EXAMINING THE ROLE OF TIME PERSPECTIVE IN THE PROMOTION OF HEALTHY BEHAVIORAL PRACTICES

by

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Abstract

Examining the Role of Time Perspective in the Promotion of Healthy Behavioral Practices

Past research has provided suggestive evidence that the tendency to consider future consequences of one's own actions (Strathman et. al., 1996), or to be generally oriented towards the future (Zimbardo & Boyd, 1999) should be conducive to healthy behavioral practices. In Studies 1 and 2, I developed and validated an individual differences measure of the dispositional tendency to focus on the short- versus long-term implications of one's own behavior, the Time Perspective Questionnaire (TPQ). As predicted, scores on the TPQ were positively correlated with an index of health behavior, and this association remained significant even after controlling for a conceptually related construct (impulsivity).

Studies 3 and 4 were designed to test the causal status of the observed association by experimentally manipulating time perspective using a minimal cognitive-behavioral intervention and observing the impact on health behavior. In Study 3, I designed a brief (three 1/2-hour weekly sessions) time perspective intervention to enhance long-term thinking about physical activity and examined its efficacy among a sample of young adults enrolled in fitness classes. Participants were assigned to one of three conditions: time perspective intervention, goal-setting control intervention, and no treatment. Physical activity was assessed at pre-intervention, at post-intervention (3 weeks later), and at 7-week follow-up. Controlling for pre-intervention physical activity levels, time perspective participants reported larger increases in vigorous physical activity than the no treatment participants at both post-intervention and follow-up, and larger increases than goal-setting control participants at post-intervention. These behavioral effects were accompanied by increases in long-term thinking about exercise in the time perspective

condition, relative to the other two conditions. This study provides the first experimental evidence that the effects of health behavior interventions may be enhanced by increasing participants' long-term time perspective, and that time perspective is causally associated with health behavior.

In Study 4, I tested the efficacy of the time perspective intervention on a larger sample of participants, and added a six-month follow-up measurement of physical activity. Again, significant effects emerged in favor of the time perspective intervention relative to the no treatment condition at post-intervention, and a trending effect at the six-month follow-up relative to the goal-setting control intervention.

Together, studies 1 to 4 attest to the importance of time perspective in promoting health behavior in general, and physical activity in particular.

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CHAPTER 1

General Introduction

Why do people knowingly engage in behaviors that are damaging to their health in the long run? Why do people fail to engage in behaviors that could protect them against later disease and disability? These are questions that have plagued health researchers, practitioners, and lay people alike. Psychologists have recently made efforts to understand the cognitive bases for these seemingly self-defeating behavioral practices.

One psychological construct capable of explaining why people have difficulty maintaining healthy behavior patterns is time perspective. This construct can be conceptualised as the tendency to consider future consequences of one's own behavior (e.g., Strathman, Gleicher, Boninger, & Edwards, 1994), length of one's personal time horizon (e.g., Wohlford, 1966), or a general orientation towards the past, present, or future (e.g., Zimbardo & Boyd, 1999). All three conceptualisations define time perspective as a relatively stable individual difference variable that can explain seemingly self-defeating behaviors across a wide variety of domains including health.

Intuitively, the tendency to focus on the here-and-now at the expense of long-term considerations should be related to one's motivation to perform health protective behaviors. Most health protective behaviors, such as exercise and proper diet, require the individual to endure minor inconvenience and/or discomfort in the short-term in order to obtain favourable outcomes that may be realised many years or even decades later. Thus, an orientation toward the long-term consequences of one's present actions should facilitate behaviors that are consistent with one's long-term health interests.

In this chapter I will begin by reviewing several examples of early research on time

perspective followed by a detailed description of measurement techniques. I will also present a theory of the etiology of time perspective—"temporal orientation theory"—and describe the relevance of time perspective to understanding and changing health behaviour.

Early Research on Time Perspective

One of the earliest investigations of time perspective was conducted by Teahan (1957). He asked 60 seventh- and eighth-grade boys to list topics that they had thought or talked about over the previous two weeks. After participants generated their list, they then rated each topic according to whether it represented a past, present, or future concern. He found that those participants who described higher numbers of future-oriented concerns over the past two weeks also had the highest levels of academic achievement. Teahan (1957) was one of the first researcher to demonstrate an association between time perspective and academic achievement.

Klineberg (1968) studied 24 maladjusted and 23 "normal" boys attending private schools in France in order to examine the relationship between their capacity to delay gratification and their general orientation towards the future. Each boy was interviewed individually, and their verbalisations were coded for concern about future events. Capacity to delay gratification was measured by the boys' responses to a hypothetical scenario depicting a delay of gratification dilemma, and their actual response to a situation wherein they were presented with a choice between a small immediate reward and a larger, later reward. Although none of the measures discriminated the normal boys from the troubled ones, Klineberg found that the boys who were most consistent delayers of gratification showed greater concern for the future, as measured by the number of references they made to future events during the interview. In this study, then, Klineberg (1968) linked time

perspective with behavioral response tendencies in novel choice situations.

Lamm, Schmidt, and Trommsdorf (1976) examined the hopes and fears of 100 middle and lower class adolescents in Germany. The investigators asked participants to think of several hopes and fears, and then to state the year at which they thought each could occur. The extent of projection of these hopes and fears into the future represented the authors' operationalization of future orientation. When comparing different social strata within their sample, Lamm et. al. discovered that middle-class adolescents had a more extended future orientation than the lower-class adolescents. Lamm et al. (1976) thus provided evidence that time perspective is correlated with societal variables.

