

APPLICATION OF SOCIAL
COGNITIVE THEORY TO THE
STUDY OF WALKING FOR
ACTIVE TRANSPORTATION

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By

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ABSTRACT

Active transportation (AT) is a form of physical activity involving human-powered transportation (e.g., walking) and is associated with health benefits. However, the majority of Canadians do not use AT. Although environmental factors, such as proximity, are correlated with AT, interventions to change such factors have been ineffective. According to social cognitive theory, both environmental and personal factors (i.e., social and spatial cognitions) may influence motivated behaviour. The social cognitions of interest in the present study included self-regulatory efficacy to schedule (i.e., confidence to regularly schedule walking for AT), and to overcome barriers (i.e., confidence to cope with barriers to walking for AT). Spatial cognitions included distance and travel time cognitions. The purpose of the study was to examine whether social cognitive personal factors (i.e., scheduling self-efficacy, barriers self-efficacy), spatial cognitive personal factors (i.e., distance and travel time cognitions), and an environmental factor (i.e., proximity) were associated with walking for AT to/from a university campus over a two-week period in a convenience sample of adults. Participants in this prospective observational study were a convenience sample of 105 students, faculty, and staff at a western Canadian university, who ranged in age from 17 to 55 years ($M = 24.62$ years, $SD = 8.15$). Participants completed three online surveys over a two-week period. Social cognitions for the following two-week period and spatial cognitions were assessed at Time 1. Recall of walking for AT to/from a university campus in the previous week was assessed at Time 2 and Time 3. Total walking for AT to/from campus over the two-week period was the outcome variable. The overall hierarchical multiple regression model predicting AT from the social and spatial cognitions and proximity was significant ($R^2_{\text{adjusted}} = .53$; $p < .01$). As hypothesized, scheduling ($\beta_{\text{std}} = .44$, $p < .01$) and barriers ($\beta_{\text{std}} = .23$, $p < .05$) self-efficacy were associated with AT. Scheduling self-efficacy was the strongest predictor. Contrary to hypotheses, distance and travel time cognitions and proximity were not significant (p 's $> .05$). Social cognitions, particularly self-regulatory efficacy to schedule, and efficacy to overcome barriers, may play an important role in individuals' use of walking for AT to/from a university campus. Future research should continue to examine social cognitive-theory based personal and environmental predictors of AT, such as self-regulatory efficacy to goal set, outcome expectations, the weather and residential density, to better understand potential determinants of this health-promoting type of physical activity.

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1 INTRODUCTION

Active transportation (AT) involves any form of human-powered transportation, such as walking (i.e., the focus of the present study) or cycling, and is a type of physical activity (Craig et al., 2003; Public Health Agency of Canada, 2007; von Huth Smith, Borch-Johnsen, & Jørgensen, 2007). In North America, trips involving walking for AT have decreased over the last 10 years while automobile trips and time dedicated to transportation via automobiles have increased (Go for Green, 2004; Robinson & Godbey, 1999). In 2007, Canadians made an average of six trips per day by car of distances less than three kilometers, which is an approximately 30 minute walk or less (Public Health Agency of Canada, 2007). Both time spent transporting oneself in a car and car ownership are positively associated with obesity and obesity risk (Bell, Ge, & Popkin, 2002; Frank, Andresen, & Schmid, 2004).

In contrast, 15 to 30 minutes of walking or cycling for AT on a daily basis is associated with health benefits, such as reductions in body mass index (i.e., BMI), waist circumference, and blood lipid profiles (i.e., total cholesterol, low density lipoprotein cholesterol, and triglycerides) (Barengo, Kastarinend, Lakkaa, Nissinenc, & Tuomilehtoe, 2006; Hu, Pekkarinen, Hänninen, Tian, & Guo, 2001; Hu et al., 2002; von Huth Smith et al., 2007; Wagner et al., 2001). Unfortunately, although Canadians are willing to engage in AT, willingness does not typically translate into the use of AT (Go for Green, 2004). For example, 82% of Canadians stated a willingness to increase their walking for AT (Go for Green, 1998). However, in a different study, only 6.6% of Canadians reported walking for AT on a regular basis (Statistics Canada, 2001). Perhaps individuals live too far away from routine destinations, such as their workplaces, a shopping center, or a recreation facility, to engage in AT. However, 54% of Canadian adults live within walkable distances (i.e., within a 2.5 kilometer radius/25 minute walk) to routine destinations (Go for Green, 1998).

1.1 Active Transportation and the Built Environment

Given the low levels of AT (Go for Green, 1998), identification of correlates is needed. To date, the majority of research has focused on aspects of the built environment including proximity (i.e., the shortest network route between different land uses), land use (i.e., the different uses of physical space, such as residential, office, retail, and public space), street

connectivity (i.e., directness or ease of travel between two points), and residential density (i.e., number of residential dwellings in an area of land) (Bourdeaudhuij, Sallis, & Saelens, 2003; Saelens, Sallis, & Frank, 2003). These aspects have been significantly and consistently associated with AT among adults (Bourdeaudhuij et al., 2003; Frank, 2000; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Saelens et al., 2003).

Thus, a movement exists to change the built environment in order to increase the use of AT (Road Map 2020, 2007). Specific examples include the construction of walking trails, use of traffic speed reducing measures, and increased mixed land use. Such changes involve a lengthy process with considerable planning and effort (Schafer & Victor, 2000). However, by only focusing on changing the built environment to increase the use of AT, the intuitively appealing but unsubstantiated assumption of “if you build it, they will come” prevails (Foster & Hillsdon, 2004).

This assumption, applied to the context of the present thesis, would be that if walkable environments were present, individuals would choose to walk as their means of transport. However, research has demonstrated that built environment changes have limited effectiveness in increasing levels of AT (Foster & Hillsdon, 2004; Morrison, Petticrew, & Thomson, 2003; Ogilvie, Egan, Hamilton, & Petticrew, 2004). Unanswered questions remain in the literature about the underlying reason(s) for this ineffectiveness (Foster & Hillsdon, 2004), especially considering that aspects of the built environment correlate consistently and significantly with AT (Bourdeaudhuij et al., 2003; Frank, 2000; Owen et al., 2004; Saelens et al., 2003).

1.2 Social Cognitive Theory-Based Explanation for the Ineffectiveness of Changes to the Built Environment on Active Transportation

One reason for the limited effectiveness may be the failure to also take into account the impact that individuals' personal, inner factors have on whether they pursue motivated behaviour (e.g., AT) (Bandura, 1986). According to social cognitive theory (Bandura, 1986), individuals are not automatically shaped and controlled by environmental stimuli nor are they solely motivated to pursue behaviour by personal, inner forces. Rather, according to the social cognitive theory proposition of triadic reciprocity, behaviour, environmental factors, and personal factors, such as social and spatial cognitions, act as reciprocal, interacting determinants of each other. Thus, in the case of AT, environmental and personal factors could both operate as determinants depending on the situation. The environment should serve as the overriding

determinant when environmental factors act as powerful constraints, such as during extreme weather. When environmental constraints are weak, personal factors should serve as the predominant influence on behaviour.

To date, there is limited theoretically-based research concerning the correlates of AT. The advantage to this type of research is that once consistent correlates of behaviour have been identified, interventions can be designed, based on the theory, to target the correlates and, potentially impact behaviour (Baranowski, Anderson, & Carmack, 1998). Despite the lack of social cognitive theory-based investigations, some research has examined what could be conceptualized as personal factors (i.e., social and spatial cognitions) as correlates of AT.

1.3 Social Cognitions and Active Transportation

Social cognitions are defined as “how people make sense of others (person perception) and themselves (self-regulation)” (Conner & Norman, 2005, p. 5). Kitamura, Mokhtarian, and Laidet (1997) demonstrated that in an adult population in the San Francisco Bay area, attitude (i.e., a social cognition) was the best predictor of walking for AT. The multiple regression model also included other social-ecological predictors, such as aspects of the built environment (i.e., residential density, public transit accessibility, mixed land use, and presence of sidewalks) and socioeconomic status. Bourdeaudhuij, Teixeira, Cardon, and Deforche (2005) examined social-ecological factors related to AT. They demonstrated that in adult populations in Belgium and Portugal, environmental factors, such as residential density, mixed land use, and the availability of sidewalks, explained eight percent of the variance in AT. However, in the same predictive model, social cognitive factors, including social norms, social support from family and friends, task self-efficacy, and perceived benefits and barriers, explained an additional 42% of the variance.

Thus, in the limited, but available research on social-ecological correlates of AT, social cognitive factors account for more variance in AT than aspects of the built environment (Bourdeaudhuij et al., 2005; Kitamura et al., 1997). To extend the research and to provide a more theoretically-based (Bandura, 1986) understanding of potential influences on the use of AT, further examination of social cognitions is warranted. According to social cognitive theory, personal efficacy beliefs, which revolve around confidence to exercise control over one’s health habits, are a core social cognitive determinant (Bandura, 2004). In particular, one must have the efficacy to perform a variety of self-regulatory skills across a number of behavioral domains in

order to engage in motivated health behaviours. This type of efficacy is termed self-regulatory efficacy (Bandura, 1986; 1997; Maddux & Gosselin, 2003).

1.4 Self-Regulatory Efficacy

Walking for AT requires an individual to self-regulate a variety of behaviours so that AT can occur. Self-regulation “involves the self acting on itself to alter its own responses with the goal of producing the desired outcome” (Baumeister & Vohs, 2003, p. 199). In the case of engaging regularly in AT (i.e., the desired outcome), one may need to self-regulate across several domains of behavioural performance, such as the scheduling of AT into the day, overcoming barriers (e.g., lack of time), and setting weekly goals (Brawley, Rejeski, & King, 2003; McAuley & Mihalko, 1998; McAuley, Pena, & Jerome, 2001; Meichenbaum & Turk, 1987). To persistently and regularly engage in self-regulation, one must also be confident in one’s skills and abilities to perform various self-regulatory behaviours. As an individual becomes more confident in one’s skills and abilities to self-regulate, the individual is expected to exert more effort in achieving desired outcomes and remain persistent and task-diagnostic when challenges to self-regulation are encountered (Bandura, 1997; Maddux & Gosselin, 2003).

