The Relationship of Preferences and Self-Regulation Among Consistent Exercisers

Ashley E. Dorough

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Richard A. Winett, Ph.D., Chair
Eileen S. Anderson, Ed.D., Member
Janet Wojcik, Ph.D., Member

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Abstract

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Previous research, such as 'exercise determinants', has primarily sampled minimally physically active and sedentary people. In turn, studies focused on correlates of and perceived barriers to minimal physical activity (PA). The present study focused on exercisers (N=247, mean age=34) to assess social cognitive variables associated with PA consistency. Participants were categorized as either *inconsistent*, or *slightly, fairly,* or *highly consistent* exercisers. A new *preference* construct (type of activity, environment, social setting, feedback) for exercise was developed, and its association with consistency was assessed. Online measures assessed PA levels, preferences, enjoyment, outcome expectancy, self-efficacy, social-support, self-regulation. Higher planning confidence (β=.333, *p*<.000) and frequency (β=.276, *p*<.000) was associated with higher levels of PA consistency. Planning preference influenced planning frequency (β=.498, *p*<.000). Planning confidence influenced planning preference (β=.187, *p*<.003), which mediated its effect on planning frequency (β=.220, *p*<.000). Goal-setting frequency influenced consistency (β=.279, *p*<.000). Goal-setting preference influenced goal-setting frequency (β=.668, *p*<.000). Tracking frequency influenced consistency (β=.216, *p*<.000). Tracking preference influenced tracking frequency (β=.696, *p*<.000). Tracking confidence influenced tracking preference (β=.517, *p*< .000). Age influenced planning confidence (β=-.147, *p*<.021) and goal-setting confidence (β=-.164, *p*<.01). Engaging in PA in one's preferred environment (β=.540, *p*<.000) or with preferred company (β=.220, *p*<.001) was higher among more consistent exercisers. Using strategies to offset perceived barriers to exercise was highly predictive of consistency (β=.458, *p*<.000). Results suggest interventions should assess and match people to PA preference dimensions (i.e. environment, company, and self-regulation strategies) which will increase their self-regulation and ultimately exercise consistency.

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To my husband, Brad—you challenge me to be a better version of myself. I am persuaded to love you and am your biggest fan.

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The Relationship of Preferences and Self-Regulation Among Consistent Exercisers

Background Significance

Physical activity (PA) is fundamental to health, yet only a small percentage of the population meets minimal guidelines (USDHHS, 2000). The guidelines encourage Americans to accumulate at least 30 minutes of moderate-intensity[1] physical activity on preferably every day of the week (USDHHS, 2000). These levels are consistent with guidelines set forth by the Center for Disease Control and Prevention and the American College of Sports Medicine (ACSM; Pate, Pratt, Blair, Haskell, Macera, Bouchard, et al., 1995). Alternatively, *Healthy People 2010* (*HP 2010*) reported adults should engage in vigorous-intensity[2] physical activity for at least three days a week for 20 minutes.

HP 2010 indicated that only 23% of American adults reported participating in the recommended amount of vigorous physical activity and only 15% reported moderate regular physical activity. An additional 40% do not engage in any regular physical activity (USDHHS, 2000).

One consequence of this sedentary life style is that the prevalence of overweight and obesity has drastically increased. Results from the 1999–2002 National Health and Nutrition Examination Survey (NHANES), using measured heights and weights, estimated that 65 percent

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[1]**Moderate-intensity physical activity** generally requires sustained rhythmic movements and refers to a level of effort equivalent to: 3 to 6 metabolic equivalents (METs); any activity that utilizes 3.5 to 7 Calories per minute (kcal/min); or the effort a healthy individual might expend while walking briskly, mowing the lawn, dancing, swimming, or bicycling on level terrain, for example. A person should feel some exertion but should be able to carry on a conversation comfortably during the activity (USDHHS, 1999).

[2] **Vigorous-intensity physical activity** generally requires sustained, rhythmic movements and refers to a level of effort equivalent to a "perceived exertion" of greater than 6 metabolic equivalents (METs); any activity that burns more than 7 kcal/ min; or the effort a healthy individual might expend while jogging, mowing the lawn with a nonmotorized pushmower, chopping wood, participating in high-impact aerobic dancing, swimming continuous laps, or bicycling uphill, for example. Vigorous-intensity physical activity may be intense enough to represent a substantial challenge to an individual and results in a significant increase in heart and breathing rate (USDHHS, 1999).

of U.S. adults are either overweight (BMI of 25-29) or obese (BMI ≥ 30). America is currently

the most 'overweight' country in the world (USDHHS, 2005a).

National data suggests up to 25% of the nation's deaths caused by chronic diseases can

be attributed to physical inactivity (USDHHS, 2004a). The benefits of exercise include the

prevention of illnesses including cardiovascular diseases such as heart disease and stroke, as well

as Type II diabetes, various cancers (i.e. colon, breast, prostate, lung, pancreas), and premature

mortality. Physical activity also reduces the complications of diabetes, hypertension,

osteoporosis, and obesity and promotes overall psychological well-being through increased

energy levels, enhanced self-image, and improved self-efficacy for managing stress, anxiety, and

depression (Freidenreich & Orenstein, 2002; McTiernan, Ulrich, Slate, & Potter, 1998; cancer

prevention: Lee, Sesso, Oguma, & Paffenbarger, 2003; Michaud, Giovannucci, Willet, Colditz,

Stampfer, & Fuchs, 2001; USDHHS, 2004a; Whitmarsh, 1998).

According to early 2004 estimates, only 30% of Americans meet current guidelines for

physical activity (USDHHS, 2004b). Of those that initiate, only about half attain any significant

health benefits because consistency is minimal, inadequate, or discontinued (Pollock, Gaesser,

Butcher, et al., 1998; USDHHS, 2004a). Discontinuance most often occurs within 3-6 months of

initiation (Dishman, 1991; Robison & Rogers, 1994), with attrition continuing until rates plateau

at 12-24 months (Martin & Dubbert, 1982).

Previous Theories and Studies

Health behavior change has been the challenge addressed by theoretical models such as

the theory of reasoned action (Ajzen & Fishbein, 1980), the protection motivation and social

cognitive theories (Maddux & Rogers, 1983; Bandura, 1986), and the health belief (Proschaska,

DiClemente, & Norcross, 1992), and transtheoretical models of behavior change (Rosenstock,

Strecher, & Becker, 1988). However, much research is needed to delineate intermediary

processes leading to the long-term maintenance of regular physical activity. Programs have been

successful at initiation of PA, but few have shown maintenance. Rothman (2000; Rothman,

Baldwin, & Hertel, 2004) and others (Williams, Anderson & Winett, 2005) attribute the failure

of current health models to explain this lack of maintenance to their failure to distinguish and

account for specific *facilitators* of long-term maintenance. According to Rothman et al. (2004),

different decision factors and processes (e.g. level of expectations, satisfaction, and self-

regulation; Rothman, 2000, 2004; Williams et al., 2005) exist at the initiation and maintenance

stages of behavior change, calling for fresh approaches to identify such differences and reconcile

determinants of progression from initiation, to maintenance, to long-term habit.

Rothman (2004) proposed hypotheses about phases of behavior change. A *maintenance*

phase is characterized by a sustained effort to continue a newly established behavior. The *habit*

phase is characterized by a self-perpetuating pattern of behavior. In other words, to meet criteria,

the behavior has to be performed successfully over an extended period of time (consistency).

Rothman suggests, however, there is a marked difference between the habit and maintenance

phases in the affective relationship with the behavior. According to Rothman (2004) once in the

habit phase, an individual would no longer analyze whether or not being physically active is

worthwhile. Instead, the behavior persists without justification and a person is "less sensitive to

fluctuations in the outcomes afforded by the behavior" (i.e. exercising, p. 138). Rothman

suggests we need to increase our understanding of the self-regulatory and other processes

occurring in the maintenance and habit phases.

Programs that *have* shown modest levels of maintenance of physical activity have

extended treatment across follow-up periods (Duncan, Anton, Sydeman, et al., 2005; Dunn et al.,

1999; Writers Group, 2001). Are these few studies showing long-term outcomes, establishing self-regulatory behaviors during extended care? Are they developing and nurturing this idea of *habit*, or consistency even? Are they considering those successful 'maintainers'' strategies and behaviors to guide theory based on cognitive and behavioral reinforcements?

Affectively, enjoyment and personal preferences have only been considered peripherally; they have not been a focal point of physical activity interventions. By focusing on what *facilitates* people who participate in physical activity over the long-term allows for 'front-end' thinking. Knowing what aids in development of PA consistency is the first step in defining what hinders progress from initiation, to maintenance, to long-term habit. This allows for identification of how a behavior evolves and what patterns are formed to maintain the behavior (Cicchetti & Sroufe, 2000). What we have yet to specify are the facilitators that maintain the path to successful development of consistent physical activity habits; perhaps they include increasing strategies for overcoming or changing the perception of barriers and engaging in PA in ways that one prefers, to increase self-regulation and enjoyment.

Individuals' barriers, real and perceived, to physical activity seem to account for high rates of early recidivism (Keele-Smith & Leon, 2003). There is consistent evidence for the relationship between barriers, satisfaction with PA outcomes, and the maintenance of PA (Sallis & Owen, 1997, 1999; Sullivan, 1998; Rothman, 2000, Rothman et al., 2004; Steptoe, Rink, & Kerry, 2000; Keele-Smith & Leon, 2003). Barriers include lack of time, direction, or support, and additional priorities such as work and family commitments, aversive physical consequences (e.g. injury and induced pain), and dissatisfaction with PA due to unrealistic goals or expectations (Sullivan, 1998; Keele-Smith & Leon, 2003). There is little research, however, investigating successful strategies, how to identify real vs. perceived barriers, or how to negotiate

barriers or manipulate satisfaction with PA to increase exercise maintenance (Dishman &

Buckwoth, 1996).

In addition to confidence in overcoming barriers and satisfaction with PA outcomes,

people are more likely to participate in physical activities they find enjoyable (Leslie et al., 1999;

Sallis & Owen, 1999). In a recent study, Salmon, Owen, Crawford, Bauman, & Sallis (2003)

found enjoyment, preferences, and barriers to be significant predictors associated with PA.

Booth et al. (1997) and Roux, Ubach, Donaldson, & Ryan (2004) also found preferences played

an important role in PA (Salmon et. al., 2003; Booth, Bauman, Owen, Gore, 1997). In these

studies, however, *preferences* was limited to either the type of PA (e.g. structured vs.

unstructured), the intensity of PA, and/or the source of assistance for PA, with one study only

measuring those 'insufficiently' active individuals. The Roux et al. (2004) study involved

overweight individuals in a weight-loss program and measured individual preferences relating to

program costs, travel time to the program, amount of doctor involvement, emphasis of the

program components, and the focus of the program. The authors concluded participants would

be more willing to pay for a weight-loss program if it were to reflect his/her personal

preferences.

Therefore, individualization and tailoring are other important aspects in PA interventions.

Keele-Smith & Leon (2003) reported individuals were more likely to be consistent in their

physical activity when given an individualized prescription for exercise. Tailoring towards

individuals is inherent in the notion of preferences. Evidence supports tailoring as a successful

and a more effective method for producing longer-term health behavior change than generic

programs (Marcus, Owen, Forsyth, Cavill, & Fridinger, 1998; Bock, Marcus, Pinto, & Forsyth,

2001; Keele-Smith & Leon, 2003). Most of these studies have concentrated on tailoring print

messages and feedback to the individuals. None have considered tailoring on different

dimensions of preferences for physical activity. As noted, some studies *do* articulate preferences

as facilitators (i.e., Salmon et al., 2003; Booth et al., 1997; Roux et al., 2004). However, we

have yet to develop a theoretical model incorporating preferences aimed at explaining self-

regulation, enjoyment, and other behaviors or cognitions contributing to consistent and continued

exercise.

The purpose of this study was to identify facilitators of exercise consistency. More

specifically, the study explored the associations between self-regulatory behaviors (i.e. planning,

goal-setting, and tracking), affective matching (e.g., preferences related to self-regulation), and

other associated psychosocial characteristics related to PA (e.g., self-efficacy, outcome

expectancy, enjoyment, barriers and strategies). The first step in this process was to establish the

preference construct and to understand and define its diverse dimensions. The second step was

to determine how preferences are associated with other social cognitive constructs, and with PA

consistency in currently physically active individuals.

Preliminary Data

Elicitation interviews were conducted with physically active and inactive men and

women (N=15, ages 25–64). Content focused on current PA levels, preferences surrounding

these activities, facilitators and barriers for maintenance, prior history with physical activity and

nutrition, as well as family health history (Appendix A).

The preliminary data supported the importance of preferences and barriers. People were

able to articulate specific ways and situations in which they liked to (or would like to) engage in

PA, and the various barriers precluding PA or supports facilitating PA. People could also

express details regarding outcome expectancies and self-efficacy, e.g. how confident they were

and how they preferred to make and adhere to the lifestyle changes necessary to incorporate

consistent PA into their lives. People recalled engaging in PA that was physically, cognitively,

and affectively aversive, unenjoyable, inefficient (time-wise), and for the most part, not

preferred. This led to discontinuance and lapses in motivation. Those currently active and

showing consistent regular PA reported not only engaging in preferred activities, but also

engaging in preferred ways (i.e. preferred environmental and social settings), using specific

strategies identified to aid in their consistency. Preferences were not limited solely to enjoyment

properties but also included functional characteristics that at times were even more important

than enjoyment (i.e., preference of convenience could weigh more heavily than preference of a

particular setting). Therefore, as conceived in this study, *preferences* is a multi-dimensional

construct that is expanded beyond where and with whom a person prefers to engage in PA, to

include preferred feedback (i.e. mechanical and bio feedback), and the nature of confidence,

preference, and frequency of self-regulatory behaviors.

　　　Pilot data and seminal studies (e.g. Salmon et al., 2003; Booth et al., 1997; Roux et al.,

2004) served as a base for construction of this project. For this study, the *preference* construct's

definition was expanded to include not only a diversity in choices but also a balance of choices

despite existing barriers. The definition was also narrowed, delineating a variety of preference

dimensions, and finally, operationalized as a multi-dimensional construct. Dimensions included

type of activity, PA intensity, frequency, and duration, enjoyment and success, ease of access,

setting, as well as other social and temporal characteristics (i.e. social supports, self-efficacy, and

self-regulation). It was hypothesized that multiple dimensions of preferences govern or

contribute to PA consistency level. It also was hypothesized that if an individual is engaged in a

preferred activity, in preferred ways, then aspects such as self-regulation should be enhanced, and PA should be more enjoyable, and consistently maintained over the recent 3 months.

Method

Design and Procedures

This study was a cross-sectional survey of 247 individuals at Time 1 and 204 of the original 247 individuals at Time 2. Time 1 and Time 2 surveys were administered online at www.surveymonkey.com. Surveys consisted of multiple questionnaires assessing demographic variables, past and current physical activity levels, physical activity preferences, and social cognitive and self-regulatory variables related to physical activity. Time 2 assessments occurred approximately one to four weeks after the Time 1 assessment. At Time 2, participants completed an abbreviated version of the Time 1 survey assessing the previous week's physical activity levels and the individual's physical activity preferences. All procedures and measures were approved by the Institutional Review Board of Virginia Tech University prior to recruitment and data collection (Appendix B: Request for Approval; Appendix C: Informed Consent).

Recruitment

Participants were recruited through a combination of efforts including a press release printed in various Virginia newspapers (Appendix D), an email sent through faculty/staff listserves at Virginia Tech and through the University of South Carolina Prevention Institute's Physical Activity world-wide listserve, and flyers posted at grocery stores in proximity of Virginia Tech (Appendix E). These recruitment efforts directed people to a website offering a brief introduction of the study and explaining its assessment of current PA levels, preferences surrounding these activities, facilitators and barriers for maintenance of PA, and prior history with PA. This introduction also explained that participation would require approximately 30-45

minutes. The webpage also informed each participant of the eligibility requirements, questionnaire completion procedures (including that there would be a one-week follow-up survey to complete upon email notice), and the option to consent and continue with the study or to discontinue involvement. In compensation for participation, each individual was offered personalized feedback about his or her preferences for physical activity derived from their survey responses; participants were also offered a 'physical activity prescription' intended to aid in their enjoyment and long-term maintenance of PA. In addition, each participant was entered into an overall drawing in which one participant would receive five individual training sessions with a certified personal trainer. Before moving forward, all participants were required to click an *Agree* button which served as a signature to an informed consent disclosing confidentiality, potential risks, and other criteria set forth by the Virginia Tech's Institutional Review Board and the Psychology Department's Human Subjects Committee before completing the online questionnaires (Survey Measures: Appendices F- M).

Measures

Sociodemographics and Health Status

Participants reported sociodemographic information including age, sex, ethnicity/race, marital status, years of education, occupation, income range, and number of children (living at home), as well as height, weight, current health problems, and personal and family health history.

Physical Activity

The Cooper Institute's Aerobic Center Longitudinal Study-Physical Activity Questionnaire (ACLS-PAQ) is a retrospective measure assessing the participation, duration, intensity, and volume (energy expenditure) of 14 physical activities occurring during the prior 3-

month time frame (Kohl, Blair, Paffenbarger, Macera, & Kronenfeld, 1988). For Time 1, energy expenditure was calculated from responses to the ACLS-PAQ by multiplying the number of sessions per activity per week over the past 12 weeks by the duration of participation and the MET (metabolic equivalent values) level of the particular activity [(session/wk) × (min/session) × (hrs) × (METs) = MET-hrs/week].

To gain an estimate of consistency of physically activity over the past 3 months, participants were asked at Time 1 and Time 2 to estimate, "How many weeks, out of the past 12 weeks, have you exercised at least 3 days per week?" Responses to this question were used to categorize participants in one of 4 groups for the outcome measure of Consistency Level. The four levels of PA consistency included *inconsistent*, *slightly consistent*, *consistent*, and *highly consistent*.