In a more recent study, Nurmi (1987) extended the research on societal factors by examining the influence of demographic and familial variables on future orientation of adolescents (N = 148; ages = 10-11, 14-15, and 17-19 years). Consistent with findings by earlier investigators, Nurmi found that adolescents from higher social classes were able to project themselves further into the future. In addition, those adolescents who reported being troubled by their home environment also tended to report more fears about their future vocation, and possessed fewer long-range educational plans. Interestingly, this effect was moderated by age—while negative family interactions were associated with a truncated time perspective for younger adolescents, the opposite was true for older adolescents. Although there are other possible interpretations regarding the moderating effects of age, this study added to Lamm et al.'s (1976) earlier suggestion that societal variables are important predictors of time perspective, by demonstrating that proximal environmental factors are also implicated.

As is apparent from these early investigations of time perspective, much of the work

was correlational in design and frequently used indices of time perspective to predict academic performance, capacity to delay gratification, or a limited number of societal and environmental variables.

Measurement of Temporal Orientation

In keeping with the different conceptualizations of time perspective proposed in the literature, there are different classes of measures that have been used to assess time perspective. These include projective techniques, event-based measures, and self-report measures (Table 1).

Table 1

Description of Measurement Methodology in Previous Investigations of Temporal Orientation

Measure	Description	Representative Studies
1. Projective Techniques	• Participant exposed to ambiguous stimulus and asked to generate an interpretation of it. • Response coded for number of references to future, and/or for overall thematic content.	Teahan (1958) Barndt and Johnson (1955) LeShan (1952) Wolford (1966)
2. Event-Based Measures	• Participants asked to recall a specified number things that they have thought or spoken about in a pre-specified time interval. • Probed by interviewer to establish relevant time reference (past, present, future).	Klineberg (1968) Teahan (1958) Lessing (1972) Wallace (1956) Wolford (1966)

3. Self-report Measures	• Participant responds to questionnaire items probing relevant content. • Items are summed or averaged to yield scale or factor scores (e.g., past, present, future).	Bond and Feather (1988) Roos and Albers (1965a,b) Stewart and Ahmed (1984) Strathman et al. (1994) Zimbardo and Boyd (1999)

Projective Techniques

Projective techniques are predicated on the assumption that important aspects of personality functioning reveal themselves in the form and content of responses that individuals give to ambiguous stimuli. The rationale is that such stimuli are blank slates upon which individuals project their personality dynamics. In line with this rationale, projective techniques usually involve presenting an individual with an ambiguous visual stimulus or incomplete text fragment, and then asking the respondent to express their interpretation or to otherwise bring closure to the stimulus. Despite the elegance and intuitive appeal of the projective hypothesis, however, it does not stand up under close scrutiny. The reliability and validity of projective measures is generally poor, particularly for the most popular of all projective techniques, the Rorschach inkblot test (see Wood, Nezworski, & Stejskal, 1996).

Fortunately, not all projective measures of personality share similarly poor psychometric qualities. The Thematic Apperception Test (TAT), for example, shows some promise. The TAT involves presenting an individual with a series of cards depicting ambiguous scenes or scenarios, and asking the participant to articulate their impression of what they see. Responses to each card can be coded in a variety of ways to detect thematic

trends. Jemmott (1987), for example, reviews a convincing body of research demonstrating that individual differences in social motives as measured by coded responses to the TAT predict immunologic recovery from stressors. These findings demonstrate that the TAT does indeed have the potential to reveal meaningful aspects of health-relevant personality functioning.

Indeed, early work using projective measures of time perspective yielded some interesting findings. Teahan (1957), for example, administered the TAT to 60 seventh and eighth grade students who represented the upper and lower grade quartiles of academic performance in their class. Each participant was presented with three TAT cards, including Card 1 (depicting a boy with a violin), Card 12B (depicting a boy sitting alone in a cabin), and Card 14 (depicting a silhouette of a person in a window). Participants were given the cards one at a time along with the instruction, "Write a story about this picture." Responses were then analyzed by the author and followed up with, "How much time was involved in the action of this story—not in writing it but in the action described? How long would it have taken if it had really happened?" Those participants who were high achievers demonstrated a significantly more temporally extended future references than low achievers on this measure for all three TAT cards presented.

Two other projective techniques used for measuring time perspective are the Incomplete Sentences Test (IST; Lessing, 1968), and the Story Completion Test (SCT; LeShan, 1952). The IST involves presenting participants with a series of sentence stems. Participants are required to complete each sentence by writing in the blank space beside the stem. These completed sentences can then be coded for thematic content, in much the same way that verbal responses to the TAT are coded. In this way, the IST belongs to the family

of projective tests in that it is assumed that the thematic content of responses reveals important personality dynamics. In the case of the IST, the stimulus is semantic rather than visual.

The SCT is another semantic projective test, originally developed as a measure of time perspective by LeShan (1952), but was also used by Teahan (1958) in a more refined form. Participants are required to write a story starting with a partially completed statement. Two such story fragments in Teahan's (1958) refined SCT are as follows: "At three o'clock one bright sunny afternoon in May, two men were out walking near the edge of town..."; and "Joe is having a cup of coffee in a restaurant. He is thinking of the time to come when..." Teahan found that high achievers showed evidence of a more extended future orientation in their responses to these fragments than low achievers, although the difference between the groups attained statistical significance for only one of the two stories presented.

Despite the few positive findings presented here, the reliability of projective measures of time perspective is generally poor. Perhaps as a result, the associations between these measures and other theoretically meaningful variables are inconsistent across studies (Lessing, 1968, 1972).