The self-regulatory beliefs that were of interest in the present study included efficacy in skills and abilities to schedule walking for AT to/from a university campus for work/school and to overcome barriers to walking for AT to/from a university campus. Self-regulatory efficacy regarding the scheduling of walking AT is conceptualized as confidence in the skills and abilities to organize, plan, and schedule regular walking for AT into one’s life (cf. Ducharme & Brawley, 1995; McAuley & Mihalko, 1998). Barriers self-efficacy is conceptualized as confidence in skills and abilities to engage in regular walking for AT in the face of barriers/impediments to the behaviour (cf. Ducharme & Brawley, 1995; McAuley & Mihalko, 1998).

Examination of self-regulatory efficacy for scheduling walking for AT and for overcoming barriers to walking for AT has not been undertaken. However, research has examined barriers to AT (Crawford, Mutrie, & Hanlon, 2001; Shannon et al., 2006). For example, Shannon et al. (2006) examined barriers to walking and biking for AT in a sample of students and staff at an Australian university. Examples of barriers included a lack of safety due to vehicular traffic, inclement weather, the physical effort required, needing a change of clothes, and the necessity to take children to daycare. Irregular users, compared to regular users, of AT

reported barriers as being significantly more important. The conclusion was that a focus on reducing barriers would be an effective intervention strategy to promote AT.

However, inspection of the mean scores revealed that most barriers were reported as being below the midpoint of the measurement scale (i.e., closer to the “*not at all important*” end), regardless of whether individuals were irregular or regular users of AT. Thus, despite the finding of differences, both groups did not report the barriers as being important, which makes questionable the study conclusion that an effective intervention strategy should target a reduction in barriers. This type of interpretation problem in relation to the identification of problematic barriers is common across numerous barrier studies in the physical activity domain (see Brawley, Martin, & Gyurcsik, 1998 for a review).

Further, attempts to identify problematic barriers through Likert-type scales does not provide any information on which barriers individuals may have difficulty in overcoming (Brawley et al., 1998). For example, although an individual may report a barrier, such as a lack of time, as being very important on a Likert-type scale, that same individual may have high efficacy to overcome the barrier, thereby negating the impact of the barrier on behaviour (cf. self-efficacy theory: Bandura, 1997; Brawley et al., 1998). Thus, assessment of barriers self-efficacy is a key component to better understanding the impact of barriers on motivated behaviour (Brawley et al., 1998).

Despite the lack of research on self-regulatory efficacy to overcome barriers to AT and to schedule AT, these efficacy beliefs are consistent correlates of various other types of physical activity. For example, in a sample of adults engaged in structured exercise classes, efficacy to perform a variety of self-regulatory behaviors, including scheduling and overcoming barriers, as well as goal setting and relapse prevention, were significant, independent predictors of exercise frequency (Woodgate, 2006). Scheduling self-efficacy alone (Rodgers & Sullivan, 2001; Woodgate, Brawley, & Weston, 2005), barriers self-efficacy alone (Garcia & King, 1991; Gyurcsik, Bray, & Brittain, 2004; Martin, McCaughtry, & Shen, 2008, Woodgate, 2006), and both scheduling and barriers self-efficacy (Brawley & Poag-Ducharme, 1993; Ducharme, & Brawley, 1995; Woodgate, 2006) have predicted leisure-time physical activity across a variety of populations, such as children, first-year university students, adults, and older adults. Considering the breadth of past research in the larger physical activity domain showing that both scheduling and barriers self-efficacy are consistently associated with behaviour (see McAuley & Mihalko,

1998 for a review) and the key role that self-regulatory efficacy beliefs have in influencing behaviour (Bandura, 2004), these social cognitions are expected to predict walking for AT to/from a university campus in the present study.

1.5 Spatial Cognitions in Active Transportation Research

Spatial cognitions are defined as “the knowledge and internal or cognitive representation of the structure, entities and relations of space” (Hart & Moore, 1973, p. 248). The literature acknowledges that spatial behavior (i.e., navigation through one’s environment) is based on what is perceived to exist and what has been experienced rather than on the objective environment (Golledge & Stimson, 1997). Of particular interest in the spatial cognitive literature are distance and travel time cognitions.

Distance cognitions capture an individual’s perceptions of distance information relating to one’s geographic environment (Lloyd, 1997). In AT, distance cognitions involve an individual’s cognitions of the distance to/from a destination. Such cognitions are based on an individual’s creation of a cognitive map of one’s environment (Lloyd, 1997). Although research is limited, distance cognitions have been found to be distinct from objective assessments of distance (i.e., proximity) as well as to be associated with the use of AT and transportation mode choice (Lloyd, 1997; McCormack, Cerin, Leslie, DuToit, & Owen, 2008; Shannon et al., 2006; Socialdata Australia, 2000).

McCormack et al. (2008) demonstrated that in a sample of adults in South Australia, distance cognitions did not consistently converge with/reflect the objectively measured distance (i.e., proximity). Specifically, individuals tended to overestimate proximity to close destinations (e.g., park, library) of less than 375 meters. These distance cognitions were associated with a decrease in the odds of walking for AT. Individuals tended to have more accurate distance cognitions when actual distances (i.e., proximity) ranged from 750 to 1500 meters. Such distance cognitions were associated with higher odds of walking for AT. Further, in both instances, distance cognitions and proximity predicted the use of AT to some of the same destinations, such as a grocery store, as well as to different destinations. For example, proximity, but not distance cognitions, predicted AT to the post office. The findings suggest distance cognitions and proximity should be examined as distinct predictors of AT.

Travel time cognitions capture an individual’s cognitions of travel time information relating to one’s geographic environment (Lloyd, 1997). In AT, travel time cognitions involve an

individual's perceptions of the time it would take to travel from one destination to another destination. Travel time cognitions correlate with transportation mode choice (Fuji, Gärling & Kitamura, 2001; Socialdata Australia, 2000). Fuji et al. (2001) demonstrated that in a sample of adults in Osaka, Japan, individuals who were more likely to commute by car also overestimated commute time if they were to take public transportation. Burnett (1978) found that adult's destination choices were based on travel time cognitions. Thus, extending the findings, it may be reasonable to expect travel time cognitions to predict AT. That is, as individuals expect AT to take longer (i.e., as travel time cognitions increase), the use of AT should decrease.

1.6 Study Purpose and Hypotheses

Although walking for AT is associated with health benefits (Barengo, et al., 2006; Hu et al., 2001; Hu et al., 2002; von Huth Smith et al., 2007; Wagner et al., 2001), the majority of Canadians do not engage regularly in this type of physical activity (Go for Green, 2004; Statistics Canada, 2001). Although aspects of the built environment, such as proximity, are consistently correlated with AT (Bourdeaudhuij et al., 2003; Frank, 2000; Owen et al., 2004; Saelens et al., 2003), interventions to change such aspects are largely ineffective (Foster & Hillsdon, 2004; Morrison, et al., 2003; Ogilvie, et al., 2004). In addition to environmental factors, personal factors may be associated with an individual's use of walking for AT (Bandura, 1986).

Thus, the purpose of the present theory-based study was to examine whether social cognitive personal factors (i.e., scheduling self-efficacy, barriers self-efficacy), spatial cognitive personal factors (i.e., distance and travel time cognitions), and an environmental factor (i.e., proximity) were associated with walking for AT to/from a university campus over a two-week period in a convenience sample of adults. Walking for AT to/from a university campus was selected as the outcome variable in the present study, as opposed to, for example, walking for AT to other destinations, such as a grocery store, for one primary reason. The present study involved a prospective observational design, which included the assessment of social cognitions for the following two-weeks and the assessment of behaviour over these two-weeks. In this two-week time span, walking for AT to a routine daily destination was needed to ensure that the behaviour was somewhat challenging so that the social cognitive responses did not ceiling out (i.e., due to a behaviour being more easily performed, such as walking to buy groceries one day in a week) and to obtain variability in both the social cognitive and behavioural measures.

According to theory (Bandura, 1986), environmental factors are expected to be the

overriding predictors of behaviour when environmental constraints are powerful. In contrast, personal factors should serve as the predominant predictors when environmental constraints are weak. These theoretical propositions suggest the need for a hierarchical multiple regression analysis when examining potential predictors of walking for AT to/from a university campus (cf. Cohen, Cohen, West & Aiken, 2003; Tabachnik & Fidell, 2006). In such analysis, the most theoretically important predictors are entered first in the model as hypothesized, followed by predictors hypothesized as being of less importance being entered next, and entry continues in this fashion (i.e., “the least is last” guideline, Cohen et al., 2003).

Thus, the specific aim of the present study was to use a hierarchical multiple regression analysis to determine whether the personal factor of scheduling self-efficacy, followed by the personal factor of barriers self-efficacy, followed by the spatial cognitive personal factors, followed by the environmental factor were associated with walking for AT to/from a university campus over a two-week period. Personal factors were expected to be the strongest predictors of walking for AT to/from the university campus. Proximity, the environmental factor, was assumed not to be a powerful constraint since an inclusion criterion for study participation was that participants had to report living within a walkable distance to/from the university campus. This criterion was needed to ensure that participants had a realistic opportunity to walk for AT, and to provide answers regarding their self-efficacy to schedule AT and to overcome barriers to AT (cf. Bandura, 1997).

