), whereby participants who reported body shape oriented motives were not as physically active as participants who did not report body shape oriented motives (Segar, Spruijt-Metz, & Nolen-Hoeksema, 2006). Deci and Ryan (2002) also suggested the importance of goals and the role that different goal contents have on the quality of behaviour.

Goals and motives: The SDT approach

Distinguishing between goals and motives is essential to this proposed study and Deci and Ryan (2002) have offered some clarification for this debate within the SDT framework. A motive is a reason why (i.e., the "why") a person executes select behaviours and within the SDT-approach, they may range from highly controlling (external, introjected) to more self-determined (identified, integrated, intrinsic) forms of regulation. In contrast, a goal (i.e., the "what") is the actual outcome that the person is aspiring to achieve from engagement in the behaviour (Ingledew & Markland, 2007). For example, a student may study diligently for their exams because they feel pressured by their parents to do well (their motive) and they hope to receive an A^+ (their goal).

From Deci and Ryan's (2002) perspective, there are both intrinsic and extrinsic goals. An intrinsic goal is one that represents a person's natural aspirations and development, which are regarded as an "inward-oriented frame" of reference (Vansteenkiste, Matos, Lens, & Soenens, 2007, p.773). Examples of intrinsic goals include outcomes such as personal improvement (i.e., health and physical fitness) and contributions to society. In contrast, an extrinsic goal is one that represents a person's aspirations to create a favourable impression of him/herself in the eyes of others by attaining "external signs of worth, which yield an outward-oriented focus" (Vansteenkiste et al., 2007, p.773). Examples of extrinsic goals include outcomes such as, material gains (e.g., fancy car), status (e.g., high ranking positions), and physical attractiveness (e.g., muscular development). According to Deci and Ryan (2000), intrinsic goal pursuits are linked with greater well-being and lower ill-being because they often result in the satisfaction of the three basic psychological needs (i.e., competence, autonomy, relatedness). In contrast, extrinsic goal pursuits are thought to be completely disassociated with this basic need satisfaction, or even thought to have a negative effect on the satisfaction of these basic psychological needs (Vansteenkiste et al., 2007).

One model that is embedded in SDT is the Self-Concordance Model (SCM; Sheldon & Elliott, 1999; Sheldon, 2002; see Figure 2). The SCM expands on the ideas presented within SDT by Deci and Ryan (2002) to incorporate people's personal goals (Sheldon, 2002). Ideally this model will help researchers determine how people are able to decipher between making a good personal goal and making a potentially 'harmful' personal goal for themselves (Sheldon & Houser-Marko, 2001). The model attends to the whole process of goal making and goal attainment, looking specifically at the role

that goal attainment plays on a person's need satisfaction and their overall well-being (Sheldon & Elliot, 1999). The term self-concordance is used to describe the act of people pursuing their own personal goals based upon their own intrinsic interest and because it parallels with their identity (Csikszentmihalyi, 1993).

Initial work conducted by Sheldon and Elliot (1998) using the SCM with university students found that goals may increase the degree of self-concordance with more internalized goals linked with greater effort expended and subsequent goal attainment. These processes appeared to exert positive efforts on well-being (Sheldon & Elliot, 1998). By adapting the model proposed by Sheldon and Elliot to sport, Smith and colleagues reported that autonomous goal motives were associated with greater effort expended which in turn produced goal attainment, need fulfillment, and well-being (Smith & Ntoumanis, 2008).

While the SCM is a useful model, it clouds the distinction between goals and motives forwarded by Deci and Ryan (2002). Essentially, Deci and Ryan (2002) argue that goals and motives are separate motivational mechanisms that exert independent effects on markers of well-being. Recent research by Sebire, Standage, and Vansteenkiste (2008) highlights the importance of distinguishing the intrinsic and extrinsic goals that one pursues from the motives that regulate exercise behaviour. Goal content can affect a person's personal and relational functioning (Sebire et al., 2008). Based on the theoretical framework of SDT, there can be both intrinsic and/or extrinsic goals that are distinct from autonomous and controlled motives, yet both mechanisms play a role in behavioural participation from Deci and Ryan's (2002) perspective. Sebire

et al. (2008) provided preliminary support for the reliability and validity of scores derived from the Goal Content for Exercise Questionnaire (GCEQ).

Sebire and colleagues' (2008) study sought to develop a questionnaire to assess goal content in exercise settings. In their investigation (Sebire et al., 2008), three studies were conducted to develop, confirm, and test the validity of GCEQ scores. The first study was comprised of 147 males and 207 females ages 18 to 73 years (M = 34.40, SD = 11.64) who were identified as predominantly "white". Sebire et al. (2008) used an expert review procedure to produce 26 items for the initial GCEQ. Items were created from either (a) analysis of existing instruments or (b) a focus group of known graduate student "exercisers" (not defined by Sebire et al., 2008). Exploratory factor analysis (EFA) resulted in the retention of 24 from the original 26 GCEQ items, representing five factors, labelled as: social affiliation, health management, image, skill development, and social recognition. In study two, Sebire et al. (2008) provided support for the structural validity of GCEQ scores in confirmatory factor analyses (CFA) after reviewing four additional items from the 24 refined items from the EFA. Further support for the validity of GCEQ scores was evident with intrinsic goals correlating with greater need fulfillment and autonomous regulation compared to extrinsic goals. Their second study was comprised of 137 males and 175 females ages 19 to 63 years (M = 34.44; SD = 11.88) who also reported being predominantly white. In the third study, evidence supporting the 20-item GCEQ was provided with CFA of the measurement model in a separate sample and temporal stability of GCEQ scores across two testing occasions separated by four weeks were provided (intraclass r's ranged from 0.79 to 0.89). Their third study used an independent sample of 142 male and 333 female

university students ages 18 to 24 years ($M = 42.62$; $SD = 10.54$). Collectively, Sebire and colleagues (2008) concluded that the GCEQ is an effective measure of exercise based goal content based on results from the three studies.

Physical activity goal content has also been examined for healthy midlife women ($M_{age} = 49.3$; Segar, Eccles, & Richardson, 2008). Segar and colleagues found that people who reported physical activity goals that had a focus of decreasing weight or benefitting health were much less likely to engage in physical activity over time than people who reported physical activity goals focused on improving their quality of life.

In another study by Segar, Spruijt-Metz, and Nolen-Hoeksema (2006) that was also conducted on the frequency of physical activity for midlife women ($M_{age} = 45.6$). After controlling for BMI for the multiple regression anaylsis $\beta = -0.15$, $p = 0.26$, they found that the women who reported body-shape motives as reason for engaging in physical activity were significantly less active than the women who did not report any body-shape motives $\beta = -0.35$, $p = 0.007$, $R^2 = 0.14$. These findings are consistent with Deci and Ryan's SDT (2002) that states that less self-determined motives are linked with decreased frequency of the desired behaviour.

Additional studies in contexts other than exercise and physical activity have examined the intrinsic/extrinsic goal content distinction proposed by Deci and Ryan (2002) in relation to behavioural markers. Two studies by Vansteenkiste, Simons, Lens, Soenens, Matos, and Lacante (2004) and Vansteenkiste et al. (2007) extended the research by Deci and Ryan (2000) on the "what" and the "why" of goal pursuits. Vansteenkiste et al. (2004) reported that the content of a person's goals matters when it comes to increasing the utility value of a learning activity (in this case recycling).

Participants who focused their attainment on intrinsic goals were more likely to display mastery orientation, performance, and persistence. With the addition of an extrinsic goal to the intrinsic goal, a greater focus on external indicators of worth as opposed to the learning task at hand resulted. In other words, both types of goals (intrinsic vs. extrinsic) evoked an alternate technique to the learning task, whereby simply adding more utility value to the present task by adding a future goal was not enough. It was the content of the future goal that matters. The second study by Vansteenkiste et al. (2007) was done in an exercise context. In accordance with SDT (Deci & Ryan, 2002) literature, Vansteenkiste et al. (2007) found that extrinsic goals, as opposed to intrinsic and no-goal framing, undermined performance because it discouraged a task-focused approach and garnered the activation of the participants' ego involvement (Vansteenkiste et al., 2007). This study by Vansteenkiste et al. (2007) is among the first to suggest that the focus on intrinsic as opposed to extrinsic goals is adaptive because it reduces attention to the person's ego and maintains focus on the task at hand.

Chapter 2

Purpose of Study

The use of goal setting has been well documented in sport (Burton & Weiss, 2007), however, less is known about the utility of distinguishing between intrinsic and extrinsic goals using SDT as a framework in broader health contexts. Furthermore, it is unclear if goals and motives as defined within SDT exert independent effects on behaviours, such as physical activity and healthy eating. Limited combined research has been performed on goals and motives in the exercise/general physical activity context, especially with the use of people enrolled in a commercial weight-loss program. The purpose of the present study was to examine the role of intrinsic/extrinsics and autonomous/controlled motives in relation to health behaviours in a sample enrolled in a commercial weight-loss program (i.e. Weight Watchers, Jenny Craig, etc.). This purpose was addressed by examining two general questions: (1) What motives are responsible for the physical activity behaviour and the healthy eating behaviour of people enrolled in a commercial weight-loss program? and (2) What contribution do intrinsic/extrinsic goals have in relation to physical activity and healthy eating behaviour in combination with a person's motives?

Hypotheses

Each of the following hypotheses were developed based on either (1) arguments extrapolated from SDT (c.f., Deci & Ryan, 2002), or (2) previous research findings examining goals and motives using SDT as a guiding conceptual framework (c.f., Sebire et al., 2008). In order to address the purpose of this study the following specific hypotheses were tested:

H_1: Autonomous motives for physical activity and healthy eating would be positively associated with the target health behaviours.

H_2: Controlled motives for physical activity and health eating would be negatively associated with the target health behaviours.

H_3: Intrinsic goals would be positively associated with the target health behaviours, while extrinsic goals would be negatively associated.

H_4: Autonomous motives would be positively associated with intrinsic goals.

H_5: Controlled motives would be positively associated with extrinsic goals.

Chapter 3 – Methods

Participants

The participants for this study were 121 (6.80% male and 93.20% female) individuals currently enrolled in commercial weight-loss programs (i.e. Weight Watchers, Jenny Craig, etc). The sample size to achieve a medium effect ($\beta = 0.80$) at $p = 0.01$ (two-tailed) was estimated to be 82 participants (Cohen, 1992) and therefore the acquired sample meets these requirements.

The inclusion and exclusion criteria were as follows: Eighteen was the youngest age assessed in order to account for the ability of the participant to provide their own informed consent and there was no maximum age cut-off. All participants were currently enrolled in a commercial weight-loss program at the time of data collection. If they reported that they were enrolled in more than one commercial weight-loss program, they were not excluded. They were literate in the English language. All participants had to be willing to participate and could not have any ambulatory restrictions (people in wheelchairs were not excluded, however, no such individual identified themselves in this manner). Those who wished to participate in this study, but who did not meet the inclusion criteria were shown gratitude for their interest, but were not included in this investigation.

Instruments

Demographics. General demographic information was collected from the participants (i.e., gender, age, SES, etc.). See Appendix A (Section 1) for more details.

Physical Activity Behaviour. To assess the participants' physical activity behaviour, the Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985) was used. The GLTEQ is a 3-item self-report measure assessing the frequency of mild, moderate, and strenuous exercise done for at least 15 minutes per session during a typical week. An overall exercise behaviour score (expressed in metabolic equivalent units or METS) was calculated by summing the weighted product of responses to each question as follows: $\sum$ = [strenuous x 9] + [moderate x 5] + [mild x 3]. According to Jacobs, Ainsworth, Hartman, and Leon (1993), the GLTEQ is easy to understand, stable, and correlates positively with exercise behaviour suggesting some convergent validity of GLTEQ scores. Although a different sample from the current study, previous studies with university students have reported no particular concerns with using this instrument (Wilson, Longley, Muon, Rodgers, & Murray, 2006; Wilson, Rodgers, Fraser, & Murray, 2004). In addition to the METS component of the GLTEQ, the GLTEQ-Sweat was also used. The GLTEQ-Sweat is a single item self-report measure assessing how often per week, during leisure time, that a person engages in regular activity long enough to work up a sweat. Participants had the choice of one of three responses (i.e., often, sometimes, never/rarely).

Healthy Eating Behaviour. Eating behaviours were assessed with three separate instruments designed to provide a comprehensive summary of eating behaviours in terms of (a) fruits and vegetables, (b) meats, milk, and grains, and (c) consumption of foods that vary in fat and fibre on a daily basis. The number of fruits and vegetables consumed in a typical day was assessed using the Fruits and Vegetables Screening Measure (Prochaska & Sallis, 2004). Originally developed for adolescents, this two-

item instrument has demonstrated its utility for assessing dietary intake for adults (Calfas, Sallis, Zabinski, Wilfley, Rupp, Prochaska, 2002). Both questions ask, in a typical day, how many servings of fruit (or vegetables) do you eat? This two question instrument is similar to another two question eating behaviour measure, the Dietary Instrument for Nutrition Education, where Baker and Wardle (2002) found that it had high test-retest correlations (fruit: $r = 0.90$ and vegetable: $r = 0.85$). Healthy eating behaviour was also assessed using the National Health and Nutrition Examination Survey (NHANES, 1999-2000). This modified, three question instrument assessed the number of servings per day, on average in the last twelve months, that a person consumes meat and alternatives, milk and alternatives, and grain products (see Appendix A, Section 4B). Two additional questions were extracted from the NHANES to quantify the degree (i.e., high, medium, low) of fat and fibre intake consumed in a typical day.