Event-Based Measures

Lessing (1972) describes time perspective as "the forward expanse of time over which future images of the self are projected" (p. 464). The conceptualization of time perspective as the extension of one's personally relevant future necessitates a different measure of time perspective than would be dictated by a general orientation toward the future. This variant of time perspective is most commonly measured by several techniques loosely related to the "events test" developed by Wallace (1956). Teahan (1958), for

example, asked his participants to record 25 things that they had thought about or talked about over the past two weeks, and then to rate each as to whether or not it referred to something in the past, present, or future. The proportion of total responses referring to the future was used as an index of future orientation.

Teahan (1958) reported that this measure of future orientation exhibited good reliability, as indicated by a significant positive correlation between responses to odd versus even items. However, the actual magnitude of the correlation coefficient was not reported, leaving open the possibility that the odd and even items were, in fact, not highly correlated with each other at all. Not surprisingly, others have noted that the events test has frequently yielded paradoxical findings (Lessing, 1968; 1972), calling into question its validity as a measure of individual differences in time perspective.

Self-Report Measures of Time Perspective

The shift away from projective techniques and event-based measures of time perspective occurred for several reasons. First, projective and event-based measures did not correlate well with each other, calling into question the notion that they were measuring the same construct. Second, both types of measures were only sporadically associated with theoretically meaningful variables, calling into question their usefulness for researchers.

The earliest efforts to measure time perspective through self-report date back to the 1960s with the development of the Time Reference Inventory (Roos, 1964). This is an interesting measure that requires individuals to respond to a number of items such as "I believe the happiest time of my life is in the _____" (past / present / future). For each item the participant is asked to indicate whether it refers to the past, present, or future, and also to indicate at approximately what chronological age the item refers to in their life. Degree of

orientation towards the past, present, and future is scored as the number of items attributed to each temporal category. Extension of past and future orientation is calculated by averaging deviations between the current age of the participant and the age to which each past or future item refers. The authors demonstrated that scores on this measure discriminated between mentally challenged individuals and normals (Roos & Albers, 1965a), and between alcoholics and normals (Roos & Albers, 1965b). Reliability for the instrument was not reported.

The Stewart Personality Inventory (SPI; Stewart, 1976) includes items purported to measure future orientation. The scale is an 80-item, broad spectrum questionnaire that assesses numerous aspects of personality functioning. Each item is a catch phrase (i.e., "Finding meaning in life", "Helping a friend"), to which individuals are required to indicate whether they: 1) like it on the whole, 2) are absolutely uncertain, or 3) dislike it on the whole. The SPI has items that pertain to future orientation (e.g., "Thinking about distant goals", and "Planning for the future"), however none of the factors emerging from factor analyses of the scale can clearly be interpreted as such (Stewart, 1976; Stewart & Ahmed, 1984).

Finally, Bond and Feather (1988) developed a measure of perceived use of time, called the Time Structure Questionnaire (TSQ). The TSQ is a 26-item questionnaire that requires individuals to circle "yes" or "no" in response to questions regarding their habitual use of time. Although the TSQ was not designed specifically to measure time perspective, three items load on a single factor that the authors labeled present orientation: "Many of us tend to daydream about the future. Do you find this happening to you?" (reverse scored), "Do you spend time thinking about opportunities that you have missed?" (reverse scored),

and "Do you spend time thinking about what your future might be like?" (reverse scored). Scores on this three-item subscale correlated positively with several indices of negative affectivity and generalized distress among three undergraduate student samples (Bond & Feather, 1988). The reliability of this subscale, however, was not reported and its conceptualization is quite limited, purporting to measure only individual differences in preoccupation with the present.

More contemporary work by Zimbardo and colleagues (Gonzalez & Zimbardo, 1985; Zimbardo & Boyd, 1999) has focused on validation of a self-report measure of preoccupation with various temporal frames: past, present, and future (Zimbardo, 1990). The work of Alan Strathman and colleagues (Strathman et al., 1994), on the other hand, has involved validation of a self-report measure of the tendency to be sensitive to temporally proximal versus distal contingencies associated with one's behavior. Because the measures proposed by Strathman et al. (1994) and Zimbardo & Boyd (1999) are better constructed and more well-validated than any previous self-report measures of time perspective, they deserve special attention.

Zimbardo Time Perspective Inventory (ZTPI). Zimbardo's measure of time perspective, originally called the Stanford Time Perspective Inventory (STPI; Zimbardo, 1990), first appeared in a Psychology Today readership survey (Gonzalez & Zimbardo, 1985). The first publication of a revised version, the 56-item Zimbardo Time Perspective Inventory (ZTPI), surfaced in the peer reviewed literature only very recently (Zimbardo & Boyd, 1999). Zimbardo and Boyd (1999) define time perspective as "the often non-conscious process whereby the continual flows of personal and social experiences are assigned to temporal categories, or time frames, that help to give order, coherence, and

meanings to those events" (p. 1271). According to this conceptualization, people rely differentially on past, present, or future time frames. Some rely more heavily on one temporal frame than others, resulting in measurable intra-individual temporal biases that manifest themselves in decisions, goals, and actions. Individual differences in time perspective, then, arise from "the habitual overuse or underuse of one or more of these temporal frames" (p. 1272).

One interesting facet of the ZTPI is the inclusion of items measuring orientation toward the past. This is a fairly unique attribute among the family of existing self-report measures of time perspective, which tend to assess differences in temporal focus extending from the present outwards towards the distant future (c.f., Roos & Albers, 1965a, 1965b).