Specific study hypotheses were that self-efficacy to schedule and to overcome barriers would be the strongest predictors of walking for AT to/from the university campus followed by the spatial cognitive personal factors and then the environmental factor. According to theory (Bandura, 1986; 2004), self-regulatory efficacy is a key determinant of engagement in motivated behavior. Further, these self-regulatory efficacy beliefs have consistently predicted other types of physical activity (Brawley & Poag-Ducharme, 1993; Ducharme & Brawley, 1995; Garcia & King, 1991; Gyurcsik et al., 2004; McCaughtry & Shen, 2008; Poag-DuCharme & Brawley, 1993; Rodgers & Sullivan, 2001; Woodgate et al., 2005, Woodgate, 2006). Based on past research (McCormack et al., 2008; Socialdata Australia, 2000), and tenets in social cognitive theory (Bandura, 1986), the spatial cognitive personal factors of distance cognitions and travel time cognitions were hypothesized to predict walking for AT to/from the university campus. Although proximity was assumed not to serve as a powerful constraint, it was still expected to

predict walking for AT to/from the university campus since past research has shown that individuals who lived within a walkable distance to routine destinations may still not engage in AT (McCormack et al., 2008).

2 METHODS

2.1 Participants and Design

Participants were a volunteer convenience sample of 105 students, faculty, and staff at a western Canadian university. Ages of the participants ranged from 17 to 55 years ($M = 24.62$ years, $SD = 8.15$). The majority of participants were female ($n = 73$; 69.52%), White ($n = 97$; 92.38%), and single ($n = 69$; 65.71%; see Table 1). Full-time university students comprised the majority of the sample ($n = 87$; 82.85%). The mean BMI of the participants, calculated from self-reported height and weight, was 25.13 kg/m^2 ($SD = 4.83 \text{ kg/m}^2$). Please see Table 1 for all of the demographic characteristics of the study sample.

This study used a two-week prospective observational design. Prospective observational studies are naturalistic in design and allow the researcher to establish a temporal relationship between variables (Ray, 2003). This type of design was needed to address the study purpose of whether social cognitive personal factors (i.e., scheduling self-efficacy, barriers self-efficacy), spatial cognitive personal factors (i.e., distance and travel time cognitions), and an environmental factor (i.e., proximity) were associated with walking for AT to/from a university campus over a two-week period in a convenience sample of adults.

Table 2.1. Demographic Characteristics of the Study Participants

Demographic Characteristics	<i>n</i>	Percent
GENDER		
Female	73	69.52
Male	32	30.47
COLLEGE		
Arts and Science	56	53.33
Medicine	9	8.57
Graduate Studies	9	8.57
Kinesiology	8	7.61
Engineering	4	3.80
Business	2	1.90
Agriculture	2	1.90
Education	2	1.90
Veterinary Medicine	2	1.90
Law	1	0.95
Dentistry	1	0.95
Pharmacy/Nutrition	1	0.95
EMPLOYMENT/STUDENT STATUS		
Full-time student	87	82.85
Staff	11	10.47
Faculty	4	3.80
Part-time student	2	1.90
MARITAL STATUS		
Single	69	65.71
Not married but living with partner	19	18.09
Married	15	13.76
Widowed	1	0.95
RACE		
White	97	92.38
Chinese	3	2.85
South Asian	2	1.90
First Nations, Métis, or Inuit	2	1.90
West Asian	1	0.95
Arab	1	0.95
Black	1	0.95
INCOME		
\$0-9,999	26	24.76
\$10,000-19,999	21	20.00
\$20,000-29,999	15	13.76
\$30,000-39,999	4	3.80
\$40,000-49,999	5	4.76
\$50,000-59,999	6	5.71
\$60,000-69,999	5	4.76
\$70,000-79,999	3	2.85
\$80,000+	18	17.14

2.2 Procedures

Ethical approval for the study was obtained from the University of Saskatchewan Behavioural Research Ethics Board prior to participant recruitment (see Appendix A). Participants were recruited from a western Canadian university via announcements made by the researcher in classrooms and via the campus web terminal (i.e., PAWS) (see Appendix B for the standard classroom and PAWS announcements). Twenty-four instructors from various Colleges at the university were initially contacted via email 3 weeks prior to the beginning of the study to gain approval for classroom visits (see Appendix C for the course names, disciplines, and levels). Instructors were asked if they would allow the researcher to visit the classroom to make a 5-minute study announcement at the beginning or end of the class(es), depending on which time was most convenient for the instructor. Fourteen of the 24 instructors allowed the researcher to make a study announcement in one or more of their classes. A total of 16 classroom visits were conducted 2 weeks prior to the beginning of the study. During the classroom visits, interested individuals were asked to provide their email addresses on a standard study form. Individuals who provided their email addresses were then emailed two days prior to the opening of Survey 1, with details of the study as well as a link to the online survey that they could access two days hence. The study announcement on PAWS was posted for a five-day period (November 18th – 22nd, 2007). Individuals who were interested in study participation could access directly a link to Survey 1 from the study announcement on PAWS.

Inclusion criteria for study participation included:

1. Being an adult, aged 17 years or older.
2. Being a student, faculty, or staff at the university.
3. Being required to commute to/from the university campus.
4. Not car pooling with others to the university campus.
5. Perceiving that one lived within a walkable distance from one's home to/from the university campus.

Inclusion criteria were assessed through questions on Survey 1 (see Appendix D for participant inclusion criteria questions). Individuals who were not students, faculty, or staff at the university were excluded from study participation because, as stated previously, the behaviour of walking for AT to a routine destination in a two-week time span was needed. Individuals who

lived on-campus were excluded from study participation since they did not have to commute to and from the university campus. Further, individuals who car pooled to the university campus were excluded because proximity and travel time cognitions (i.e., primary independent variables) may not have been reported for a single destination (i.e., point A to point B) but may have been reported for multiple destinations (i.e., point A to point B to point C, etc.) thus creating the potential for error variance in measurement (Rietveld, Zwart, van Wee, & van den Hoorn, 1999). Participants were required to perceive that they lived within a walkable distance to/from the university because social cognitive theory suggests if individuals are inexperienced with a behaviour their self-regulatory efficacy judgments may be equivocal (Bandura, 1997). Thus, including a known source of error in measurement would have called into question the validity and reliability of the self-regulatory efficacy measures (Thomas, Nelson & Silverman, 2005).

Individuals who satisfied participant inclusion criteria were automatically directed to the informed consent page. If informed consent was given (i.e., through the provision of an email address), individuals were then directed to the remainder of Survey 1, which assessed demographics (see Appendix E) and the primary study variables (see Appendices F through H). Individuals who did not meet one or more of the participant inclusion criteria were directed to a webpage informing them that they could not participate in the study and thanking them for their interest.

The study consisted of three web-based surveys examining a two-week period of school/work (i.e., Monday to Friday of each week; 10 days in total). Participants were instructed that they could access the three web-based surveys at any computer with Internet access. Email addresses that participants provided as informed consent were used to match surveys over the three time periods of assessment. Survey 1 (i.e., baseline) assessed participant inclusion criteria, demographics, scheduling self-efficacy, barriers self-efficacy, distance cognitions, and travel time cognitions. Survey 1 was open for a 5-day period (November 18th – 22nd, 2007). Surveys 2 and 3 assessed walking for AT to/from the university during the past week of school/work (i.e., Survey 2: Monday - Friday, November 19th to 23rd, 2007; Survey 3: Monday – Friday, November 26th to 30th, 2007). Survey 2 was opened online one day after Survey 1 was closed (opened November 23rd, 2007) and remained open for a 7-day period (closed November, 29th, 2007). Survey 3 was opened online one day after Survey 2 was closed (opened November 30th, 2007) and remained open for a 22-day period (closed December 21st, 2007). A total AT score

was calculated based on the two weeks of data collection (i.e., based on Surveys 2 and 3). See Figure 2.1 for the timeline of survey administration.

A total of 209 individuals met participant inclusion criteria and began Survey 1. One hundred and fifty five individuals started Survey 2 and 135 individuals started Survey 3. Of these 135 individuals, full data were obtained on 105 individuals. The sample of 105 individuals were the participants in the present study. To determine if study participants ($n = 105$) differed from study dropouts ($n = 74$: individuals who provided data for Survey 1 or Survey 1 and 2), two multivariate analyses of variance (MANOVAs) and one chi-square analysis were conducted. The first MANOVA examined whether the two groups differed in the continuous demographic variables (i.e., age and BMI). The MANOVA was not significant, $F(2, 195) = 1.88$, Wilks' lambda = .98, $p > .05$, indicating that study participants and dropouts did not differ from each other in the continuous demographic characteristics. Chi-square analyses examined whether the two groups differed in the categorical demographic variables (i.e., gender, college, marital status, and income). The chi-square tests were not significant for any of the variables (p 's $> .05$). The second MANOVA examined group differences in the social and spatial cognitions that were assessed on Survey 1. The MANOVA was not significant, $F(4, 59) = 1.42$, Wilks' lambda = .237, $p > .05$.

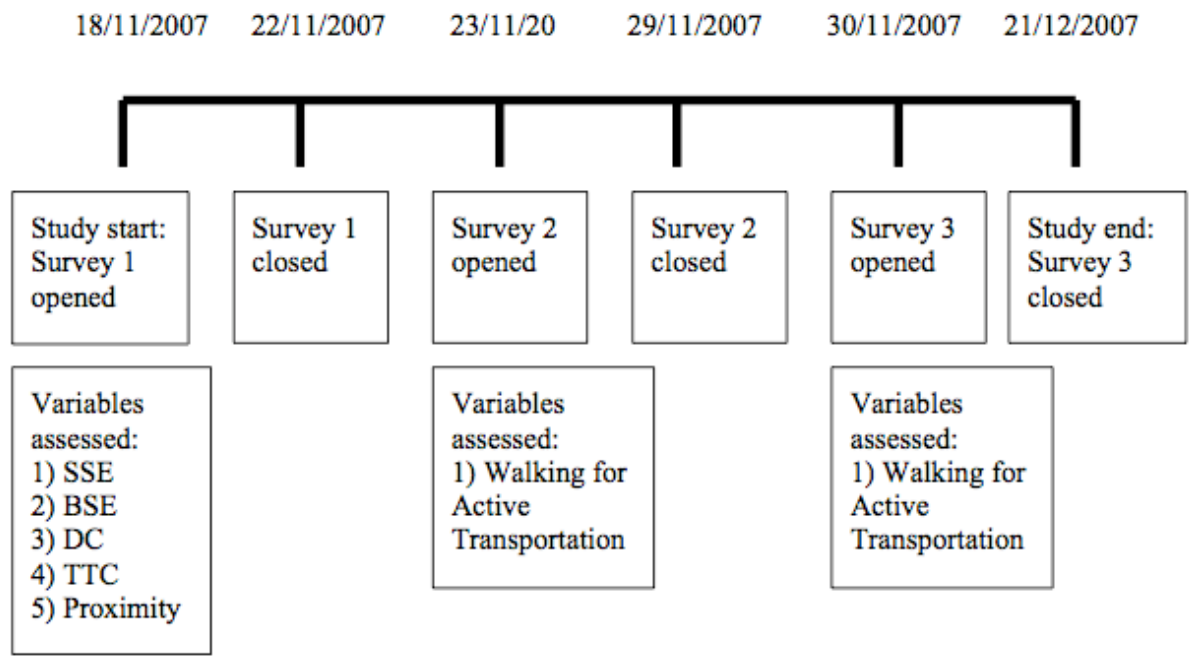


Figure 2.1. Timeline of Survey Administration and Variables Assessed

Note. SSE = Scheduling self-efficacy; BSE = Barriers self-efficacy; DC = Distance cognitions; TTC = Travel time cognitions. Walking for active transportation, assessed on Surveys 2 and 3, were combined into a 2-week overall score, which was used in the analyses.