Motives for Physical Activity. A modified version of the Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004), was used to assess the participants motives for engaging in physical activity. By using the BREQ-2, as opposed to the BREQ, this study was also able to assess amotivation. Like most instruments that assess behavioural regulation along the continuum proposed by Deci and Ryan (1985), this instrument does not include an integrated regulation subscale because it was found that it was not possible to distinguish empirically between integration and identified regulation (Markland & Tobin, 2004). Markland and Tobin (2004) showed support for the use of the BREQ-2 based on a study they conducted involving 194 participants enrolled in an exercise referral program in the United

Kingdom. They found that the BREQ-2 measurement model had an excellent fit to the data (Satorra-Bentler Scaled Chi Square = 136.49, df = 125, p = .23; CFI = .95; $RMSEA$ = .02, 90% CI = .00 - .04; $SRMR$ = .05) (Markland & Tobin, 2004). The items contained in the BREQ-2 are prefaced by the question, "Why do you exercise?" Participants were asked to indicate on a scale of '0' = Not true for me to '4' = Very true for me on how true each BREQ-2 statement was to them. An example of one of the statements is, "I feel like a failure when I haven't exercised in a while" (see full instrument in Appendix A, Section 2A).

Motives for Eating. Participants completed the Regulation of Eating Behaviours Scale (REBS; Pelletier et al., 2004). The REBS assessed the participants motivational orientation towards dietary regulation. Participants were asked to indicate the extent to which each item corresponds to their personal motives regulating their eating behaviour in response to the stem, "Why are you regulating your eating behaviours?" Participants were asked to circle the appropriate number on a 7-point Likert scale ('1' = Does not correspond at all and '7' = Corresponds exactly). Evaluation of the internal consistency of the subscale scores in previous investigations revealed that Cronbach's alphas (Cronbach, 1951) ranged from 0.79 to 0.91 (c.f., Pelletier et al., 2004).

Intrinsic/Extrinsic Goals for Healthy Eating. Participants completed a modified version of the Exercise Motivations Inventory-2 (EMI-2; Markland & Ingledew, 1997) that was labelled as the Goal Content for Eating Questionnaire (GCEATQ) for the purposes of this study. This instrument was used to assess the reasons people often give when asked why they eat a healthy diet. A 5-point Likert scale was used to assess the degree to which the statement is true for that person (i.e., '0' = Not at all true for me and

'5' = Very true for me). Items were selected for inclusion from the EMI-2 based on their expected relevance to eating as opposed to exercise. The EMI-2 contains fourteen subscales designed to measure variation in intrinsic/extrinsic motives for exercise in line with SDT (Deci & Ryan, 2002). Items from the EMI-2 from the following subscales were excluded because they lacked relevance to healthy eating: (a) Nimbleness, (b) strength/endurance, (c) competition, and (d) stress management. The remaining EMI-2 items modified and included in this study represented intrinsic (revitalization, enjoyment, challenge, affiliation, ill-health avoidance, positive health) and extrinsic (social recognition, health pressures, weight management, appearance) goals for healthy eating.

Intrinsic/Extrinsic Goals for Physical Activity. The Goal Content for Exercise Questionnaire (GCEQ; Sebire et al., 2008) was used to assess the 'what' of goal pursuits that was aligned with Deci and Ryan's (2002) SDT. Twenty-six items were initially selected by Sebire et al. (2008) to represent a range of lower order (health management, skill development, social affiliation, social recognition and image improvement) and higher order (intrinsic and extrinsic) themes of exercise goal content. Subsequent factor analysis reduced this to a final GCEQ item count of twenty that was used in this study (see Appendix A). Health management, skill development, and social affiliation were identified as intrinsic content goals and image improvement and social recognition were identified as extrinsic content goals (Sebire et al., 2008). Participants rated each item responding to the stem, "Please indicate to what extent these goals are important to you while exercising". Each item was scored on a 7-point Likert scale that ranged from 1 (Not at all important) through 4 (Moderately important) to 7 (Extremely important).

Data collection procedures

Employing a cross-sectional design, data was collected from various commercial weight-loss programs in the Niagara and surrounding region in addition to other areas across Canada and the United States of America. In order to recruit participants, a series of presentations were made at a local fitness centre and at a weight-loss centre in the Niagara region. Five additional weight-loss centres were provided with a recruitment poster to be placed such that it would be visible. Posters were also placed in various community locations such as, grocery stores, fitness centres, Brock University, etc. Finally, electronic (i.e., list serves, social networking tools, etc.) and word of mouth or snowball sampling (Trochim, 2001) recruitment efforts were undertaken. After e-mailing a dietician at St. Michaels hospital in Toronto asking for assistance in participant recruitment, the registered dietician agreed to post our poster in her clinic office and to hand out our letter of invitation to all of her patients.

Participants answered the multi-section questionnaire using a secure electronic survey based website (www.surveymonkey.com) or via hard copy format (5 responded to the questionnaire via hard copy). A secure electronic survey was created in an attempt to promote an anonymous environment in which the participant would likely not experience any perceived coercion from the researcher (Dillman, 2000). Each participant was offered a chance to win one of three $50 cash prizes by being entered into a draw as an incentive to facilitate participation. The draw date took place at the end of the data collection period.

Participant Recruitment

During the month of January a number (i.e., 6) of recruitment strategies were initiated to promote participant enrolment. Initially, telephone calls and e-mails were sent out to local commercial weight-loss establishments. In total, five places were contacted and only one responded (response rate = 20%). Upon contact with one large corporation involved with weight-loss initiatives, the research investigator was forwarded to contact the territory manager. The territory manager willingly arranged for an on site meeting in St. Catharines, ON. Following this meeting, a formal request was submitted by the research investigator to the Ontario regional representative who denied the request citing "confidentiality concerns" as reason for non-involvement. Another commercial weight-loss establishment located in North-Western Ontario was approached to assist with recruitment. A formal request for their assistance was made and the outcome was not known at month's end. It was also during this month that a recruitment message was posted on a number of Facebook groups (n = 7). All accessible Brock University department chairs were contacted in order to request assistance with our recruitment initiatives (response rate = 32%). Finally, graduate students in the Faculty of Applied Health Sciences at Brock University were contacted via a mass e-mail. An e-bulletin was posted on an online health website (http://www.womenshealthmatters.ca) and also a formal advertisement was posted in an online newspaper (www.sootoday.com). Posters were placed at various strategic locations (e.g., grocery stores, book stores/coffee shops, etc.) in the city of St. Catharines, ON with plans to expand the postering area to additional Niagara region cities/towns in the month of February.

Recruitment continued into the month of February with the primary focus being placed on following up with strategies that were first initiated in January. The formal request that was made to the second commercial weight-loss program was followed with both an e-mail and a telephone call, neither yielding any favourable results. A direct link to the online survey was posted on six different Facebook groups on Thursday February 12th, 2009. This message was re-posted on February 26th, 2009. Additional Facebook weight-loss support groups (n = ~15) were joined in the following weeks and recruitment postings were made in the same manner. Follow-up e-mails were sent to all participants to thank them for participating and also to remind them that we would appreciate them forwarding our contact information onto any people they may know who are also enrolled in a program, which was consistent with the snowball sampling recruitment method. A Gmail account was set up and three listservs were joined and a recruitment message was successfully sent to one of the accounts. A recruitment message was also posted on a blog that has shown utility in previous recruitment efforts for research. A brief message was posted on TVCogeco and was distributed for viewing on local channel ten. An additional commercial weight-loss program centre was contacted via telephone, but yielded no favourable results at month's end. Also, a recruitment request was sent to a large hospital in Toronto, ON and was positively received with the clinic manager, a registered dietician, agreeing to post the recruitment poster in her clinic office and to hand out our letter of invitation to all clinic patients. Finally, a recruitment table was set up at a local mall in Welland, ON during community information days at the end of the month to advertise the study to local clientele.

The final month of participant recruitment was focused primarily on following up with previous recruitment attempts and also initiating a couple of new recruitment strategies that had not yet been put in place by the third stage of participant recruitment. One of the new strategies put in place consisted of posting a message on an Institutional Review Board approved academic survey share (http://IRBapproved.blogspot.com) and also a brief message was placed on a social messaging utility (e.g., Twitter) in order to access people who were interested in health-related issues and information. Another strategy implemented was the promotion of our study to the local clinics (5) providing them with posters without previous contact or consent. Admittedly, all of these places had been contacted two months previously by telephone, however, none of the people that the researcher came into direct contact with indicated any record of such contact. Another new strategy for the final stage of participant recruitment involved advertisement via a local women's fitness centre in St. Catharines, ON. For one week (at alternate times throughout the day) the owner of the gym permitted the researcher to enter into her establishment and set up an information table and also provide the clients with small verbal presentations concerning the study. The final new strategy put in place involved one of the high profile commercial weight-loss programs in St. Catharines, ON. The researcher accompanied a lifetime member into the local centre, whereby the member took the opportunity to make a public and verbal announcement concerning the ongoing research being conducted at Brock University and the need for additional participants. It was then that the researcher asked any willing participants to provide their contact information. Follow up recruitment procedures included: (1) re-posting on Facebook pages (2) making sure all thank you e-mails with a recruitment message

embedded were sent out to all participants and (3) re-sending e-mails to previously interested participants who had not yet completed the survey.

Data analysis procedures

The data analysis was comprised of both a preliminary and a main analysis phase within this study. Preliminary analyses involved seven specific steps. First, (1) the data was checked for non-response, (2) partial non-responses were replaced with within-person mean substitution, (3) complete missing cases were replaced with expectation maximization algorithm, (4) all assumptions were tested for each statistical test, (5) reliability cofficients were then calculated, (6) followed by the calculation of descriptive statistics, and (7) the final step involved the calculation of Pearson bivariate correlations.

The main analyses that were conducted were a series of nine multiple regression models. Multiple regressions are used to predict values of a dependent (or criterion) variable from knowledge of the values of two or more independent (or predictor) variables (George & Mallery, 2003). The data consisted of two conceptual sets of predictor variables: (1) Goals for both physical activity and healthy eating behaviours and (2) motives for both physical activity and healthy eating behaviours. The dependent (or criterion) variables in this study were the self-reported physical activity and healthy eating behaviours.

Chapter 4 – Results

Preliminary analyses

Prior to conducting the main analyses, some problems were addressed with the data set. Of the sample providing a response to the survey ($N = 121$; 93.2% female; $M_{age} = 37.62$, $SD = 14.07$, BMI = 29.63), twenty-two cases were deleted as a result of consenting to participate and then failing to provide any responses (e.g., complete non-responders). Partial non-responders ($n = 8$) consented to participate and then proceeded to give only partial data (e.g., may have only filled out responses for one of the instruments). In order to account for any missing data evident with partial non-responders in this sample, two replacement procedures were utilized. The first procedure used was within-person mean substitution to account for any missing data for persons who had only partial non-response issues ($n = 8$). The second procedure used was expectation maximization algorithm to account for participants who had greater non-response issues.

Statistical assumptions

In addition to accounting for any missing data prior to the main analyses, all relevant statistical assumptions were assessed. The initial three assumptions assessed for correlations were: (1) Normality, (2) linearity, and (3) homoscedasticity. Normality was assessed by first creating a histogram to assess normality visually. Then skewness and kurtosis values were calculated using frequency statistics and assessed to examine normality using statistics from the sample data. Skewness values for physical activity motives and goals ranged from -0.78 to 2.88 and for healthy eating motives and goals ranged from -2.61 to 4.41 respectively. Kurtosis values for physical activity motives and

goals ranged from -0.92 to 8.91 and ranged from -0.88 to 23.99 for healthy eating motives and goals, respectively (see Tables 2 and 3 for specific values). Next, linearity was assessed by visually examining scatterplots to see whether data was distributed along a relatively straight line. None of the data created any major concerns regarding deviation from linearity. Homoscedasticity was also examined visually by examining the scatterplots to look for the desired "football shape" of the data points. The data fell within the desired range to meet the requirement of homoscedasticity (Keppel & Zedeck, 1989). Four assumptions tested for the regression analyses were as follows: (1) Normality, (2) linearity, (3) homoscedasticity, and 4) independence of residuals. As normality, linearity, and homoscedasticity were already evaluated, independence of residuals was examined by looking at the Durbin-Watson values which did not exceed | 2.0 | in the present study, suggesting that this assumption was met.

Reliability analyses

To examine score reliability, coefficients of internal consistency (Cronbach α; Cronbach, 1951) were calculated. Cronbach alpha values ranged from 0.62 to 0.92 for the BREQ-2 scores and from 0.77 to 0.91 for the GCEQ scores (see Table 2 for specific values). Reliability values (α) for healthy eating behaviour ranged from 0.86 to 0.90 for REBS scores and ranged from 0.51 to 0.84 for the GCEATQ scores (see Tables 2 and 3 for specific reliability values).

Descriptive statistics

Means ranged from 1.17 to 3.87 (*SD* ranged from 0.40 to 1.06) for the BREQ-2 subscale scores. The means for the GCEQ scores ranged from 2.93 to 6.20 (*SD* ranged

from 0.80 to 1.68). Complete descriptive statistics for physical activity motives and goals can be found in Table 2.

Means ranged from 1.31 to 6.44 (*SD* ranged from 0.64 to 1.63) for the REBS subscale scores. The means for the GCEATQ subscale scores ranged from 1.43 to 4.26 (*SD* ranged from 0.80 to 1.68). Complete descriptive statistics for healthy eating behaviour can be found in Table 3.

Upon additional examination of Table 2, interpretation of the descriptive statistics suggests that BREQ2-Identified and BREQ2-Intrinsic, which are both considered more autonomously endorsed regulations according to Deci and Ryan (2002), were the most strongly endorsed in this sample. Alternatively, BREQ2-Amotivation was the least strongly endorsed motivational regulation in this sample. Interpretations of the responses to the GCEQ instrument (see Table 2) indicate that GCEQ-Health Management and GCEQ-Image were the most strongly endorsed goals for physical activity in this sample, whereas GCEQ-Social Recognition and GCEQ-Social Affiliation were the least strongly endorsed.

Interpretation of the REBS scores revealed that the most strongly endorsed motive for healthy eating was REBS-Identified, which was closely followed by both REBS-Integrated and REBS-Intrinsic that were also strongly endorsed. The least strongly endorsed motive in this sample was REBS-Amotivation. The most strongly endorsed goals for healthy eating (see Table 3) were GCEATQ-Positive Health and GCEATQ-Ill Health Avoidance. Meanwhile, the least strongly endorsed goals were GCEATQ-Affiliation and GCEATQ-Social Recognition. Descriptive statistics for healthy eating and physical activity behaviours can be found in Tables 2 and 3 respectively.