In a sense, the tenability of items measuring past orientation depends on one's conceptualization of time perspective. For example, from a behavioristic perspective it makes sense that outcomes of one's present behaviors can only occur in the temporal space extending from the here-and-now out towards the distant future; it is not logically possible for outcomes of behavior to occur before the behavior itself. Zimbardo, however, has taken quite a broad approach to understanding time perspective, one that is not limited to temporal aspects of behavioral contingencies. According to Zimbardo and Boyd (1999), the decisions of both past and future oriented individuals could be conceptualized as "top-down" in that they are driven by non-immediate factors (e.g., personal history, future aspirations). The decisions of present-oriented individuals, on the other hand, could be conceptualized as "bottom-up" in that they are most heavily influenced by the salient aspects of the individual's personal immediate experience (e.g., situational cues, physiological states).

Interestingly, the authors suggest that the optimal temporal orientation can be understood as an appropriately flexible balance among these "top-down" and "bottom-up" processes.

In the initial validation study for the ZTPI, Zimbardo and Boyd (1999) administered the scale to several samples of undergraduate students from various North American universities. An exploratory principal-components analysis (using a varimax rotation) suggested the presence of five components, together explaining 36% of the variance in scores on the measure. The factors were interpreted by the authors as: past-negative ("I often think of what I should have done differently in life"), past-positive ("It gives me pleasure to think about the past"), present-hedonistic ("Taking risks keeps my life from becoming boring"), present-fatalistic ("My life path is controlled by forces I cannot influence"), and future ("I am able to resist temptations when I know that there is work to be done"). Subsequently, a confirmatory factor analysis was conducted using a new sample of university students. The fit of this model appeared adequate based on the χ^2 / df ratio (2.30); no standardized or parsimony-adjusted fit indices were reported. Internal consistency of each of the subscales was acceptable, ranging from a low of .74 for the present-fatalistic subscale, to a high of .82 for the past-negative factor. Four-week test-retest reliability coefficients for each of these subscales ranged from .70 to .80.

As is apparent from the nature of the five factors and the items that comprise them, the five-factor model proposed by Zimbardo and Boyd (1999) could conceivably be reduced to a more parsimonious three-factor model with subscales representing past, present, and future orientation. That is, the two past factors and the two present factors might be an artifact of the positive and negative wording of the items alone. Unfortunately, inter-factor correlations were not reported, and the authors did not competitively test the five-factor

model against any competing factor models (e.g., a three-factor model). Therefore it is difficult to fully assess the validity of the five-factor model proposed by Zimbardo and Boyd (1999) for the ZTPI.

In the validation component of their investigation, Zimbardo and Boyd (1999) present correlations between the ZTPI and a large number of other scales that measure conceptually similar constructs, including ego control, impulsivity, novelty seeking, and Strathman et al.'s (1994) Consideration of Future Consequences scale (CFC). Each of the five subscales of the ZTPI appears to be related to conceptually similar constructs in theoretically meaningful directions; however, the validity coefficients are less consistent for the past negative and past positive subscales than for the present and future subscales.

The authors administered the ZTPI to a second sample of undergraduates along with measures of several demographic and performance variables that should be related to individual differences in time perspective (i.e., age, self-reported grade point average, hours of studying per week). Again, the subscales of the ZTPI were correlated with these variables in theoretically meaningful directions; however, the strength of these associations was weak for the past-positive and past-negative subscales. Moreover, the future subscale (and to a lesser extent, the present hedonistic subscale) seems to be the only subscale of the ZTPI that is strongly related to indices of academic performance (i.e., grade point average, hours of studying per week) and age.

In several independent studies reviewed by Zimbardo and Boyd (1999), present time perspective was positively associated with risky driving (Zimbardo, Keough, & Boyd, 1997), more frequent substance use (Keough, Zimbardo, & Boyd, 1999), and unsafe sexual

practices (Rothspan & Read, 1996). Predictably, future time perspective was negatively associated with these same variables, but with slightly less consistency.

Overall, support for the validity of the present-hedonistic and future subscales of the ZTPI is quite strong. However, the two past and present subscales appear to be mirror images of each other, begging the question: do these represent truly independent factors? In order to disentangle this issue, a competitive model test would be required wherein a reduced, three-factor model is compared to the proposed five-factor model using confirmatory factor analytic techniques. Any significant discrepancy in fit observed between the three- and five-factor model would suggest a reinterpretation of the factor structure of the scale, and of the conceptual framework upon which the five-factor model is based. Unfortunately, no competing factor models were tested by the authors and therefore the viability of other factor models could not be assessed.

It is also evident from the findings reported by Zimbardo and Boyd (1999) that the predictive and discriminant validity of the two past subscales (past-negative and past-positive) is questionable. Although these scales do correlate with other personality measures in sensible ways, they do not appear to predict any meaningful outcome variables (i.e., academic performance, sexual practices, driving behavior). In a sense, this is not problematic given that Zimbardo and Boyd (1999) conceptualize time perspective as a general orientation, and are not concerned exclusively with explaining behavioral tendencies. However the discriminant validity of the past-negative factor is problematic. It is highly positively correlated with depression and negatively correlated with self-reported happiness and self-esteem. Moreover, it relates to other measures of negative affect like anxiety, aggressiveness, and emotional stability in ways that would be expected of a

measure of depression (Zimbardo & Boyd, 1999). It would be important to demonstrate that the past-negative and past-positive subscales are related to theoretically meaningful outcomes in ways that are conceptually and empirically separable from other constructs. Although there is evidence supporting the validity of the present and future subscales of the ZTPI, the validity of the past-positive and past negative subscales has yet to be convincingly demonstrated.