3 MEASURES

3.1 Self-Regulatory Efficacy

Self-regulatory efficacy to schedule regular walking for AT to/from a university campus and to overcome barriers to walking for AT to/from a university campus for the following two-week period of school/work (i.e., Monday to Friday) were assessed. Since these self-regulatory efficacy beliefs have not been assessed to date in the AT literature, the measures had to be developed for use in the present study. Thus, the scheduling and barriers self-efficacy measures were pilot tested initially. Individuals (N=30) at the university, who were not from the study sample, completed the scheduling and barriers self-efficacy measures and were asked to identify unclearly worded items and if any items should be added to the measures. Based on the pilot testing, variability in responses was evident, no items were reworded or clarified, and no items were added.

3.1.1 Scheduling Self-Efficacy

Scheduling self-efficacy was assessed using five items. Four items were based on a measure of scheduling self-efficacy used in previous research (Woodgate et al., 2005). The wording of the four items was changed to capture efficacy to schedule walking for AT to/from a university campus (see Appendix F; items 2 – 5) versus wording in the original items that captured efficacy to schedule structured exercise sessions (Woodgate et al., 2005). The remaining item was developed for the purpose of the study in order to capture efficacy to plan and organize time around walking for AT to the university (see Appendix F; item 1). An example item read, “*Over the next 2 weeks (Monday to Friday each week), I am confident that I can organize my time around walking for transportation to or from the university no matter what.*” Efficacy for each item was assessed on a 0% (*not at all confident*) to 100% (*completely confident*) scale. An overall mean value for all 5 items was calculated for each participant and used in the analyses. In the current study, Cronbach's alpha for the scheduling self-efficacy measure was acceptable at 0.97 (Nunnally, 1978).

3.1.2 Barriers Self-Efficacy

Barriers self-efficacy was assessed using 7 items. Three items were derived from a previously used measure of exercise-related barriers self-efficacy (Woodgate et al., 2005), but were reworded to reflect overcoming barriers to walking for AT to/from a university campus (see Appendix G; items 1 – 3). Four items (see Appendix G; items 4-7) were based on past AT research that identified barriers (Crawford et al., 2001; Shannon et al., 2006). An example item read, “*Over the next 2 weeks (Monday to Friday each week), I am confident that I can walk to or from the university campus when I have to walk at a dark time of day*”. Efficacy was assessed on a 0% (*not at all confident*) to 100% (*completely confident*) scale. An overall mean value for the 7 items was calculated for each participant and used in the analyses. In the current study, Cronbach's alpha for the barriers self-efficacy measure was acceptable at 0.91 (Nunnally, 1978).

3.2 Distance Cognitions

The open-ended measure of distance cognitions required a participant to report the perceived distance, in kilometers, s/he lived from the university based on the question: “*Please think of the route and mode of transportation you normally take in order to get to the campus. How far (in kilometers) do you live away from the university?*” (see Appendix H). The simple kilometer estimate was an interval method for estimating cognitive distance and was consistent with measures used in past research (Burnett, 1978; Canter & Tagg 1975; Golledge & Stimson, 1997; Lee, 1970).

3.3 Travel Time Cognitions

Similar to past research (Burnett, 1978), travel time cognitions were measured by having a participant report, in an open-ended fashion, “*If you were to walk to the university campus from your home, how long (in minutes) would it take?*” (see Appendix H)

3.4 Proximity

To objectively measure the proximity of a participant's home to the university, each participant indicated her/his postal code in the demographics section of Survey 1 (see Appendix E). Proximity was computed using geographic information systems (GIS; ArcGIS 9.2). The shortest network route between each participant's postal code and a centrally located postal code on the university campus was calculated in kilometers, to the nearest one decimal point. As such, the accuracy of the proximity measure was to the nearest 100 meters. The measurement of

proximity was consistent with past active transportation research using GIS in order to calculate the shortest network route distance (Aultman-Hall, Roorda, & Baetz, 1997; Duncan & Mummery, 2007; McCormack et al., 2008).

3.5 Active Transportation

Each participant recalled her/his transportation mode to or from the university campus over the first week of the study (i.e., Monday to Friday) on Survey 2 and again over the second week of the study on Survey 3. On a calendar of the last week, which included specific dates, each participant selected the type of transportation mode(s) used in order to get to or from the university on each day (i.e., walk, cycle, personal vehicle, public transportation, or other) (see Appendix I). Including specific dates in measures of physical activity has been shown to enhance participant recall and measurement validity (Johnson, Sallis, & Hovell, 2000). A total walking for AT score was calculated by summing the number of days that a participant recalled engaging in walking for AT to/from the university campus over the two weeks. This continuous variable ranged from 0 (*no days of walking for active transportation to/from the university*) to 10 (*walking for active transportation to/from the university on every day*) and was used in the analyses.

3.6 Data Analyses

Data screening and, if needed, cleaning procedures of the primary study variables (i.e., independent variables of scheduling self-efficacy, barriers self-efficacy, distance cognitions, travel time cognitions, proximity, and the dependent variable of walking for AT to/from the university campus) were undertaken first (Tabachnik & Fidell, 2006). Next, descriptive statistics for the primary study variables were computed (i.e., means, standard deviations, skewness, kurtosis, and bivariate correlations). Finally, a hierarchical multiple regression analysis was conducted to predict walking for AT to/from the university campus from the primary independent variables.

Four steps were included in the hierarchical multiple regression analysis (Cohen et al., 2003). Scheduling self-efficacy was entered in the first step followed by barriers self-efficacy on the second step of the regression analysis. These social cognitions were entered in the first two steps owing to the considerable amount of research demonstrating their consistent utility in predicting various other types of physical activity (Ducharme & Brawley, 1995; Gyurcsik, Bray, & Brittain, 2004; Poag-DuCharme & Brawley, 1993; Woodgate et al., 2005) and theory-based

contention that self-regulatory efficacy beliefs are key predictors of motivated behaviour (Bandura, 2004). Scheduling self-efficacy was entered first due to the better correspondence than barriers self-efficacy with the outcome of walking for AT to/from the university campus. That is, since walking for AT takes time each day, individuals need to regulate this action by scheduling AT into their everyday life. In contrast, the barriers included on the barriers self-efficacy measure may not have been barriers that individuals had to overcome regularly/daily to engage in walking for AT. For example, the barrier of bad weather may have not been necessarily present during the entire two-week study period.

The remaining personal factors, distance cognitions and travel time cognitions, were entered in the third step of the analysis. According to social cognitive theory (Bandura, 1986), personal factors may be most predictive of behaviour when environmental factors do not act as powerful constraints on behaviour. In the present study, since all individuals indicated that they lived within a walkable distance to the university (i.e., a participant inclusion criterion), proximity was assumed not to be an extremely powerful constraint. Also, including distance and travel time cognitions in the third step allowed for the examination of whether these spatial cognitions predicted unique variance above what was predicted by the social cognitive variables, which have been well established in physical activity research, in steps 1 and 2. Proximity was entered in the fourth step of the analysis. Standardized beta values, significance levels, and semi-partial correlations were used to interpret the results of the hierarchical multiple regression (Tabachnick & Fidell, 2006).

4 RESULTS

4.1 Data Screening and Cleaning

Missing values within each primary study variable were replaced with the sample mean value of the variable. Replacing missing cases with the sample mean allowed for all of the analyses to proceed, without a reduction in sample size due to listwise deletion during the analyses and did not change mean values for the overall sample (Tabachnik & Fidell, 2006). Table 4.1 shows the variables that contained missing cases. Further, outliers were defined as values being three standard deviations above or below the respective variable sample mean (Tabachnik & Fidell, 2006). No outliers were detected for any of the variables. To ensure that the assumptions of multiple regression were met before completing the analysis, skewness and kurtosis values were calculated for each variable, singularity and multicollinearity were tested, and residual scatter plots were examined to ensure normality, linearity, and homoscedasticity (Tabachnik & Fidell, 2006). These assumptions were not violated.

Table 4.1. Missing Data

Variable	Case #	<i>n</i>	Percent
Scheduling self-efficacy	94, 95	2	1.8
Barriers self-efficacy	37, 65, 101	3	2.7
Distance cognitions	1, 10, 13, 17, 67, 68, 73, 100	8	7.5
Proximity	95, 80, 73, 19, 21, 26, 29, 31	8	7.5

4.2 Descriptives

As seen in Table 4.2, the sample means for the self-regulatory efficacy beliefs (i.e., scheduling and barriers self-efficacy) were above the midpoint of the measurement scale. Thus, participants were slightly more than moderately confident in their abilities to self-regulate (i.e., schedule and overcome barriers) but no ceiling effects were evident. Participants reported living, on average, 2.61 kilometers from the university campus (i.e., distance cognitions) and that walking would take, on average, 25.80 minutes (i.e., travel time cognitions). The mean for

proximity was 2.66 kilometers. Participants reported walking for AT to/from the university campus for nearly half of their trips in the prior two-weeks (i.e., 10 days).