Physical Activity Preferences

The PREFER Questionnaire (Preferences Related to Exercise Fidelity, Efficacy, & Regulation) administered at Time 1 and Time 2 was created to assess preferences related to physical activity [i.e. type of activity, its frequency, intensity, and duration; environment, company (social setting), and feedback preferences, and other individual, social, and temporal characteristics (i.e. preference, confidence, and frequency of self-regulatory behaviors)]. More specifically, the preference dimensions assessed included environmental and social settings, strategies, barriers, and self-regulation (planning, goal-setting, tracking, feedback). Item scaling varied among items and included Likert-type scales, yes/no, and coded open-ended questions.

Variables used throughout analyses measured the frequency of self-regulation behavior skills for physical activity (i.e. planning, goal-setting, and tracking) and the frequency of engaging in PA according to one's preference for environmental and social settings (i.e. *How*

often do you plan or schedule your physical activity?, ...set goals for your PA?, ...track your

PA?, How often do you engage in physical activity according to your environmental preference?,

...according to your company, or social setting, preference?).

PREFER Environment. Environment Preference was assessed with an item asking if the

participant preferred to exercise *Outdoors*, *Indoors*, or *Both Outdoors & Indoors*. *Environment*

Importance was measured by participants' indication of how important exercising in their

preferred environment was for them (Not at all Important, Somewhat Important, Moderately

Important, Very Important). *Environment Confidence* for exercising in the preferred

environment was measured with a 5-point Likert scale (1 = *Not at all confident* to 5 = *Very*

confident). *Environment Frequency* of exercise in the preferred environment was measured with

a 5 point scale (0 = *Never* to 5 = *Always*). Stability of the responses to the PREFER

Environmental Frequency was good (*r* (test-retest) = .613, *p* < .01).

PREFER Company. Company Preference referred to they type of preferred social setting

and was assessed with item choices of *Alone*, *1-2 family members*, *1-2 friends*, *Group/Class*,

Team, *Other*. *Company Frequency* of measured exercise in the preferred social setting and was

measured with a 5 point scale (0 = *Never* to 5 = *Always*). Stability of the responses to the

PREFER Company Frequency was acceptable (*r* (test-retest) = .553, *p* < .01).

PREFER Feedback. Feedback Preference was assessed with item asking which, if any,

type exercise feedback the participant preferred. Item choices were *Biofeedback (i.e. heart rate*

monitor), Mechanical feedback (e.g., pedometer), Stopwatch or timed exercises, Physical

feedback (i.e. feel stronger, fitter, healthier), Aesthetic feedback (i.e. lost/gain weight, look

better), Mental feedback (i.e. feel more aware and sharper mentally), Feeling more energized,

Verbal feedback from partner, trainer, coach/program director, or other, Written/ printed

feedback from email, online program, or other, Other (please specify). Feedback Current assessed which of the preferred choices were forms of exercise feedback the individual currently received.

Feedback Preference Match: Feedback match scores were based on preference and on current receipt of exercise feedback based on preference. Feedback scores were either *2* if the individual reported currently receiving preferred type of feedback or *0* if the individual reported not receiving preferred type of feedback. Participants could not receive a score of *1*, as they either were or were not receiving preferred feedback.

PREFER Strategies and Barriers. Strategies and *Barriers* were assessed independently with multiple items related to Strategies facilitating exercise and barriers hindering exercise. *Strategies* was a list of ways individuals might fit physical activity and exercise, planned or otherwise, into their lifestyle, e.g. *I get up earlier to exercise*, *I exercise on my lunch break*, *I found an exercise facility with childcare*, and others. These choices were assessed on a 5-point Likert scale (0 = *Does not apply* to 5 = *Always*). *Barriers* was a list of items that might be perceived as exercise hindrances, e.g. *Low motivation*, *Lack of direction/Unsure of what to do*, *Work responsibilities, therefore lack of time*, *Dissatisfaction with previous exercise history*. These choices were assessed on a 5-point Likert scale (1 = *Does not describe* to 5 = *Describes completely*).

Strategies & Barriers Balance: A total number of strategies and barriers was computed independently. *Strategy-Barrier Balance* was then calculated by subtracting barriers from strategies. The purpose of this was to have single score reflecting the discrepancy between the number of real or perceived barriers a participant reported and the number of strategies he or she

reported. The score was to indicate which PA consistency level, if any, embodied the notion of 'balance' or even demonstrated residual strategies for overcoming barriers.

   PREFER Self Regulation: Planning, Goal-Setting, Tracking. Planning, Goal-Setting, and *Tracking Preference* were assessed independently with an item asking whether the participant *Yes*, preferred to plan, goal-set, and track his/her physical activity, or *No*, did not prefer to do the behavior. *Planning, Goal-Setting,* and *Tracking Confidence* for performing the behavior in relation to exercise were each measured with a 5-point Likert scale (1 = *Not at all confident* to 5 = *Very confident*). *Planning, Goal-Setting,* and *Tracking Frequency* for exercise were each measured with a 5 point scale (0 = *Never* to 5 = *Always*). Stability of the responses to the PREFER Planning, Goal-Setting, and Tracking Frequencies were good (r (test-retest) = .627, $p <$ .01; r (test-retest) = .649, $p < .01$; r (test-retest) = .795, $p < .01$, respectively).

Enjoyment

  At Time 1, individual mean scores were calculated for the Physical Activity Enjoyment Scale (PACES; Kendzierski & DeCarlo, 1991) which was an 18-item scale assessing an individual's level of enjoyment when engaging in physical activity. PACES has been shown to have good internal consistency and to be a reliable and valid measure (reliability: Kendzierski et al., 1991; Crocker, Bouffard & Gessaroli, 1995; validity: Kendzierski et al., 1991; Wankel, 1993; Motl, 2001). The internal consistency for this particular sample was high (Cronbach alpha = .95).

Outcome Expectancy

  An additional measure for outcome expectancy included at Time 1 was an expanded version of the Benefits of Physical Activity Scale (BPA: Sallis, Hovell, Hofstetter, et al., 1989) modified by Rovniak et al. (2002). The 25-item scale assessed both positive and negative

outcome expectancies related to physical activity. It asked participants to rate the likelihood and

the importance of a particular outcome ranging from *Not at all Likely* (1) to *Extremely Likely* (5)

and from *Not at all Important* (1) to *Extremely Important* (5), respectively. A mean score was

computed based on participants' responses. This modified version has been shown to have good

internal consistency and test-retest reliability. Internal consistency for this sample was high

(Cronbach alpha = .86).

Self-Efficacy

The Self-Efficacy for Exercise Behaviors Scale (Sallis, Pinski, Grossman, Patterson, &

Nader, 1988) has been shown to be a reliable and valid measure. It was given at Time 1 to assess

participants' belief in their ability to create time for health-related behaviors (i.e. diet and

exercise) and to continue exercise despite various barriers. This was a 12-item scale including

statements such as *Stick to your exercise program when you have excessive demands at work,*

and *Get up earlier to exercise.* Means were calculated based on response choices that were

measured by a 5-point Likert-type scale ranging from 1 (*I know I cannot*) to 5 (*I know I can*).

Internal consistency for this sample was high (Cronbach alpha = .89).

Self-Regulation

At Time 1, the Exercise Goal-Setting Scale (EGS) and the Exercise Planning and

Scheduling Scale (EPS: Rovniak, et. al, 2002) has been shown to exhibit

good internal consistency and good test-retest reliability (Rovniak, et. al., 2002). These scales

include items related to goal-setting and self-monitoring for physical activity (EGS), as well as

items concerned with an individual's daily exercise planning and scheduling (EPS). Response

choices for both measures ranged from *1* (*Does not describe*) to *5* (*Describes completely*).

Means were computed for each of these measures. Internal consistency for this sample were

high for the goal-setting measure (Cronbach alpha = .85), and were quite low for the planning

and scheduling measure (Cronbach alpha = .43). However, because of the lower number of

items in this scale, a more appropriate mean inter-item correlation was found to be in an

acceptable range of .2 to .5 for all but 2 item correlations (inter-item correlation acceptability:

Briggs and Cheek, 1986). One set of items that correlated more (.8) was: *I never seem to have*

enough time to exercise and *Finding time to exercise is difficult for me*. The other set of items

correlated less (.04) was: *I never seem to have enough time to exercise* and *I write my activity*

sessions in an appointment book or calendar.

Social Support

At Time 1, the Family and Friend Support for Exercise Habits Scale (Sallis, Grossman,

Pinski, Patterson, & Nader, 1987) determined the amount of perceived social support for

physical activity participants felt that they had received from family and friends over the past 3

months (reliability & validity data: Sallis, et al., 1987). Each participant was given a mean score

based on items with responses ranging from 1 (*Never*) to 5 (*Very often*) and included statements

such as *Gave me encouragement to stick with my exercise program* and *Offered to exercise with*

me. Internal consistency for this sample was high (Cronbach alpha = .90).

<div align="center">Data Analysis</div>

A multiple regression approach to path analysis with Time 1 data was used to determine

how preference dimensions influenced participants' consistency of exercise over the preceding

12 weeks. Separate models of the effects of the self-regulation dimensions of planning, goal-

setting, and tracking, the effects of age, gender and behavior-specific confidence, preference, and

frequency on consistency level were examined (See Figure 1 as an example). In each analysis,

behavior-specific confidence was modeled to directly affect behavior-specific preference,

frequency and consistency of exercise. In addition, preference was modeled to directly influence

behavior-specific frequency; frequency directly influenced consistency level. Gender and age

were allowed to directly affect all other variables in the model. Preference was not modeled to

directly influence consistency level because of its high correlation with frequency (Pearson R

were .532 to .743, across self-regulatory dimensions).

Three additional models were tested to examine the effects preference for feedback,

preference for exercise environment, preference for exercise company, and strategy-barrier

balance on consistency level (see Figure 5 as an example). Current receipt of preferred feedback

and frequency of exercising in preferred environment and preferred company were separately

modeled to directly affect consistency level. In these models, age and gender were modeled to

affect feedback matching or frequency of exercise in preferred mode and consistency level. A

model of the influence of strategy-barrier balance was similarly modeled (see Figure 7).

Finally, variables from individual models along with mean scores from social support,

self efficacy, and enjoyment measures were included in a final model (see Figure 8).

Within each model, total and direct effects were evaluated by the size of the standardized

coefficient (β) associated with each effect. Indirect effects were computed from total and direct

effect coefficients (i.e., total-direct) to evaluate the direct and indirect proportions of each

variable's total effect. For all analyses a very strong effect is defined as .40 and above, a strong

effect as .25 to .39, a moderate effect as .16 to .24, and a small effect is defined as any value less

than .15. All statistical analyses were performed used SPSS Version 13.0.

<div align="center">Results</div>

Participants

Of the 351 individuals who completed the Time 1 survey, 247 reported participating in

PA over the previous 12 weeks and were used in the following Time 1 analyses. Of the 247, 204 individuals (82.5%) completed both the Time 1 and the Time 2 surveys and were used in Time 2 analyses. At Time 1, participants were 71% female and 29% male with a mean age of 34.23 (SD=12.03). Their mean weight and height were 160.98 lbs (SD=37.87) with a mean BMI of 25.13 (SD=5.23). A majority of the sample was from the state of Virginia (62%); the remainder represented 37 other states and a few countries including Canada and New Zealand. Participants were mostly Caucasian (90%), 3.2% Asian, 2.4% African American; 2.8% indicated multiracial backgrounds, and .4% indicated Hispanic backgrounds. Forty-eight percent were single and 42% were married. The majority of participants (75%) reported having no children under the age of 18 living at home, 11% reported having one child, and 12% reported two children.

Twenty percent of participants reported having some college education, 30% a 4 year college education, 29% a Master's degree, and 17% a post-Master's/Doctoral degree. Twenty-four percent of reported household income was less than $30,000 per year, 30% between $30,001 and $60,000 per year, 19% between $60,001 and $90,000, 22% between $90,000 and $200,000, 5% reported incomes in excess of $200,000 per year.

Although the majority of the sample did not report having many medical conditions, 11% reported having high cholesterol. Family member medical conditions were higher with 47% having or had high-blood pressure, 41% high cholesterol, 32% heart disease, 29% colon or another type of cancer, and 22% Type II diabetes.

Individuals also rated level of motivation to exercise based on family health history. Motivation varied among participants with 19% being not at all motivated, 25% slightly motivated, 32% moderately motivated, 17% very motivated, and 6% extremely motivated. Sociodemographic characteristics for Time 1 are reported in Table 1.

Consistency of Physical Activity & Total METs

Participants were asked how many of the 12 weeks prior to the Time 1 assessment they had exercised at least 3 or more days per week. Of the 247 participants who had reported any weeks with this level of physical activity, 52 (21%) were categorized as *inconsistent*ly physically active, reporting at least three days of PA per week for 1 to 4 weeks of the past 12 weeks. Another 52 (21%) were *slightly consistent*, indicating similar weekly levels of physical activity but for 5 to 8 weeks of the past12 weeks. Finally, 60 (24%) were considered *consistent* reporting 9 to 11 weeks of past 12 weeks and 83 (33%) were *highly consistent*ly physically active reporting regular physical activity for 12 out of past 12 weeks. Men and women in the sample had similar levels of exercise consistency (Pearson χ^2 (3, N=247) = 3.02, *p*= .389). Of 176 females, 22.2% were inconsistent, 23.3% were slightly consistent, 22.7% were consistent, and 31.8% were highly consistently physically active. Of 71 males, 18.3% were inconsistent, 15.5% were slightly consistent, and 28.2% were consistent, and 38% were highly consistently physically active.

At Time 1, participants' amount of physical activity was high, reflecting a physically active sample. Mean total number of MET hours per week reported was 35.59 (SD= 36.97). The mean number of different physical activities participants reported was 3.69 (SD= 1.56) of 10 possible activity choices. On average, males (M= 35.1, SD= 47.1) and females (M= 35.8, SD= 32.2) reported similar means of MET hours ($F_{(1,247)}$= .016, *p*= .899). Men (M= 3.6, SD= 1.6) and women (M= 3.7, SD= 1.6) in the sample also reported similar means for number of physical activities reported (Pearson χ^2 (8, N=247) = 4.90, *p*= .769). At Time 2, mean total number of MET hours per week were 37.44 (SD= 42.96), and the mean number of activities reported were 3.09 (SD= 1.39). Participants with higher levels of consistency also achieved higher levels of

weekly energy expenditure ($F_{(3,247)}$= 11.80, p= .000, see Table 3), and higher numbers of weekly

physical activities (means, $F_{(3,247)}$= 5.95, p= .001, see Table 3).

Table 2 contains the means, standard deviations, and post-hoc analyses for self-

regulation, preference, and other measures according to participants' reported consistency level

at Time 1. Table 3 contains the means and standard deviations for measures at Time 2.

Preferences for Physical Activity

Means, standard deviations, and intercorrelations of self-regulation, preference,

enjoyment, and social cognitive variables are presented in Table 4.

PREFER Planning. Eighty-five percent of the participants answered "yes" to the

question "Do you prefer to plan your physical activity". Participants' confidence that they could

plan was high (M= 4.0, SD= 1.2; 5-point scale). Frequency of planning was moderate (M= 2.8,

SD= .87; 5-point scale). Preference for planning differed among consistency levels (Pearson χ^2

(3, N=247) = 12.44, p= .006) with 90.4% of those highly consistent exercisers preferring to plan

their PA. Participants with higher levels of PA consistency also reported higher planning

confidence ($F_{(3,247)}$= 8.69, p= .000, see Table 3) and frequency ($F_{(3,247)}$= 13.01, p= .000, see

Table 3). Eighty-nine percent (157) of females preferred to plan their exercise; whereas only

77% (55) of males preferred to plan (Pearson χ^2 (1, N=247) =5.73, p= .017). Men (M= 2.8, SD=

.94) and women (M= 2.8, SD= .84) in the sample had similar levels of frequency of planning

($F_{(1,247)}$= .112, p= .738; 5-point scale) and confidence for planning (M= 4.0, SD= 1.2 & M= 3.9,

SD= 1.1, respectively; $F_{(1,247)}$= .031, p= .860; 5-point scale).

The standardized coefficients from the path-analysis for the influence of planning

confidence, preference, and frequency on physical activity consistency level are shown in Figure

1. Direct effects are displayed on the path lines connecting the variables, total effects of each

variable on physical activity consistency level are displayed under each variable, along with the R^2 yielded in the analysis for each variable. Of the total effects, confidence for planning exhibited the strongest total effect on physical activity consistency ($\beta_{(total)} = .333$, $p = .000$). The effect of planning confidence was largely direct (.247/.333 or 74% direct and 26% indirect). Planning frequency also exerted a strong effect on consistency level ($\beta_{(total)} = .276$, $p = .000$). Planning preference, gender, and age did not influence PA consistency level (see Figure 1). The planning model explained 20% of the variance in exercise consistency observed in the participants.

Within the planning model, planning frequency, which had a strong effect on consistency level, was strongly influenced by planning preference ($\beta_{(direct)} = .276$, $p = .000$). Planning confidence had a moderate effect on planning frequency ($\beta_{(direct)} = .220$, $p = .000$) which appears to be enhanced by confidence's additional effect on planning preference. Age exhibited a moderate effect on planning confidence ($\beta_{(direct)} = -.147$, $p = .021$).

PREFER Goal-Setting. In addition to preferring to plan their exercise, participants also reported a preference for setting exercise goals (74.1%). Although, higher frequency of goal-setting was associated with higher levels of PA consistency ($F_{(1,247)} = 6.15$, $p = .000$, see Table 3), there were no differences for goal-setting preference (Pearson χ^2 (3, N=247) = 3.09, $p = .378$) or confidence ($F_{(1,247)} = 2.39$, $p = .070$) among the various consistency levels. Men and women in the sample reported similar levels of goal-setting preference (Pearson χ^2 (1, N=247) = .591, $p = .442$) with 77.5% of men and 72.7% of women preferring to set PA goals. Goal-setting frequency (M= 2.6, SD= 1.1 & M= 2.4, SD= 1.1, respectively; 5-point scale; $F_{(1,247)} = 3.11$, $p = .079$) and confidence for goal-setting (M= 2.8, SD= 1.3 & M= 3.1, SD= 1.5, respectively; $F_{(1,247)} = 1.58$, $p = .209$) were also similar among males and females in this sample.