Consideration of Future Consequences (CFC). The Consideration of Future Consequences Scale (CFC), developed by Strathman et al. (1994) is a 12-item self-report measure of the tendency to focus on proximal versus distal outcomes of one's own actions. According to the authors: "The CFC refers to the extent to which individuals consider the potential distant outcomes of their current behaviors and the extent to which they are influenced by these potential outcomes." (p. 743). Items are phrased so as to capture tendencies toward consideration of immediate consequences, longer-range consequences, or to make trade-offs between the two. Examples of items are: "I consider how things might be in the future, and try to influence those things with my day to day behavior" and "I only act to satisfy my immediate concerns, figuring the future will take care of itself." Respondents indicate the extent to which each item is descriptive of themselves using a 1 to 5 response scale, where 1 = "extremely uncharacteristic," and 5 = "extremely characteristic."

In their initial validation study, the authors administered the CFC to several samples of undergraduate males and females at two large American universities. In these samples, the CFC demonstrated good internal consistency (alphas = .80 to .86), and acceptable stability across two-week ($r = .76$, $p < .001$) and five-week ($r = .72$, $p < .001$) test-retest

intervals. A principal factors analysis of the scale suggested the presence of a single underlying factor for all of the scale items, accounting for 94% of the variance. Confirmatory factor analysis provided further support for the one-factor model. The one-factor model demonstrated adequate fit as evidenced by χ^2 / df ratios (ratio = 2.18 to 4.11) and by parsimony adjusted indices (RMSR = .057 to .069) in three different samples. As was the case with the ZTPI, however, no alternate factor models were tested.

Validity of the scale was demonstrated in two carefully designed studies. The first was geared towards examining the extent to which individual differences in CFC moderated the effects of persuasive messages about the environment when the magnitude of hypothetical contingencies is manipulated. In this study, the authors administered a series of vignettes to undergraduate students at several large academic institutions. These vignettes were designed to measure the extent to which individuals' evaluations of an action (e.g., offshore oil drilling) would be influenced by changes in the temporal framing of the consequences of the action (e.g., reduction in gas prices, pollution from oil seepage). The investigators used a between-subjects design to manipulate the magnitude and temporal framing of the consequences presented in the vignettes.

The authors found that those with a short-term orientation as measured by the CFC were more affected by manipulations of the severity of the immediate contingencies presented in the scenarios, but were relatively unaffected by manipulations of the severity of long-range contingencies. For those scoring high on long-term orientation, the pattern of findings was reversed—their attitudes and evaluations were most influenced by changes in the long-term hypothetical contingencies, and were relatively immune to changes in short-

term contingencies. Thus, influence of knowledge on attitudes and evaluations was moderated by individual differences in CFC.

Unfortunately, participants filled out the CFC immediately after responding to the vignettes. This leaves open the possibility that participants filled out the CFC in such a way as to mirror their responses to the vignettes, in order to appear self-consistent. Nonetheless, this work provides some suggestive evidence regarding the importance of individual differences in CFC in predicting attitudes and evaluations of decision-relevant information.

In a second study, the authors demonstrated that pre-existing differences in mean scores were observable among "known" groups who should theoretically differ on their degree of CFC. The authors administered the CFC to members of a group undergraduates drawn from student activist organizations (e.g., College Democrats; Black Students for Progressive Change), whose causes could be interpreted as being long-term in nature. As predicted, the mean CFC score for the activist group was significantly higher than that of any of the four undergraduate comparison groups.

Finally, the authors again administered the scale to a sample of undergraduate students along with several other personality measures and several theoretically meaningful dependent measures: environmental behavior, health concern, alcohol use, and cigarette use. The authors predicted that individuals' scores on the CFC would predict unique variance in each of these dependent measures over and above that accounted for by the other individual difference variables. As predicted, the CFC scores were correlated in theoretically consistent directions with both the personality and dependent measures. Moreover, the CFC predicted unique variance in self-reported environmental behavior, general health concern, number of cigarettes smoked on a weekly basis, and alcohol

consumption over the past month over and above that already accounted for by measures of conscientiousness, optimism, and the future subscale of the ZTPI. This study lends further support to the validity of the CFC scale, and also provided early suggestive evidence that self-reported temporal orientation could be a causally important determinant of health behavior.

Critique of Existing Self-Report Measures of Time Perspective

Both the ZTPI and the CFC have well established reliability and validity, although it could be argued that the latter has performed better in this respect thus far. However, there are several shortcomings associated with each measure, some of which have been alluded to in the previous section.

The construction of the ZTPI, for example, is driven by a very broad conceptualization of time perspective that includes orientation towards the past, present, and future. Although the inclusion of items measuring past orientation makes conceptual sense, evidence supporting the predictive and discriminant validity of the two past subscales of the ZTPI is lacking. Moreover, it is not entirely clear that even the present and future scales are separable, and the crucial analyses that would allow the reader to disentangle this issue have not been reported (e.g., inter-factor correlations, competitive factor model tests).

The CFC is conceptualized quite differently. The authors have designed a reliable and valid measure of the tendency to focus on the temporally proximal versus distal consequences of one's own actions. However, the scope of this scale is quite restricted, and the item wording is very technical (e.g., "I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences"), perhaps limiting its usefulness with some populations (i.e., younger

respondents, respondents with verbal limitations, respondents from non-English speaking cultural backgrounds).