Participants reported, on average, engaging in physical activity during a typical week. Considerable variability was evident based on the large standard deviation across GLTEQ-METS and GLTEQ-SWEAT scores in this sample of commercial weight-loss program clientele. The sample reported eating more vegetables than fruits per day on average and was more likely to report having consumed more fibre/day as opposed to fat/day. Inspection of responses to each modified NHANES item revealed that, on average, participants consumed more grain products per day followed by meat and alternatives, and then milk and alternatives (see Table 3).

Bivariate correlations

Upon inspection of Table 4, interpretation of the bivariate correlation data suggests that the relationship between participant motives (BREQ-2) and goals (GCEQ) and self-reported physical activity behaviour (GLTEQ-METS) reveals correlations that ranged from -0.26 to 0.40 in this sample. Correlations between BREQ-2 subscale scores ranged between -0.38 to 0.69. All GCEQ subscale scores were positively correlated and ranged in value from the smallest relationship of 0.21($r_{\text{image.skill development}}$) to the largest correlational value which was 0.61 ($r_{\text{image.social affiliation}}$). An interesting pattern for the correlations with physical activity can be found when examining the data presented in Table 4 between BREQ-2 and GCEQ subscales with GLTEQ responses. Correlations ranged from -0.32 to 0.53 in magnitude between motives and goals and physical activity behaviour. The strongest correlates of GLTEQ-METS were BREQ2-Identified and BREQ2-Intrinsic. Similarly, the strongest correlates of GLTEQ-SWEAT (r's ranged from -0.32 to 0.53) were also BREQ2-Identified and BREQ2-Intrinsic. There was no distinctive pattern of correlations evident between GCEQ goals reflecting more intrinsic

than extrinsic orientations and GLTEQ-METS at the bivariate level, however, positive correlations were present in the sample data (see Table 4).

Table 5 reveals the relationship between healthy eating motives (REBS subscale scores) and eating behaviours (see Table 5 for *p*-values associated with all bivariate *r*'s). Correlations between REBS subscale scores ranged between -0.15 to 0.69 in this sample. Bivariate correlations for Fruit/Day ranged from -0.19 to 0.15 in this sample. Vegetables/Day scores revealed bivariate correlations that ranged from -0.20 to 0.27 in this sample. For the measure of healthy eating motives with the dependent variable Meat and Alternatives, correlations ranged from -0.16 to 0.17. The Milk and Alternatives variable had correlations that ranged from -0.34 to 0.42. Grain products had correlations that ranged from -0.27 to 0.38. Fat had correlations that ranged from -0.27 to 0.18 and Fibre had correlations that ranged from -0.16 to 0.35. The strongest correlate of Fruit/Day was REBS-Identified, whereas the strongest correlates of Vegetables/Day and NHANES-Meat were both REBS-Intrinsic. Both REBS-Identified and REBS-Intrinsic were the strongest correlates of NHANES-Milk, however, they were both negative in direction. Two interesting correlations existed for NHANES-Grain and Fat/Day because the strongest correlates for both of these variables was REBS-Intrinsic, but in the negative direction. The strongest correlate for Fibre/Day was also REBS-Identified.

Table 6 displays the bivariate correlations for healthy eating goals (GCEATQ) and healthy eating behaviour (see Table 6 for specific *p*-values for each bivariate *r*). Correlations between GCEATQ subscale scores ranged between 0.12 and 0.82. Positive correlations were noted among all subscale scores from the GCEATQ, regardless of

their intrinsic/extrinsic orientation. Interestingly, the weakest correlate of all of the goals represent in the GCEATQ was GCEATQ-Weight Management. The relationship between healthy eating goals and self-reported healthy eating behaviour consists of both positive and negative correlations (*r's* ranged from -0.32 to 0.30). Reportedly, the correlations between GCEATQ variables and eating behaviours were quite small in magnitude. A mixed pattern of positive and negative correlations exist between the healthy eating behaviour subscale scores. Sixty-two percent of these correlations were positive, whereas only 38% were negative (see Table 6).

Table 7 reveals the bivariate correlations for eating motives assessed by the REBS and eating goals assessed by the GCEATQ. The correlations between REBS subscale scores ranged between -0.15 to 0.69. The GCEATQ subscale scores were predominantly positively correlated with the REBS subscale scores and ranged in value from the smallest relationship of -0.18 ($r_{\text{amotivation·positive health}}$) to the largest correlational value which was 0.68 ($r_{\text{intrinsic.enjoyment}}$). All of the GCEATQ subscale scores were positively correlated and ranged in value from 0.12 ($r_{\text{social recognition.positive health}}$) to 0.82 ($r_{\text{revitalization.enjoyment}}$).

Multiple linear regression analyses

Nine separate multiple linear regression analyses were completed to test the relationship between eating and physical activity behaviour with motives and goals. Simultaneous entry was used in the regression analysis predicting GLTEQ scores from BREQ-2 and GCEQ scores. The same method of entry was used to predict each eating variable score from REBS and GCEATQ scores. A summary of the regression analysis predicting each criterion variable is depicted in Tables 8 through 16 inclusive.

The multiple linear regression model predicting GLTEQ-METS from BREQ-2 and GCEQ scores (see Table 8) was statistically significant ($F(10,87) = 3.58$, $p < 0.01$). Mahalanobis distance was used to delete one outlier. This set of BREQ-2 and GCEQ predictor variables accounted for 21.00% of the GLTEQ-METS variance ($R = 0.54$, $R^2 = 0.29$, $R^2_{adj} = 0.21$). The predictor variable that was the only statistically significant predictor of GLTEQ-METS was the BREQ2-Intrinsic variable ($p < 0.05$). None of the variables pertaining to goals from the GCEQ were statistically significant when predicting GLTEQ-METS. Structure coefficients indicated that both BREQ2-Identified and BREQ2-Intrinsic contributed positively and strongly to predicting GLTEQ-METS. BREQ2-Intrinsic accounted for the largest portion of unique variance (4.00%) in predicting GLTEQ-METS.

The multiple linear regression model predicting GLTEQ-SWEAT from BREQ-2 and GCEQ scores (see Table 9) was statistically significant ($F(10,88) = 4.90$, $p < 0.01$). Mahalanobis distances revealed that there were no outliers requiring removal from this analysis. This set of BREQ-2 and GCEQ predictor variables accounted for 28.50% of the GLTEQ-SWEAT variance ($R = 0.60$, $R^2 = 0.36$, $R^2_{adj} = 0.29$). Both the BREQ2-Extrinsic and BREQ2-Identified predictor variables were significant predictors of GLTEQ-SWEAT ($p < 0.05$). Similar to Table 8, structure coefficients indicated that both BREQ2-Identified and BREQ2-Intrinsic contributed positively and strongly to predicting GLTEQ-SWEAT. BREQ2-Identified accounted for the largest portion of unique variance (7.00%) in predicting GLTEQ-SWEAT followed by BREQ2-Extrinsic (3.00%).

The multiple linear regression model predicting Fruit/Day from REBS and GCEATQ scores (see Table 10) was not statistically significant at conventional levels ($F(16,82) = 1.19$, $p = 0.29$). Mahalanobis distances indicated that there were no outliers. This set of REBS and GCEATQ predictor variables accounted for 3.00% of the Fruit/Day variance ($R = 0.43$, $R^2 = 0.19$, $R^2_{adj} = 0.03$). The only statistically significant predictor of Fruit/Day was GCEATQ-Affiliation ($p < 0.05$). Structure coefficients indicated that REBS-Amotivation and REBS-External were the strongest motives predicting Fruit/Day, while GCEATQ-Positive Health GCEATQ-Ill Health Avoidance were the strongest goals predicting this eating behaviour. GCEATQ-Affiliation accounted for the largest portion of unique variance (6.00%) in predicting Fruit/Day.

The multiple linear regression model predicting Vegetables/Day from REBS and GCEATQ scores (see Table 11) was statistically significant ($F(16,82) = 2.16$, $p < 0.05$). Mahalanobis distances revealed that there were no outliers requiring omission. This set of REBS and GCEATQ predictor variables accounted for 15.90% of the Vegetables/Day variance ($R = 0.54$, $R^2 = 0.30$, $R^2_{adj} = 0.16$). Significant predictors for Vegetables/Day include both motives and goals. REBS-Intrinsic and GCEATQ-Social Recognition were both found to be statistically significant predictors (p's < 0.05). Structure coefficients indicated that REBS-Intrinsic was the strongest motive predicting the consumption of Vegetables/Day, while GCEATQ-Social Recognition was the dominant goal predicting this eating behaviour. GCEATQ-Social Recognition accounted for the largest portion of unique variance (6.00%) in predicting Vegetables/Day. Although not statistically significant ($p = 0.09$), a trend was found for GCEATQ-Ill Health Avoidance predicting greater consumption of Vegetables/Day.

This variable displayed the second largest structure coefficient amongst GCEATQ predictors in this regression model but accounted for no unique variance in this model.

The multiple linear regression model predicting Meat and Alternatives from REBS and GCEATQ scores (see Table 12) was not statistically significant ($F(16,80) = 1.26$, $p = 0.25$). Mahalanobis distances resulted in two deleted cases. This set of REBS and GCEATQ predictor variables accounted for 4.10% of the Meat and Alternatives variance ($R = 0.45$, $R^2 = 0.20$, $R^2_{adj} = 0.04$). None of the predictor variables were significant predictors of Meat and Alternatives (all p's > 0.05). Although a trend towards statistical significance was found for GCEATQ-Challenge ($p = 0.06$) predicting greater consumption of Meat and Alternatives. Structure coefficients indicated that only GCEATQ-Challenge contributed positively and moderately to predicting Meat and Alternatives. Both GCEATQ-Challenge and GCEATQ-Weight Management accounted for the largest portions of unique variance in predicting Meat and Alternatives.

The multiple linear regression model predicting Milk and Alternatives from REBS and GCEATQ scores (see Table 13) was statistically significant ($F(16,81) = 2.16$, $p < 0.05$). Mahalanobis distances were used to delete one case. This set of REBS and GCEATQ predictor variables accounted for 16.00% of the Milk and Alternatives variance ($R = 0.55$, $R^2 = 0.30$, $R^2_{adj} = 0.16$). REBS-Introjected was the only significant predictor associated with the consumption of Milk and Alternatives ($p < 0.05$), although REBS-Integrated approached statistical significance ($p = 0.07$). Structure coefficients indicated that REBS-Introjected was the dominant predictor of Milk and Alternatives followed by GCEATQ-Appearance. REBS-Introjected accounted for the largest portion

of unique variance (6.00%) in predicting Milk and Alternatives followed by REBS-Integrated (3.0%).

The multiple linear regression model predicting Grain Products from REBS and GCEATQ scores (see Table 14) was not statistically significant ($F(16,81) = 1.22$, $p = 0.27$). Mahalanobis distance calculations indicated that one case needed to be deleted. This set of REBS and GCEATQ predictor variables accounted for 3.40% of the Grain Products variance ($R = 0.44$, $R^2 = 0.19$, $R^2_{adj} = 0.03$). The only significant predictor found to predict Grain Products was REBS-Intrinsic ($p < 0.05$). No other variables were significant predictors, although GCEATQ-Affiliation approached conventional levels of statistical significance ($p = 0.07$) in this model. Structure coefficients indicated that REBS-Intrinsic was the dominant predictor of the consumption of Grain Products. REBS-Intrinsic accounted for the largest portion of unique variance (9.00%) in predicting Grain Products followed by GCEATQ-Affiliation (3.00%).

The multiple linear regression model predicting Fat intake from REBS and GCEATQ scores (see Table 15) was not statistically significant ($F(16,81) = 1.74$, $p = 0.06$). Mahalanobis calculations indicated one case needed to be deleted. This set of REBS and GCEATQ predictor variables accounted for 10.90% of the Fat intake variance ($R = 0.51$, $R^2 = 0.26$, $R^2_{adj} = 0.11$). GCEATQ-Ill Health Avoidance was the only significant predictor of Fat intake ($p < 0.05$). Although it is noted that REBS-Intrinsic scores approached conventional levels of statistical significance ($p = 0.07$). Structure coefficients indicated that only GCEATQ-Social Recognition contributed moderately to predicting typical Fat intake. Both REBS-Intrinsic (3.00%) and

GCEATQ-Ill Health Avoidance (4.00%) accounted for the largest portions of unique variance in predicting Fat intake.

The multiple linear regression model predicting Fibre intake from REBS and GCEATQ scores (see Table 16) was statistically significant ($F(16,82) = 1.78$, $p < 0.05$). Mahalanobis distances were calculated and did not reveal any outliers. This set of REBS and GCEATQ predictor variables accounted for 11.30% of the Fibre intake variance ($R = 0.51$, $R^2 = 0.26$, $R^2_{adj} = 0.11$). The only significant predictor of Fibre was GCEATQ-Positive Health ($p < 0.05$), although it is noted that REBS-Identified scores approached conventional levels of statistical significance in this regression model ($p = 0.08$). Structure coefficients indicated that GCEATQ-Positive Health was the dominant predictor of Fibre intake followed by REBS-Identified. Both REBS-Extrinsic and REBS-Identified accounted for 3.00% of unique variance in predicting Fibre with GCEATQ-Positive Health accounting for the most unique variance (10.00%) in this regression model.

Chapter 5 - Discussion

The purpose of the present study was to examine the role of both goal pursuits and motives and their relationship with both physical activity behaviour and healthy eating behaviour amongst patrons of commercial weight-loss programs. Goal pursuits were dichotomized as either intrinsic or extrinsic in nature according to the postulates of Deci and Ryan (2002) within SDT and motives were separated into distinct autonomous or controlling regulations. This study represents a significant addition to the literature for several reasons. Firstly, it was unique for at least two reasons: (a) This study tested theoretical relationships on responses collected from a sample enrolled in a commercial weight-loss program; and (b) This study examined the importance of both goals ("what") and motives ("why") for two important health behaviours conceptually linked with weight control (c.f., Sebire et al., 2008). Secondly, this study contributed evidence for the advancement of a new instrument for measuring goals for eating behaviour. Prior to this investigation, no known instrument was available for use that was in accordance with Deci and Ryan's (2002) SDT. This study also advanced a modified version of select EMI-2 subscales as a possible instrument to measure intrinsic/extrinsic goal distinctions in line with SDT for healthy eating behaviours. Thirdly, this study assisted with the advancement of theory, whereby it challenged the propositions made by Deci and Ryan (2000) that both the 'what' and the 'why' matter with reference to a target health behaviour in commercial weight-loss programs clientele. In sum, the observations made in this study suggests that the 'why' (i.e., motives) may be more important than the 'what' (i.e. goals).