The influences of goal-setting confidence, preference, and frequency on the physical activity consistency are shown in Figure 2. Within the path model, goal-setting frequency exhibited the strongest total effect on consistency level ($\beta_{(total)}$= .279, p= .000). Goal-setting preference, goal-setting confidence, age, and gender did not influence PA consistency in this model. The goal-setting model explained 9.1% of the variance in consistency level observed among participants.

Contributing to higher goal setting frequency was goal-setting preference ($\beta_{(total\ direct)}$= .668, p= .000) and goal setting confidence ($\beta_{(direct)}$= .150, p= .000), which was enhanced by goal-setting confidence's similar effect on goal-setting preference ($\beta_{(direct)}$= .151, p= .05). Age exhibited a moderate effect on goal-setting confidence ($\beta_{(direct)}$= -.164, p= .01) and a moderated effect on goal-setting preference ($\beta_{(direct)}$= -.154, p = .016). Gender exhibited a small moderated effect on goal-setting frequency ($\beta_{(direct)}$= .089, p= .048). Age and gender did not exhibit significant effects on any other variables.

PREFER Tracking. Tracking PA was preferred by 149 of the participants (60.3%); however, tracking preference differed among PA consistency levels (Pearson χ^2 (3, N=247) = 10.24, p= .017). Higher levels of PA tracking frequency ($F_{(3,247)}$= 6.96, p= .000, see Table 3), but not tracking confidence ($F_{(3,247)}$= 2.07, p= .105) were associated with higher levels of PA consistency. Fifty-nine percent of men and 63.4% of women preferred to track his/her PA (Pearson χ^2 (1, N=247) =.389, p= .533). Confidence for tracking was similar among males (M= 2.8, SD= 1.3) and females (M= 2.8, SD= 1.6; $F_{(1,247)}$= .000, p= .996). Males (M= 2.3, SD= 1.5), however, exhibited higher levels of tracking frequency than observed in females (M= 1.8, SD= 1.3; $F_{(1,247)}$= 6.05, p=.015; 5-point scale).

Influences of tracking confidence, preference, and frequency on physical activity

consistency are shown in Figure 3. Within the model, tracking frequency was the only variable

to exhibit a total effect on consistency level ($\beta_{(total)}$ = .216, p= .003). The tracking model

explained 5.6% of the variance in consistency observed in the participants. Within the model,

tracking preference exhibited a very strong effect on tracking frequency ($\beta_{(direct)}$ = .696, p= .000)

and tracking confidence had a very strong effect on preference for tracking ($\beta_{(direct)}$ = .517, p=

.000). Age exhibited a moderate effect on tracking confidence ($\beta_{(direct)}$ = -.170, p = .008).

Gender exhibited a small, mostly indirect, effect on tracking frequency ($\beta_{(direct)}$ = .129, p = .002).

PREFER Feedback. Participants were fairly well matched to their preferred type of

feedback; 90.3% (223) were matched versus 9.7% (24) that were not matched. The most often

chosen modes of preferred and currently received feedback were *Physical feedback (i.e. feel*

stronger, fitter, healthier) (83.8% (207) preferred and 70.9% (175) currently receive) and *feeling*

more energized (71.3% (176) preferred and 54.3% (134) currently receive). Participants with

higher levels of PA consistency were more likely to be well matched to their feedback preference

(Pearson χ^2 (3, N=247)=12.11, p= .007, see Table 3). Eighty-seven percent of men and 94% of

women in the sample were matched to their preferred modes of feedback males (Pearson χ^2 (1,

N=247)=1.89, p= .169).

The effects of preferred feedback on consistency are shown in Figure 4. Matched

feedback exhibited a moderate effect on consistency level ($\beta_{(total)}$ = .206, p= .000); age and

gender did not influence PA consistency in this model. Receiving preferred type of PA feedback

accounted for 6.2% of the variance in PA consistency

PREFER Environment. Thirty-six percent (89) of the sample preferred the engage in PA

outside, 9.7% (24) preferred inside, and 54.3% (134) preferred both environments. Frequency of

engaging in PA in one's preferred environment was higher among those more consistent

exercisers ($F_{(3,247)}$= 40.72, *p*= .000, see Table 3). Males (M= 3.0, SD= .80) and females (M=2.9,

SD= .76) tended to exercise in their preferred environment on a regular basis ($F_{(1,247)}$= .431, *p*=

.512; 5-point scale).

The influence of frequency of exercising in preferred environment on physical activity

consistency level is shown in Figure 5. Frequency of exercising in preferred exhibited a strong

total effect on consistency level (β (total) = .540, *p*= .000). Age and gender did not influence PA

consistency level of the participants. Frequency of exercising in one's preferred environment

explained 30.7% of the variance in PA consistency among participants—the most predictive of

these preliminary models.

PREFER Company.   The social setting most highly preferred by this sample was to

exercise alone (107, 43.5%), followed by exercising with one to two friends (65, 26.4%), in a

group or class situation (31, 12.6%), with one to two family members (30, 12.2%), and team or

other situation (13, 5.3%). Over half of participants reported often engaging in PA with one's

preferred company (129, 52.4%).   Frequency of engaging in PA with one's preferred company

was higher among those more consistent exercisers ($F_{(3,246)}$= 4.63, *p*= .004, see Table 3). Forty-

eight percent of males and 42% of females preferred to exercise alone (Pearson χ^2 (5, N=247)=

18.89, *p*= .002).   Frequency of exercising according to preference, alone or otherwise, was

similar among males (M= 2.8, SD= .88) and females (M= 2.7, SD= .97; $F_{(1,246)}$= .43, *p*= .512).

The influence of frequency of exercising with preferred company on physical activity

consistency level is shown in Figure 6. Preferred company frequency exhibited a moderate total

effect on consistency level (β (total) = .220, *p*= .001). Age and gender did not influence the PA

consistency among participants. Exercising with one's preferred company explained 6.7% of PA consistency among the participants.

PREFER Strategies & Barriers   The most highly chosen or perceived barriers to PA were work responsibilities (M= 2.9, SD=1.3), low energy (M= 2.2, SD= 1.1), low motivation (M= 2.17, SD= 1.2), and family responsibilities (M= 2.16, SD= 1.2). The most highly used strategies for engaging in PA were making exercise part of one's daily routine (M= 3.5, SD= 1.3), exercising after work (M= 3.1, SD= 1.3) or on the weekends (M= 2.9, SD= 1.2), and goal-setting (M= 2.64, SD= 1.4). Total number of barriers were higher among those inconsistent and slightly consistent exercisers ($F_{(3,247)}$= 28.13, p= .000, see Table 3). Total number of strategies increased with consistency level ($F_{(3,247)}$= 4,31, p= .006, see Table 3). Those inconsistent individuals exhibited a negative strategy-barrier balance mean suggesting inconsistent exercisers perceive more barriers than the strategies they employ (M= -1.3, SD= 7.2). Indeed, strategy-barrier balance scores increased significantly with consistency ($F_{(3,247)}$= 24.35, p= .000, see Table 3). Males (M= 18.8, SD= 5.0) and females (M= 19.9, SD= 6.0) reported similar levels of perceived barriers ($F_{(1,247)}$= 1.93, p= .167) and strategies (M= 25.1, SD= 7.1 & M= 25.6, SD= 7.4, respectively, $F_{(1,247)}$= .273, p= .602), yielding similar balance scores (M= 6.4, SD= 7.8; M= 5.8, SD= 9.6, respectively , $F_{(1,247)}$= .207, p= .649).

Influence of strategy-barrier balance on physical activity consistency level is shown in Figure 7. Strategy-barrier balance exhibited a strong total effect on consistency level ($\beta_{(total)}$= .458, p= .000) with the model explaining 23% of variance observed in consistency level—the second most predictive of these preliminary models.

The Comprehensive Model of Physical Activity Consistency among Exercisers

The variables from these preliminary models were combined with other social cognitive variables in a comprehensive model of exercisers' physical activity consistency.

Enjoyment. The overall sample indicated moderate, but not complete enjoyment of physical activity (M= 5.53, SD= .99, 7-point scale). Enjoyment means as measured by PACES were similar among males and females (M= 5.6, SD= 1.0 & M= 5.5, SD=1.0, respectively, $F_{(1,247)}$= 1.23, p= .268). PA enjoyment levels increased with consistency ($F_{(3,247)}$= 22.64, p= .000, see Table 3).

Outcome Expectation. The overall sample indicated low to moderate outcome expectancy for physical activity (M= 2.87, SD= .41, 5-point scale). Outcome expectancy means as measured by the Benefits for Physical Activity Scale were similar among males and females (M= 2.8, SD= .38 & M= 2.9, SD= .42, respectively, $F_{(1,247)}$= 2.39, p= .123). There were no significant differences in outcome expectancy for PA among the various PA consistency groups ($F_{(3,247)}$= 1.94, p= .124).

Self Efficacy. The overall sample indicated moderate self-efficacy for physical activity (M= 3.49, SD= .82, 5-point scale). Self-efficacy means as measured by the Self-Efficacy for Exercise Behaviors Scale were significantly different; means were slightly higher among males than females (M= 3.7, SD= .76 & M= 3.4, SD= .83, respectively, $F_{(1,247)}$= 5.24, p= .023). Self-efficacy means significantly increased with PA consistency ($F_{(3,247)}$= 32.65, p= .000, see Table 3).

Self Regulation. Based on previously established self-regulation scales (i.e., Exercise Goal-Setting Scale and Exercise Planning and Scheduling Scale), the overall sample indicated low to moderate planning and scheduling and goal-setting for PA(M= 2.45, SD= .46, 5-point scale; M= 2.64, SD= .77, 5-point scale, respectively). Goal-setting means as measured by the

EGS were significantly different among males and females (M= 2.9, SD= .70 & M= 2.6, SD= .78, respectively, $F_{(1,247)}$= 8.80, p= .003). However, planning and scheduling means as measured by the EPS were similar among males and females (M= 2.4, SD= .45 & M= 2.5, SD= .47, respectively, $F_{(1,247)}$= .161, p= .688). Goal-setting means varied among consistency level ($F_{(3,247)}$= 5.67, p= .001). Planning and scheduling means, on the other hand, were similar among consistency levels ($F_{(3,247)}$= .730, p= .535).

Social Support. The overall sample indicated low to moderate social support for physical activity (M= 2.24, SD= .62, 5-point scale). Social support means as measured by the Family and Friend Support for Exercise Habits Scale were similar among males and females (M= 2.2, SD= .64 & M= 2.3, SD= .61, respectively, $F_{(1,247)}$= 2.14, p= .145). Increased social support was associated with increased PA consistency ($F_{(3,247)}$= 6.30, p= .000, see Table 3).

Analysis of Preliminary Overall Effects on Consistency Level

Effects of various social cognitive constructs as well as preference and self-regulatory factors on PA consistency are shown in Table 8. This particular model is not exhaustive in showing relationships among variables due to analyses limitations of SPSS Version 13.0. Therefore, only those statistically significant standardized coefficients are included, illustrating the influences of social support, self-efficacy, planning confidence, tracking preference and frequency, environmental frequency, enjoyment, and strategies and barriers on physical activity consistency level.

The tracking frequency variable was included because theoretically, one might understand tracking to be a superior self-regulatory function based on the efforts required to track. These efforts may include planning and goal-setting to some degree. Further assessment of this would be beneficial, not only to better understand self-regulation skills, but to also better

understand the nature of preferences and frequency (given the tracking preference model, Figure 3, showed preference as a very strong predictor of behavioral frequency).

Of the total effects, self-efficacy was the strongest predictor of PA consistency level (β (total) = .216, p= .000), followed by frequency of exercising in preferred environment (β (total) = .328, p= .000), social support (β (total) = .255, p= .000), strategy-barrier balance (β (total) = .178, p= .004), and planning confidence (β (total) = .159, p= .007). The total effects of age on consistency level was close to being significant (β (total) = .111, p= .083) and with different analyses should be allowed to directly affect consistency. Gender, tracking preference, tracking frequency, and enjoyment did not significantly affect consistency in this model.

Significantly contributing to self-efficacy was social support (β (direct) = .196, p= .002) and gender (β (direct) = .172, p= .006). Once again, age was almost a significant predictor of self-efficacy (β (direct) = .120, p= .054).

Significantly contributing to environmental frequency was self-efficacy (β (direct) = .392, p= .000) and social support (β (direct) = .170, p= .003). Planning confidence was close to significant in predicting preferred environmental frequency (β (direct) = .116, p= .055). Gender and age did not exhibit a significant effect on environmental frequency.

There were no significant predictors of social support, as age and gender were the only variables allowed to affect social support in this particular path model.

Significantly contributing to strategy-barrier balance (number of strategies vs. number of barriers) was self-efficacy (β (direct) = .227, p= .001), social support (β (direct) = .219, p= .000), enjoyment (β (direct) = .189, p= .004), tracking frequency (β (direct) = .137, p= .013), and age (β (direct) = .123, p= .023). Gender, environmental frequency, and planning confidence were not significant predictors of one's strategy-barrier balance score. Significantly contributing to PA

enjoyment was self-efficacy ($\beta_{(direct)} = .336$, $p = .000$), environmental frequency ($\beta_{(direct)} = .288$, $p = .000$), and social support ($\beta_{(direct)} = .131$, $p = .016$). Age, gender, planning confidence, and environmental frequency did not exhibit a significant effect on PA enjoyment. Significantly contributing to tracking frequency was tracking preference ($\beta_{(direct)} = .729$, $p = .000$), age ($\beta_{(direct)} = .106$, $p = .014$), and self-efficacy ($\beta_{(direct)} = .096$, $p = .040$). Age and planning confidence did not exhibit a significant effect on tracking frequency.

Significantly contributing to planning confidence was social support ($\beta_{(direct)} = .157$, $p = .014$) and age ($\beta_{(direct)} = -.137$, $p = .031$). Gender did not exhibit a significant effect on planning confidence.

Relationships were based on what factors were allowed to affect each variable within the model. Further analyses of the data are needed to determine best overall predictive model for PA consistency level.

Discussion

Goals of Exploratory Research

Over the past decade, advances have been made in the understanding of processes involved in the initiation of certain health behaviors, i.e. physical activity. However, Rothman et al. (2004) offer the following:

> Taken together, the dominant theoretical approaches to the study of health behavior offer little guidance as to how the processes that govern the initiation and the maintenance of behavior change might differ. Because maintenance has been operationalized as action sustained over time, it is predicted to rely on the same set of behavioral skills and motivational concerns that facilitate the initial change in behavior. Yet this perspective

remains at odds with the observation that people who successfully adopt a new pattern of

behavior frequently fail to maintain that pattern of behavior over time. (p. 132)

Extending efforts in research to distinguish and account for facilitators of maintenance holds

potential for delineating determinants of progression from physical activity initiation, to

maintenance, to long-term habit. The present study attempted to identify facilitators for

participants' PA consistency for the prior 3 months.

Findings and Considerations

A primary aim of this study was to explore the relationship of preferences to self-

regulation and PA consistency level and to consider the influence of specific self-regulatory

behaviors on PA consistency. Results show that multiple dimensions of preferences do exist and

can be distinguished; yet, preferences, as measured in this study, were not shown to govern PA

consistency level. Support was found, however, for a relationship between preference and self-

regulation. More specifically, preference contributed to self-regulatory behaviors by predicting

behavior-specific frequency of planning, goal-setting, and tracking. Furthermore, frequency

significantly influenced PA consistency of the sample for the prior 3 months.

In all of the models, behavior-specific frequency was shown to be the best predictor for

consistency level. Behavior-specific preference was shown to be the best predictor of behavior-

specific frequency. And, in the self-regulation models, behavior-specific confidence was found

to significantly predict behavior-specific preference.

Planning, in particular, was the most preferred type of self-regulation strategy, and

having a preference for planning was highly predictive of planning behavior. Perhaps, this

explains why those consistent exercisers were planning more often and preferred planning as

well, indicating a type of match between preference and behavior. Similar relationships were

found for goal-setting and for tracking; however, the high endorsement of preference for planning may be because the necessary behavioral skills involved in planning are not so intrusive in one's life that it must be weighed against spending time doing work, being with the family, or grocery shopping. In other words, it is easier to do than set goals or track a behavior; the actual behavior of planning can occur anywhere, at any time. It is the follow-through of physical activity that is weighed against priorities and lifestyles. It is logical that frequent planning is highly predictive of a person's consistency.

Goal-setting and tracking, on the other hand, are more difficult to delineate. Goals differ both qualitatively and quantitatively (Cervone, Mor, Orom, Shadel, & Scott, 2004); therefore, the type of goals individuals prefer to set, along with how they pursue them, and how they define attainment of them can be highly variable across individuals. Moreover, tracking may require the incorporation of multiple self-regulatory behaviors (i.e., both planning and goal-setting), causing it to be a less preferred strategy. Yet, as an essential self-regulatory strategy, the data show the importance of goal-setting as an external and internal motivator of behavior, and thus call for interventions founded on these observations (Maes,& Karoly, 2005). Further assessment of goal-setting and tracking would be beneficial, not only to better understand self-regulation skills, but to also better understand the nature of preferences and frequency (given the tracking preference model, Figure 3, showed preference as a very strong predictor of behavioral frequency).

Additional Findings

Results of additional analyses suggests that preferences can facilitate not only frequency of self-regulatory behaviors, but also of affective factors (i.e. enjoyment, social support) contributing to maintenance and continued exercise. Levels of PA enjoyment were highest for

those individuals consistently participating in regular physical activity. Moreover, when asked on the PREFER, what aspect was most important when exercising, that it be "enjoyable" was one of the top two answers across all consistency levels. These findings are consistent with previous research finding enjoyment as a significant predictor for PA participation (e.g. Salmon et al., 2003).