Table 4.2. Descriptives for Primary Study Variables

Variable	Mean	<i>SD</i>	Skewness	Kurtosis
Scheduling self-efficacy	66.40	35.88	-2.13	-1.41
Barriers self-efficacy	63.42	27.35	-2.15	-1.17
Distance cognitions	2.61	1.24	-1.96	-0.06
Travel time cognitions	25.80	12.93	1.82	-1.02
Proximity	2.66	1.22	1.94	0.28
Walking for active transportation	4.60	4.11	0.77	-1.87

Note. Scheduling and barriers self-efficacy were measured on a 0% (not at all confident) to 100% (completely confident) scale. Distance cognitions and proximity were measured in kilometers. Travel time cognitions were measured in minutes. Walking for active transportation to/from the university campus ranged from 0 (no days of walking for active transportation) to 10 (10 days of walking for active transportation).

4.3 Bivariate Correlations

Pearson product bivariate correlations between the primary study variables are shown in Table 4.3. Scheduling and barriers self-efficacy were significantly and positively correlated but not redundant (Tabachnik & Fidell, 2006). Scheduling and barriers self-efficacy were significantly and negatively correlated with travel time cognitions and proximity. Thus, as self-efficacy to schedule and to overcome barriers increased, travel time cognitions and proximity decreased. Further, a significant moderate correlation was found between distance cognitions and proximity, which suggests that perceptions of distance were not redundant with objectively assessed distance. Walking for AT was significantly correlated with all of the study variables except distance cognitions.

Table 4.3. Pearson Bivariate Correlations Among Primary Study Variables

Variable	1	2	3	4	5	6
1. Scheduling self-efficacy	----					
2. Barriers self-efficacy	.79**	----				
3. Distance cognitions	-.12	.04	----			
4. Travel time cognitions	-.47**	-.31**	.51**	----		
5. Proximity	-.43**	-.36**	.42**	.80**	----	
6. Walking for AT	.71**	.62**	-.14	-.44**	-.47**	----

** $p < .01$

4.4 Hierarchical multiple regression predicting 2-week walking for AT

Table 4.4 contains the results from the hierarchical multiple regression analysis predicting 2-week walking for AT. Scheduling self-efficacy was included in the first step of the regression. The overall regression model in Step 1 was significant $F(1, 103) = 109.29, p < .01, R^2_{\text{adjusted}} = .51$. Barriers self-efficacy was included in step 2 of the analysis. The overall model was significant, $F(2, 102) = 59.44, p < .01, R^2_{\text{adjusted}} = .53$. Distance and travel time cognitions were added in step 3 of the analysis. The overall model was significant, $F(4, 100) = 31.24, p < .05, R^2_{\text{adjusted}} = .55$. Proximity was entered in the final step of the analysis. The overall model was significant, $F(5, 99) = 26.05, p < .05, R^2_{\text{adjusted}} = .56$.

In the final model, the social cognitions of scheduling and barriers self-efficacy significantly predicted walking for AT. Examination of the standardized betas and semi partial correlations revealed that scheduling self-efficacy was the strongest predictor ($\beta_{\text{std}} = .44, p < .01$) followed by barriers self-efficacy ($\beta_{\text{std}} = .23, p < .05$; see Table 4.4). The spatial cognitions (i.e., distance and travel time cognitions) and proximity did not predict unique variance as illustrated through the nonsignificant R^2 changes in steps 3 and 4, although proximity approached significance.

Table 4.4. Summary of the Hierarchical Multiple Regression Analysis Predicting 2-Week Walking for AT

Predictor Variable	Unstandardized Beta	Standardized Beta	Sig.	Semi partial correlations
Step 1				
Scheduling self-efficacy	.08	.71	.01**	.71
Step 2				
Scheduling self-efficacy	.06	.52	.01**	.31
Barriers self-efficacy	.03	.24	.03*	.14
Step 3				
Scheduling self-efficacy	.04	.42	.01**	.23
Barriers self-efficacy	.04	.27	.05*	.16
Distance cognitions	.00	.00	.99	.00
Travel time cognitions	-.04	-.15	.09	-.11
Step 4				
Scheduling self-efficacy	.05	.44	.01**	.24
Barriers self-efficacy	.03	.23	.03*	.13
Distance cognitions	.02	.00	.93	.00
Travel time cognitions	.00	-.00	.98	-.00
Proximity	-.65	-.19	.09	-.11

* $p < .05$

** $p < .01$

Note. Step 1: R^2 adjusted = .51 ($p < .01$); Step 2: R^2 adjusted = .53 ($p < .01$), $\Delta R^2 = .02$ ($p < .05$); Step 3: R^2 adjusted = .55 ($p < .01$), $\Delta R^2 = .01$ ($p > .05$); Step 4: R^2 adjusted = .56 ($p < .01$), $\Delta R^2 = .01$ for Step 4 ($p > .05$).

5 DISCUSSION

The purpose of the present theory-based study was to examine whether social cognitive personal factors (i.e., scheduling self-efficacy, barriers self-efficacy), spatial cognitive personal factors (i.e., distance and travel time cognitions), and an environmental factor (i.e., proximity) were associated with walking for AT to/from a university campus over a two-week period in a convenience sample of adults. The hypothesis that scheduling and barriers self-efficacy would be the strongest predictors was supported. Of note, the study findings further illustrated that of the self-regulatory efficacy beliefs, scheduling self-efficacy was the most predictive of walking for AT to/from a university campus.

Using SCT as a basis for speculating why the social cognitions predicted, it is suggested that as individuals became more confident in their skills and abilities to schedule and to overcome barriers, engagement in walking for AT increased. The relationships found in the present study paralleled findings from the larger physical activity research domain, which has consistently found that both scheduling and barriers self-efficacy have been associated with other types of physical activity, such as structured exercise and leisure time activity (e.g., Brawley & Poag-Ducharme, 1993; Ducharme, & Brawley, 1995; Gyuresik et al., 2004; Martin et al., 2008; see McAuley & Mihalko, 1998 for a review). However, the present study was the first to demonstrate that scheduling self-efficacy and barriers self-efficacy were predictors of walking for AT to/from a university campus, which may be considered another type of physical activity (Craig et al., 2003; von Huth Smith et al., 2007).

Self-efficacy theory (Bandura, 1997) may offer some insight into these findings. In particular, in order to engage in a motivated behaviour, such as walking for AT, individuals must not only have the self-regulatory skills to allow them to perform the behavior, such as scheduling, and overcoming demands, but individuals must also have confidence in their skills and abilities to use such skills. High efficacy affords individuals the ability to remain persistently task focused and adopt strategies to successfully self-regulate (Bandura, 1997; 2004; Maddux & Gosselin, 2003). Efficacious individuals may expend considerable effort and persistence in attempts to self-regulate, which should be reflected in a positive relationship between efficacy and behaviour (Bandura, 1997), as illustrated in the present study.

Results of the present study also suggest that efficacy in the self-regulatory skill of scheduling may be an important determinant of walking for AT to a routine destination (i.e., to work at or to attend a university). In particular, transporting oneself on a routine basis to a destination may necessitate the regular use of skills to schedule in one's transportation, particularly in the case of walking for AT, which may require more time than other modes of transportation (e.g., automobile). Thus, efficacy in skills and abilities to schedule would be expected to be correspondent with and predictive of AT (Bandura, 1997). In contrast, in the present study, the barriers that were included in the measure may not have been experienced on a daily, routine basis. Thus, individuals may not have needed to employ their skills to regulate/overcome barriers on a daily basis to engage in walking for AT.

Results from the present study demonstrated that proximity was not associated with walking for AT to/from a university campus. This finding was inconsistent with past research, which has typically found a significant negative relationship between proximity and AT (Bourdeaudhuij et al., 2003; Frank, 2000; Owen et al., 2004; Saelens et al., 2003). There may be at least four explanations for the null result of proximity predicting walking for AT in the present study. First, the variability in the proximity measure did not parallel the variability in the walking for AT measure. Recall that an inclusion criterion for study participation was individuals must have reported living within a walkable distance from home to the university campus. Thus, the inclusion of only these individuals may have caused a ceiling effect in the proximity variable. Due to this ceiling effect, the variability in proximity was limited and did not match the higher variability in walking for AT.

Second, according to social cognitive theory (Bandura, 1986), environmental factors serve as overriding predictors of motivated behaviour, only when such factors are powerful constraints. Alternatively, personal factors serve as overriding predictors when environmental constraints are weak. Findings in the current study may suggest that living within an average proximity of 2.66 kilometers from the university was not a far enough distance to serve as a powerful constraint to walking for AT. Third, the present study was the first to examine social cognitive personal factors, spatial cognitive personal factors, and proximity as predictors of walking for AT. Continued investigation of all social ecological variables is warranted until a better understanding of consistent predictors is obtained, as it would be premature to suggest that any one factor is not important to the performance of walking for AT.

Fourth, the association between proximity and walking for AT may have been impacted by an unmeasured variable(s). For example, the weather (i.e., a physical environment factor) may moderate the relationship between proximity and AT. Although proximity can be assumed to remain constant, whether the weather was good (e.g., a sunny, warm day) versus bad (e.g., a snowstorm) may have impacted whether individuals engaged in walking for AT to/from the university campus. Since no data were collected on the weather in the present study, the potential for weather to serve as moderator warrants further investigation. Given the breadth of past research illustrating a relationship between the environment, including the built and physical environments, and AT (Bourdeaudhuij et al., 2003; Frank, 2000; Nankervis, 1999; Owen et al., 2004; Saelens et al., 2003), more research must be conducted to obtain a better understanding of under which conditions the environment would predict AT, while also taking into account personal factors.