There were two general goals of this dissertation. The first goal was to construct a measure of time perspective that is based on a similar conceptualisation as the CFC scale, but containing less technical items that are more generalizable to the population at large. An additional goal was to go beyond the existing correlational research to conduct experimental research that would test whether there exists a causal relationship between time perspective and health behaviour. In order to accomplish this second goal, two experimental studies were conducted wherein I formulated, delivered, and evaluated the psychosocial and behavioural effects of an intervention designed to enhance long-term thinking among university students.

The following section describes the theoretical framework that underlies the empirical studies presented in this dissertation. This theory (temporal orientation theory) describes the etiology of time perspective, and provides implications for how changes in temporal orientation may be effected.

The Etiology of Time Perspective

Despite the recent surge of interest in time perspective as a personality variable, very little effort has been made to construct a coherent theoretical framework for the construct, or to forge connections between current operationalizations of the construct and existing knowledge bases from neighboring sub-disciplines within psychology. Moreover, even less effort has been made to understand the non-dispositional dimensions of time perspective and their potential role in guiding goal-directed behavior in important domains of human functioning. This section represents an initial attempt to address some of these vitally important issues.

Temporal Orientation Theory

The theoretical framework outlined here posits that temporal orientation arises from a complex combination of biological, cognitive, and social factors. Specifically, executive system functioning, beliefs about the connectedness of present behavior to later outcomes, and values attached to these later outcomes are all important determinants of individual differences in temporal orientation.

Several extensions can be made from these propositions. First, individual differences in time perspective can neither be reduced to the operation of a single brain structure, nor can they be attributed to purely social or cognitive factors. Second, as an individual difference variable, certain aspects of time perspective may be relatively stable over time. Third, despite the stability of the variable, individual differences in time perspective are subject to influence by social factors, and therefore may be changed through effortful intervention strategies. In the sections that follow, I will describe the biological and social cognitive dimensions of time perspective.

Biological Factors

Although this dissertation does not rely on (or manipulate) biological aspects of time perspective, a discussion of this dimension of etiology is important in building a general theory of temporal orientation. In this section, I will review the existing evidence and thinking that bears on the biological dimension of time perspective.

A central concept to understanding the biological and behavioral aspects of time perspective is that of a prepotent response, defined as "any reflex or response that takes precedence over any other potential reflex or response that an organism might make" (Reber, 1995). In humans, as well as in lower animals, prepotent responses can be dictated directly by internal biological drives (e.g., hunger, thirst, reproduction; Hull, 1943), salient environmental stimuli, or by habit alone. The capacity to suspend prepotent responses is a necessary precondition of future-oriented behavior, and is made possible by the operation of the executive system.

In mammals, the executive system is located in the prefrontal cortex of the brain (Nolte, 1999). The prefrontal cortex has a significant number of pathways to and from the parietal and temporal lobes, and is part of a large network linking the brain's motor, perceptual, and limbic regions. Its functions include maintaining working memory, temporal tagging of existing memory structures, filtering of environmental stimuli, and coordination of complex behaviors (Gazzaniga, 1995). Damage to the prefrontal cortex is associated by breakdown of goal-directed behavior, difficulty in planning action sequences, and hypersensitivity to environmental cues to action (Lhermitte, 1983; Lhermitte, Pillon, & Serdaru, 1986). In short, the executive system is vitally important for inhibition of

prepotent responses and facilitation of goal-directed behavior (Norman & Shallice, 1980; Shallice, Burgess, Schon, & Baxter, 1989).

The prefrontal cortex has undergone exponential growth in our species over recent evolutionary history. Indeed, the frontal cortex is more developed in humans than in primates, and is more developed in primates than in animals lower on the philogenetic scale (Gazzaniga, Ivry, & Mangun, 1998). This growth has, in turn, potentiated a variety of cognitive self-control capacities that can override prepotent responses arising from biological drives, environmental influences, and habitual behavior patterns.

Social Cognitive Factors

Although the ability to inhibit prepotent responses in the interests of long-term contingencies is not a uniquely human capacity (Grosch & Neuringer, 1981), the existence of a well developed frontal cortex potentiates the use of volitional cognitive strategies that profoundly augment an organism's capacity for behavioral self-management (Moore, Mischel, & Zeiss, 1976).

Mischel and his colleagues (e.g., Mischel, Shoda, & Rodriguez, 1989), for example, have demonstrated that children who are taught to attend to the non-appetitive qualities of treats put before them are more able to delay gratification to attain a larger, later reward than children who are taught to attend to the more salient appetitive qualities of the treats. Mischel et al. observed that the beneficial effects of these cognitive strategies are apparent for children who normally have difficulty delaying gratification, and are used spontaneously (i.e., without prior instruction) more often among those children who perform well on the delay of gratification task than those who perform poorly on it. These effects are quite

robust, and attest to the power of volitional cognitive strategies to facilitate behavioral self-control.

Volitional self-control of this variety comes with a price, however. Contemporary work by Baumeister and colleagues has demonstrated that conscious efforts to inhibit prepotent responses (both reflexive emotional responses and natural cognitive tendencies) can lead to compromised self-control capacity on tasks immediately following initial self-control efforts. In a series of studies, Muraven, Tice, and Baumeister (1998) asked participants to engage in a task that required suspension of a prepotent response (e.g., not laughing while watching a funny movie) and observed that performance of these participants was reduced on subsequent, unrelated self-control tasks relative to controls. These robust findings suggest that self-control—operationalized as the ability to override a prepotent response—is a limited resource that is subject to energy depletion (Muraven & Baumeister, 2000).