Frequency of PA in favored environmental and social settings were aspects measured by the PREFER—with the latter being the strongest of the predictive models for consistency. The preliminary overall analyses also revealed frequency of engaging in PA in one's preferred environment as significantly contributing to PA enjoyment. It is expected additional analyses would show similar results for social setting preferences as the overall model also showed social support as measured by the Family and Friend Support for Exercise Habits Scale (Sallis, Grossman, Pinski, Patterson, & Nader, 1987) as a significantly contributing to PA enjoyment and a positive strategy-barrier balance.

The balance between strategies and barriers uniquely exhibited a very strong total effect on consistency, above and beyond the total effects exhibited by factors in six of seven individual models presented. It would seem that whether real or perceived, having more barriers than strategies was highly predictive of lower consistency levels. This data emphasize that our approaches to facilitate maintenance should emphasize strategies to overcome barriers.

When further assessed by the PREFER, the most common barriers for those inconsistently active individuals included low motivation, work responsibilities, and low energy; for those slightly consistent, work and school responsibilities and low motivation; and for those consistent and highly consistently active, work, school, and family responsibilities. However, it should be noted that highly consistent exercisers, for the most part, perceived these barriers to

only *somewhat describe* them (as opposed to *describe completely*). Further research is needed to determine whether this is an indication of real vs. perceived barriers or of superior strategies to overcome barriers, or both. Overall, individuals also reported the strategy they felt would help them overcome exercise barriers was to make exercising part of their daily routine (i.e. planning to be consistent).

Social Cognitive Constructs

In the self-regulation models behavior-specific confidence was not only important to preference; it was also predictive of behavior-specific frequency. Similarly, self-efficacy was higher among those participating in regular exercise and was shown, in the overall model, to be predictive of tracking and environmental frequency, PA enjoyment, strategy-barrier balance, and PA consistency. These findings are consistent with other studies concluding social cognitive constructs, especially self-efficacy, as highly predictive of physical activity maintenance and consistency (e.g., Armstrong, Sallis, Govell, & Hofstetter, 1993).

Based on the findings for confidence, it could be expected that outcome expectancy means would have been higher. Yet, it is possible this construct is more directly related to self-regulatory mechanisms, i.e. outcome expectancy for planning and scheduling, goal-setting, and/or tracking. That is, outcome expectancies may have more to do with self-regulation skills than with actual physical activity or exercise. Another possible reason for low means might be because decisions involved in "behavior *initiation* are based on expected outcomes", whereas, "decisions regarding behavior *maintenance* involve a consideration of the experiences people have had engaging in the new pattern of behavior and a determination of whether those experiences are sufficiently desirable to warrant continued action" (Rothman et al., 2004, p. 133). Based on this idea, the physically active sample could have more 'realistic' outcome

expectations, being familiar with what cognitions and behaviors are necessary for maintenance. Perhaps mid-range outcome expectations are what we desire in order to promote growth and perseverance and to prevent dissatisfaction or ultimately, discontinuance. This might also allow for the development of more 'realistic' problem-solving skills (strategies).

In Conclusion: Implications for Increasing PA Consistency

Interestingly, people recognize, even if on a more implicit level, that consistency **is** key. When given a list of goals considered to be important for one's exercise, individuals considered choices including *loose weight*, *stay lean*, *reach a certain level of performance*, and across all groups, *to be consistent* was a at least a top 3 choice. It is important to understand what variables contribute to higher levels of consistency and its precursor variables. This is because consistency of regular, moderate PA (i.e. the equivalent of walking 30 minutes per day at a moderate pace) is all that is required to achieve significant physical and mental health benefits.

This exploratory study was in effort to better understand maintenance and its accompanying cognitive approaches, behavioral skills, and affective associations. More specifically, the study focused on the influence of social cognitive determinants, self-regulation, and preferences on consistency of physical activity. Notwithstanding prior preference studies, a multidimensional preference construct related to physical activity has not yet been a focus investigated within the behavioral health field. This study theoretically offers another view of the processes involved in maintenance as well as directions for future research and applications. Analytically, it offers the potential for a better model for predicting physical activity consistency. This study also provides a means to understand the dimensions of preference, self-regulation, and social cognitive factors present in the various levels of consistently physically active individuals.

Future Directions

In the self-regulation preference models, preference for a strategy (i.e. planning, goal-setting, and tracking) was predictive of use of the strategy and ultimately, increased consistency. Although this may sound intuitive, it provides insight into the magnitude of the effects that self-regulation behavior skills have on promoting regular physical activity. Still, the actual frequency of planning, goal-setting, and tracking and their actual impacts on consistency are complex. For, while preference predicted frequency, findings show this is not true for everyone and even differs among self-regulatory behaviors. As indicated by our sample, about 85% reported a preference for planning. Yet, frequency for planning was lower. This was also confirmed by the equivalent means across consistency levels as measured by the Exercise Planning & Scheduling Scale (EPS). So, do people acquiesce in their failure to self-regulate (Baumeister, Heatherton, & Tice, 1994)? Knowing more about preferences might lead us to better understand the process of how people approach self-regulatory behaviors and why some act in accordance with, or fulfill, plans and goals or why some fail to implement and execute their goals.

Based on these findings, our efforts for increasing PA maintenance should focus on: reducing real and perceived barriers and increasing strategies; encouraging planning for individuals to fit PA into daily/weekly routines; supporting individual goals that are meaningful and attainable; promoting preference matching for increased enjoyment (i.e. environment and social setting) and for self-regulation. Also, further investigation in social cognitive outcomes can offer at least confirming evidence for the extant literature base and perhaps more associations will be found between preferences and social cognitive constructs.

Analytically, it would be beneficial to consider Structural Equation Modeling (SEM) to better understand the relationship of the latent variables presented. SEM would allow for a

different and more precise examination of how different variables relate to a factor.

Keller & Allen (2001) recognize that for a theoretical model to be an "effective guide to practice", it necessitates explaining the process of how a particular intervention guides participants to desired outcomes. Given the strengths of these findings, a next step would include integrating aspects of preference and other significant factors found predictive of consistency of PA and of energy expenditure for a new approach to a behavioral health intervention. The guiding hypothesis is that matching on preferences will increase long-term consistency in exercise.

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Table 1

Sociodemographic Characteristics of Participants at Time 1

Demographic Characteristic	% based on N=319	*M*	*SD*
Gender			
Female	71.3		
Male	28.7		
Age		34.23	12.03
Weight		160.98	37.87
Height		67.03	4.11
BMI		25.13	5.23
Race			
Caucasian	90.3		
Pacific Islander/Asian	3.2		
Multiracial	2.8		
African American	2.4		
Hispanic or Latino	0.4		
Native American	0.4		
Middle Eastern	0.4		
Marital Status			
Single	47.8		
Married	42.1		
Separated	1.6		
Divorced	4.9		
Widowed or Other	3.6		
Children			
0	75.7		
1	10.5		
2	11.7		
3	1.6		
4 or more	0.4		
Education Level			
1-6 years	1.6		
12 years	1.6		
Some College	20.2		
4-year College	30.4		
Masters Degree	29.1		
Post /Doctoral	17		
Annual Household Income			
under $30,000	24.3		
$30,000-$59,999	30		
$60,000-$89,999	19.1		
$90,000-199,999	22.3		
$200,000 or more	4.5		
Consistency Level			
Inconsistent	21.1		
Slightly Consistent	21.1		
Consistent	24.3		
Highly Consistent	33.6		

Table 2. Preference Characteristics of Participants Based on Physical Activity Consistency Level at Time 1

Variable	Overall Sample	Inconsistent (I)	Slightly Consistent (S)	Consistent (C)	Highly Consistent (H)					F (df)	p
	N=247	21.1%	21.1%	24.3%	33.6%						
Gender											
Female	N= 176	22.2%	23.3%	22.7%	31.8%						
Male	N= 71	18.3%	15.5%	28.2%	38.0%						

	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	F (df)	p
Age	33.10	11.02	32.60	11.81	34.15	12.80	36.02	12.18	1.091 (3)	.354
Total BMI	27.23	6.95	26.31	5.76	24.30	4.00	23.68	3.69	6.771(3) (C,D,J)	.000
Activity Match	1.69	.73	2.00	.000	2.00	.000	1.98	.220		
Preferred Env Frequency	2.13	0.59	2.90	.634	2.93	.660	3.37	.638	40.72 (3) (C,F,I,L,O)	.000
Preferred Co Frequency	2.37	1.05	2.62	.932	2.72	.865	2.96	.881	4.627 (3) (B)	.004
Planning Preference	.71	.46	.92	.269	.87	.343	.90	.297	12.439 (3)*	.006
Plan Frequency	2.29	0.96	2.79	.776	2.80	.755	3.18	.767	13.005 (3) (C,E,G,J,M)	.000
Planning Confidence	3.40	1.29	3.77	1.04	4.02	1.03	4.36	1.05	8.689 (3) (C,D,J)	.000
Goal Setting Preference	.73	.45	.69	.466	.70	.462	.81	.397	3.092 (3)*	0.378
GS Frequency	2.13	1.09	2.15	1.09	2.40	1.14	2.81	.930	6.153 (3) (B,L)	.000
Goal Setting Confidence	2.94	1.35	3.19	1.43	2.58	1.49	3.18	1.52	2.385 (3)	.070
Tracking Preference	.62	.49	.65	.48	.43	.50	.69	.47	10.244 (3)*	.017
Tracking Frequency	1.77	1.35	1.77	1.20	1.48	1.26	2.43	1.41	6.956 (3) (A,J,O)	.000
Tracking Confidence	2.79	1.41	3.08	1.44	2.40	1.45	2.89	1.63	2.68 (3)	.105
Feedback_Match	1.58	.825	1.77	.645	1.87	.503	1.93	.376	12.110 (3)*	.007
Total Barriers	24.15	5.96	21.06	5.95	18.67	4.38	16.38	3.97	28.127 (3) (C,F,H,L,M)	.000
Total Strategies	22.85	6.00	26.27	5.93	24.88	7.15	27.19	8.34	4.306 (3) (B)	.006
Strategies Barriers Balance	-1.30	7.24	5.21	7.62	6.22	7.95	10.81	8.81	24.354 (3) (C,F,I,L,N)	.000
Typical Daily Energy Level	2.73	0.84	3.23	.546	3.43	.698	3.78	.782	22.778 (3) (C,F,H,L,M)	.000
Enjoyment (PACES)	4.74	1.06	5.44	.896	5.63	.852	6.02	.787	22.642 (3) (C,F,I,K)	.000
Outcome Expectancy	2.92	.425	2.97	.413	2.79	.420	2.85	.386	1.939 (3)	.124
Self-Efficacy	2.95	.713	3.22	.767	3.39	.621	4.07	.681	32.650 (3) (C,E,L,O)	.000
Goal-Setting	2.43	.572	2.55	.788	2.53	.720	2.91	.840	5.574 (3) (B,J,M)	.001
Planning & Scheduling	2.50	.465	2.49	.504	2.43	.431	2.40	.456	.730 (3)	.535
Social Support	1.93	.523	2.30	.572	2.25	.604	2.39	.669	6.297 (3) (C,D,G)	.000
Total METs	19.69	19.05	23.31	22.55	37.76	33.05	51.70	47.46	11.805 (3) (C,D,L)	.000
Total # of Activities	3.02	1.45	3.52	1.43	3.96	1.53	4.07	1.62	5.952 (3) (C,E)	.001

Note. Significant differences between consistency levels represented by corresponding letters: ***A***= I & H, p< .05; ***B*** = I & H, p< .01; ***C*** = I & H, p< .001; ***D*** = I & C, p< .05; ***E*** = I & C, p< .01; ***F*** = I & C, p< .001; ***G*** = I & S, p< .05; ***H*** = I & S, p< .01, ***I*** = I & S, p< .001, ***J*** = S & H, p< .05; ***K*** = S & H, p< .01; ***L*** = S & H, p< .001; ***M*** = C & H, p< .05; ***N*** = C & H, p< .01; ***O*** = C & H, p< .001. * = Pearson χ^2 statistic

Table 3

Preference Characteristics of Participants Based on Physical Activity Consistency Level at Time 2

Characteristic or Variable	Overall Sample N=204		Sedentary 23%		Inconsistent 20.6%		Consistent 24%		Highly Consistent 32.4%	
Gender										
Female	N= 148		74.5%		83.3%		67.3%		68.2%	
Male	N= 56		25.5%		16.7%		32.7%		31.8%	
			M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Age			33.43	11.50	30.86	10.06	34.94	12.79	36.42	12.43
Total BMI			27.85	6.86	25.69	5.68	24.22	4.21	23.59	3.80
Activity Match			1.66	0.76	1.95	0.31	1.96	0.29	1.97	0.25
Preferred Env Frequency			2.36	0.71	2.57	0.67	2.88	0.53	3.14	0.55
Preferred Co Frequency			2.23	1.05	2.55	0.99	2.82	0.73	2.95	0.91
Plan Frequency			2.04	0.93	2.67	0.69	2.69	0.65	3.03	0.72
Planning Confidence			3.32	1.24	3.81	0.99	3.82	1.30	4.18	1.25
GS Frequency			1.89	0.86	1.95	0.96	2.02	0.95	2.48	0.99
Goal Setting Confidence			2.83	1.27	3.17	1.27	2.61	1.20	3.21	1.48
Tracking Frequency			1.51	1.18	1.62	1.31	1.61	1.11	2.36	1.34
Tracking Confidence			2.72	1.38	2.90	1.43	2.47	1.17	2.98	1.61
Total Barriers			23.09	5.41	21.24	5.27	19.02	6.22	15.88	3.90
Total Strategies			23.59	6.04	25.21	6.62	24.63	7.69	28.27	7.52
Strategies Barriers Balance			0.51	6.85	0.41	8.18	5.61	10.72	12.39	7.90
Total METs			18.67	30.67	24.77	18.97	34.12	21.61	61.36	59.82

Table 4

Means, Standard Deviations, and Correlations for Self-Regulation, Preference, Enjoyment, and Social Cognitive Variables

Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1. Age																						
2. Gender	-.071																					
3. PACES	.040	.071																				
4. OEMeans	-.175**	-.098	-.043																			
5. SEMeans	.096	.145*	.510**	-.170**																		
6. GSMeans	-.198**	.186**	.224**	.181**	.305**																	
7. PSMeans	-.195**	-.026	.011	.354**	-.073	.330**																
8. SSMeans	-.060	-.093	.267**	.111	.173**	.206**	.009															
9. Plan Conf	-.148*	.011	.275**	.176**	.337**	.285**	.121	.164**														
10. Plan Pref	.056	-.152*	.098	.167**	.094	.142*	.167**	-.012	.175**													
11. Plan Freq	.066	-.021	.359**	.062	.330**	.304**	.294**	.121	.297**	.532**												
12. GS Conf	-.158*	-.080	.093	.298**	.126*	.403**	.271**	.145*	.368**	.115	.193**											
13. GS Pref	-.181**	.049	.048	.134*	.093	.410**	.114	-.049	.112	.131*	.185**	.172**										
14. GS Freq	-.190**	.112	.172**	.113	.263**	.591**	.226**	.088	.242**	.183**	.369**	.264**	.705**									
15. Track Conf	-.170*	.000	.073	.301**	.128*	.412**	.230**	.224*	.307**	.127*	.155**	.777**	.082	.215**								
16. Track Pref	-.126*	.040	.008	.118	.149*	.473**	.172**	.150*	.139**	.264**	.260**	.355**	.276**	.330**	.524**							
17. Track Freq	-.092	.155*	.118	.008	.223**	.510**	.176**	.057	.167**	.209**	.379**	.320**	.267**	.386**	.446**	.743**						
18. Env Freq	.113	.042	.485**	-.038	.464**	.229**	-.039	.243**	.256**	.132*	.375**	.096	.084	.252**	.094	.042	.218**					
19. Co Freq	.084	.036	.259**	-.040	.116	.091	-.076	.099	.061	-.042	.257**	.008	.059	.136**	-.081	-.010	.124	.307**				
20. S_B Balnce	.133*	.029	.446**	-.035	.465**	.330**	-.017	.343**	.241**	.137*	.372**	.234**	.014	.223**	.247**	.207**	.239**	.409**	.160**			
21. Consistency	.104	.086	.456**	-.094	.515**	.227**	-.093	.236**	.311**	.159*	.356**	.024	.074	.252**	.015	.022	.174**	.549**	.230**	.467**		
22. Total MET	-.136**	-.008	.316**	.014	.319**	.218**	.053	.214**	.238**	-.045	.175**	.104	-.028	.118**	.126*	.102	.188**	.362**	.016	.339**	349**	
Means	34.23		5.535	2.875	3.491	2.643	2.447	2.242	3.95	.86	2.82	2.99	.74	2.43	2.79	.60	1.92	2.91	2.70	5.963	2.70	35.60
Std Deviations	12.03		.9994	.4111	.8160	.7718	.4622	.6239	1.15	.35	.867	1.47	.44	1.08	1.53	.49	1.36	.773	.946	9.119	1.14	36.98

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

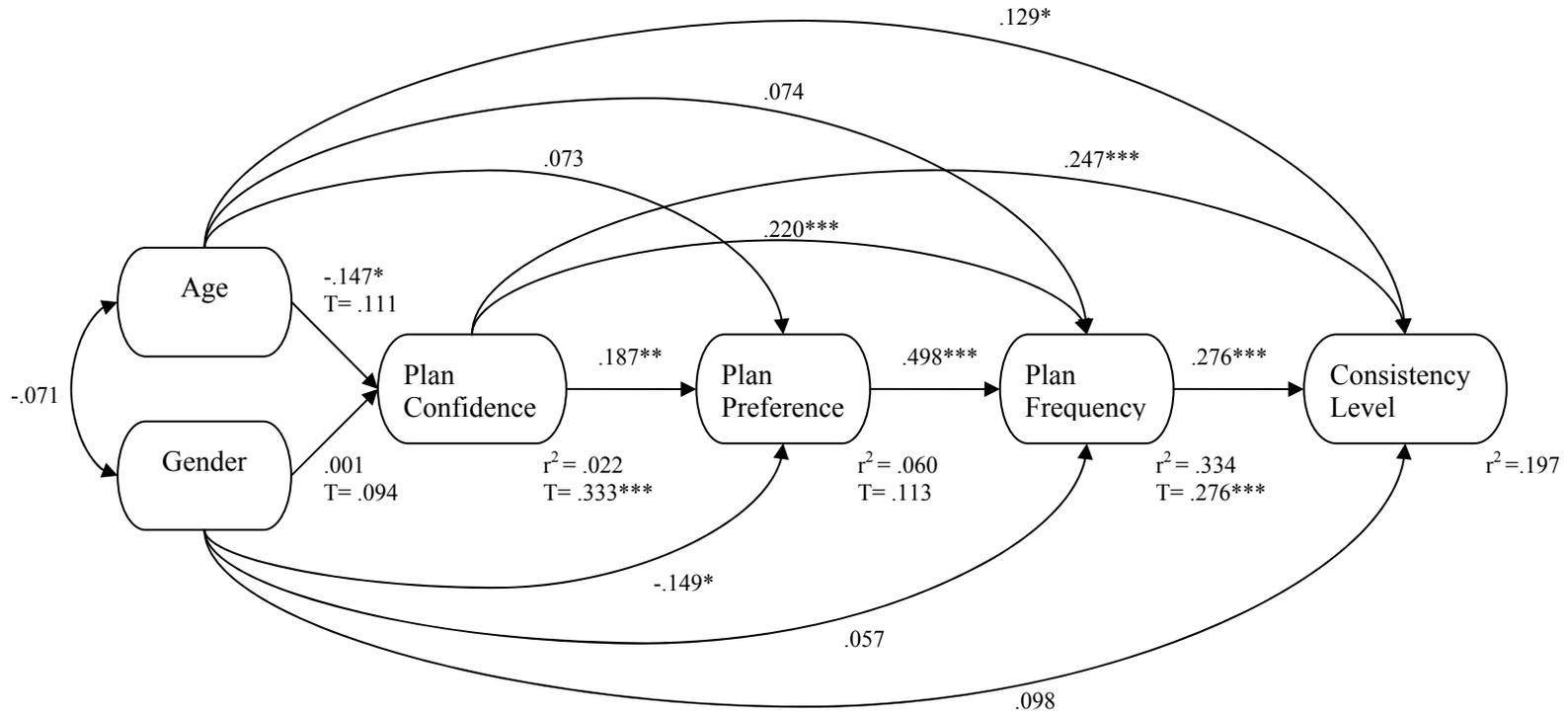*Correlation is significant at the 0.05 level (2-tailed).