Also of interest in the present study was the moderate bivariate correlation between proximity, an objective measure of distance, and distance cognitions, a cognitive representation of distance. This particular finding illustrated that the two variables were not redundant, which paralleled findings in past AT research (McCormack et al., 2008). Thus, both proximity and distance cognitions should continue to be examined in research until a better understanding is achieved of the potential impact that these variables may have on participants' social cognitions about walking for AT and actual behaviour.

Study findings also illustrated that both distance and travel time cognitions were not associated with walking for AT to/from the university campus, which contrasted evidence from prior AT research (Burnett, 1978; Fuji et al., 2001; Lloyd, 1997; McCormack et al., 2008; Shannon et al., 2006; Socialdata Australia, 2000). Of note, the extant literature has not examined social cognitions in addition to spatial cognitions when predicting AT. Results from the present study raise a question which merits further investigation, specifically, whether social cognitions related to the self-regulation of walking for AT may be the overriding predictors. However, given new literature (McCormack et al., 2008) which suggests that distance and travel time cognitions are correlates of AT, the study of these variables remains an important avenue of future AT research.

5.1 Limitations

Despite the new information that self-regulatory efficacy to schedule and to overcome barriers were predictive of walking for AT, consideration of two study limitations places the findings into context. One study limitation was the inclusion of only one environmental variable (i.e., proximity). The inclusion of additional, known environmental correlates, identified in previous literature such as residential density, mixed land use, and street connectivity (Saelens et al., 2003), may have served as more powerful constraints to walking for AT than proximity (cf. Bandura, 1986). A second study limitation was that the findings pertained mainly to young, Caucasian, female adults. Thus, generalizing the findings to other populations may be premature.

5.2 Contributions to the Literature

Taking these limitations into account, the study findings make at least two important contributions to the AT literature. First, consistent with research recommendations (Heath et al., 2006; Saelens et al., 2003), the use of social cognitive theory (Bandura, 1986) provided the opportunity to advance the understanding of the relationship between personal factors (i.e., social and spatial cognitions), the environment (i.e., proximity), and walking for AT to/from a university campus from a theoretically driven perspective. To date, few AT studies have used theory as a guide. Butz (2006) argued that innovation in the social and health sciences has been driven primarily by tools and methods and less by theoretical advances. The current study was the first to examine one aspect of SCT's triadic reciprocity, which is central to the theory (Bandura, 1986), in the AT context. Overall, the study findings offered new theoretical insight into correlates of walking for AT and, in particular, the potential for understanding how the personal factors of self-regulatory efficacy for scheduling and overcoming barriers may be influencing walking for AT to/from a university campus.

The second contribution was the development and pilot testing of measures to assess self-regulatory efficacy specific to the behavioural domain of walking for the purpose of AT to/from a university campus. Although more work needs to be done, the current study contained the first steps in the establishment of the face validity, construct validity, and predictive validity of the self-regulatory measures. Face validity was addressed through pilot testing and measurement development with experts in the field (Thomas, Nelson & Silverman, 2005). A first step toward construct validity was established by following the guidelines set out by Bandura (1986; 1997) when developing measures of self-regulatory efficacy. Predictive validity was addressed by

demonstrating that the self-efficacy measures predicted walking for AT to/from a university campus (Thomas et al., 2005). The study also provided evidence that these measures were internally consistent (i.e., acceptable Cronbach's alpha values for each measure; Nunnally, 1978).

5.3 Future Directions

The results of the current study provide a number of avenues for future research in the area of AT. A range of participants should be included in future research to determine whether the findings from the present study hold across the spectrum of individuals who can engage in walking for AT. Further, additional environmental correlates of walking for AT identified in previous research (e.g., land use, street connectivity, and weather; Frank, 2000; Nankervis, 1999; Owen et al., 2004; Saelens et al., 2003), should be examined. Such factors should be examined for a direct relationship with walking for AT. Investigations should also focus on whether environmental factors serve as moderators of self-regulatory efficacy beliefs and/or as moderators of other environmental factors (e.g., proximity). For example, scheduling self-efficacy beliefs may change depending on the amount of street connectivity from destination A to B. Destinations with high street connectivity may enhance the relationship between scheduling self-efficacy and walking for AT since walking for AT could be assumed to take less amount of time. Low street connectivity may negatively impact efficacy beliefs and walking for AT. As another example, daily weather and seasonal weather variability have been shown to be related to AT (Nankervis, 1999). Daily and seasonal weather may act as moderators in the relationships between personal factors and the use of walking for AT (e.g., lower self-regulatory efficacy in bad weather leading to lower AT) and in the relationships between built environment factors and behaviour (e.g., proximity and AT).

Additional personal factors may also be worthy of future investigation. Factors such as outcome expectations for walking for AT, task self-efficacy, motives as well as other components of self-regulatory efficacy, such as goal setting, and self-monitoring have been shown to predict other types of physical activity (Culos-Reed, Gyurcsik & Brawley, 2001; Sallis & Owen, 1998; Trost, et al. 2002). In relation to motives, it would be of particular interest to examine the overarching reason(s) why individuals engage in AT. For example, Kitamura et al. (1997) demonstrated that individuals who held pro-environment, pro-transit, and suburbanite attitudes engaged in the use of AT. Broad motives, such as pro-environment, may be early

factors that initially motivate individuals to use AT, whereas self-regulation and related efficacy may be more important in the long term use of AT (Bandura, 1997).

Controlling for past AT behaviour in the prediction of current AT behaviour would be of interest, particularly among individuals who have regularly engaged in AT. Indeed, past behaviour impacts current behavioural performance (Weinstein, 2007). Thus, not controlling for past behaviour in experienced AT users runs the risk of inflating the true association between social cognitions and current AT behaviour (Weinstein, 2007). In contrast, when examining a study population that is initiating the use of AT, then assessment of past behaviour would not be needed, with the association between social cognitions and current AT behaviour being more prominent and accurate (Weinstein, 2007)

AT research also should move from correlational study designs to prospective and manipulation study designs. These designs should be driven by theory (Baranowski et al., 1998; Butz, 2006) and would begin to establish causal relationships. For example, if the relationship found in the current study between barriers self-efficacy and walking for AT to/from a university campus receives more consistent research support, then an intervention can be designed to improve barriers self-efficacy beliefs. Such an intervention could use self-efficacy theory (Bandura, 1997) as a guide in the developmental stages. Namely, based on theory (Bandura, 1997), the intervention could help individuals improve upon their self-regulatory skills to overcome barriers by helping them learn, practice, and experience mastery around overcoming barriers and preventing lapses in the use of AT (Cramp & Brawley, 2006). Enhancing efficacy would be expected to lead to higher behaviour (i.e., AT).

Future research should also focus on predicting other types of AT (i.e., biking) as well as other aspects of walking for AT. The current study focused on walking for AT to/from a particular routine destination (i.e., a university campus). Future research should examine whether the relationships found in the present study consistently predict other types of AT and/or other aspects of walking for AT (e.g., to a grocery store). Taken together, better understanding potential theory-based social ecological correlates of AT is worthy of continued investigation (Bandura, 2004). Regular engagement in health behaviours, including AT, is dependent upon not only personal, individual level factors but social and physical environmental factors. Indeed, better understanding the range of theory-based personal and environmental factors that

consistently predict AT may lead to a social ecological design in the examination of future interventions that attempt to promote AT (cf. Baranowski et al., 1998; Butz, 2006).

REFERENCES

- Aultman-Hall, L., Roorda, M., & Baetz, B. (1997). Using GIS for evaluation of neighbourhoods pedestrian accessibility. *Journal of Urban Planning and Development*, *123*, 10–17.
- Bandura, A. (1986). *Social foundations of thought and action*. New York: Prentice-Hall.
- Bandura, A. (1997). *Self-efficacy. The exercise of control*. New York: W.H. Freeman and Company.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior*, *31*, 143-164.
- Baranowski, T., Anderson, C., & Carmack, C. (1998). Mediating variable framework in physical activity interventions. How are we doing? What might we do better? *American Journal of Preventive Medicine*, *15*, 266-297.
- Barengo, N. C., Kastarinend, M., Lakkaa, T., Nissinenc, A., & Tuomilehtoe, J. (2006). Different forms of physical activity and cardiovascular risk factors among 24–64-year-old men and women in Finland. *European Journal of Cardiovascular Prevention and Rehabilitation*, *13*, 51–59.
- Baumeister, R. F., & Vohs, K. D. (2003). Self-regulation and the executive function of the self. In M.R. Leary, & J.N. Tangney (Eds.), *Handbook of Self and Identity* (1st edition, pp. 197-217). New York: The Guilford Press.
- Bell, C. A., Ge, K., & Popkin, B. M. (2002). The road to obesity or the path to prevention: Motorized transportation and obesity in China. *Obesity Research*, *10*, 277-283.
- Bourdeaudhuij, I. D, Sallis, J. F., & Saelens B. E. (2003). Environmental correlates of physical activity in a sample of Belgian adults. *American Journal of Health Promotion*, *18*, 83-92.
- Bourdeaudhuij, I. D., Teixeira, P. J., Cardon, G., & Deforche, B. (2005). Environmental and

- psychosocial correlates of physical activity in Portuguese and Belgian adults. *Public Health Nutrition*, 8, 886-895.
- Brawley, L.R., Martin, K.A., & Gyurcsik, N.C. (1998). Problems in assessing perceived barriers to exercise: Confusing obstacles with attributions and excuses. In J. Duda (Ed.). *Advances in sport and exercise psychology measurement* (pp. 337-350). Morgantown, WV: Fitness Information Technology.
- Brawley, L. R., & Poag-Ducharme, K. A. (1993). Self-efficacy for exercise and perceived barriers: predicting exercise adherence in community fitness programs for young/elderly adults. *Canadian Fitness and Lifestyle Research Institute*, Technical Report no. 1064-0042-2055.
- Brawley, L. R., Rejeski, W. J., & King, A. C. (2003). Promoting physical activity for older adults: The challenges for changing behavior. *American Journal of Preventive Medicine*, 25, 172-183.
- Burnett, P. (1978). Time cognition and urban travel behaviour. *Human Geography*, 60, 107-115.
- Butz, W. P. (2006). Some frontiers in social science. *Science*, 312, 1989-1990.
- Canter, D., & Tagg, S. K. (1975). Distance estimation in cities. *Environment and Behaviour*, 7, 59-80.
- Cohen, J., Cohen, P., West, S.G., & Aiken, L.S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences*. New Jersey: Lawrence Erlbaum Associates.
- Conner, M., & Norman, P. (2005). *Predicting Health Behaviour: Research and practice with social cognition models* (2nd edition). Bell & Bain Ltd. Glasgow, UK.
- Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., et al. (2003). International Physical Activity Questionnaire: 12 country reliability and validity. *Medicine and Science in Sports and Exercise*, 35, 1381-1395.