Interestingly, support for the position that future orientedness requires energy comes from several studies (Goldberg & Maslach, 1996; Zimbardo & Boyd, 1999) demonstrating that individual differences in the future subscale of the ZTPI correlate strongly and positively with self-reported energy, and with self-reported conscientiousness. An energy depletion explanation also explains why many lapses in self-regulatory behaviors in health are associated with taxing experiences, or low activation mood states like depression. Support from this notion comes from correlational and experimental work demonstrating that negative moods precipitate breakdowns in self-control in a variety of domains of health behavior, including smoking cessation (Brownell, Marlatt, Lichtenstein, & Wilson, 1986;

Shiffman, 1982), and dieting (Heatherton, Herman, & Polivy, 1991; Heatherton, Striepe, & Wittenberg, 1998).

Self-control is rendered even more challenging by the fact that long- and short-term contingencies do not compete on a level playing field. A large body of research attests to the fact that rewards (i.e., favorable outcomes) are sharply discounted as temporal distance from the time of choice increases, and preference for larger, later rewards over smaller immediate rewards reverts as distance between them increases. These effects have been consistently demonstrated in humans (Ainslie, 1975; Loewenstein & Thaler, 1989), as well as in lower animals (Rachlin & Green, 1972; Rachlin, Logue, Gibbon, & Frankel, 1986). The discounted nature of temporally distal outcomes, and the energy cost associated with exerting volitional control over behavior highlight the importance of motivational factors in facilitating future-oriented behavior.

Motivational Prerequisites for Future Oriented Behavior

Motivation to reach any desired long-term outcome should be a function of: 1) how much one values the outcome, and 2) strength of one's belief that the occurrence of this outcome is contingent on one's current behavior. I propose that these values and beliefs arise from a variety of social influences including family, peer groups, and culture of origin. As such, they may vary from individual to individual within populations, in much the same way that the biological and cognitive elements do. However, values and beliefs may also vary from one population to the next, and among cultural groups within a given population. For example, it might be expected that individuals living under circumstances where the average life expectancy is significantly reduced (war-torn regions of the world, or disease-stricken populations) would have a truncated time perspective. Possible mechanisms might

include the operation of social sanctions against holding unrealistic long-term goals, and/or the existence of objectively tenuous connections between immediate behavior and long-term outcomes. Indeed, it has been demonstrated previously that low socioeconomic status is associated with decreased span of personally relevant future, and with a general orientation to the present (e.g., Lamm et al., 1976; Lessing, 1968; Nurmi, 1987).

Time Perspective and Health Behavior

In industrialized nations like Canada and the United States, most of today's major life threatening disease entities are chronic rather than infectious in nature. This shift from infectious to chronic disease as the major focus of concern is a relatively new development over the course of modern history.

Many have attributed this shift in focus to the success of modern medicine in treating acute illness. Others emphasize the role of improved living conditions and hygienic practices which have reduced the threat of many infectious diseases (e.g., cholera and smallpox). Regardless of the cause, the net result of the decline of infectious disease in North America has been an increase in average life expectancy. Because members of industrialized nations are living longer now than ever before, slowly progressing chronic disease processes such as coronary heart disease and many forms of cancer have become the primary limiting factors for the human life span. Interestingly, most of these chronic diseases could be prevented through the alteration of just a few behavioral patterns: poor diet, smoking, lack of exercise, substance abuse, and maladaptive responses to stress (LaLonde Commission of Canada, 1974; U.S. Surgeon General, 1979).

In his analysis of the historical trends in professional and lay models of illness in the western world, Aronowitz (1998) notes that the risk factor approach to understanding illness

emerged around the time when medical emphasis began shifting away from infectious disease and towards understanding chronic conditions like coronary heart disease. In fact, the origin of the term "risk factor" traces back to the very first prospective epidemiological studies from the 1950s and 1960s (e.g., the Framingham Study; the Western Collaborative Group Study). During the decades following these seminal investigations, the risk factor approach to understanding illness has gained wide acceptance by both the general public and health professionals. This shift away from understanding disease from a biomedical, mechanistic perspective resulted in increased attention to behavioral and lifestyle factors when considering the origin and development of chronic disease entities.

Prevention of chronic diseases requires action many years, or even decades before any symptoms of the disease develop. It is only through the recognition that one's current actions are inexorably linked to these later outcomes (presence versus absence of disease) that it is possible to regulate one's own behavior in the appropriate directions. Most health behaviors involve inconvenience, or even discomfort and embarrassment at the time of performance. Adding to the negative attributes of such health behaviors is the fact that many have no immediate benefits. The only benefits to be gained are far into the future, and therefore the only rational reason why individuals might want to perform health protective behaviors would be in the interests of these longer term considerations.

Given the ample number of negative consequences of such behaviors in the present as contrasted with the promise of benefits in the very distant future, it is clear that individual differences in the propensity to focus on the temporally proximal versus distal consequences of one's actions should, then, be an important determinant of who adopts health protective behaviors, and who does not.

Smoking behavior provides an illustrative example. For the habitual smoker, lighting up the next cigarette is potentially associated with a variety of immediate benefits, including feelings of well-being, avoidance of withdrawal symptoms, improved concentration. Depending on the composition of one's social network, lighting up might also win acceptance from one's peers, and improve one's sense of self-worth through feelings of belonging within the group. Despite these immediate benefits, there are really no immediate costs.