Figure 1. Influence of planning confidence, preference, and frequency on physical activity consistency level.
        Note.*= *p*< .05; **= *p*<.01; ***= *p*<.001
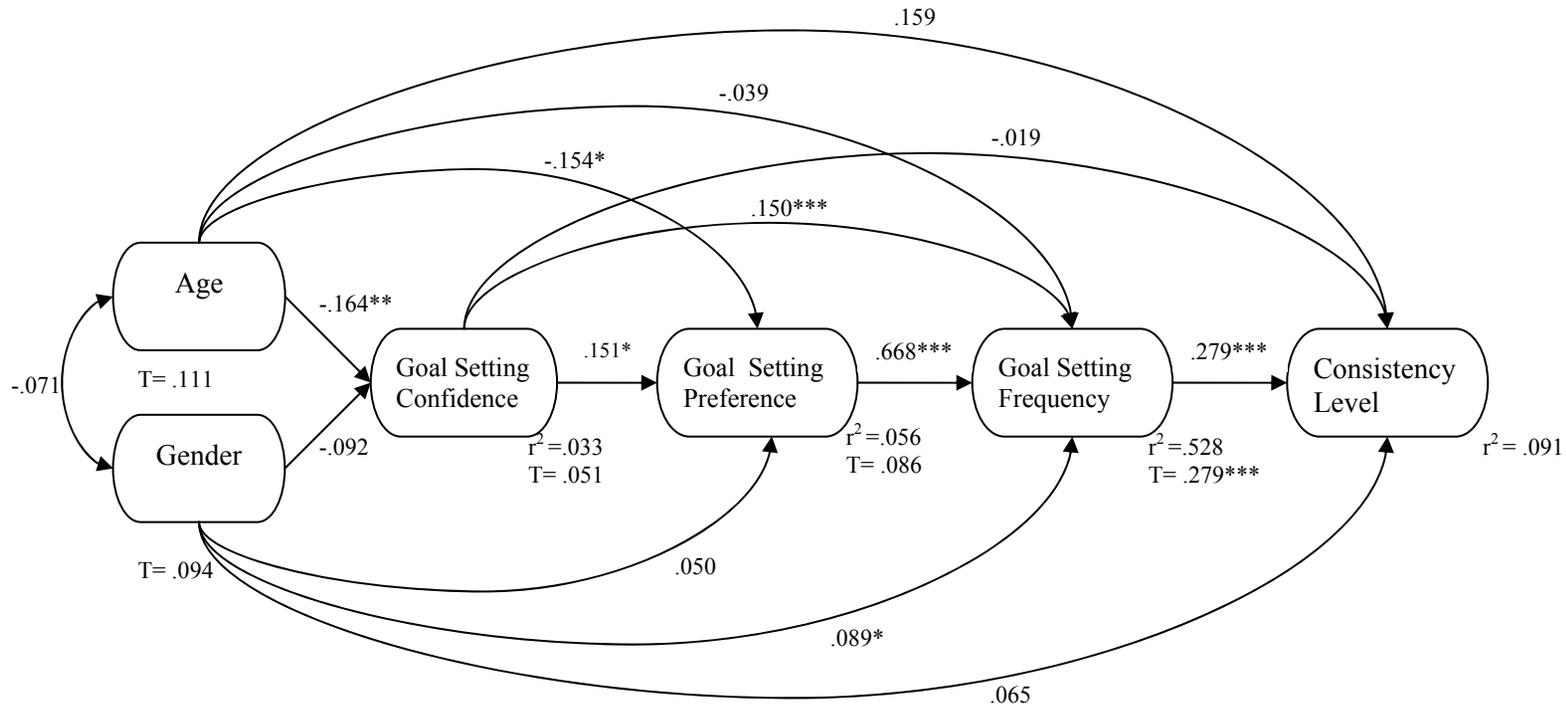
Figure 2. Influence of goal-setting confidence, preference, and frequency on physical activity consistency.
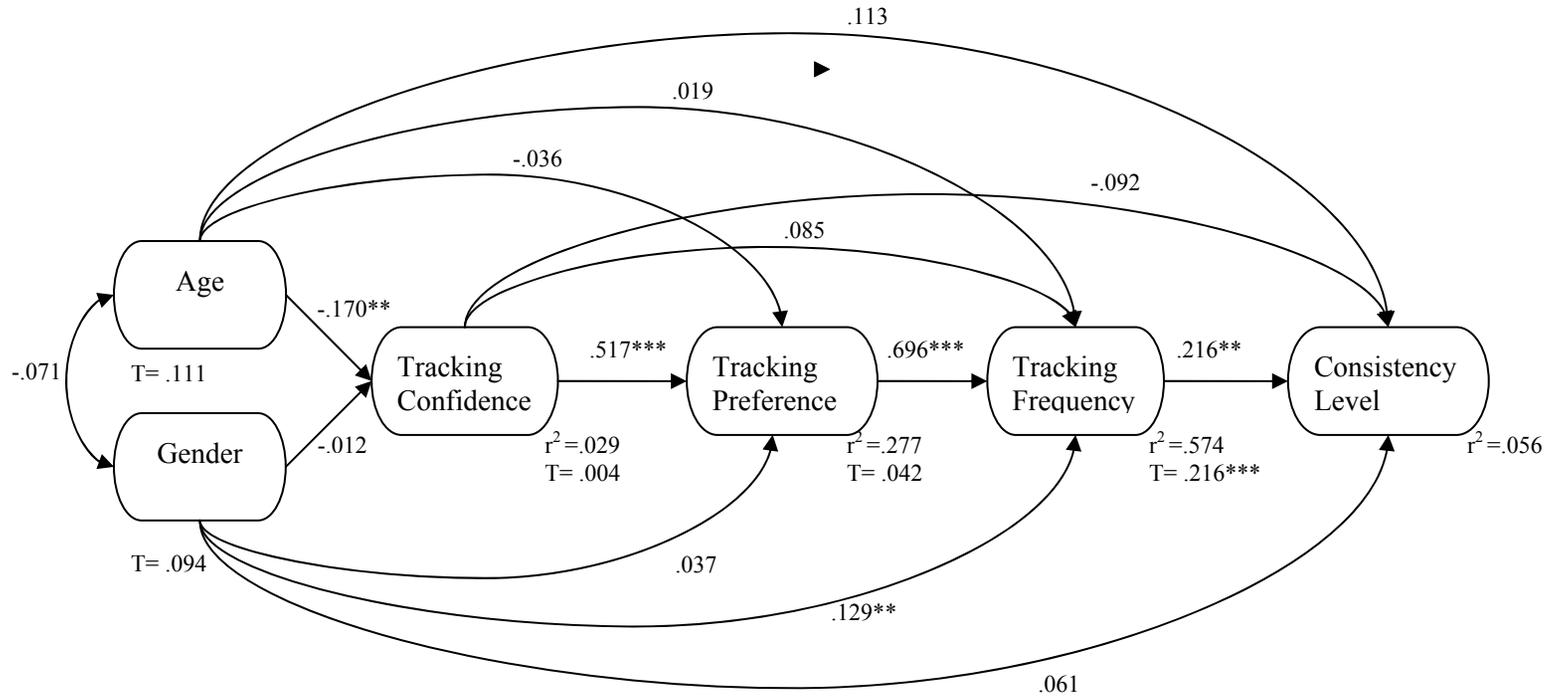
Note.*= *p*< .05; **= *p*<.01; ***= *p*<.001

Figure 3. Influence of tracking confidence, preference, and frequency on physical activity consistency level.
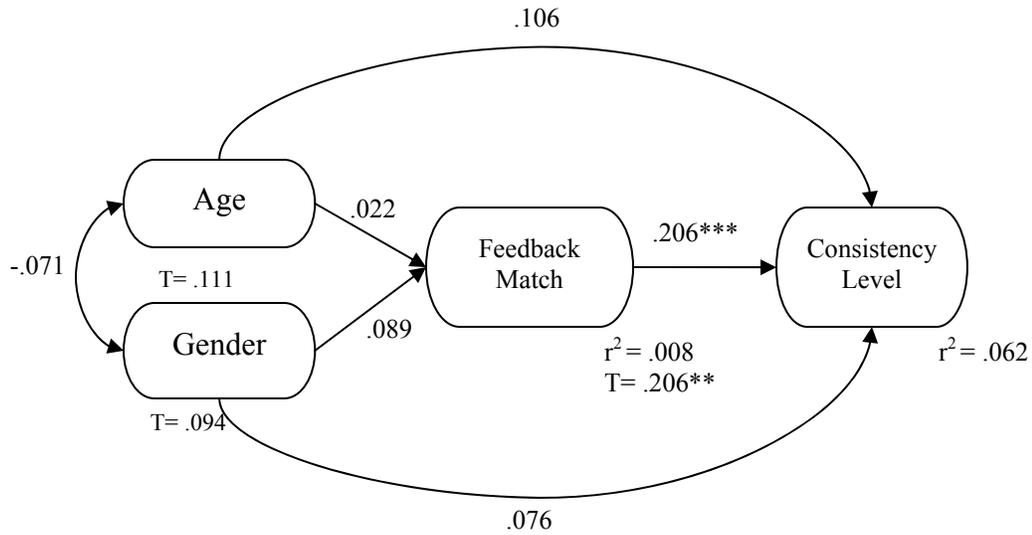*Note.**= *p*< .05; **= *p*<.01; ***= *p*<.001

Figure 4. Influence of feedback matching on physical activity consistency level.
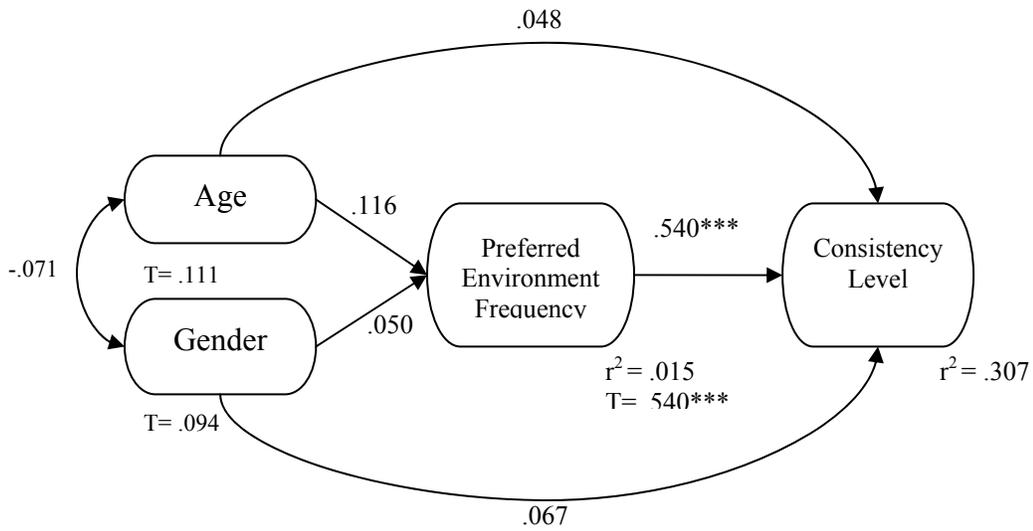*Note.*= *p*< .05; **= *p*<.01; ***= *p*<.001

Figure 5. Influence of frequency of exercising in preferred environment on physical activity
consistency level.
Note.*= *p*< .05; **= *p*<.01; ***= *p*<.001

Figure 6. Influence of frequency of exercising in preferred company on physical activity
consistency level.
Note.= p< .05; **= p<.01; ***= p<.001

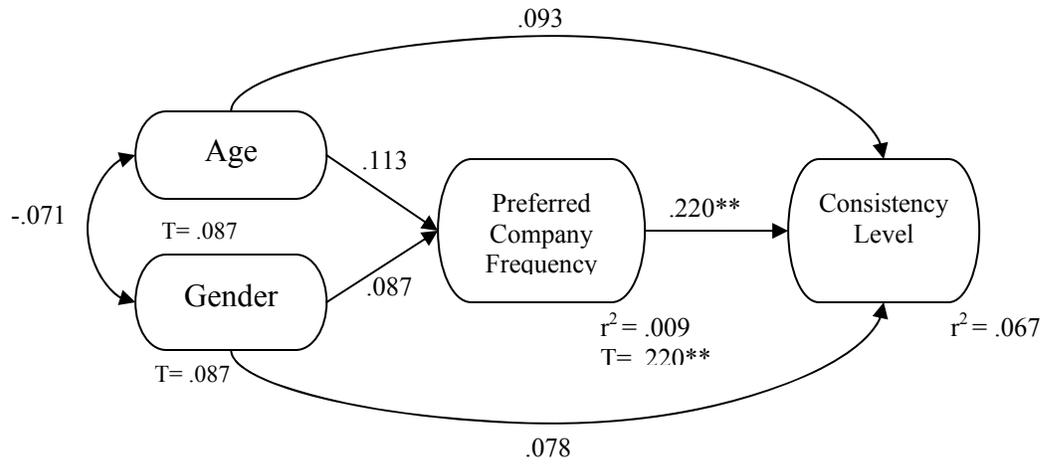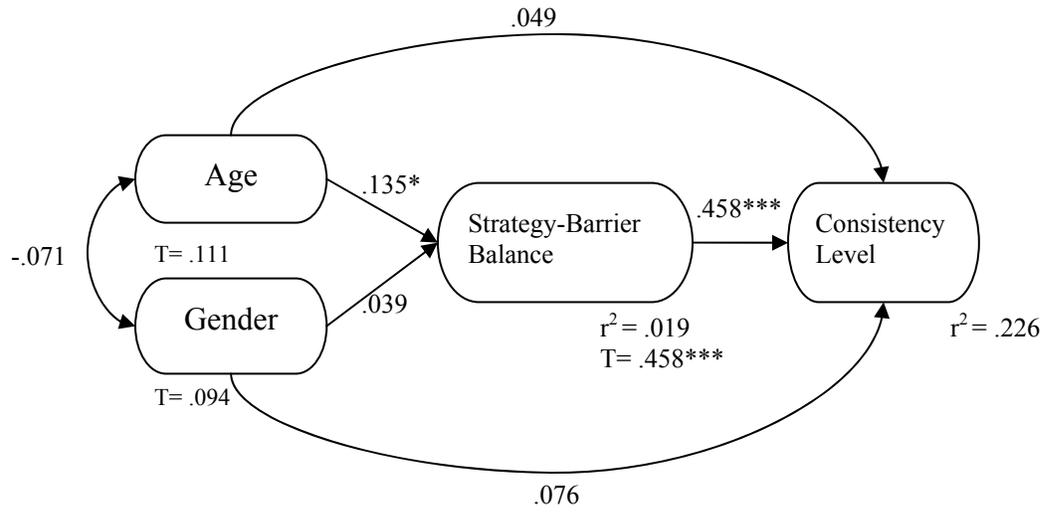*Figure 7.* Influence of strategy-barrier balance on physical activity consistency level.