The overall purpose of this study was addressed by testing five hypotheses that were based upon previous literature (c.f., Sebire et al., 2008) and SDT (Deci & Ryan, 2002). The first hypothesis suggested that more self-determined (autonomous) motives for both physical activity and healthy eating alike, the more positive the association with the target health behaviours would be. Alternatively, the second hypothesis suggested that less self-determined (controlled) motives for physical activity and health eating would be negatively associated with the target health behaviours. Third, it was hypothesized that intrinsic goals would be positively associated with the target health behaviours, while extrinsic goals would be negatively linked with these behaviours. The fourth hypothesis indicated that more self-determined (or autonomous) motives would be positively associated with intrinsic goals. The fifth hypothesis indicated that the less self-determined (or more controlled) motives would be positively associated with extrinsic goals.

Summary of the main findings

Evidence concerning the hypothesis test results was presented in detail within Tables 4 through 16. In brief, the results from this study provided mixed support for the original five hypotheses concerning relationships between intrinsic/extrinsic goals, motives that vary in perceived self-determination, and frequency of healthy eating and physical activity behaviours. Mixed support at the bivariate level (see Tables 4-7) was evident for all hypotheses. Overall, the results observed in this study across regression models suggested minimal support for the notion that both goal contents and motives matter in terms of predicting frequency of weekly physical activity and healthy eating behaviour. Only two of the nine regression models provided any evidence that

intrinsic/extrinsic goals (the "what") and autonomous/controlled motives (the "why") predicted variation in health behaviours in this sample of commercial weight-loss program clientele.

Physical activity behaviour findings and links with previous research

The first hypothesis stated that autonomous motives would be positively associated with the target health behaviours and the results were consistent with the physical activity component of the first proposed hypothesis because the more self-determined (autonomous) the motives (i.e., the "why") regulating physical activity, the more positive the association with physical activity behaviour was in this sample. Specifically, the BREQ2-Intrinsic variable was the only statistically significant predictor of GLTEQ-METS (see Table 8). Similar findings were also found for the other marker of physical activity behaviour (GLTEQ-SWEAT) in this study, whereby BREQ2-Identified (i.e., a more self-determined motive) was a significant predictor for GLTEQ-SWEAT (see Table 9). One interesting variable that was not consistent with the first proposed hypothesis and was also found to be statistically significant was BREQ2-Extrinsic, however, it did not account for as much unique variance in predicting GLTEQ-SWEAT as did BREQ2-Identified.

These results are consistent with previous literature regarding motives for physical activity where Sebire et al. (2008) concluded that only motives, not goals matter with respect to physical activity behaviour. Both the results of this study and these reported by Sebire et al. (2008) provide evidence that the intrinsic/extrinsic nature of people's goals may not matter to the same degree as the reasons why people are engaged in particular health behaviours such as physical activity and healthy eating.

One possible explanation for these findings concerns the criterion variables used by Sebire et al. (2008) and the fact that this study only focused on behaviour. Sheldon and Niemiec (2006) argued that goals (i.e., the "what") and motives (i.e., the "why") matter for a person's well-being and made no specific arguments concerning a person's behaviour. The study Sebire et al. (2008) supported this idea with relative intrinsic goals accounting for variance in well-being beyond motives for exercise in a sample of employed adults from the United Kingdom.

The second hypothesis stated that controlled motives for physical activity and healthy eating would be negatively associated with the target health behaviours. Consistent with the data concerning the first hypothesis, the data in this study supported this hypothesis with reference to physical activity because it was found that the more controlled motives (i.e., the "why") for physical activity were negatively associated with self-reported physical activity (GLTEQ-METS; see Table 4 for specific details). A similar pattern of negative correlations was also evident for GLTEQ-SWEAT and the more controlled motives (BREQ2-Amotivation and BREQ2-Extrinsic). These observations are consistent with previous studies using university students (Wilson et al., 2004) and the broader SDT literature (Deci & Ryan, 2002) and imply that coercive sources of external pressure are unlikely to sustain investment in healthy lifestyles that include regular physical activity as an integral component.

The third hypothesis stated that intrinsic goals would be positively associated with the target health behaviours, while extrinsic goals would be negatively linked with physical activity and healthy eating. However, this hypothesis was not shown support with the study data because none of the intrinsic/extrinsic goals (i.e., the "what") were

statistically significant when predicting GLTEQ-METS, in accordance with the contentions embraced by Sebire and colleagues (2008). Similar non-significant relationships were found for the other self-reported measure of physical activity (GLTEQ-SWEAT). However, despite the lack of statistically significant findings in association with physical activity behaviour and goals, it is interesting to note that regardless of how small the relationships were, all of them were in the positive direction in the bivariate correlation matrix (see Table 4). These weak correlations may imply two plausible conclusions. First, it is conceivable that intrinsic/extrinsic goals are not differentially associated with the frequency of physical activity behaviours in commercial weight-loss programs users. And second, it is equally plausible that irrespective of the intrinsic/extrinsic orientation of goals, they may be associated with greater frequency of physical activity, however, the magnitude of these relationships are not likely to be strong per se. An alternative explanation for the absence of the hypothesized findings concerns the actual instrument used to measure physical activity goals. At the onset of the current study, the GCEQ (Sebire et al., 2008) had only been used in two previous investigations to date in which neither sample were patrons of commercial weight-loss programs (Sebire et al., 2008; 2009). Given that construct validation is on ongoing process requiring multiple sources of evidence (Messick, 1995), the results of this study could be interpreted as evidence that the GCEQ requires further empirical work for samples similar to the one used in this study prior to being adopted as the instrument of choice.

The fourth hypothesis stated that autonomous motives would be positively associated with intrinsic goals. It was supported (see Table 4) by the data collected for

this sample because autonomous motives (i.e., the "why") were positively associated with intrinsic goals (i.e., the "what") in the correlation matrix (see Tables 4 and 5). One interesting relationship existed between the most autonomous physical activity motive (BREQ2-Intrinsic) and one of the extrinsic physical activity goals (GCEQ-Image) whereby weight-loss program users that were intrinsically motivated toward physical activity were not as concerned about their image. This finding is consistent with SDT (Deci & Ryan, 2002) because the more extrinsically oriented a goal, the less likely the desired behaviour will be pursued for self-determined reasons and also consistent with Segar et al. (2006) that found that midlife women with non-body-shape motives for physical activity were more active than those with body-shape motives. However, the reader must be cautioned when interpreting this data because the negative relationship found between these two variables was not statistically significant at conventional levels ($p < 0.05$) for this sample and was very small in magnitude ($r = -0.06$).

The fifth hypothesis stated that controlled motives would be positively associated with extrinsic goals. Similarly to the fourth hypothesis, the fifth hypothesis was also supported by the study findings because it was found that more controlled motives (i.e., the "why") for physical activity were more positively associated with extrinsic goals (i.e., the "what"; see Table 4). Specifically, the magnitude of the observed relationships between external and introjected motives ($r_{12} = 0.24$ to 0.38) was stronger with both GCEQ-Image and GCEQ-Social Recognition than with any of the three intrinsic goals assessed by the GCEQ in this sample. This observation offers evidence of convergent validity for the GCEQ responses in this sample and suggests

that controlling reasons for physical activity may be associated with extrinsic goals for this health behaviour that have been linked with ill-being (Sebire et al., 2008).

Healthy eating behaviour findings and links with previous research

Unlike the data on physical activity behaviour, the eating behaviour data is more ambiguous and challenging to interpret clearly in this study. In general, the first hypothesis appears to have been partially supported by most of the healthy eating data because it appears that autonomous motives for healthy eating were more positively associated with the healthy eating variables.

Evidence at the bivariate level (see Table 4) shows, in general, that people who endorse either REBS-Extrinsic or REBS-Introjected as a form of motivation for eating, report lower fruit/vegetable intake, fat and fibre consumption, and ingestion of meat and milk-related products. However, participants endorsing more autonomous reasons that motivate their eating habits also reported lower milk and grain consumption, which is not wholly consistent with past findings (Pelletier et al., 2004) or SDT (Deci & Ryan, 2002). While the explanation for this anomaly remains open for further scrutiny, it appears that difficulties surrounding the assessment of healthy eating behaviours represents a plausible explanation for these observations. As such, the measurement of motives and intrinsic/extrinsic goals for eating needs future attention in the literature.

The second hypothesis was supported because it was found that controlled motives for healthy eating were negatively associated with healthy eating behaviours. This is consistent with previous findings from two studies found by Pelletier et al. (2004). Although both studies were conducted solely on females, the applicability to the current study is quite close because approximately 93% of the responses were from

female participants. While the pattern of correlations between controlled motives assessed with the REBS and healthy eating behaviours is consistent across the indices of food consumption presented in Table 4, it is clear that the magnitude of the correlations, at least in this sample, is quite small (r_{12} ranged -0.01 to -0.34). A presumably reasonable assumption to make is that controlling forms of motivation that regulate eating behaviours are linked with greater frequency of "unhealthy" eating, but the strength of these reasons for food consumption may have little practical utility.

The third hypothesis that was proposed was partially supported by this data but there was no consistent pattern regarding whether intrinsic or extrinsic goals were more positively or negatively associated with healthy eating behaviour (see Table 6). A possible reason for the lack of clarity within the data may be held attributable to the instrumentation used to assess both eating behaviours and the intrinsic/extrinsic goals for eating used in this study. Unfortunately there is no instrument available currently that measures intrinsic/extrinsic goals regarding eating behaviour that is consistent with the SDT framework. Therefore an instrument that was originally designed by Ingledew and Markland (2007) to measure descriptive motives for exercise was adapted to measure goals for eating for the purposes of the present study. This adaptation was acceptable given that the instrument has been presented as an index of intrinsic/extrinsic goal content in exercise based on the distinction made in SDT and the nature of the subscales seemed relevant to eating as well as exercise. The extent to which the intrinsic/extrinsic goal distinction advocated by Deci and Ryan (2002) matters for healthy eating cannot be supported with the present data but remains an area ready for additional investigation and possibly instrument development.

The fourth hypothesis was supported by the data because it was found that autonomous motives for healthy eating were more positively associated with intrinsic goals as opposed to extrinsic goals (see Table 7). Similarly the fifth hypothesis was also supported by the data because it was found that controlled motives were more positively associated with extrinsic goals as opposed to intrinsic goals for healthy eating. Taken together, these observations provided evidence for the convergent validity of responses to the GCEATQ and REBS. Messick (1995) has suggested that construct validation is an ongoing process and as such the support for both hypothesis four and five should be interpreted with caution given the lack of consistent findings observed between GCEATQ scores and indices of healthy eating behaviour.

Does the "what" matter if we know "why"?

Interpretations of the data from this study suggest, in general, that motives seem to matter more than goals for both physical activity behaviour and healthy eating behaviour in this sample of commercial weight-loss program participants. In a previous study conducted by Sheldon et al. (2001) the researchers concluded that both motives and goals mattered in a sample of first year university students working towards academic achievement. The study by Sheldon et al. (2001) used a framework labelled the Self-Concordance Model (SCM; Sheldon et al., 1999) which is concerned with how goals can promote adaptive or healthy consequences. The proposed end result of the SCM is well-being, whereas the present study was centred around two health behaviours (e.g., physical activity and healthy eating) as the outcome variables. The results from this study are consistent with the Sebire et al. (2009) study that found that

only motives mattered when examining relationships with behavioural indicators of physical activity.

A number of plausible explanations could account for the results in this study suggesting that motives in general matter more than goals. Firstly, it is possible that the manner in which the motive and goal scores were treated in the analysis impacted the interpretations to be made from this study. In previous goal content research using SDT (Sebire et al., 2008), goal content scores were combined to form an omnibus index (i.e., relative intrinsic goals). While an approach such as this is entirely consistent with the SDT approach endorsed by Deci and Ryan (2002), it provides only macro-level accounts for the importance of goals contents that has been examined by Koestner and Losier (2002).

Is also seems plausible that goals only matter in relation to motives if the issue under study concerns well-being as opposed to health behaviours. To date, only one study has addressed this issue directly and it was confined to the assessment of self-report physical activity scores (Sebire et al., 2009). Regardless of this limitation, Sebire et al. (2009) provide evidence that relative intrinsic goal contents matter to well-being markers but not physical activity behaviour. The latter observation is consistent with the findings from this study and leave the issue of goal content open to scrutiny and speculation if the target for intervention or explanation concerns behavioural variables. Indeed, Sheldon and Niemiec's (2006) original arguments were rooted in understanding well-being, not behaviour, which makes the observations from the present study and those of Sebire et al. (2009) aligned with their assertions. There is also the possibility

that it is more difficult to predict behaviour as opposed to other psychological variables. Future studies may want to take that possibility into account.

A final possibility concerns the manner in which this sample responded to the instruments designed to assess motives (BREQ-2 and REBS) and goals (GCEQ and GCEATQ) across health behaviours. As an example, the extremely kurtotic value of the REBS- Amotivation kurtosis scores may have had an adverse affect on the correlation and regression output. Reliability scores for amotivation were lower than desired. However, amotivation has demonstrated non-normal distribution previously in the literature (Wilson et al., 2007). One obvious adverse effect concerns the possibility that the magnitude of correlation and regression coefficients may have been reduced and may also have caused a reversal in the direction (i.e., sign is revealed as positive when in actuality it should have been negative or vice versa) and therefore the reader is cautioned regarding any interpretations made regarding the output of this study (Pedhazur, 1997).