- Cramp, A. G., & Brawley, L. R. (2006). Moms in motion: A group mediated cognitive-behavioral physical activity intervention. *International Journal of Behavioral Nutrition and Physical Activity*, 3, 23-32.
- Crawford, F., Mutrie, N., & Hanlon, P. (2001). Employee attitudes towards active commuting. *International Journal of Health Promotion and Education*, 39, 14–20.
- Culos-Reed, N. S., Gyurcsik, N. C., & Brawley, L. R. (2001). Using theories of motivated behavior to understand physical activity. In R. N. Singer, H. A. Hausenblaus, C. M. Janelle. (Eds.), *Handbook of Sport Psychology* (pp. 695-717). Toronto, Ontario: John Wiley & Sons.
- Ducharme, K. A., & Brawley, L. A. (1995). Predicting the intentions and behavior of exercise initiates using two forms of self-efficacy. *Journal of Behavioral Medicine*, 18, 479-497.
- Duncan, M. J., & Mummery, K. W. (2007). GIS or GPS? A comparison of two methods to assess route taken during active transportation. *American Journal of Preventive Medicine*, 33, 51-53.
- Foster, C., & Hillsdon, M. (2004). Changing the environment to promote health enhancing physical activity. *Journal of Sports Sciences*, 22, 755-769.
- Frank, L. D. (2000). Land use and transportation interaction: implications on public health and quality of life. *Journal of Planning Education and Research*, 20, 6–22.
- Frank, L. D., Andresen, M. A., & Schmid, T. L. (2004). Obesity relationships with community design, physical activity, and time spent in cars. *American Journal of Preventive Medicine*, 27, 87–96.
- Fuji, S., Gärling, T., & Kitamura, R. (2001). Changes in drivers' perception and use of public transportation: Effects of temporary structural change on cooperation in a real-life social

- dilemma, *Environment and Behaviour*, 33, 796-808.
- Garcia, A., & King, A. (1991). Predicting long-term adherence to aerobic exercise: A comparison of two models. *Journal of Sport and Exercise Psychology*, 13, 394-410.
- Go for Green. (1998). National Survey on Active Transportation, Envirionics.
- Go for Green. (2004). National Survey on Active Transportation, Envirionics.
- Golledge, R. G., & Stimson, R. J. (1997). *Spatial behavior: A geographic perspective*. New York: The Guilford Press.
- Gyurcsik, N. C., Bray, S. R., & Brittain, D. R. (2004). Coping with barriers to vigorous physical activity during transition to university. *Family and Community Health*, 27, 130-142.
- Hart, R. A., & Moore, G. T. (1973). The development of spatial cognition: A review. In R. M. Downs & D. Stea (Eds.), *Image and Environment: Cognitive Mapping and Spatial Behavior* (pp. 246-288). Chicago: Aldine.
- Heath, G. W., Brownson, R. C., Kruger, J., Miles, R., Powell, K. E., Ramsey, L. T., & the Task Force on Community Preventive Services. (2006). The effectiveness of urban design and land use and transport policies and practices to increase physical activity: A systematic review. *Journal of Physical Activity and Health*, 3, S55-S76.
- Hu, G., Pekkarinen, H., Hänninen, O., Tian, H., & Guo, Z. (2001). Relation between commuting, leisure time physical activity and serum lipids in a Chinese urban population. *Annals of Human Biology*, 28, 412 – 421.
- Hu, G., Pekkarinen, H., Hänninen, O., Yu, Z., Guo, Z., & Tian, H. (2002). Commuting, leisure-time physical activity, and cardiovascular risk factors in China. *Medicine and Science in Sports and Exercise*, 34, 234–238.
- Johnson, M.F., Sallis, J.F., & Hovell, M.F. (2000). Self-report assessment of walking: Effects of

- aided recall instructions and item order. *Measurement in Physical Education and Exercise Science*, 4(3), 141-155.
- Kitamura, R., Mokhtarian, P. L., & Laidet, L. (1997). A micro-analysis of land use and travel in five neighborhoods in the San Francisco bay area. *Transportation*, 25, 125-158.
- Lee, T. (1970). Perceived distance as a function of direction in the city. *Environment and Behaviour*, 2, 40-51.
- Lloyd, R. (1997). *Spatial cognitions: Geographic environments*. Boston: Kluwer Academic Publishers.
- Maddux, J. E., & Gosselin, J. T. (2003). Self-efficacy. In M.R. Leary & J.P. Tangney (Eds.), *Handbook of Self and Identity* (pp. 128-238). New York, The Guilford Press.
- Martin, J. J., McCaughtry, N., & Shen, B. (2008). Predicting physical activity in Arab American school children. *Journal of Teaching in Physical Education*, 27, 205-219.
- McAuley, E., & Mihalko, S. L. (1998). Measuring exercise-related self-efficacy. In J. L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 371-381). Morgantown, WV: Fitness Information Technology.
- McAuley, E., Pena, M. M., & Jerome, G. (2001). Self-efficacy as a determinant and an outcome of exercise. In G. C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 235-261). Champaign, IL: Human Kinetics.
- McCormack, G. R., Cerin, E., Leslie, E., Du Toit, L., & Owen, N. (2008). Objective versus perceived walking distance to destinations: Correspondence and predictive validity. *Environment and Behavior*, 40, 401-425.
- Meichenbaum, D., & Turk, D. C. (1987). Teaching self-regulatory skills. In D. Meichenbaum & D.C. Turk (Eds.), *Facilitating Treatment Adherence* (pp. 185-202). New York, Plenum

Press.

- Morrison, D. S., Petticrew, M., & Thomson, H. (2003). What are the most effective ways of improving population health through transport interventions? Evidence from systematic reviews. *Journal of Epidemiology and Community Health, 57*, 327-333.
- Nankervis, M. (1999). The effect of weather and climate on bicycle commuting. *Transportation Research Part A, 33*, 417-431.
- Nunnally, J. C. (1978). *Psychometric theory*. Toronto: McGraw-Hill Book Company.
- Ogilvie, D., Egan, M., Hamilton, M., & Petticrew, M. (2004). Promoting walking and cycling as an alternative to using cars: systematic review. *Behavioral Medicine Journal, 329*, 763-767.
- Owen, N., Humpel, N., Leslie, E., Bauman, A., & Sallis, J. F. (2004). Understanding environmental influences on walking: Review and research agenda. *American Journal of Preventive Medicine, 27*, 67-76.
- Poag-DuCharme, K. A., & Brawley, L. R. (1993). Self-efficacy theory: use in the prediction of exercise behavior in the community setting. *Journal Applied Sport Psychology, 5*, 178 – 194.
- Public Health Agency of Canada. (2007). *What is active transportation?* Retrieved August, 29, 2007, from http://www.phac-aspc.gc.ca/pau-uap/fitness/active_trans.htm.
- Ray, W. J. (2003). *Methods: Toward a science of behavior and experience*. Scarborough, ON: Thomson/Wadsworth.
- Rietveld, P., Zwart, B., van Wee, B., & van den Hoorn, T. (1999). On the relationship between travel distance and travel time of commuters. *The Annals of Regional Science, 33*, 269-287.

- Road Map 2020. (2007). *Working for a sustainable Saskatoon*. Retrieved August 30, 2007, from <http://www.roadmap2020.ca/index.html>.
- Robinson, J. P., & Godbey, G. G. (1999). *Time for life: the surprising ways Americans use their time*. University Park: Pennsylvania State University Press.
- Rodgers, M. W., & Sullivan, M. J. L. (2001). Task, coping and scheduling self-efficacy in relation to frequency of physical activity. *Journal of Applied Social Psychology, 31*, 741-753.
- Saelens, B. E., Sallis, J. F., & Frank, L. D. (2003). Environmental correlates of walking and cycling: Findings from the transportation, urban design and planning literatures. *Annals of Behavioral Medicine, 25*, 89-91.
- Sallis, J. F., & Owen, N. (1998). *Physical activity and behavioral medicine*. Thousand Oaks: Sage Publications.
- Schafer, A., & Victor, D. G. (2000). The future mobility of the world population. *Transportation Research Part A, 34*, 171-205.
- Shannon, T., Giles-Corti, B., Pikora, T., Bulsara, M., Shilton, T., & Bull, F. (2006). Active commuting in a university setting: Assessing commuting habits and potential for modal change. *Transport Policy, 13*, 240–253.
- Socialdata Australia. (2000). *Potential Analysis 'Perth'*, Retrieved March 26, 2008, from, http://www.dpi.wa.gov.au/mediafiles/tsmart_report.pdf.
- Statistics Canada. (2001). *Census: analysis series - Where Canadians work and how they get there*, Retrieved August, 29, 2007, from, <http://www12.statcan.ca/english/census01/products/analytic/companion/pow/pdf/96F0030XIE2001010.pdf>.