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

Figure 8. Overall path model showing significant standardized coefficients for the influences of social support, self-efficacy, planning confidence, tracking preference and frequency, environmental frequency, enjoyment, and strategies and barriers on physical activity consistency level.
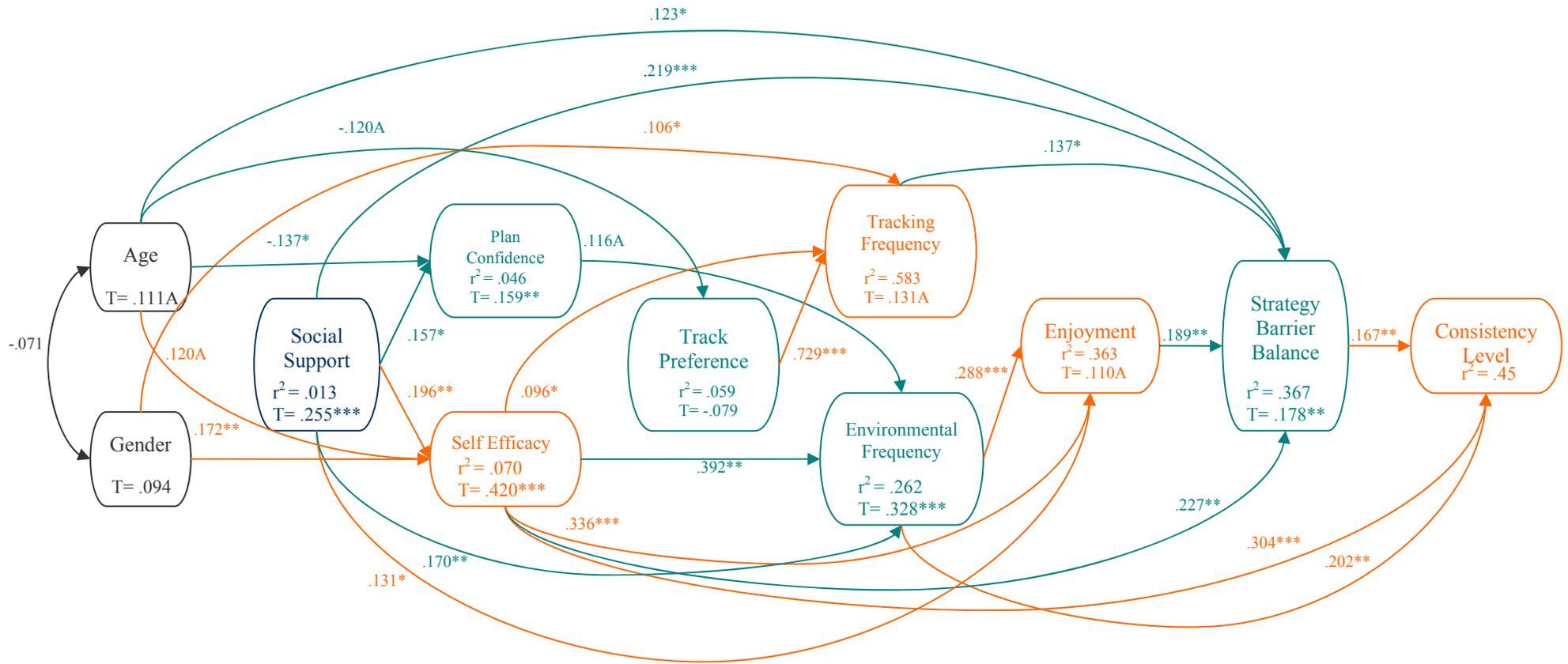
Note. *= *p*< .05; **= *p*<.01; ***= *p*<.001; A (Almost Significant)= *p*< .06 - .10

Appendix A

Physical Activity and Nutrition History Elicitation Interview

Center for Research in Health Behavior, Department of Psychology, Virginia Tech University

Informed Consent

The Physical Activity and Nutrition History Interview is part of a research project at Virginia Tech. These interviews will provide us information regarding peoples' current and past levels of physical activity and nutrition behavior. In turn, this will help us understand how to construct and facilitate tailored programs that will increase health behavior knowledge as well as improve overall health. This research project is funded by the Center for Research in Health Behavior and will eventually involve a number of people from the regional population.

Procedure

This interview will last about 60 minutes. You will be asked about your current and past physical activities, the length and intensity levels at which you exercise(d), the preferences surrounding these activities, any perceived barriers you experience(d), and how you overcome these barriers. You will also be asked to tells us about your prior history with exercise and some information concerning family history. Since the tailored program we plan to develop and test will be offered within the area, you may be asked ideas about how to carry out such a program and your future interest in the study. This interview will be conducted individually and in a quiet public place.

Confidentiality

Your answers will be entirely confidential and private. The interview will be audio-recorded. We will guard your privacy in this way – your name and address will be recorded on the interview form. A participant number will also be recorded on your interview form. Only your participant number will be recorded on the interview recording. After the interview, our staff will use your recorded interview to verify and clarify what is recorded on the interview form. This will help us look for common themes and ideas among all the interviews. Once the interview form is complete, we will destroy the interview recording. We will keep interview recordings in a locked file cabinet until we destroy them.

Potential Risks/Benefits and the Freedom to Withdrawal

You may feel uncomfortable answering questions about your nutrition and exercise habits. Your participation is voluntary. You may decide at any time to discontinue the interview. You may choose not to answer any question. There is no penalty for deciding not to complete the interview or for deciding not to answer any question.

Your responses could help us develop a program to improve nutrition and exercise of people living in our area and across the country. For your time today, we would like to extend to you

the opportunity to access the results of this study at your convenience through contact information that will be provided to you at the completion of the interview. In addition, we would like to offer you some recommendations for improved health behaviors that are based on your responses and tailored towards your preferences as well as an informational packet including a list of local fitness facilities and a complimentary pedometer.

The information from this research may be used for scientific or educational purposes. It may be presented at meetings, published in books or professional journals, or used for other purposes Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research. However, your name will not be used or associated with any aspect of this research.

Study Contact Information

This research has been approved by the Human Subjects Committee of the Department of Psychology and by the Institutional Review Board of Virginia Tech. You may call any of the following people at Virginia Tech if you have any questions:

Dr. Richard A. Winett, Dr. Eileen S. Anderson, Dr. Janet R. Wojcik,
or Ashley E. Dorough, CRHB Researchers   540.231.8747
Dr. Dave Harrison, Chair of Human Subjects Committee   540.231.4422
Dr. Jack Finney, Chair of Institutional Review Board   540.231.6670
Dr. David Moore, Chair of Psychology Department   540.231.4991

I agree to participate in this interview. I understand the information provided above and I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent to participate in this project. I understand that I may withdraw at anytime without penalty. I agree to abide by the rules of the interview.

_____   _____

Your Signature   Address/Phone Number

_____   _____

Staff Signature   Date

Appendix A (continued)

Physical Activity and Nutrition Survey

Elicitation Interview

Introduction

*We are in the early stages of developing an exercise/nutrition promotion program to be offered throughout the New River Valley. This is part of a research project at the Center for Research in Health Behavior, Department of Psychology, at Virginia Tech. As one of our first steps, we wanted to talk to a diverse group of adults in order to understand what people believe, what they know, and what they do with respect to physical activity and nutrition. We sincerely appreciate your willingness to talk with me today. I have a series of questions related to physical activity, nutrition, and your past experiences with health behaviors. There aren't any correct answers to these questions; we just want your honest impressions, opinions, and responses.

*I will be taking notes during the interview, and since we are interviewing many people, with your permission, I would also like to tape record our interview.

*The interview should take about 60 minutes.   In recognition of the time and service you've given through this interview, we would like to extend to you the opportunity to access the results of this study at your convenience through contact information that will be provided to you at the completion of the interview. In addition, we would like to offer you some recommendations for improved health behaviors that are based on your responses and tailored towards your preferences as well as an informational packet including a list of local fitness facilities and a complimentary pedometer.

*Do you have any questions?

*Since this interview is part of a research project at Virginia Tech, we need your informed consent to participate in the interview. **Complete consent form now.**

Let's begin by getting some basic information about you.

Name:_____ Email or phone #:_____

Age: _____   Gender: _____   Marital Status: _____

Race/Ethnicity:_____

Height in Inches: _____   Weight in Pounds: _____

Years of Education: _____   Occupation:_____

          If retired, from what occupation: _____

Children: Total number: _____   Gender/Ages: _____

                    Living at home number: _____   Gender/Ages: _____

Activity Assessment:

A pattern of physical activity is regular if activities are performed

- most days of the week
- 5 or more days of the week if moderate-intensity activities are chosen; or
- 3 or more days of the week if vigorous-intensity activities are chosen.

Moderate- the effort a healthy individual might expend while walking briskly, mowing the lawn, dancing, swimming, or bicycling on level terrain, for example.

Vigorous- intensity physical activity generally requires sustained, rhythmic movements and refers to a level of effort equivalent to the effort a healthy individual might expend while jogging, mowing the lawn with a nonmotorized pushmower, chopping wood, participating in high-impact aerobic dancing, swimming continuous laps, or bicycling uphill, for example. (Vigorous-intensity physical activity may be intense enough to represent a substantial challenge to an individual and results in a significant increase in heart and breathing rate.)

How many days a week usually include physical activity/exercise?

How long do you usually exercise?

How physically demanding your exercise? (e.g. breathing heavier than normal, increased heart rate, perspirating, etc.)

Now, I would like to begin by asking you some general questions about yourself.

Tell me a little bit about yourself.

What is a normal day like for you?

(Based on individual responses, inquire about occupation, family, hobbies, etc.)

Now I would like to ask you some questions concerning your beliefs and current lifestyle choices.

How often do you exercise?

What do you do?

How long to you typically exercise?

Tell me why you exercise (motivation)?

Tell me about what you like (preferences)?

Are these the same reasons you participated in some regular form of physical activity in the past?

What benefits do you receive or would expect to receive from participating in regular physical activity?

Do you plan time to exercise?

> If yes, how did you go about planning and was it successful?

> How successful are you at planning some physical activity on most days of the week?

> If no, have you ever scheduled time out of your day/week to exercise?

> What keeps you from setting aside time during your day/week?

What do you think would happen if you did plan time?

Tell me anything that you find hinders you from exercising or as much as you prefer?

Are these the same things that hindered you in the past? If currently active, what happened that you began exercising again?

What do/did you do to overcome these hindrances?

If you were, at one time, involved in physical activity but are no longer, what caused you to discontinue?   How long were you inactive (define lapse to the individual). Tel l me more about what happened. Tell me more about what you did, liked, didn't like.

What strategy do you use or what do you do to help yourself be physically active?

Does this strategy motivate you physically?   Mentally? How?

What do you tell yourself when you don't feel like exercising?

What would make exercising even better?

If this were the case, how confident are you that you would exercise most days out of the week?

What form of exercise do you enjoy the most?

       type of sport- (e.g. running, swimming, biking)

       type of environment- (e.g. with a friend, outside, to music)

What do you think is "healthy" eating? Please, explain.

What do you think is "healthy exercise"? Please, explain.
Do you consider either of these a part of your daily lifestyle?

What are some things that make it harder for you to eat healthy foods?

What are some things that make it easier for you to eat healthy foods?

On a typical day, how would you describe your energy level?   _____
From 1-5, with 5 representing higher amounts of energy.

Have you had, or do you currently have, any health complications such as diabetes, heart disease, high blood pressure, high cholesterol, etc.?

Is there anyone in your family that also has or has had these same health complications?

Appendix B

Request for Approval of Research Proposal

Center for Research in Health Behavior, Department of Psychology

Investigator:

Ashley E. Dorough, B.S., Graduate Researcher
Title:
AN EXPLORATION OF PREFERNCES: IDENTIFICATION & EVALUTATION OF A
MULTI-DIMENSIONAL CONSTRUCT FOR PHYSICAL ACTIVITY

Justification of Project:

National data estimates two-thirds of Americans are overweight or obese. In addition, an
estimated 25% of all deaths caused by chronic diseases can be attributed to physical inactivity.
To this effect, the risks of cardiovascular diseases (e.g. heart disease, stroke), Type II diabetes,
other chronic illnesses, and obesity are largely preventable and considerably reduced through
regular physical activity.

Health initiatives such as *Steps to a Healthier US* as well as other programs are now being
developed to change health behaviors. The purpose of this study is to contribute to and enhance
the current knowledge base by identifying viable constructs that determine why people are or are
not physically active and how to bring about long-term maintenance and enjoyment of physical
activity. More specifically, this study will focus on a viable construct in where there is a paucity
of research. This construct is "individual preferences" with regard to physical activity.
Preferences offer researchers multiple dimensions that are crucial to recognize and define.
Having this information will aid in further understanding how to tailor programs to prevent and
control chronic diseases.

Procedures:

Participants:
Participants will include 240 *consistently* and *inconsistently physically active* adults (males and
females) throughout the Roanoke and New River Valleys of Virginia who will sign informed
consent forms. *Consistently physically active* will be defined as individuals PA/exercise
guidelines of either 30 minutes of moderate activity on most days of the week or 20 minutes of
vigorous activity on at least 3 days per week for at least 10 weeks out of the past 13 weeks prior
to recruitment. *Inconsistently physically active* will be defined as individuals who report
physical activity in the 3 months prior to recruitment, but whose activity is insufficient in
meeting those recommendations. For the purposes of this study, those sedentary individuals who
have not engaged in any physical activity in the 3 months prior to recruitment will be excluded.
The participant age range will be limited to those individuals between 20 and 50 years of age.
These ages were chosen to target the adult population of interest.

Inclusion Criteria for this study:

- Adults ages 20-50 years who signed consent forms.

Exclusion Criteria:

- Minors less than 20 years of age or those over 50 years of age at the time of informed consent.
- Those participants considered sedentary or insufficiently consistent in his/her physical activity.

Procedures:

Participants in the Virginia Tech study will be recruited in the Spring of 2005. A story will be posted in the local media and also sent to a faculty/staff list serve at Virginia Tech. Recruitment and survey completion will be web-based. This recruitment strategy has been previously approved by the Institutional Review Board (IRB #04-229; ref 03-206). In addition, recruitment might include a snowball sampling method in attempts to obtain a variety of subjects. For this method, initially, participants will be selected for the sample on the basis of convenience and for the purposes of meeting a matrix of criteria for desired characteristics (e.g. age, sex, marital status, and others). The participants will then nominate acquaintances whom they think might be willing to participate in the research and also comprise desired characteristics. The nominees who agree to participate are then asked to nominate other potential participants. At the time of recruitment and prior to completing the measures, each participant will be required to read and sign an informed consent. Because this will be online, each individual will read the informed consent, containing a brief summary of the study, and then select an "agreement" button if he/she wishes to participate. A separate message will precede this button option explaining that by clicking on the agreement button this means the subject has read the statement, printed a copy for their files, agrees to participate in the study, and accepts that personal information will be electronically supplied to the researcher to document their participation (i.e. email name and address and date). The attached informed consent appears as it would appear online to the potential participants or can be accessed at http://filebox.vt.edu/users/adorough/Survey1.htm. The participants will then be asked a series of questionnaires: **1)** a sociodemographics page, **2)** The Aerobics Center Longitudinal Study Physical Activity Questionnaire, **3)** PREFERence Questionnaire, **4)** Physical Activity Enjoyment Scale (PACES), **5)** Exercise Confidence Scale, **6)** Exercise Goal-Setting & Exercise Planning Scale, **7)** Exercise Outcomes Scale, and **8)** a Social Supports Scale. These surveys will assess individuals' current PA levels, his/her preferences surrounding these activities, facilitators and barriers for maintenance, prior history with physical activity, and other social-cognitive variables associated with physical activity (i.e. self-efficacy, self-regulation). The duration of participation will last approximately 60 minutes. The overall intention of this study is to operationally define the construct of *preference* and to develop a scale that has good psychometric properties to measure this construct. The total effects of preferences on current physical activity level and on other psychosocial variables (i.e. self-efficacy, self-regulation, outcome expectancy, and social supports) will be determined. Additional exploratory goals include establishing test-retest reliability and predictive validity of the new PREFERence-Q.

Risks and Benefits:

There is none to little risk for the study participants. For the most part, the questionnaires will be completed entirely online. Privacy will be guarded in this way—only professional CRHB (Center for Research in Health Behavior) research staff will have access to response information. Upon completion of the survey, each participant will be asked to provide us with contact information in order for us to send a follow-up email which will assess the prior week's physical activity. Contact information will also ensure the participant receives his/her local business coupons and is entered for an overall drawing to win 5 personal training sessions with an American College Sports Medicine (ASCM) certified Personal Trainer (cPT). The names and addresses will be recorded only for these purposes and will be held confidential and independent of participant responses. A participant number will be assigned to each survey. Only the participant number will be identified with its respective responses. After the interview, our staff will use the responses to verify and clarify what is entered in online. This will help us look for common themes and ideas among all the interviews. Once the survey is complete, we will destroy the computerized responses. We will keep all data in a password protected computer data base until it is analyzed and subsequently destroyed.

The main benefit of the study is contributing to the knowledge base of behavioral medicine and the dissemination of preference-based approaches in order to facilitate improved health behaviors. *Preferences* is a new multi-dimensional construct that has only been considered peripherally with regard to physical activity. Identifying its role will enable researchers to design and test various tailored programs that will increase health behavior knowledge, and encourage regular physical activity and a healthy diet. In addition, personal and family health history information will be assessed to promote awareness of genetically-based risks. Therefore, the information provided by this study will also have implications for not only the improvement of overall health, but also for disease prevention, especially when targeted towards "at risk' populations such as those with cardiovascular diseases, diabetics, and people genetically predisposed to these diseases.

Confidentiality/Anonymity:

All participant data will be kept confidential with any identifying information accessible only to key project personnel.

Informed Consent:

Attached is an informed consent required for Expedited research.
Freedom to Withdrawal without Penalty: The informed consent will inform the participants of the option to withdrawal at any time without penalty.

External Permissions:

No external permissions are required for this study.

Biographical Sketch:

Ashley E. Dorough
Department of Psychology
Virginia Tech
<u>Education and Experience</u>:

1997-2000   B.S., Psychology Major, Tennessee Technological University,
      Cookeville, TN
Completion of this undergraduate degree required a year-long senior thesis, including all
background literature reviews, data collecting and analyses, as well as the interpretation and
professional writing of the thesis.