Future directions

The examination of both goals and motives for physical activity and healthy eating has shown a need for further examination within the realm of commercial weight-loss users. Future research would do well to expand upon the current investigation by conducting longitudinal research where variables are measured over time in an attempt to be able to make stronger inferences with respect to causality. By examining variables over time, inferences pertaining to causal claims may also be made that could expand on the theoretical framework, or in contrast, may further refute the theory.

Both behaviours within this investigation were measured using self-report instrumentation. Future research in this area may seek to test behaviour using a combination of methods (e.g. subjective and objective measures). Objective measure for physical activity behaviour could include accelerometers and for eating behaviour could include such measures as a 'diet diary' or fecal examination. A combination of both subjective and objective measures may assist in providing a more accurate assessment of the participants.

Given that this study employed a modified instrument to assess intrinsic/extrinsic goals for healthy eating behaviour, future research would do well to develop an instrument specific to eating behaviour using a construct validation approach (Messick, 1995). Once created, the reliability and validity of the instrument's scores in multiple samples, including commercial weight-loss program users, should be established in pilot studies prior to using the instrument in practice. Attention to issues of item content relevance and representation would be particularly useful across multiple cohorts (especially commercial weight-loss program users) to determine the nature of intrinsic/extrinsic goal experiences form the participant's perspective.

Practical applications

According to Sheldon and Niemiec (2004) both goals and motives matter, however, the results from this study suggest that only motives may matter for commercial weight-loss program users. It is possible that intrinsic/extrinsic goals only matter when the issue concerns well-being and not for specific health behaviours, such as physical activity and healthy eating. Therefore, health promotion initiatives designed for people who are enrolled in commercial weight-loss programs may want to consider

placing greater emphasis on the reasons why their clients engage or should engage in the target health behaviours as opposed to what they are actually trying to achieve. Previous studies and theorizing (Edmunds, Ntoumanic, & Duda, 2008) have suggested that social environments that help people feel their choices/decisions are supported by those in authority (i.e., autonomy support; Deci & Ryan, 2002), that people interact with them genuinely and with empathy (i.e., involvement; Deci & Ryan, 2002), and that have clear outcomes available to client (i.e., structure; Deci & Ryan, 2002) are most likely to fulfill basic psychological needs and thereby enhance optimal forms of motivation. It seems reasonable to suggest that clinic managers and staff engaged with clients attempting to lose or control their weight should be cognizant of providing autonomy support, structure, and involvement for their clients in a manner consistent with the principles outlined by Deci and Ryan (2002).

In order to satisfy the basic psychological needs of competence, autonomy, and relatedness by offering autonomy support, structure, and involvement, a couple of practical considerations can be made according to literature conducted on coach/athlete relationships by Mageau and Vallerand (2003). Mageau and Vallerand (2003) discuss the role that coaches have for providing their athletes with autonomy support by providing their athletes with choice within specific rules and guidelines, providing a rationale for any given tasks and limits set, acknowledging feelings and perspectives of both the coach and athlete, providing opportunities for independent work, providing non-controlling feedback, and preventing ego-involvement in the athletes. Therefore, one practical consideration that may also be applicable for people enrolled in commercial weight-loss programs would be for the operators of these programs to offer

their clients a degree of choice when deciding how their clients would like to meet their weight-loss aspirations and providing them opportunities on they can tackle their weight-loss challenges independently away from the weight-loss program (Mageau & Vallerand, 2003).

An additional practical application comes from the satisfaction of competence, autonomy, and relatedness by providing structure and involvement of the clients' welfare in commercial weight-loss programs. Mageau and Vallerand (2003) report that by providing structure it promotes people's need for competence and may assist with helping people interact competently with their environment. Involvement of the clients' welfare can also be satisfied by making the client feel connected and important. Suggesting that a potential practical application for this in commercial weight-loss program settings would be for the program implementers to provide a very structured setting for their clientele and for them to promote an environment where they are able to interact with other people and are able to feel that their well-being is important (Mageau & Vallerand, 2003).

This study also suggests that engaging in incentive-based programs may be linked with less self-determined reasons (i.e., external or introjected) for engaging in physical activity or healthy eating. This is consistent with SDT literature (Deci & Ryan, 2002) that states that less self-determined motives are associated with greater ill-being and therefore should be avoided.

Limitations

Despite the unique aspects of this study, a number of limitations exist. This study was based entirely on self-report data, was cross-sectional in design, was

comprised of a relatively small sample size, and involved instrument modification. Each limitation is discussed below in no particular order of importance.

Self-report presents a number of possible issues, such as the possibility that the study participants did not report their information properly. This could be a result of misunderstanding the material, social desirability, and recall bias (Crocker & Algina, 1986). Social desirability occurs if participants respond to the questions in the way in which they think the investigators may want them to or because they think that that would be the best response, however, it is not indicative of their actual behaviour/self (Crocker & Algina, 1986). Recall bias may occur if the participant intentionally responds improperly to a question, which may occur if they want to protect their personal information. Also, self-report in this circumstance may be an issue because it is possible that the type of people who access questionnaires, such as the one used in this study, may already be an intrinsically motivated type of person. Therefore questions pertaining to motivational regulations within this study may already be predisposed to fall closer to the intrinsically regulated end of the motivational continuum proposed by Deci and Ryan (2002), thus nullifying any potential relationships that we may encounter. A possible option for accounting for this potential limitation would be to conduct this study in collaboration with slightly more objective measures, such as an accelerometer/pedometer, weigh scale administered by a physician, and measuring tape also administered by a physician. However, based upon previous research (Welk, 2002) the use of objectives measures (e.g., accelerometry) is not exempt from limitations.

The second potential limitation with this study pertains to the actual design. The research was based upon a cross-sectional design. This design was chosen due to the

nature of the questions being asked and the magnitude of the research being conducted. In an attempt to make this study as accessible as possible worldwide, it was not feasible to test the participants at more than one time point. Unfortunately, without multiple time points being taken into consideration, causal claims cannot be made based upon this research, however, researchers can conclude relationships that may exist between study variables (Trochim, 2001). Also, by using a cross-sectional design the researchers have only examined a small portion of the population and are applying the knowledge gained about the entire population, which may not be entirely accurate (Trochim, 2001). A possible way to account for this limitation would be to test the participants at multiple time points.

The third possible limitation is based upon the relatively small sample size that was collected for this research. The proposed sample size to achieve a medium effect ($\beta = 0.80$) at $p = 0.01$ (two-tailed) was 84 participants (Cohen, 1992) and therefore was based entirely on statistical considerations. The actual sample size collected was slightly greater than proposed ($N = 121$). It is unclear what the actual percentage of the population is enrolled in commercial weight-loss programs and therefore it seems implausible to confidently claim that an appropriate sample was obtained to be representative of the population. One possible future direction to address this limitation concerns collecting data from intact groups of known size (e.g., entire rosters from weight-loss clinics) to more accurately gauge the external validity of the sample data.

The final limitation that presents itself within this study is the issue of instrument modification. Unfortunately, at present there are no known instruments that measure healthy eating goals in accordance with Deci and Ryan's (2002) SDT. For this

reason, a modification was made to an existing instrument (Exercise Motivations Inventory-2) that was originally designed to measure a person's motives for exercise in accordance with Deci and Ryan's (2002) SDT principles and adapt it to goal content associated with an alternate health behaviour (i.e., healthy eating). Admittedly, such an approach to measurement may pose some problems (Wilson, Mack, & Grattan, 2008), however, the content validity of scores from this instrument could not be assessed until it was used within the actual study. The BREQ-2 was also slightly modified for the purposes of this research whereby items were changed to "physical activity" as opposed to "exercise". This adaptation was minimal and likely had trivial impact on the overall validity of the BREQ-2's scores. In order to account for this limitation, future researchers may do well to first develop an instrument to specifically measure healthy eating goals in line with SDT (Deci & Ryan, 2002) and test it in a pilot study prior to application within an actual research project.

Summary

The purpose of the present study was to examine the role of goals and motives and their relationships with physical activity and healthy eating behaviour among commercial weight-loss program clientele. The participants were primarily female (N = 121; 93.2% female; M_{age} = 37.62, SD = 14.07) and were all members of commercial weight-loss programs. Participant recruitment was facilitated by online social networking services, word of mouth, presentations, and etc. Each participant completed the questionnaire via a secure online survey based website at one time point. In summary, the key findings of this study suggest that motives for physical activity and healthy eating may matter more than goals for people enrolled in commercial weight-

loss programs and more autonomously endorsed motives are linked with greater frequency of behaviour. Future researchers may want to add the use of accelerometry when measuring physical activity behaviour in addition to self-reported data in an attempt represent both an objective and a subjective measure of physical activity. This study may also be strengthened by having participants complete a food diary that is then analyzed by a registered dietician. Finally, future studies are needed to develop and validate an instrument designed specifically to measure goals for eating behaviour in accordance with SDT.

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Table 1

Estimated Program Costs for the Top 3 Commercial Weight Loss Programs in America

Program	Membership Fee or Initial Cost	Periodic Fees	Meal Plan	Other	Estimated Cost of 3 Month Program
Weight Watchers	$35.00 for 1st week (with membership fee)	$12.00/week, on a pay-as-you-go basis	Not required	None	$167.00
Jenny Craig	$199.00 for 6 months, $364.00 for 1 year	None	$70.00-$105.00/week ($10.00-$15.00/day)	$10.00 for 2nd of 2 weight loss manuals	$1249.00
L A Weight Loss	$88.00	Upfront costs of $7.00 /week multiplied by the # of weeks calculated to reach goal weight	None	$10.00 for optional walking videotape	Not calculated*

**Note.* Costs of L A Weight Loss were not estimated because of insufficient information. (Adapted from, Tsai & Wadden, 2005).

Table 2

Descriptive statistics and reliability coefficients for physical activity motives and goals

Variables	*M*	*SD*	*Skew.*	*Kurt.*	Co. α
1. BREQ2-Amotivation	1.17	0.40	2.88	8.91	0.62
2.BREQ2- Extrinsic	1.73	0.86	1.22	0.54	0.87
3.BREQ2- Introjected	2.42	0.96	0.54	-0.19	0.76
4.BREQ2- Identified	3.87	0.82	-0.56	-0.28	0.84
5. BREQ2-Intrinsic	3.56	1.06	-0.38	-0.91	0.92
6. GCEQ-Social Affiliation	2.93	1.60	0.53	-0.92	0.89
7. GCEQ-Image	5.25	1.39	-0.78	0.19	0.86
8. GCEQ-Health Management	6.20	0.80	-0.73	-0.08	0.77
9. GCEQ-Social Recognition	2.99	1.68	0.63	-0.50	0.90
10. GCEQ-Skill Development	4.20	1.65	-0.21	-0.84	0.91
11. GLTEQ-METS	45.92	24.27	0.63	2.10	-
12. GLTEQ-SWEAT	2.17	0.67	-0.28	-0.68	-

Note. $N = 99$. *M* = Mean. *SD* = Standard Deviation. *Skew.* = Univariate Skewness. *Kurt.* = Univariate Kurtosis. Co. α = Cronbach's (1951) coefficient of internal consistency. *BREQ2* = Behaviour Regulation in Exercise Questionnaire-2 (Markland & Tobin, 2004). *GCEQ* = Goal Content for Exercise Questionnaire (Sebire et al., 2008). *GLTEQ-METS* = Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). *GLTEQ*-SWEAT = Godin Leisure Time Questionnaire indicator of amount of times per week person sweats due to physical exertion (Godin & Shephard, 1985).

Table 3

Descriptive statistics and reliability coefficients for eating behaviour motives and goals

Variables	*M*	*SD*	*Skew.*	*Kurt.*	Co. α
1.REBS-Amotivation	1.31	0.83	4.41	23.99	0.90
2.REBS- Extrinsic	2.04	1.28	1.38	1.35	0.88
3.REBS-Introjected	3.68	1.63	0.01	-0.88	0.86
4.REBS-Identified	6.44	0.64	-1.22	1.36	0.90
5.REBS-Integrated	5.63	1.12	-1.44	3.47	0.87
6.REBS-Intrinsic	5.26	1.48	-0.86	0.33	0.89
7.GCEATQ-Weight Management	4.17	0.93	-2.61	8.69	0.80
8.GCEATQ-Ill Health Avoidance	4.26	0.87	-1.31	1.27	0.84
9.GCEATQ-Revitalization	3.84	0.95	-0.80	0.83	0.71
10.GCEATQ-Appearance	3.77	0.97	-0.90	0.48	0.77
11.GCEATQ-Social Recognition	1.43	1.39	0.99	0.13	0.87
12.GCEATQ-Positive Health	4.48	0.63	-1.43	2.03	0.84
13.GCEATQ-Enjoyment	3.76	1.09	-1.10	1.28	0.86
14.GCEATQ-Health Pressure	2.13	1.31	0.27	-0.46	0.51
15.GCEATQ-Challenge	2.62	1.34	-0.07	-0.72	0.79
16.GCEATQ-Affiliation	1.79	1.28	0.45	-0.24	0.82
17.Fruit/Day	2.53	0.90	-0.08	0.14	-
18.Vegetables/Day	3.23	0.87	-1.07	0.44	-
19. NHANES-Meat & Alternatives	2.43	1.05	1.54	4.39	-
20.NHANES-Milk & Alternatives	2.05	0.97	0.86	1.41	-
21.NHANES-Grain Products	3.00	1.42	0.80	1.03	-
22.Fat/Day	1.31	0.52	2.18	6.62	-
23.Fibre/Day	2.47	0.59	-1.17	0.06	-

Note. $N = 99$. *M* = Mean. *SD* = Standard Deviation. *Skew.* = Univariate Skewness. *Kurt.* = Univariate Kurtosis. Co. α = Cronbach's (1951) coefficient of internal consistency. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (adapted from Markland & Ingledew, 1997). *NHANES* = National Health and Nutrition Examination Survey (National Centre for Health Statistics, 1999-2000).