- Tabachnik, B. G., & Fidell, L. S. (2006). *Using multivariate statistics* (5th edition). Boston: Pearson/Allyn & Bacon.
- Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2005). *Research methods in physical activity*. Champaign, IL: Human Kinetics.
- Trost, S. G., Owen, N., Bauman, A. E., Sallis, J. F., & Brown, W. (2002). Correlates of adults participation in physical activity: Review and update. *Medicine and Science in Sport and Exercise*, 34, 1996-2001.
- von Huth Smith, L., Borch-Johnsen, K., & Jørgensen, T. (2007). Commuting physical activity is favourably associated with biological risk factors for cardiovascular disease. *European Journal Epidemiology*, 22, 771-779.
- Wagner, A., Simon, C., Ducimetiere, P., Montaye, M., Bongrad, V., Yarnell, et al. (2001). Leisure-time physical activity and regular walking or cycling to work are associated with adiposity and 5y weight gain in middle-aged men: the PRIME study. *International Journal of Obesity*, 25, 940-948.
- Weinstein, N. D. (2007). Misleading tests of health behaviour theories. *Annals of Behavioral Medicine*, 33, 1-10.
- Woodgate, J. (2006). Self-efficacy theory and the self-regulation of exercise behaviour. Ph.D. dissertation, University of Waterloo (Canada), Canada. Retrieved June 9, 2008, from *Dissertations & Theses: Full Text database*. (Publication No. AAT NR14464).
- Woodgate, J., Brawley, L. R., & Weston, Z. J. (2005). Maintenance cardiac rehabilitation exercise adherence: Effects of task and self-regulatory self-efficacy. *Journal of Applied Social Psychology*, 35, 183-197.

APPENDICES

APPENDIX A

Certificate of Approval



Certificate of Approval

PRINCIPAL INVESTIGATOR
Nancy Gyurcsik

DEPARTMENT
Kinesiology

BEH#
07-147

INSTITUTION(S) WHERE RESEARCH WILL BE CONDUCTED (STUDY SITE)
University of Saskatchewan
Saskatoon SK

STUDENT RESEARCHERS
Dan Fuller

SPONSOR
UNFUNDED

TITLE
The effects of social cognitions, weather, and distance on individual's choice of transportation mode and physical activity

APPROVAL DATE	EXPIRY DATE	APPROVAL OF:
17-Jul-2007	16-Jul-2008	Application Recruitment Material Consent Form Questionnaires

CERTIFICATION

The University of Saskatchewan Behavioural Research Ethics Board has reviewed the above-named research project. The proposal was found to be acceptable on ethical grounds. The principal investigator has the responsibility for any other administrative or regulatory approvals that may pertain to this research project, and for ensuring that the authorized research is carried out according to the conditions outlined in the original protocol submitted for ethics review. This Certificate of Approval is valid for the above time period provided there is no change in experimental protocol or consent process or documents.


Any significant changes to your proposed method, or your consent and recruitment procedures should be reported to the Chair for Research Ethics Board consideration in advance of its implementation.

ONGOING REVIEW REQUIREMENTS

In order to receive annual renewal, a status report must be submitted to the REB Chair for Board consideration within one month of the current expiry date each year the study remains open, and upon study completion. Please refer to the following website for further instructions: <http://www.usask.ca/research/ethical.shtml>



 John Rigby, Chair
 University of Saskatchewan
 Behavioural Research Ethics Board

 18/07

 Signature Date

Please send all correspondence to:

Ethics Office
 University of Saskatchewan
 Room 306 Kirk Hall, 117 Science Place
 Saskatoon SK S7N 5C8
 Telephone: (306) 966-2084 Fax: (306) 966-2069

APPENDIX B

Classroom and PAWS Recruiting Announcement

Classroom Announcement

Hi, my name is Daniel Fuller,

I am involved in a study examining some of the reasons why individuals chose a certain mode of transportation over another. We are especially interested in why people do or do not choose walking as a mode of transportation. We are interested in finding out how your thoughts, the weather, and how far you live from campus may influence your choice of transportation mode and physical activity.

We are looking for:

- Students, Faculty and Staff
- Individuals who do not reside on the university campus

Participation in the study is voluntary. If you choose to participate you will be asked to complete 3 surveys over the next 2 weeks. The three surveys will take a total of 25 minutes to complete.

If you want more information, contact

Daniel Fuller

Email: dlf545@mail.usask.ca

Phone: 966-1123

PAWS Announcement

ONLINE SURVEY: How Do You Get To Campus?

University of Saskatchewan students, faculty and staff, I am inviting you to participate in a research study looking at psychological and environmental factors that influence walking for transportation. Everyone can participate, it doesn't matter if you drive, take the bus, walk, cycle or otherwise. If you want to participate, you will fill out a 15 minute questionnaire online during the week of November 18th, followed by two 10 minute questionnaires on Friday November 23rd and Friday November 30th, respectively.

If you are interested in completing this study, you may access the survey now at

<http://www.barnzilla.ca/survey/>

For more information contact:

Daniel Fuller, College of Kinesiology, University of Saskatchewan 87 Campus Drive, Saskatoon SK. S7N 5B2 Tel: 306-966-1123 Email: dlf545@mail.usask.ca

APPENDIX C

Course Name, Subject, and Course Level

Course Name	Subject and Level
Introduction to the Engineering Profession	General Engineering 101
Introduction to Sociology	Sociology 110
General Physics	Physics 111
Price Theory & Resource Allocation	Economics 111
Literature & Composition	English 110
Literature & Composition	English 110
General Psychology	Psychology 110
General Biology	Biology 110
Family	Sociology 207
Social Control	Sociology 214
Collective Behaviour	Sociology 224
Collective Behaviour	Sociology 224
Introduction to Cultural Anthropology	Anthropology 111
General Psychology	Psychology 110
Personal Health and Lifestyles	Health Science 120
Physical Activity for Persons with Impairment	Kinesiology 423

APPENDIX D

Participant Inclusion Criteria Questions

Getting Started

We are trying to figure out what things are associated with whether or not people do active transportation to get to school or work at the University of Saskatchewan. For this study please think of active transportation as only walking to or from the University of Saskatchewan campus. Even if you don't walk for active transportation, we would still like you to do the study.

If you agree to participate in the study, you will be asked to fill out 3 web-based surveys. The three surveys will take approximately 25 minutes to do in total. If you agree to participate, you will be asked to do Survey 1 right now. Then, you will receive an email reminder to do Survey 2 in 5 days from now. In two weeks, another email reminder to do Survey 3 will be sent to you. You will not give your name on the surveys and only University of Saskatchewan researchers will see the surveys. You will be asked to provide your email address on each survey. We will need your email address so that we can match each of your surveys to each other. However, once the study is completed, your email address will be deleted from the data. If you would like to participate in the survey please continue. You will be asked to provide your email address. By providing your email are agreeing to consent to the study.

Are you a student, faculty, or staff at the University of Saskatchewan?

Yes No

Do you live in residence at the University of Saskatchewan?

Yes No

Do you feel that you live within a walkable distance to and from the University of Saskatchewan campus?

Yes No

Email address:

Verify email address:

APPENDIX E

Survey Demographic Questions

- 1) What is your gender (check one)?
 - a) Female
 - b) Male

- 2) What is your College (check one)?
 - a) Arts & Science
 - b) Business
 - c) Agriculture
 - d) Law
 - e) Medicine
 - f) Engineering
 - g) Kinesiology
 - h) Graduate Studies
 - i) Education
 - j) Veterinary Medicine
 - k) Dentistry
 - l) Nursing
 - m) Pharmacy & Nutrition

- 3) What do you do at the University of Saskatchewan (check the one that best describes you)?
 - a) Full time student
 - b) Part time student
 - c) Faculty member
 - d) Staff member
 - e) Other

- 4) What is your age? (e.g., 23 Years) _____ Years

- 5) How tall are you without your shoes? (e.g., 5 Feet 10 Inches) _____ Feet
_____ Inches

- 6) How much do you weigh without your shoes? (e.g., 157 pounds)
_____ pounds

- 7) Regardless of your nationality, which of the following would you use to best describe your ancestry (check all that apply)?
 - a) White
 - b) Chinese
 - c) Black
 - d) Filipino
 - e) Latin American
 - f) Southeast Asian
 - g) South Asian

- h) West Asian
 - i) North American Indian, Metis, or Inuit
 - j) Arab
 - k) Other
- 8) What is your marital status (check one)?
- a) Married
 - b) Divorced
 - c) Widowed
 - d) Single
 - e) Not married, but living with a partner
- 9) What is the approximate range of your household TOTAL INCOME from ALL SOURCES (check one)?
- a) \$0-9,999
 - b) \$10,000-19,999
 - c) \$20,000-29,999
 - d) \$30,000-39,999
 - e) \$40,000-49,999
 - f) \$50,000-59,999
 - g) \$60,000-69,999
 - h) \$70,000-79,999
 - i) \$80,000 or more
- 10) What is your postal code at your current address? (e.g., Z4T6C7, no spaces)
- _____

APPENDIX F

Scheduling Self-efficacy Measure

APPENDIX G

Barriers Self-efficacy Measure

APPENDIX H

Distance and Travel Time Cognitions Measures

Distance Cognitions:

Please think of the route and mode of transportation you normally take in order to get to the campus. How far (in kilometers) do you live away from the university?

Travel Time Cognitions:

If you were to walk to the university campus from your home, how long (in minutes) would it take?

APPENDIX I

Choice of Transportation Mode Question

We are interested in knowing your actual transportation mode to or from the University of Saskatchewan of the past week (Monday to Friday). Please indicate the transportation mode that you used to get to or from the university for each day last week.

Monday November 19, 2007	Tuesday November 20, 2007	Wednesday November 21, 2007	Thursday November 22, 2007	Friday November 23, 2007
Public Transportation	Public Transportation	Public Transportation	Public Transportation	Public Transportation
Walk	Walk	Walk	Walk	Walk
Car	Car	Car	Car	Car
Cycle	Cycle	Cycle	Cycle	Cycle
Other	Other	Other	Other	Other

Monday November 26, 2007	Tuesday November 27, 2007	Wednesday November 28, 2007	Thursday November 29, 2007	Friday November 30, 2007
Public Transportation	Public Transportation	Public Transportation	Public Transportation	Public Transportation
Walk	Walk	Walk	Walk	Walk
Car	Car	Car	Car	Car
Cycle	Cycle	Cycle	Cycle	Cycle
Other	Other	Other	Other	Other