2001   Teaching Assistant/ Research Assistant, Clinical Health Psychology
      Department, University of Utah, Salt Lake City, UT

Responsibilities involved teaching two writing labs required for a Psychology Research Methods
course in which students were taught APA (American Psychological Association) standards and
methodology for writing and reporting empirical research.

Responsibilities also involved conducting research for a grant focusing on juvenile diabetes,
including data entry and integration of medical information using SPSS programming, coding
behavior of adolescents and mothers, attending weekly focus groups for the grant, and others.

Present   2nd Year PhD candidate, Clinical Psychology Program (Emphasis: Health),

      Virginia Tech University, Blacksburg, VA

Responsibilities include meeting graduate course requirements for field, teaching introductory
psychology recitation courses, serving as a research assistant for the Center for Research and
Health Behaviors, as well as working as a graduate clinician at the Psychological Services
Center.

Appendix C

Informed Consent

AN EXPLORATION OF PREFERNCES: IDENTIFICATION & EVALUTATION OF A
MULTI-DIMENSIONAL CONSTRUCT FOR PHYSICAL ACTIVITY

This study is part of a research project at Virginia Tech. The information obtained will provide us with information regarding individuals' current and past levels of physical activity, his/her preferences regarding physical activity, and other social-cognitive variables associated with physical activity (i.e. self-efficacy, self-regulation). In turn, this will help us understand how to construct and facilitate tailored programs that will increase health behavior knowledge as well as improve overall health. This research project is funded by the Center for Research in Health Behavior and will involve a number of people from the regional population.

Procedure

This survey will last about 60 minutes. You will be asked about your current and past physical activities, the length and intensity levels at which you exercise(d), the preferences surrounding these activities, any perceived barriers you experience(d), and how you overcome these barriers. You will also be asked to tell us about your prior history with exercise and some information concerning family history. In addition, you will be asked to consider your confidence levels and goals with respect to physical activity. This survey will be completed entirely online.

Confidentiality

Your answers will be entirely confidential and private. We will guard your privacy in this way—Upon completion of the survey, each participant will be asked to provide us with contact information in order for us to send a follow-up email which will assess the prior week's physical activity. Contact information will also ensure the participant receives his/her local business coupons and is entered for an overall drawing to win 5 personal training sessions with an American College Sports Medicine (ASCM) certified Personal Trainer (cPT). Your name and address will be recorded only for these purposes and will be held confidential and independent of your responses. A participant number will be assigned to your survey. Only your participant number will be identified with your responses. After the interview, our staff will use your responses to verify and clarify what is entered in online. This will help us look for common themes and ideas among all the interviews. Once the survey is complete, we will destroy the computerized responses. We will keep all data in a password protected computer data base until it is analyzed and subsequently destroyed.

Potential Risks/Benefits and the Freedom to Withdrawal

You may feel uncomfortable answering questions about your exercise habits. Your participation is voluntary. You may decide at any time to discontinue the survey. You may choose not to answer any question. There is no penalty for deciding not to complete the survey or for deciding not to answer any question.

Your responses could help us develop a program to improve nutrition and exercise of people living in our area and across the country. For your time today, we would like to extend to you the opportunity to access the results of this study at your convenience through contact information that will be provided to you at the completion of the interview. Also, you will have the opportunity to print or obtain some coupons to local businesses including: ……… In addition, by completing this survey you will be entered into a final drawing in which one individual will receive 5 of personal training sessions from an ASCM certified Personal Trainer. This training would consist of recommendations for improved health behaviors that are based on your responses and guidance for physical activity that is tailored towards your preferences.

The information from this research may be used for scientific or educational purposes. It may be presented at meetings, published in books or professional journals, or used for other purposes Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research. However, your name will not be used or associated with any aspect of this research.

Study Contact Information

This research has been approved by the Human Subjects Committee of the Department of Psychology and by the Institutional Review Board of Virginia Tech. You may call any of the following people at Virginia Tech if you have any questions:

    Dr. Richard A. Winett, Dr. Eileen S. Anderson, Dr. Janet R. Wojcik,
    or Ashley E. Dorough, CRHB Researchers   540.231.8747
    Dr. Dave Harrison, Chair of Human Sujects Committee   540.231.4422
    Dr. Jack Finney, Chair of Instituitional Review Board   540.231.6670
    Dr. David Moore, Chair of Psychology Department   540.231.4991

I agree to participate in this interview. I understand the information provided above and I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent to participate in this project. I understand that I may withdraw at anytime without penalty. I agree to abide by the rules of the interview.

_____   _____
Your Signature   Address/Phone Number

_____   _____
Staff Signature   Date

_____**Online Informed Consent**_____

<u>Welcome!</u>

My name is Ashley Dorough. I am a graduate student in Virginia Tech's Clinical Psychology Program, and am studying health promotion & disease prevention. I am inviting you to participate in a survey conducted for a research project with Virginia Tech's Center for Research in Health Behavior. Our research focuses on individuals' current and past levels of physical activity, their preferences regarding physical activity, and other social-cognitive variables associated with physical activity (i.e. self-efficacy & self-regulation). Your participation will help us understand how to construct and facilitate tailored programs that will increase health behavior knowledge as well as improve overall health. Below, I have tried to answer a few questions you might have regarding the survey:

How long will it take?

The survey will take approximately 30-45 minutes to complete and will be completed entirely online. Please take as much time as you need to answer the questions as thoroughly as possible. One week after completing the survey, you will receive a brief follow-up survey that will take approximately 15 minutes to complete.

Is it confidential?

Your answers will be entirely confidential and private. We will guard your privacy in this way—each participant will be asked to provide us with contact information (i.e. email address) in order for us to send the follow-up email which will assess the prior week's physical activity. A participant ID (your email address) will be assigned to your survey. Only your participant ID will be identified with your responses.   Once the surveys are complete, we will destroy the computerized responses. We will keep all data in a password protected computer data base until it is analyzed and subsequently destroyed.

What do I receive in return?

Your contact information (email address) will ensure that you receive **personalized feedback regarding your preferences for physical activity** and that you are entered for an overall drawing to **win 5 personal training sessions with an American College Sports Medicine (ASCM) certified Personal Trainer (cPT)*.** Personalized feedback will be emailed to you upon completion of the study given you completed both surveys, and your participant ID will automatically enter you for the grand prize drawing (notification of winning will arrive via email).
*Eligibility for training sessions dependent upon regional location.

Is this voluntary?

Your participation is voluntary. You may decide at any time to discontinue the survey. There is no penalty for deciding not to complete the survey. We encourage you to complete the survey in one sitting. However, if, for any reason, you need to temporarily discontinue the survey, you may do so in the following way: click **EXIT** survey screen, the website will save your responses and will allow you to continue where you left off as long as you continue using the same computer.

What will my responses be used for?

The information from this research may be used for scientific or educational purposes. It may be presented at meetings, published in books or professional journals, or used for other purposes Virginia Tech's Department of Psychology considers proper in the interest of education, knowledge, or research. However, your name will not be used or associated with any aspect of this research. This

research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University, by the Department of Computer Science at Virginia Polytechnic and State University. IRB Approval Date: March 2005; Expiration Date: March 2006.

Your participation is greatly appreciated!

Study Contact Information:

Should I have any questions about this research or its conduct, I may contact:

Dr. Richard A. Winett, Dr. Eileen S. Anderson, Dr. Janet R. Wojcik, or **Ashley E. Dorough** (CRHB Researchers)	540.231.8747	adorough@vt.edu
Dr. Dave Harrison, Chair of Human Subjects Committee	540.231.4422	dwh@vt.edu
Dr. Jack Finney, Chair of Psychology Department	540.231.6670	finney@vt.edu
David M. Moore, Chair of Internal Review Board	540.231.4991	moored@vt.edu

By clicking on the link below you agree that you have read and understand the purpose of this research and hereby give your voluntary consent to participate in the research.

http://www.surveymonkey.com/s.asp?u=31739918625

Appendix D

Press Release

CONTACT:

Catherine Doss

(540) 231-5035

cdoss@vt.edu

Participants sought for online exercise study

BLACKSBURG, Va., June 9, 2005 – The National Institutes of Health and the Centers for Disease Control and Prevention agree that physical activity and exercise are keys to improving a person's quality of life by enhancing health and preventing diseases. However, only about a quarter of adults in the United States are meeting even the minimum recommendations for physical activity.

A Virginia Tech student believes she may have some promising ideas as to why so many people find becoming and staying active so difficult.

"People differ in the types of activities and exercise they can do and enjoy," said Ashley Dorough, a graduate student in the clinical psychology program in the university's College of Science. "Though this may seem apparent, it hasn't been taken into account in many programs. People need to be matched with the kinds of activities and exercise they prefer."

But there's more to it than that.

Dorough said her initial research showed that there were five to seven other important preference dimensions to physical activity and exercise to which people identified, even those individuals who were inactive.

"My most basic idea is that if we can help people sort through their preferences, we can develop programs that are tailored to how each person likes to do specific activities," Dorough said. "And when people engage in tasks in ways they prefer, they are more likely to stick to it."

As much as this makes sense, there is not much research to support this idea, Dorough said.

As part of her research, Dorough is looking for a wide cross-section of men and women ages 20-60 who are able to answer a series of questions online.

"Participants may be consistently active, they may be sendantary for most of their lives, or anywhere in between," Dorough said.

After completing a series of questions, participants will receive personalized feedback that will suggest particular preferences for physical activity and exercise using the seven dimensions from Dorough's study.

"This is a unique opportunity for people to advance knowledge and programs in physical activity, exercise and health," Dorough said. "At the same time, participants can gain some insights into their own physical activity and exercise preferences."

To participate in the study, go to: http://filebox.vt.edu/users/adorough/Preferences.htm. All information is confidential.

The clinical psychology program at Virginia Tech aims to develop outstanding clinical scientists. The program is accredited by the American Psychological Association and is a member of the Academy of Psychological Clinical Science Programs, a top group of programs in major research universities across the United States and Canada. Dorough's project is conducted through the Center for Research in Health Behavior, a center within the Department of Psychology focused on disease prevention and health promotion.

The College of Science at Virginia Tech gives students a comprehensive foundation in the scientific method. Outstanding faculty members teach courses and conduct research in biology, chemistry, economics, geosciences, mathematics, physics, psychology, and statistics. The college is dedicated to fostering a research intensive environment and offers programs in nano-scale and biological sciences, information theory and science, and supports research centers—in areas such as biomedical and public health sciences, and critical technology and applied science—that encompass other colleges at the university. The College of Science also houses programs in pre-medicine and scientific law.

Appendix E

Recruitment Flyer
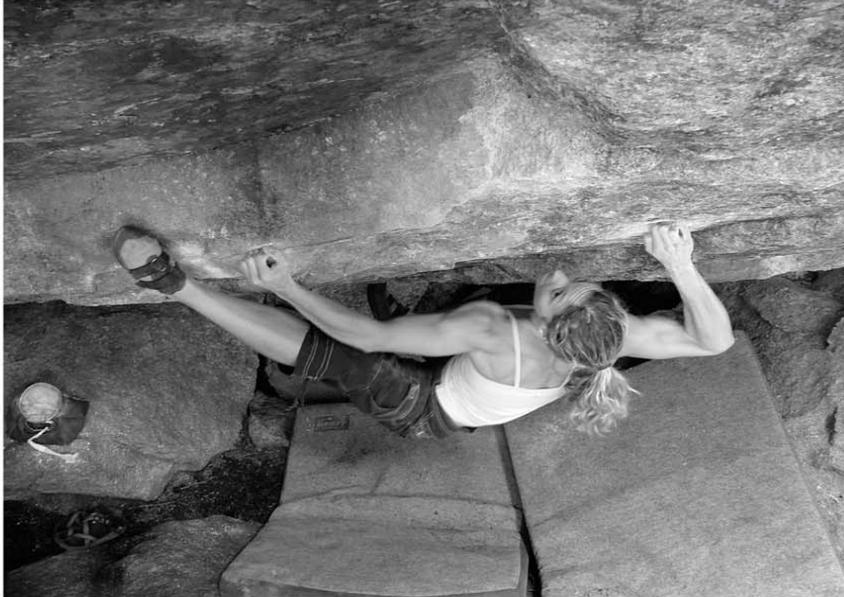
Appendix F

Sociodemographics

(Center for Research in Health Behavior, Virginia Tech, 2002)

Name: _____

e-mail address: _____

Age: _____ Gender: _____ Marital Status: _____

Height: _____ feet_____ inches Weight: _____lbs.

1   **Racial background** (Circle all that apply):

    A.   White
    B.   African American
    C.   Asian or Pacific Islander
    D.   Other _____

2   **How many adults, age 18 or older live in your home?** _____

3   **How many children, under age 18 live in your home?** _____

4   **Please list the ages of the children living in your home:**

    Child #1 Age _____

    Child #2 Age _____

    Child #3 Age _____

    Child #4 Age _____

    Child #5 Age _____

    Child #6 Age _____

6   **How many years of school have you completed?** (Circle One)

1 2 3 4 5 6 7 8 9 10 11 12 Some College 4 year college Masters Degree Post Masters

7   **What is your specific occupation?** If you work at a plant or a factory, or if you are in the military, please list the job you do there. If you are retired, disabled or unemployed, please list your most recent job:

8   **What is the annual income of your household** (include all *adults* working)?

    a) $10,000 or less/year

    b) $10,001 - $20,000

    c) $20,001 - $30,000

    d) $30,001 - $40,000

    e) $40,001 - $50,000

    f) $50,001 - $60,000

    g) $60,001 - $70,000

    h) $70,001 - $80,000

    i) $80,001 - $90,000

    j) Greater than $90,000

18   **Please check if you have had any of the following medical conditions:**

_____ Angioplasty	_____ Heart transplant
_____ Blocked arteries in neck or legs	_____ Infection around the heart
_____ Blood clots in legs or lungs	_____ Irregular heart beats
_____ Bulge in aorta (aortic aneurysm)	_____ Kidney disease
_____ Bypass surgery	_____ Liver disease
_____ Diabetes	_____ Narrowing of the Aorta (aortic stenosis)
_____ Emphysema or asthma	_____ Racing heart when resting
_____ Heart Attack	_____ Stroke
_____ Heart Failure	_____ Sudden chest pain
_____ Heart murmur	_____ Thyroid Disease

_____   Fluid retention in ankles NOT related to   _____
             pregnancy, a long airplane flight, or
             being on your feet all day   Difficulty breathing when lying flat
_____   _____

20   **Have you been diagnosed with or experienced any of the following conditions within the past 3 years? (please check all that apply)**

Heart Disease   _____

Stroke   _____

Type II Diabetes   _____

High Blood Pressure   _____

High Cholesterol   _____

Colon Cancer   _____

Other cancer (please specify):_____

21   **To the best of your knowledge, have any of your immediate family members been diagnosed with or experienced any of the following conditions?**

Heart Disease   _____

Stroke   _____

Type II Diabetes   _____

High Blood Pressure   _____

High Cholesterol   _____

Colon Cancer   _____

Other cancer (please specify):_____

22   **To what extent has your family's health history motivated you to be more physically active?**

Not at all motivated	Slightly motivated	Moderately motivated	Very motivated	Extremely motivated	Does not apply
1	2	3	4	5	6

Appendix G

The Aerobics Center Longitudinal Study Physical Activity Questionnaire

(Kohl, Blair, Paffenbarger, Macera, & Kronenfeld, 1988)

In this section we would like to ask you about your current physical activity and exercise habits that you perform regularly, at least once a week. Please answer as accurately as possible.

1. For the last 3 months, which of the following moderate or vigorous activities have you
    performed regularly? (Please choose *Yes* for all that apply and *No* if you do not perform the
    activity; provide an estimate of the amount of activity for all marked *Yes*. Be as complete as
    possible.

Walking
NO   YES →   How many sessions per week?   _____
                     How many miles (or fractions) per session? _____
                     Average duration per session?   _____(minutes)

        What is your usual pace of walking?

        Casual/Strolling   Average/Normal   Fairly Brisk   Brisk/Striding
            (< 2 mph)   (2 to 3 mph)   (3 to 4 mph)   (4 mph or faster)

Stair Climbing
NO   YES →   How many flights of stairs do you climb **UP** each **day**?   _____
                     (1 flight + 10 steps)

Jogging or Running
NO   YES →   How many session per week?   _____
                     How many miles (or fractions) per week?   _____
                     Average duration per session?   _____(minutes)

Treadmill
NO   YES →   How many sessions per week?   _____
                     Average duration per session?   _____
                     Speed?   _____(mph)   Grade?   _____

Bicycling
NO   YES →   How many sessions per week?   _____
                     How many miles per session?   _____
                     Average duration per session?   _____

Swimming Laps
NO   YES →   How many sessions per week?   _____
                              How many miles per session?   _____
                                (880 yards = 0.5 miles)
                              Average duration per session?   _____(minutes)

Aerobic Dance/Calisthenics/Floor Exercise
NO   YES →   How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Moderate Sports (e.g. Leisure volleyball, golf (not riding), social dancing, doubles tennis)
NO   YES →   How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Vigorous Racquet Sports (e.g. Racquetbal, singles tennis)
NO   YES →   How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Other Vigorous Sports or Exercise Involving Running (e.g. Basketball, soccer)
NO   YES →   Please specify: _____
                              How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Other Activities
NO   YES →   Please specify: _____
                              How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Weight Training (Machines, free weights)
NO   YES →   How many sessions per week?   _____
                              Average duration per session?   _____(minutes)

Household Activities (Sweeping, vacuuming, washing clothes, scrubbing floors)
NO   YES →   How many hours per week? _____

Lawn Work and Gardening
NO   YES →   How many hours per week? _____

2. How many times a week do you engage in vigorous physical activity long enough to work up
     a sweat? _____(times per week)

Exercise is physical activity that is planned or structured. It involves repetitive bodily movement
done to improve or maintain one or more of the components of physical fitness—

cardiorespiratory endurance (aerobic fitness), muscular strength, muscular endurance, flexibility, and body composition.

3. How many weeks, out of the past 12 weeks, have you exercised at least 3 days per week? (Please give your best estimate).