Table 4

Bivariate correlations between physical activity motives, goals, and physical activity behaviour

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. BREQ2-Amotivation	-											
2.BREQ2-Extrinsic	0.38	-										
3. BREQ2-Introjected	-0.02	0.35	-									
4. BREQ2-Identified	-0.38	-0.22	0.34	-								
5. BREQ2-Intrinsic	-0.27	-0.20	0.22	0.69	-							
6. GCEQ-Social Affiliation	0.02	0.15	0.09	0.31	0.24	-						
7. GCEQ-Image	-0.09	0.24	0.25	0.11	-0.06	0.31	-					
8. GCEQ-Health Management	-0.11	0.11	0.20	0.55	0.46	0.44	0.24	-				
9.GCEQ- Social Recognition	0.05	0.37	0.38	0.15	0.00	0.60	0.60	0.24	-			
10. GCEQ-Skill Development	0.01	0.22	0.25	0.33	0.36	0.61	0.21	0.47	0.48	-		
11. GLTEQ-METS	-0.26	-0.14	0.18	0.39	0.40	0.14	0.17	0.17	0.19	0.22	-	
12. GLTEQ-SWEAT	-0.32	-0.32	0.10	0.53	0.36	0.06	-0.06	0.30	-0.01	0.15	0.53	-

Note. BREQ2 = Behaviour Regulation in Exercise Questionnaire-2 (Markland & Tobin, 2004). *GCEQ* = Goal Content for Exercise Questionnaire (Sebire et al., 2008). *GLTEQ-METS* = Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). *GLTEQ*-SWEAT = Godin Leisure Time Questionnaire indicator of amount of times per week they sweats due to physical exertion (Godin & Shephard, 1985). Correlations between $|0.26 - 0.69|$ are significant at $p < 0.01$ (two-tailed) and correlations $|0.21 - 0.25|$ are significant (two-tailed) at $p < 0.05$ in this sample.

Table 5

Bivariate correlations between healthy eating motives and healthy eating behaviour

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. REBS-Amotivation	-												
2.REBS- Extrinsic	0.23	-											
3. REBS-Introjected	0.12	0.43	-										
4. REBS-Identified	-0.11	-0.01	0.28	-									
5. REBS-Integrated	-0.02	0.06	0.28	0.60	-								
6. REBS-Intrinsic	-0.15	0.09	0.18	0.51	0.69	-							
7. Fruit/Day	-0.19	-0.17	-0.14	0.15	0.12	0.10	-						
8. Vegetables/Day	-0.11	-0.20	-0.01	0.14	0.19	0.27	-0.07	-					
9. NHANES-Meat	-0.16	-0.15	-0.04	0.02	0.02	0.07	0.17	0.05	-				
10.NHANES-Milk	-0.18	-0.08	-0.34	-0.05	-0.17	-0.05	0.22	-0.03	0.42	-			
11.NHANES-Grain	0.04	0.03	-0.07	-0.08	-0.17	-0.27	0.28	-0.26	0.30	0.38	-		
12.Fat/Day	0.07	0.06	0.09	-0.02	-0.19	-0.22	0.05	-0.27	-0.09	-0.09	0.18	-	
13.Fibre/Day	0.00	-0.16	0.01	0.26	0.07	0.08	0.35	0.09	0.08	0.03	-0.01	-0.03	-

Note. REBS = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *NHANES* = National Health and Nutrition Examination Survey (National Centre for Health Statistics, 1999-2000). Correlations between $|0.26 - 0.69|$ are significant (two-tailed) at $p < 0.01$ and are also significant when $|0.21 - 0.25|$ (two-tailed) at $p < 0.05$.

Table 6

Bivariate correlations between healthy eating goals and healthy eating behaviour

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1.GCEATQ-Weig. Man.	-															
2.GCEATQ-Ill Heal A.	0.20	-														
3.GCEATQ-Revitaliz.	0.19	0.54	-													
4.GCEATQ-Appear.	0.54	0.27	0.48	-												
5.GCEATQ-Soc. Rec.	0.20	0.14	0.39	0.46	-											
6.GCEATQ-Pos.Heal.	0.16	0.61	0.65	0.25	0.12	-										
7.GCEATQ-Enjoy.	0.22	0.52	0.82	0.43	0.36	0.76	-									
8.GCEATQ-Health P.	0.15	0.52	0.32	0.24	0.43	0.34	0.36	-								
9.GCEATQ-Challeng.	0.17	0.33	0.55	0.41	0.66	0.31	0.56	0.48	-							
10.GCEATQ-Affil.	0.26	0.35	0.55	0.48	0.59	0.40	0.63	0.36	0.71	-						
11. Fruit/Day	-0.05	0.14	0.07	-0.03	-0.13	0.24	0.10	0.07	-0.05	0.13	-					
12. Vegetables/Day	0.14	0.21	0.05	0.02	-0.32	0.12	0.06	-0.09	-0.05	-0.10	-0.07	-				
13. NHANES-Meat	-0.16	0.08	-0.02	-0.06	-0.08	0.11	0.06	0.06	0.11	0.12	0.17	0.05	-			
14.NHANES-Milk	-0.17	0.15	0.07	-0.22	-0.17	0.12	0.07	0.04	-0.04	-0.00	0.22	-0.03	0.42	-		
15.NHANES-Grain	-0.17	-0.07	-0.10	-0.09	0.04	-0.01	-0.05	0.04	0.03	0.04	0.28	-0.26	0.30	0.38	-	
16.Fat/Day	-0.11	-0.26	-0.09	-0.05	0.24	-0.05	0.01	0.03	0.03	0.12	0.05	-0.27	-0.09	-0.09	0.18	-
17.Fibre/Day	-0.04	0.07	0.08	-0.05	-0.05	0.30	0.11	0.10	0.01	0.05	0.35	0.09	0.08	0.03	-0.01	-0.03

Note. GCEATQ = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). *Weig. Man.* = Weight Management. *Ill Heal A.* = Ill Health Avoidance. *Revitaliz.* = Revitalization. *Appear.* = Appearance. *Soc. Rec.* = Social Recognition. *Pos.Heal.* = Positive Health. *Enjoy.* = Enjoyment. *Health P.* = Health Pressure. *Challeng.* = Challenge. *Affil.* = Affiliation. *NHANES* = National Health and Nutrition Examination Survey (National Centre for Health Statistics, 1999-2000). Correlations are significant $|0.26 - 0.82|$ (two-tailed) at $p < 0.01$ and are also significant when $|0.20 - 0.25|$ (two-tailed) at $p < 0.05$.

Table 7

Bivariate correlations between healthy eating motives and healthy eating goals

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. REBS-Amotivation	-															
2.REBS- Extrinsic	0.23	-														
3. REBS-Introjected	0.12	0.43	-													
4. REBS-Identified	-0.11	-0.01	0.28	-												
5. REBS-Integrated	-0.02	0.06	0.28	0.60	-											
6. REBS-Intrinsic	-0.15	0.09	0.18	0.51	0.69	-										
7.GCEATQ-Weig. Man.	0.05	0.20	0.37	0.40	0.41	0.38	-									
8.GCEATQ-Ill Heal A.	-0.04	0.12	-0.02	0.42	0.46	0.46	0.20	-								
9.GCEATQ-Revitaliz.	-0.05	0.27	0.29	0.48	0.49	0.55	0.19	0.54	-							
10.GCEATQ-Appear.	0.03	0.23	0.49	0.37	0.39	0.45	0.54	0.27	0.48	-						
11.GCEATQ-Soc. Rec.	0.25	0.52	0.45	0.21	0.17	0.19	0.20	0.14	0.39	0.46	-					
12.GCEATQ-Pos.Heal.	-0.18	0.09	0.08	0.55	0.52	0.52	0.16	0.61	0.65	0.25	0.12	-				
13.GCEATQ-Enjoy.	-0.10	0.22	0.31	0.57	0.63	0.68	0.22	0.52	0.82	0.43	0.36	0.76	-			
14.GCEATQ-Health P.	0.11	0.33	0.06	0.26	0.27	0.28	0.15	0.52	0.32	0.24	0.43	0.34	0.36	-		
15.GCEATQ-Challeng.	0.03	0.43	0.37	0.33	0.32	0.43	0.17	0.33	0.55	0.41	0.66	0.31	0.56	0.48	-	
16.GCEATQ-Affil.	0.04	0.34	0.37	0.38	0.45	0.51	0.26	0.35	0.55	0.48	0.59	0.40	0.63	0.36	0.71	-

Note. REBS = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). Correlations are significant |0.26 – 0.76| (two-tailed) at $p < 0.01$ and are also significant when |0.20 – 0.25| (two-tailed) at $p < 0.05$.

Table 8

Multiple regression predicting physical activity behaviour (GLTEQ-METS)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. BREQ2-Amotivation	-0.06	-0.54	0.59	-0.49	0.00
2.BREQ2- Extrinsic	-0.19	-1.58	0.12	-0.42	0.02
3.BREQ2- Introjected	0.01	0.06	0.95	0.29	0.00
4.BREQ2- Identified	0.18	1.17	0.24	0.76	0.01
5. BREQ2-Intrinsic	0.30	2.26	0.03	0.77	0.04
6. GCEQ-Social Affiliation	-0.17	-1.25	0.22	0.17	0.01
7. GCEQ-Image	0.13	1.13	0.26	0.26	0.01
8. GCEQ-Health Management	-0.13	-1.03	0.31	0.28	0.01
9. GCEQ-Social Recognition	0.18	1.20	0.24	0.26	0.01
10. GCEQ-Skill Development	0.12	0.95	0.35	0.37	0.01

Note. BREQ2 = Behaviour Regulation in Exercise Questionnaire-2 (Markland & Tobin, 2004). *GCEQ* = Goal Content for Exercise Questionnaire (Sebire et al., 2008). *GLTEQ-METS* = Godin Leisure Time Exercise Questionnaire (Godin & Shephard, 1985). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 9

Multiple regression predicting physical activity behaviour (GLTEQ-SWEAT)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. BREQ2-Amotivation	-0.09	-0.92	0.36	-0.45	0.01
2.BREQ2- Extrinsic	-0.23	-2.05	0.04	-0.38	0.03
3.BREQ2- Introjected	0.01	0.04	0.97	0.26	0.00
4.BREQ2- Identified	0.44	3.02	0.00	0.69	0.07
5. BREQ2-Intrinsic	-0.09	-0.68	0.50	0.70	0.00
6. GCEQ-Social Affiliation	-0.18	-1.34	0.19	0.16	0.01
7. GCEQ-Image	-0.13	-1.16	0.25	0.24	0.01
8. GCEQ-Health Management	0.15	1.24	0.22	0.26	0.01
9. GCEQ-Social Recognition	0.11	0.74	0.46	0.24	0.00
10. GCEQ-Skill Development	0.11	0.94	0.35	0.33	0.01

Note. BREQ2 = Behaviour Regulation in Exercise Questionnaire-2 (Markland & Tobin, 2004). *GCEQ* = Goal Content for Exercise Questionnaire (Sebire et al., 2008). *GLTEQ-SWEAT* = Godin Leisure Time Exercise Questionnaire Sweat Indicator (Godin & Shephard, 1985). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.01$ (two-tailed) and is also significant at $p < 0.05$ (two-tailed).

Table 10

Multiple regression predicting healthy eating behaviour (Fruit/Day)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	-0.12	-1.08	0.28	-0.44	0.01
2.REBS- Extrinsic	-0.09	-0.67	0.51	-0.38	0.00
3. REBS-Introjected	-0.05	-0.39	0.70	-0.31	0.00
4. REBS-Identified	0.09	0.59	0.56	0.33	0.00
5. REBS-Integrated	0.03	0.20	0.85	0.27	0.00
6. REBS-Intrinsic	-0.01	-0.07	0.94	0.23	0.00
7.GCEATQ-Weight Management	-0.09	-0.65	0.52	-0.11	0.00
8.GCEATQ-Ill Health Avoidance	-0.07	-0.48	0.63	0.31	0.00
9.GCEATQ-Revitalization	0.06	0.31	0.76	0.16	0.00
10.GCEATQ-Appearance	-0.00	-0.02	0.98	-0.06	0.00
11.GCEATQ-Social Recognition	-0.15	-0.88	0.38	-0.30	0.01
12.GCEATQ-Positive Health	0.28	1.52	0.13	0.56	0.02
13.GCEATQ-Enjoyment	-0.28	-1.10	0.28	0.23	0.01
14.GCEATQ-Health Pressure	0.14	1.03	0.31	0.17	0.01
15.GCEATQ-Challenge	-0.21	-1.18	0.24	-0.12	0.01
16.GCEATQ-Affiliation	0.40	2.44	0.02	0.29	0.06

Note. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 11

Multiple regression predicting healthy eating behaviour (Vegetables/Day)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	0.05	0.49	0.63	-0.20	0.00
2.REBS- Extrinsic	-0.12	-0.93	0.35	-0.36	0.01
3. REBS-Introjected	0.17	1.34	0.19	-0.03	0.02
4. REBS-Identified	-0.01	-0.07	0.94	0.26	0.00
5. REBS-Integrated	-0.01	-0.06	0.95	0.35	0.00
6. REBS-Intrinsic	0.33	2.14	0.04	0.49	0.04
7.GCEATQ-Weight Management	0.08	0.66	0.51	0.25	0.00
8.GCEATQ-Ill Health Avoidance	0.24	1.70	0.09	0.38	0.02
9.GCEATQ-Revitalization	0.03	0.18	0.85	0.10	0.00
10.GCEATQ-Appearance	-0.04	-0.26	0.80	0.04	0.00
11.GCEATQ-Social Recognition	-0.40	-2.59	0.01	-0.58	0.06
12.GCEATQ-Positive Health	0.02	0.11	0.92	0.22	0.00
13.GCEATQ-Enjoyment	-0.18	-0.78	0.44	0.11	0.01
14.GCEATQ-Health Pressure	-0.12	-0.92	0.36	-0.17	0.01
15.GCEATQ-Challenge	0.25	1.53	0.13	-0.09	0.00
16.GCEATQ-Affiliation	-0.18	-1.17	0.25	-0.18	0.01