1   2   3   4   5   6   7   8   9   10   11   12

Appendix H

PREFERence Questionnaire

1. What forms of exercise do you enjoy the most? (Activities listed in alphabetical order, please choose no more than five)

Aerobics, general
Backpacking, general
Badminton
Baseball
Basketball
Bicycling (road riding)
Bicycling (stationary)
Bicycling (mountain)
Bowling
Boxing
Calisthenics
Canoeing or rowing
Circuit training, general
Cricket (batting, bowling)
Croquet
Curling
Dancing, aerobic, ballet or modern, twist
Diving, springboard or platform
Fencing
Fishing
Football
Frisbee, ultimate
Gardening, general
Golf
Gymnastics
Hacky sack
Handball
Health club exercise, general
Hiking
Hockey
Horseback riding
Jogging, general
Judo, karate, kick boxing, tae kwan do
Lacrosse
Moto-cross
Pilates
Polo

Racquetball
Rock climbing
Rope jumping
Rowing
Rugby
Running
Sailing, boat/board, windsurfing, general
Skateboarding
Skating (ice & roller)
Skiing, snow (downhill, cross-country)
Skiing, water (wakeboarding)
Scuba diving, skin diving
Snow shoeing
Soccer
Softball
Squash
Stretching
Surfing, body or board
Swimming
Table tennis, ping pong
Tai chi
Tennis
Volleyball
Walking
Water Sports (aerobics/calisthenics, polo, volleyball)
Weight lifting or body building
Whitewater rafting, kayaking, or canoeing
Yoga
None

Other (please specify)

2. How many of these activities have you engaged in on a regular basis in the past 12 weeks?

1 of 5
2 of 5
3 of 5
4 of 5
5 of 5
None

3. If none, which activities do you do instead?

4. If you are physically active, how satisfied are you with the activities you are currently doing?

Very Dissatisfied
Somewhat Dissatisfied
Indifferent
Somewhat Satisfied
Very Satisfied

5. If you are not physically active, how satisfied are you with being inactive?

Very Dissatisfied
Somewhat Dissatisfied
Indifferent
Somewhat Satisfied
Very Satisfied

6. If you had to choose what is most important to you when you exercise, what would your top three choices be?

That it...
is Enjoyable
is Convenient
is Interesting
is Exhilarating and Stimulating
Does not cause pain
Physically feels good while exercising
Physically feels good after exercising
Physically makes me look better
Mentally feels good while exercising
Mentally feels good after exercising
Physically makes me stronger
Gives me a sense of accomplishment   Other (please specify)

7. How important is the setting or environment in which you exercise?

Not at all important
Somewhat important
Moderately important
Very important

8. In which environment do you most prefer to exercise?

Outside
Inside
Both Inside and Outside
Other (please specify)

9. Please choose the reasons you prefer to exercise inside?

It is the nature of the exercise/sport to occur indoors
I like being inside over being outside
The weather is not consistent enough to be outside
I sweat when I am outside
I am not as self-conscious when I am inside
I feel that I push myself harder when I am inside
It is convenient
Other (please specify)

10. Please choose the reasons you prefer to exercise outside?

It is the nature of the exercise/sport to occur outside
I like being outside over being inside
I am not as self-conscious when I am outside
I feel that I push myself harder when I am outside
It is convenient
Other (please specify)

12. How often do you engage in physical activity in this preferred setting?

Always
Often
Sometimes
Rarely
Never

13. For the most part, how structured do you prefer your activities to be? (structured meaning routine, planned for time and place, etc.)

Very structured
Somewhat structured
Non structured

14. When physically active, how competitive do like to be with yourself?

Not at all competitive
Somewhat competitive
Moderately competitive
Very competitive
Extremely competitive

15. When physically active, how competitive do like to be with others?

Not at all competitive
Somewhat competitive
Moderately competitive
Very competitive
Extremely competitive

16. With whom do you most prefer to exercise?

Alone
With 1 or 2 other people
In a group or class situation
In a team situation
Other (please specify)

17. How often do you exercise according to your answer on Number 6?
(e.g. If you prefer to exercise alone, how often do you actually exercise alone?)

Always
Often
Sometimes
Rarely
Never

18. Do you like to receive encouragement from others regarding your exercise and the effects of your exercise?

Always
Often
Sometimes
Rarely
Never

19. How necessary is family support to your exercise? (For example, having help with cooking, household chores, taking care of the kids, running errands, etc.)

Not at all necessary
Somewhat necessary
Moderately necessary
Very necessary
Extremely necessary

20. How necessary is friend/social support to your exercise? (For example, providing encouragement for you, exercising with you, etc.)

Not at all necessary
Somewhat necessary
Moderately necessary
Very necessary
Extremely necessary

21. Do you prefer to plan or schedule your exercise?

Yes   No

22. How much do you actually like planning your exercise?

Like it very much
Like it somewhat
Indifferent
Do not like it very much
Hate it

23. How often do you plan or schedule your exercise?

Always
Often
Sometimes
Rarely
Never

24. If you were to plan or schedule your exercise, how confident are you that you would actually stick to the plan?

Not at all confident
Somewhat confident
Moderately confident
Very confident
Extremely confident

25. Do you prefer to keep track of your exercise progress?

Yes   No

26. How often do you keep track of your exercise progress?

Always
Often
Sometimes
Rarely
Never

27. How would you most like to keep track of your progress?

Recorded in a journal or personal activity log
Recorded on computer program that produces graphs and models
Mentally keep records of progress
Other (please specify)

28. What type of feedback do you prefer when exercising? (You may choose more than one answer.)

Biofeedback (i.e., heart rate monitor)
Mechanical feedback (i.e., pedometer)
Stopwatch or timed exercises
Physical feedback (i.e. feel stronger, fitter, healthier)
Aesthetic feedback (i.e. lost weight, look better)
Mental feedback (i.e. feel more aware and sharper mentally)
Feeling more energized
No feedback preferred
Other (please specify)

29. Do you prefer to set goals for your exercise?

Yes   No

30. How often do you set goals for you exercise?

Always
Often
Sometimes
Rarely
Never

31. If you were to begin setting exercise goals, how confident are you that you could stick your goals?

Not at all confident
Somewhat confident
Moderately confident
Very confident
Extremely confident

32. How important are the following goals to your exercise? In other words, what goals do you, or would you like to work on?

>Not at all important
>Somewhat important
>Moderately important
>Very important
>Extremely important

To reach a certain level of performance
To just get better or be better at the exercise or sport
To be consistent
To loose a certain amount of weight
To maintain a certain weight
To gain a certain amount of weight
To be leaner and more muscular
Other

33. What time goals do you prefer to set for your exercise?

Long-term goals (6 months to a year or more)
Short-term goals (1-6 months)
Number of minutes or hours (either daily or weekly)
Number of days per week or month
Other (please specify)

34. What type of guidance or assistance do you prefer when exercising?

self-guided
personal trainer
class instructor
doctor/physician
friend or partner
Other (please specify)

35. How physically demanding do you prefer your exercise?

Light intensity for long periods of time
Light intensity for short periods of time
Moderate intensity for short periods of time
Moderate intensity for long periods of time
Strenuous for short periods of time (i.e. for power)
Strenuous (vigorous) for long periods of time (i.e. for endurance)
Other (please specify)

36. On a scale from 1-5, how would you describe your energy level on a typical day?

1   2   3   4   5

Barriers to exercise can be anything that you feel hinders you from being as physically active as you would like to be. Although many people share some of the same barriers (i.e. lack of time), barriers can be very different for different people.

37. For each item listed, please choose the extent to which each barrier for exercise applies to your life.

> Does not describe
> Somewhat describes
> Moderately describes
> Very much describes
> Describes completely

Low motivation
Low energy
Work responsibilities, therefore lack of time
School responsibilities, therefore lack of time
Family commitments, therefore lack of time
Social (friend) commitments, therefore lack of time
Lack of direction & unsure of what to do
Lack of social support
Aversive physical consequences (i.e. pain, health risks)
Dissatisfaction with past exercise history

Just as barriers can be different, so can the Strategies people use to overcome them.

38.   How often do you use the following Strategies?

> Does not apply
> Never
> Rarely
> Sometimes
> Often
> Always

I have never really thought about strategies for overcoming my exercise barriers
I get up earlier to exercise
I exercise after work
I exercise on my lunch break
I exercise more on the weekends
I found someone to help me take care of the kids
My friend(s) and I swap days babysitting
I found an exercise facility with childcare
I found some community sports opportunities to participate in
I found an exercise partner for accountability
I usually study while I exercise (if indoors on a cardio machine)
I make exercising part of my daily routine
I chose an exercise that is more convenient during the weekdays and do what I enjoy most on the weekends
I began setting more exercise goals for myself
I began tracking my progress

39.   Of the Strategies listed below, how confident are you that each strategy will help you overcome some of your exercise barriers?

> Does not apply
> Not at all confident
> Somewhat confident
> Moderately confident
> Very confident
> Extremely confident

Get up earlier to exercise
Exercise after work
Exercise on your lunch break
Ask someone to help you take care of the kids
Find an exercise facility with childcare
Seek out community sports opportunities to participate in
Seek out an exercise partner for accountability
Study while you exercise (if indoors on a cardio machine)

Make exercising part of your daily routine
Choose an exercise that is more convenient during the weekdays
Set more exercise goals for yourself
Begin tracking your progress

40. Please list any other Strategies you employ to overcome barriers to exercise?

Appendix I

Physical Activity Enjoyment Scale (PACES)

(Kendzierski and DeCarlo, 1991)

Please rate how you feel *at the moment* about the physical activity you have been doing over the past 3 months.

I enjoy it	*1 2 3 4 5 6 7	I hate it
I feel bored	1 2 3 4 5 6 7	I feel interested
I dislike it	1 2 3 4 5 6 7	I like it
I find it pleasurable	*1 2 3 4 5 6 7	I find it unpleasurable
I am very absorbed in this activity	*1 2 3 4 5 6 7	I am not at all absorbed in this activity
Its no fun at all	1 2 3 4 5 6 7	Its a lot of fun
I find it energizing	*1 2 3 4 5 6 7	I find it tiring
It makes me feel depressed	1 2 3 4 5 6 7	It makes me feel happy
It's very pleasant	*1 2 3 4 5 6 7	It's very unpleasant
I feel good physically while doing it	*1 2 3 4 5 6 7	I feel bad physically when doing it
It's very invigorating	*1 2 3 4 5 6 7	It's not at all invigorating
I am very frustrated by it	1 2 3 4 5 6 7	I am not at all frustrated by it
It's very gratifying	*1 2 3 4 5 6 7	It's not at all gratifying
It's very exhilarating	*1 2 3 4 5 6 7	It's not at all exhilarating
It's not at all stimulating	1 2 3 4 5 6 7	It's very stimulating
It gives me a strong sense of accomplishment	*1 2 3 4 5 6 7	It does not give me any sense of accomplishment
It's very refreshing	*1 2 3 4 5 6 7	It's not at all refreshing
I felt as though I would rather be doing something else	1 2 3 4 5 6 7	I felt as though there was nothing else I would rather be doing

* Item is reversed score (ie: 1=7, 6=2, 7=1

Appendix J

Outcome Expectancy for Exercise

(Sallis, et. al., 1989; Rovniak, et. al., 2002)

Below is a list of possible outcomes of participating in regular physical activity.

Please rate each question **twice**.
- Under the heading **"How Likely"**, please indicate *how likely it is that you* would experience each of the outcomes below.
- Under the heading **"How Important"**, please indicate *how much it would matter to you* if each of the outcomes below occurred.

Please choose one number form the following rating scale in each space.

Not at all likely	**1**	**Not at all important**
Somewhat likely	**2**	**Somewhat important**
Moderately likely	**3**	**Moderately important**
Very likely	**4**	**Very important**
Extremely likely	**5**	**Extremely important**

SAMPLE: If it is very likely that I will develop stronger muscles, but my muscle strength is not at all important to me (i.e. it doesn't matter at all to me) then I would answer like this:

	How Likely	How Important
1. I will build up my muscle strength	4	1

If I exercise regularly, then: **How Likely**   **How Important**

1.   I will build up muscle strength
2.   It will be too time-consuming
3.   I will feel less depressed and/or bored
4.   It will improve my self-esteem
5.   I will feel tired
6.   I will not be good at doing the exercise
7.   It will take too long to achieve the outcomes I want
8.   I will not enjoy it
9.   I will feel less tension and stress
10. It will be too much work and effort to motivate myself to exercise
11. I will improve my health or reduce my risk of disease
12. I will do better on my job
13. I will feel physically uncomfortable while exercising (our of breath, in pain, etc)
14. It will be difficult to find friends to do the activity with me

15. I will feel more attractive
16. I will improve my heart and lung fitness
17. It will cost too much money
18. I will find it boring
19. I will increase my energy level
20. I will improve my muscle tone
21. It will take away from the time I have to spend with my family
22. It will take away from the time I have for my work/school
23. I will feel better about my body
24. I will gain muscle
25. It will decrease the energy I have for other activities

Appendix K

Self-Efficacy for Exercise Behaviors Scale

(Sallis, Grossman, Pinski, Patterson, Nader, 1988)

The following questions refer to your confidence in trying to increase or continue your exercise. Below is a list of things that people might do while trying to increase or continue regular exercise. For the following questions, rate exercises such as running, weightlifting, swimming, brisk walking, bicycle riding, or aerobic classes. Whether you exercise consistently or not, please rate how confident you are that you could really motivate yourself to do similar exercises **consistently, for at least six months.**

Using the following rating scale, please circle the number that best describes **how sure you are that you can do these?**

1. Stick to your exercise program when your family is demanding more time from you
2. Stick to you exercise program when you have household chores to attend to
3. Stick to your exercise program when you have excessive demands at work
4. Stick to your exercise program when social obligations are very time consuming
5. Read to study less in order to exercise more
6. Get up early, even on weekends, to exercise
7. Get up earlier to exercise
8. Stick to your exercise program after a long, tiring day at work
9. Exercise even though you are feeling
10. Set aside time for an exercise program; that is, walking, jogging, swimming, biking, or other continuous activities for at least 30 minutes, 3 times a week
11. Continue to exercise with others even though they seem too slow or too fast for you
12. Stick to your exercise program when undergoing a stressful life change (e.g. divorce, death in family, moving)

**This will be on a 5 point Likert-type scale ranging from 1(I know I cannot) to 5 (I know I can).

Appendix L

Exercise Goal-Setting Scale (EGS) and Exercise Planning and Scheduling Scale (EPS)

(Rovniak, Anderson, Winett, & Stephens, 2002)

These will be on a 5 point Likert-type scale ranging from 1 (Does not describe) to 5 (Describes completely).

<u>Goals</u>

The following questions refer to how you set exercise goals and plan exercise activities. Please indicate the extent to which each of the statements below describes you:

1. I often set exercise goals
2. I usually have more than one major exercise goal
3. I usually set dates for achieving my exercise goals
4. I don't typically write down my exercise goals
5. My exercise goals help to increase my motivation for doing exercise
6. I find it difficult to measure whether or not I have achieved my exercise goals
7. I tend to break more difficult exercise goals down into a series of smaller goals
8. I usually keep track of my progress in meeting my goals
9. I have developed a series of steps for reaching my exercise goals
10. I usually achieve the exercise goals I set for myself
11. If I do not reach an exercise goal, I analyze what went wrong
12. I make my exercise goals public by telling other people about hem
13. My exercise goals tend to focus on beginning or maintaining a regular exercise routine
14. My exercise foals tend to focus on improving my appearance and /or performance

<u>Plans</u>

The following questions refer to how you fit exercise into your lifestyle. Please indicate the extent to which of the statements below describes you:

1. I never seem to have enough time to exercise
2. Exercise is generally not a high priority when I plan my schedule
3. Finding time for exercise is difficult for me
4. I try to fit in exercise when I have free time
5. I schedule all events in my life around my exercise routine
6. I schedule my exercise at specific times each week
7. I plan my weekly exercise schedule
8. When I am very busy, I don't do much exercise
9. Everything is scheduled around my exercise routine—work, etc.
10. I try to exercise at the same time and same day each week to keep a routine going
11. I write my planned activity sessions in an appointment book or calendar
12. I try to fit in exercise if there is time left after scheduling other activities

Appendix M

The Family and Friend Support for Exercise Habits Scale

(Sallis, Grossman, Pinski, Patterson, & Nader, 1987)

The following questions refer to social support for your exercise.

Below is a list of things people might do or say to someone who is trying to exercise regularly. Please read and answer every question. If you are not exercising regularly, then some of the question may not apply to you. In that case, please choose "6" for "does not apply".

Please rate each question **twice**. Under "Family", rate how often anyone living in your household has said or done what is described, during the last 3 months. Under "Friends", rate how often you friends or co-workers have said or done what is described, during the last 3 months.

Please choose one number from the following rating scale in each space.

None	Rarely	A few times	Often	Very Often	Does not apply
1	2	3	4	5	6

SAMPLE:	**Family**	**Friends**
1. If my family rarely exercises with me, and my friends very often do, I would answer like this:		
a. Exercises with me.	a. 2	a. 5

During the past 3 months, my family (or members of my household) and friends:

		Family	**Friends**
a)	Exercised with me	_____	_____
b)	Gave me encouragement to stick with my exercise program	_____	_____
c)	Changed their schedule so we could exercise together	_____	_____
d)	Offered to exercise with me	_____	_____
e)	Gave me helpful reminders to exercise	_____	_____
f)	Discussed exercising with me	_____	_____
g)	Talked about how much they like to exercise	_____	_____
h)	Helped plan events around my exercising	_____	_____
i)	Asked me for ideas on how they can exercise more	_____	_____
j)	Took over work/chores so I had more time to exercise	_____	_____
k)	Made positive comments about my physical appearance	_____	_____
l)	Got angry with me or complained about the time I spend exercising	_____	_____
m)	Criticized or made fun of me for exercising	_____	_____
n)	Gave me rewards for exercising such as bought or gave me something I like	_____	_____