Note. REBS = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 12

Multiple regression predicting healthy eating behaviour (Meat & Alternatives)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	-0.08	-0.72	0.47	-0.35	0.01
2.REBS- Extrinsic	-0.11	-0.83	0.41	-0.21	0.01
3. REBS-Introjected	0.02	0.14	0.89	-0.19	0.00
4. REBS-Identified	-0.04	-0.27	0.79	0.00	0.00
5. REBS-Integrated	-0.03	-0.18	0.86	0.01	0.00
6. REBS-Intrinsic	0.03	0.18	0.86	0.16	0.00
7.GCEATQ-Weight Management	-0.25	-1.81	0.07	-0.48	0.03
8.GCEATQ-Ill Health Avoidance	0.02	0.13	0.90	0.17	0.00
9.GCEATQ-Revitalization	-0.22	-1.10	0.28	0.04	0.01
10.GCEATQ-Appearance	0.01	0.08	0.94	-0.16	0.00
11.GCEATQ-Social Recognition	-0.19	-1.15	0.26	-0.08	0.01
12.GCEATQ-Positive Health	0.17	0.94	0.35	0.26	0.01
13.GCEATQ-Enjoyment	-0.06	-0.22	0.83	0.19	0.00
14.GCEATQ-Health Pressure	0.00	-0.01	1.00	0.12	0.00
15.GCEATQ-Challenge	0.33	1.90	0.06	0.44	0.04
16.GCEATQ-Affiliation	0.24	1.43	0.16	0.39	0.02

Note. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 13

Multiple regression predicting healthy eating behaviour (Milk & Alternatives)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	-0.12	-1.14	0.26	-0.33	0.01
2.REBS- Extrinsic	0.11	0.84	0.41	-0.10	0.01
3. REBS-Introjected	-0.35	-2.66	0.01	-0.64	0.06
4. REBS-Identified	0.05	0.34	0.74	-0.09	0.00
5. REBS-Integrated	-0.28	-1.87	0.07	-0.29	0.03
6. REBS-Intrinsic	-0.14	-0.91	0.37	-0.09	0.01
7.GCEATQ-Weight Management	0.03	0.26	0.80	-0.36	0.00
8.GCEATQ-Ill Health Avoidance	0.10	0.68	0.50	0.23	0.00
9.GCEATQ-Revitalization	0.09	0.49	0.63	0.15	0.00
10.GCEATQ-Appearance	-0.17	-1.23	0.22	-0.43	0.01
11.GCEATQ-Social Recognition	-0.14	-0.92	0.36	-0.29	0.01
12.GCEATQ-Positive Health	-0.08	-0.46	0.65	0.25	0.00
13.GCEATQ-Enjoyment	0.36	1.54	0.13	0.18	0.02
14.GCEATQ-Health Pressure	-0.03	-0.20	0.85	0.03	0.00
15.GCEATQ-Challenge	-0.07	-0.41	0.68	-0.05	0.00
16.GCEATQ-Affiliation	0.24	1.58	0.12	0.06	0.02

Note. REBS = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 14

Multiple regression predicting healthy eating behaviour (Grain Products)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	0.04	0.37	0.72	0.14	0.00
2.REBS- Extrinsic	0.06	0.48	0.63	0.15	0.00
3. REBS-Introjected	-0.03	-0.21	0.83	-0.03	0.00
4. REBS-Identified	0.06	0.41	0.68	-0.12	0.00
5. REBS-Integrated	-0.05	-0.29	0.77	-0.35	0.00
6. REBS-Intrinsic	-0.51	-3.07	0.00	-0.63	0.09
7.GCEATQ-Weight Management	0.05	0.40	0.69	-0.16	0.00
8.GCEATQ-Ill Health Avoidance	-0.04	-0.24	0.81	-0.13	0.00
9.GCEATQ-Revitalization	-0.22	-1.12	0.27	-0.25	0.01
10.GCEATQ-Appearance	0.01	0.05	0.96	-0.22	0.00
11.GCEATQ-Social Recognition	-0.20	-1.21	0.23	0.01	0.01
12.GCEATQ-Positive Health	0.17	0.96	0.34	0.00	0.01
13.GCEATQ-Enjoyment	0.12	0.48	0.63	-0.15	0.00
14.GCEATQ-Health Pressure	0.04	0.27	0.79	0.07	0.00
15.GCEATQ-Challenge	0.13	0.75	0.46	0.08	0.01
16.GCEATQ-Affiliation	0.30	1.81	0.07	0.16	0.03

Note. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.01$ (two-tailed).

Table 15

Multiple regression predicting healthy eating behaviour (Fat)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	-0.05	-0.43	0.67	0.03	0.00
2.REBS- Extrinsic	0.02	0.12	0.90	0.23	0.00
3. REBS-Introjected	-0.08	-0.61	0.54	0.03	0.00
4. REBS-Identified	0.06	0.40	0.69	-0.16	0.00
5. REBS-Integrated	-0.13	-0.86	0.39	-0.39	0.01
6. REBS-Intrinsic	-0.30	-1.86	0.07	-0.42	0.03
7.GCEATQ-Weight Management	-0.13	-0.99	0.33	-0.37	0.01
8.GCEATQ-Ill Health Avoidance	-0.30	-2.08	0.04	-0.40	0.04
9.GCEATQ-Revitalization	-0.19	-1.00	0.32	-0.07	0.01
10.GCEATQ-Appearance	0.06	0.38	0.71	-0.07	0.00
11.GCEATQ-Social Recognition	0.22	1.37	0.17	0.47	0.02
12.GCEATQ-Positive Health	0.16	0.91	0.36	-0.02	0.01
13.GCEATQ-Enjoyment	0.26	1.07	0.29	0.03	0.01
14.GCEATQ-Health Pressure	0.11	0.80	0.43	0.15	0.01
15.GCEATQ-Challenge	-0.03	-0.17	0.87	0.25	0.00
16.GCEATQ-Affiliation	0.18	1.15	0.25	0.25	0.01

Note. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.05$ (two-tailed).

Table 16

Multiple regression predicting healthy eating behaviour (Fibre)

Variables	β	t	p	r_s	$r_{Y,X1(X2)}$
1. REBS-Amotivation	0.15	1.41	0.16	0.02	0.02
2.REBS- Extrinsic	-0.23	-1.83	0.07	-0.32	0.03
3. REBS-Introjected	0.18	1.36	0.18	0.01	0.02
4. REBS-Identified	0.24	1.75	0.08	0.51	0.03
5. REBS-Integrated	-0.20	-1.28	0.21	0.13	0.01
6. REBS-Intrinsic	0.14	0.89	0.38	0.17	0.01
7.GCEATQ-Weight Management	-0.09	-0.72	0.48	-0.08	0.00
8.GCEATQ-Ill Health Avoidance	-0.22	-1.49	0.14	0.15	0.02
9.GCEATQ-Revitalization	0.04	0.23	0.82	0.15	0.00
10.GCEATQ-Appearance	-0.11	-0.78	0.44	-0.09	0.01
11.GCEATQ-Social Recognition	-0.07	-0.46	0.65	-0.09	0.00
12.GCEATQ-Positive Health	0.58	3.32	0.00	0.60	0.10
13.GCEATQ-Enjoyment	-0.38	-1.57	0.12	0.22	0.02
14.GCEATQ-Health Pressure	0.18	1.39	0.17	0.20	0.02
15.GCEATQ-Challenge	-0.01	-0.07	0.95	0.01	0.00
16.GCEATQ-Affiliation	0.10	0.63	0.53	0.09	0.00

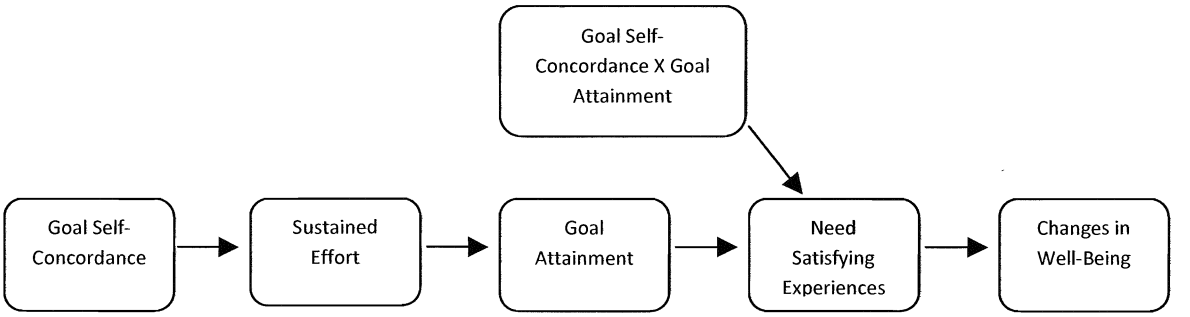
Note. *REBS* = Regulation of Eating Behaviour Scale (Pelletier et al., 2004). *GCEATQ* = Goal Content for Eating Questionnaire (Markland & Ingledew, 1997). β = Beta. t = t-value. p = probability value. r_s = structure coefficient. $r_{Y,X1(X2)}$ = unique variance. R is significant at $p < 0.01$ (two-tailed).

Figure 1

The motivational continuum within SDT (2002).

Figure 2

The Self-Concordance Model (Sheldon, 2002)



Appendix A – Instruments
Section 1: Demographics

This first part of the questionnaire is designed to describe the people participating in this study. All information received is held in confidence. Please provide your...

Age _____ YEARS

Height _____ Feet/inches _____ Metres

Weight _____ Pounds (lbs) _____ Kilogram (Kgs)

Please check one of the following...

What is your gender?

❑ male ❑ female

What is your current marital status?

❑ Married/Common Law ❑ Widowed ❑ Separated/Divorced ❑ Single

What is the highest educational qualification you currently hold?

❑ High School diploma ❑ University/College Degree ❑ Graduate Degree

What is your current employment status?

❑ Full-Time Employed ❑ Part-Time Employed ❑ Unemployed

How would you describe your ethnic origin?

❑ Aboriginal ❑ Caucasian/White ❑ Asian ❑ Other

Please indicate with a check mark if you have any of the following health conditions...

❑ Type 1/2 Diabetes

❑ Cancer If so, please specify what type: _____

❑ Cardiovascular Disease If so, please specify what type: _____

❑ Other Please specify: _____

We would like to know what commercial weight-control program(s) you are enrolled in at this time. This information is only being used to describe the people involved in our study as accurately as possible and is not being used to evaluate the programs listed. Please provide the name (or names) of the commercial weight-loss programs you are currently enrolled in at this time (e.g., Jenny Craig, Weight Watchers, Herbal Magic, etc.) in the space below:

Section 2: Reasons for Physical Activity and Physical Activity Goals

The following questions ask about the reasons why you currently engage in regular physical activity (section 2a) and the physical activity goals that you currently hold or endorse (section 2b).

For the purposes of these questions, physical activity refers to any bodily movement that expends energy. Regular physical activity typically involves the following...

- ✓ Doing physical activities that add up to a total of 30 or more minutes
- ✓ Doing physical activities that are of moderate-to-strenuous intensity such that your heart rate and/or breathing rate increase but don't exhaust you
- ✓ Doing physical activities on 4 or more days of each week

Examples of regular physical activity would include taking a half-hour brisk bike ride at least 4 times per week or completing 3 short but brisk 10 minute walks each day from Monday to Friday.

*Please keep this definition of physical activity in mind as you respond to the following questions.

Section 2a: Why do you participate in physical activity?

Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2; Markland & Tobin, 2004)

The following list identifies reasons why people engage in physical activity. Please indicate on the scale provided how true each statement is for YOU with (0) = Not true for me and (4) = Very true for me.

	Not true for me	Sometimes true for me	Moderately true for me	Often true for me	Very true for me
I feel like a failure when I haven't exercised in a	0	1	2	3	4
I don't see the point in exercising	0	1	2	3	4
I get restless if I don't exercise regularly	0	1	2	3	4
I think it is important to make the effort to exercise regularly	0	1	2	3	4
I find my exercise a pleasurable activity	0	1	2	3	4
It's important to me to exercise regularly	0	1	2	3	4
I get pleasure and satisfaction from participating in	0	1	2	3	4
I feel under pressure from my friends/family to	0	1	2	3	4
I exercise because it is fun	0	1	2	3	4
I exercise because other people say I should	0	1	2	3	4
I feel ashamed when I miss an exercise session	0	1	2	3	4
I exercise because others will not be pleased with me if I don't	0	1	2	3	4
I don't see why I should have to exercise	0	1	2	3	4
I enjoy my exercise sessions	0	1	2	3	4
I think exercising is a waste of time	0	1	2	3	4
I feel guilty when I don't exercise	0	1	2	3	4
I take part in exercise because my friends/family/spouse say I should	0	1	2	3	4
I can't see why I should bother to exercise	0	1	2	3	4
I value the benefits of exercise	0	1	2	3	4

Section 2b: What are your current physical activity goals?

The Goal Content for Exercise Questionnaire (GCEQ; Sebire et al., 2008)

People have a number of different goals that they endorse when engaging in physical activity. We would like to know a little more about YOUR physical activity goals. Please indicate on the scale provided how important each goal is for you with reference to physical activity.

	Not at all important		Moderately important			Extremely important	
...to connect with others in a meaningful manner	1	2	3	4	5	6	7
...to improve the look of my overall body shape	1	2	3	4	5	6	7
...to increase my resistance to illness and disease	1	2	3	4	5	6	7
...to be well thought of by others	1	2	3	4	5	6	7
...to acquire new physical activity skills	1	2	3	4	5	6	7
...to share my physical activity experiences with people that care for me	1	2	3	4	5	6	7
...to improve my appearance	1	2	3	4	5	6	7
...to increase my energy level	1	2	3	4	5	6	7
...to gain favourable approval from others	1	2	3	4	5	6	7
...to learn and exercise new techniques	1	2	3	4	5	6	7
...to develop close friendships	1	2	3	4	5	6	7
...to be slim so to look attractive to others	1	2	3	4	5	6	7
...to improve my overall health	1	2	3	4	5	6	7
...to be socially respected by others	1	2	3	4	5	6	7
...to become skilled at a certain physical activity	1	2	3	4	5	6	7
...to form close bonds with others	1	2	3	4	5	6	7
...to change my appearance by altering a specific area of my body	1	2	3	4	5	6	7
...to improve my endurance, stamina	1	2	3	4	5	6	7
...so that others recognise me as a physically active person	1	2	3	4	5	6	7
...to develop my physical activity skills	1	2	3	4	5	6	7

Section 3: Why do you eat a healthy diet?

The following questions ask about the reasons why you currently eat a healthy diet (section 3a) and goals that you have for healthy eating currently or plan to endorse (section 3b).

For the purposes of these questions, eating a healthy diet refers to following the guidelines set forth in Canada's Food Guide. Everybody is unique in terms of the energy requirements that shape their food intake. In general, healthy eating involves a combination of the following on a regular basis...

- ✓ Eat at least one dark green and orange vegetable each day
- ✓ Choose vegetables and fruit prepared with little or no added fat, sugar or salt.
- ✓ Make at least half of your grain products whole grain each day.
- ✓ Choose grain products that are lower in fat, sugar or salt.
- ✓ Drink skim, 1% or 2% milk each day. Drink fortified soy beverage if you do not drink milk.
- ✓ Select lower fat milk alternatives.
- ✓ Have meat alternatives such as bean, lentils and tofu often.
- ✓ Eat at least two Food Guide Servings of fish each week.
- ✓ Select lean meat and alternatives prepared with little or no added fat or salt.
- ✓ Include a small amount of unsaturated fat each day.
- ✓ Satisfy your thirst with water.
- ✓ Limit foods and beverages high in calories, fat, sugar or salt.

*Please keep this definition of healthy eating in mind as you respond to the following questions.

Section 3a: Why do you eat a healthy diet?

Regulation of Eating Behaviours Scale (REBS; Pelletier et al., 2004)

There are a variety of reasons why people regulate their eating behaviours. Different people have different reasons for eating a healthy diet and we would like to know a little bit more about why you choose to do so currently or would choose to do so in the future. The following questions outline different reasons why you **currently do** or **would** eat a healthy diet. Please indicate (by circling) the extent to which each reason is true for you on the scale provided.

Why are you regulating your eating behaviours?	Does not correspond at all						Corresponds exactly
It's fun to create meals that are good for my health	1	2	3	4	5	6	7
I like to find new ways to create meals that are good for my health	1	2	3	4	5	6	7
I take pleasure in fixing healthy meals	1	2	3	4	5	6	7
For the satisfaction of eating healthy	1	2	3	4	5	6	7
Eating healthy is an integral part of my life	1	2	3	4	5	6	7
Eating healthy is part of the way I have chosen to live my life	1	2	3	4	5	6	7
Regulating my eating behaviours has become a fundamental part of who I	1	2	3	4	5	6	7
Eating healthy is congruent with other important aspects of my life	1	2	3	4	5	6	7
I believe it will eventually allow me to feel better	1	2	3	4	5	6	7
I believe it's a good thing I can do to feel better about myself in general	1	2	3	4	5	6	7
It is a good idea to try and regulate my eating behaviours	1	2	3	4	5	6	7
It is a way to ensure long-term health benefits	1	2	3	4	5	6	7
I don't want to be ashamed of how I look	1	2	3	4	5	6	7
I feel I must absolutely be thin	1	2	3	4	5	6	7
I would feel ashamed of myself if I was not eating healthy	1	2	3	4	5	6	7
I would be humiliated if I was not in control of my eating behaviours	1	2	3	4	5	6	7
Other people close to me insist I do	1	2	3	4	5	6	7
Other people close to me will be upset if I don't	1	2	3	4	5	6	7
People around me nag me to do it	1	2	3	4	5	6	7
It is expected of me	1	2	3	4	5	6	7
I don't know why I bother	1	2	3	4	5	6	7
I can't see what I'm getting out of it	1	2	3	4	5	6	7
I can't see how my efforts to eat healthy are helping my health situation	1	2	3	4	5	6	7
I truly have the impression that I'm wasting my time	1	2	3	4	5	6	7

Section 3b: What are your current healthy eating goals?

Exercise Motivations Inventory-2 (EMI-2; Markland & Ingledew, 1997) modified to the Goal Content for Eating Questionnaire (GCEATQ)

The following questions are a number of statements concerning the goals people often have when asked why they eat a healthy diet. *Whether you currently eat healthy or not*, please read each statement carefully and indicate by circling the appropriate number, whether or not each statement *is true* for you personally, *or would be true* for you personally if you did eat healthy. If you do not consider a statement to be true for you at all, circle the '0'. If you think that a statement is very true for you, circle the '5'. If you think that a statement is partly true for you, then circle the '1', '2', '3', or '4', according to how strongly you feel that it reflects why you eat healthy or might eat healthy. Remember, we want to know why *you personally* choose to eat healthy or might choose to eat healthy, not whether you think the statements are good reasons for *anybody* to eat healthy.

Personally, I eat healthy (or might eat healthy)...	Not at all				Very true	
To stay slim	0	1	2	3	4	5
To avoid ill-health	0	1	2	3	4	5
Because it makes me feel good	0	1	2	3	4	5
To help me look younger	0	1	2	3	4	5
To show my worth to others	0	1	2	3	4	5
To have a healthy body	0	1	2	3	4	5
Because I enjoy the feeling of eating healthy	0	1	2	3	4	5
Because my doctor advised me to eat healthy	0	1	2	3	4	5
To give me goals to work towards	0	1	2	3	4	5
To lose weight	0	1	2	3	4	5
To prevent health problems	0	1	2	3	4	5
To have a good body	0	1	2	3	4	5
To compare my abilities with other peoples'	0	1	2	3	4	5
Because I want to maintain good health	0	1	2	3	4	5
Because I find eating healthy satisfying in and of itself	0	1	2	3	4	5
To enjoy the social aspects of eating healthy	0	1	2	3	4	5
To help prevent an illness that runs in my family	0	1	2	3	4	5
To help control my weight	0	1	2	3	4	5
To avoid heart disease	0	1	2	3	4	5
To recharge my batteries	0	1	2	3	4	5
To improve my appearance	0	1	2	3	4	5
To gain recognition for my accomplishments	0	1	2	3	4	5
To feel more healthy	0	1	2	3	4	5
For enjoyment of the experience of eating healthy	0	1	2	3	4	5
To have fun eating healthy with other people	0	1	2	3	4	5
To help recover from an illness	0	1	2	3	4	5
To look more attractive	0	1	2	3	4	5
To look more attractive	0	1	2	3	4	5
To accomplish things that others are incapable of	0	1	2	3	4	5
Because I feel at my best when eating healthy	0	1	2	3	4	5
To measure myself against personal standards	0	1	2	3	4	5

The final section of this questionnaire asks you to tell us a little bit about your physical activity (Section 4a) and healthy eating behaviours (section 4b). Please recall that...

Physical activity refers to any bodily movement that expends energy. According to Canada's Physical Activity Guide, it is recommended that Canadians engage in daily physical activity that adds up to 60 minutes in duration across the day. This can be done in 10 minute bouts across the space of the day and does not need to be done all in one session. It is recommended that Canadians engage in the following types of physical activity weekly...

- ✓ Endurance activities – to help the heart and lungs stay strong and provide you with more energy. These can range from light activities such as walking to more strenuous activities such as sports or exercise programs.

- ✓ Flexibility activities – to help you move with ease and keep your muscles and joints relaxed and not stiff. These can include activities such as gardening, cleaning, stretching, t'ai chi or some sports like golf and curling.

- ✓ Strength activities – to help our muscles and bones retain strength and improve your overall posture. These activities could include heavy yard work, climbing stairs, weight lifting, or resistance training.

Regular physical activity typically involves the following...

- ✓ Doing physical activities that add up to a total of 60 or more minutes/day
- ✓ Doing physical activities that are of moderate-to-strenuous intensity such that your heart rate and/or breathing rate increase but don't exhaust you
- ✓ Doing physical activities on 4 or more days of each week

Examples of regular physical activity would include taking a half-hour brisk bike ride at least 4 times per week or completing 3-6 short but brisk 10 minute walks each day from Monday to Friday.

*Please keep this definition of physical activity in mind as you respond to the following questions.

Section 4a: Physical Activity behaviour

Godin Leisure Time Exercise Questionnaire (GLTEQ; Godin & Shephard, 1985

Consider a typical week (7 days), how many times on the average do YOU do the following kinds of physical activity for more than 15 minutes during your free time **(write the appropriate number in each box for each level of activity intensity)**?

For example, if you do mild exercise daily, moderate exercise every other day, and no strenuous exercise at all over a typical week...you would write 7 for mild, 3 for moderate, and 0 for strenuous. If you feel that you do none of these activities across a typical week then please write 0 next to the appropriate activity

Intensity of the activity	Times per week
▪ **Mild (minimal effort, no perspiration)** (e.g., yoga, archery, fishing, bowling, horseshoes, golf, snowmobiling, easy walking, light gardening)	
▪ **Moderate (not exhausting, light perspiration)** (e.g., fast walking, tennis, easy bicycling, baseball, volleyball, badminton, easy swimming, alpine (downhill) skiing, social dancing, heavy gardening)	
▪ **Strenuous (exhausting such that your heart beats rapidly, sweating)** (e.g., running or jogging, hockey, soccer, squash, cross country skiing, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training)	

How often per week, during their leisure time, do you engage in regular activity long enough to work up a sweat (i.e., heart beats rapidly)? Please **check only one** of the following three options.

Often	Sometimes	Never/Rarely
☐	☐	☐

The following statements pertain to your physical activity behaviour. Please check only one answer that best describes your current participation in physical activities such as walking, jogging, weight training, gardening, and so on. Please check only one box that best describes your current physical activity participation.

According to the definition provided above, do you participate in regular physical activity?	
Yes, I **have been** regularly physically active for **more than 6 months**	❑
Yes, I **have been** regularly physically active but for **less than 6 months**	❑
No, but I **intend** to participate in regular physical activity in the **next 30 days**	❑
No, but I **intend** to participate in regular physical activity in the **next 6 months**	❑

No, and I **do not intend** to participate in regular physical activity in the **next 6 months**	❑

Section 4b: Eating Behaviours

The following questions ask about your eating behaviours. Recall that for the purposes of these questions a healthy diet refers to limiting your salt intake, reducing the portion of foods you eat regular that have a lot of saturated fats, drinking water on a regular basis. Regular healthy eating does not necessarily mean you are on a specific diet or dietary regimen but typically can involve the following...

- ✓ Cutting down on foods containing lots of sugar
- ✓ Reducing daily consumption of foods high in fat particularly saturated fats
- ✓ Avoid snacking between meals
- ✓ Not having seconds and not overeating

*Please keep this definition of healthy eating in mind as you respond to the following questions.

Fruits and Vegetables Screening Measure (Prochaska & Sallis, 2004)

In a typical day, how many servings of fruit do you eat?				
• One serving of fruit is equal to 1 medium piece of fresh fruit OR ½ a cup of fruit salad OR ¼ a cup of dried fruit OR 6 oz. of 100% orange/grapefruit/apple juice (please don't count fruit punch, lemonade, Gatorade, Sunny Delight, or fruit drink)				
0 (None)/day	1/day	2/day	3/day	4/day (or more)
❑	❑	❑	❑	❑
In a **typical day**, how many **servings of vegetables** do you eat?				
• One serving of vegetables is equal to 1 medium carrot or other fresh vegetable OR 1 small bowl of green salad OR ½ a cup of fresh or cooked vegetables OR ¾ of a cup of vegetable soup (please don't count French fries, onion rings, potato chips, or fried okra)				
0 (None)/day	1/day	2/day	3/day	4/day (or more)
❑	❑	❑	❑	❑

The following statements pertain to your eating behaviours and food choices that comprise your diet. Please check only one answer that best describes your current eating behaviours.

According to the definition provided above, do you regularly eat a healthy diet?	
Yes, I **have been** eating a healthy diet for **more than 6 months**	❑
Yes, I **have been** eating a healthy diet but for **less than 6 months**	❑
No, but I **intend** to eat a healthy diet in the **next 30 days**	❑
No, but I **intend** to eat a healthy diet in the **next 6 months**	❑
No, and I **do not intend** to eat a healthy diet in the **next 6 months**	❑

The National Health and Nutrition Examination Survey (NHANES 1999-2000; National Centre for Health Statistics).

The next questions are about the **amount** of different foods you typically eat in an average day. Considering only the past 12 months, on an **average day**, how many **servings** of the following kinds of foods do you eat?

Example: If you never eat any type of milk and alternatives (e.g., cheese, yogurt, fortified soy beverage, etc.) or avoid consuming milk and alternatives altogether then you would place a "0" in the number of servings/day column.

Type of Food	Number of servings/day
1. Meat and alternatives An example of one serving equals: Cooked fish, shellfish, poultry, lean meat 75 g (2 ½ oz.)/125 mL (½ cup) Cooked legumes 175 mL (3/4 cup) Tofu 150 g or 175 mL (¾ cup) Eggs 2 eggs Peanut or nut butters 30 mL (2 Tbsp) Shelled nuts and seeds 60 mL (¼ cup)	
2. Milk and alternatives An example of one serving equals: Milk or powdered milk (reconstituted) 250 mL (1 cup) Canned milk (evaporated) 125 mL (½ cup) Fortified soy beverage 250 mL (1 cup) Yogurt 175 g (¾ cup) Cheese 50 g (1 ½ oz.)	

3. Grain Products An example of one serving equals: Bread 1 slice (35 g) Bagel ½ bagel (45 g) Flat breads ½ pita or ½ tortilla (35 g) Cooked rice, bulgur or quinoa 125 mL (½ cup) Cereal Cold: 30 g Hot: 175 mL (¾ cup) Cooked pasta or couscous 125 mL (½ cup)	

In a typical day, overall would you say that your diet is high, medium, or low in fat?

Low	Medium	High	Don't
❑	❑	❑	❑

In a typical day, overall would you say that your diet is high, medium, or low in fibre?

Low	Medium	High	Don't
❑	❑	❑	❑