In the long-term, however, the balance of costs and benefits is flipped. Although there are presumably few long-term benefits associated with smoking, the long-term health consequences are devastating: approximately half of all chronic smokers will die prematurely, an average loss of life expectancy of 15 years (e.g., Doll, Peto, Wheatley, Gray, & Sutherland, 1994). Given the positive valence of the short-term contingencies associated with smoking, and the powerfully negative valence of the long-term contingencies, temporal focus should have a powerful impact on decisions about smoking behavior.

The same temporal issues figure prominently in virtually all health behaviors, including engaging in regular physical activity, adhering to a medical regimen, and maintaining a healthy diet. Each of these behaviors is associated with a characteristic set of contingencies whose valence changes dramatically depending on the temporal frame. Each behavior is associated with many costs in the short-term (e.g., inconvenience, discomfort, loss of pleasure), and few benefits. In the long-term, many benefits emerge (e.g., longer life span, improved functional status, decreased risk for disease), and costs are minimal.

Attention to long-term contingencies, then, should motivate health behavior performance, while attention to short-term contingencies should de-motivate health behavior performance.

Time Perspective and Social Cognitive Theories of Health Behavior

Temporal orientation theory can be viewed as an extension of classical behaviourism to include a cognitive and temporal component. As such, this novel theoretical framework shares much in common with existing social cognitive models of health behavior (e.g., Bandura, 1986; Ajzen, 1991; Becker, 1974). All social cognitive theories share the conviction that behavioral contingencies are important determinants of health behavior, although most add the proposition that perceptions of contingencies are more important determinants of behavior than actual contingencies. The theory of planned behavior (TPB; Ajzen 1991), social cognitive theory, and the health belief model all incorporate constructs that pertain directly to perceived behavioral contingencies (see Table 2).

Table 2.

Behavioural Contingencies as Operationalized by Existing Social Cognitive Theories

Theory	Construct	Definition
Theory of Planned Behavior (Ajzen, 1991)	Behavioral beliefs	Outcomes or consequences of a particular behavior / values attached to these consequences or outcomes.
Social Cognitive Theory (Bandura, 1986)	Expectations / Expectancies	Anticipated outcomes of a behavior / values attached to these outcomes.

Health Belief Model (Becker, 1974)	Perceived benefits Perceived barriers	Perceptions of benefits / costs associated with a health action.

For example, the theory of planned behavior (Ajzen, 1991), posits that behavior is most proximally determined by intentions to perform the behavior. Intentions, in turn, are determined by individuals' subjective impressions of how normative the behavior is, perceived control over the behavior (which also influences behavior directly), and attitudes toward the behavior. Attitudes are thought to be a product of the probability that given outcomes will occur if a behavior is performed, and the value that the individual attaches to these outcomes.

Thus, the theory of planned behavior suggests that beliefs about the probable outcomes of one's behavior (i.e., behavioral beliefs) are important determinants of actual behavior through their influence on attitudes and intentions to perform the behavior. Although the operationalization of behavioral beliefs is straightforward when explaining discrete behavioural choices (i.e., choosing to vote for political candidate "A" versus candidate "B"), but it becomes less clear when applied to health behaviors which, by their nature, are action sequences performed over long periods of time (Sheeran, Conner, & Norman, 2001).

Careful analysis of the kinds of outcomes referred to when predicting health behaviors using TPB reveals an interesting link between TPB and temporal orientation theory. In TPB, behavioral beliefs are usually measured by self-report items that refer to outcomes that aggregate over time, rather than those outcomes that would be expected to

occur immediately upon performance of the behavior in question. For example, "How likely is it that you personally will receive health benefits from exercising regularly?", and "How likely is it that you personally will achieve or maintain good physical and cardiovascular fitness from exercising regularly?" are both items that could be used to measure behavioral beliefs about exercise in TPB. However, "health benefits" in general and "cardiovascular fitness" in particular do not occur immediately after attending a single exercise class. Rather, these are outcomes that emerge gradually over time only after repeated and consistent performance of the behavior. It is this particular class of outcome that temporal orientation theory suggests would be motivating for an individual to perform a health protective behavior like engaging in regular exercise.

However, temporal orientation theory would also suggest that attention to immediate outcomes of one's behavior could be motivating in the opposite direction—towards non-performance. That is, if one were to focus only on the fact that attending an exercise class is likely to make one sweaty, uncomfortable, and embarrassed at being out of shape (the likely immediate outcomes for a beginner exerciser), one would be inclined to stay home and avoid exercise altogether. These, of course, are not the kinds of outcomes that TPB refers to. Thus, temporal orientation theory and TPB are allied in their conviction that long-term contingencies are motivating for health behavior performance, although the case is made much more explicitly by temporal orientation theory.

A parallel argument could be made for the convergence of temporal orientation theory and Bandura's (1986) social cognitive theory or the health belief model (Becker, 1974), both of which make explicit reference to the importance of anticipated outcomes of behavior in determining behavioral performance, and make the implicit assumption that

long-term contingencies are the primary motivating agents for health behavior performance. Time perspective, then, is an implicit component of existing social cognitive theories of health behavior.

Summary

In this dissertation, I propose that health behaviors can be meaningfully understood within the context of individual differences in, and main effects of time perspective, defined as the tendency to focus on temporally proximal versus distal outcomes of one's own behavior. Time perspective is a trait that varies from individual to individual, and can therefore be measured as an individual differences variable. However, to the extent that we are all subject to inherent trade-offs between short- and long-term outcomes associated with our current behaviors, human behavior should be universally influenced by temporal focus.

In this chapter, I have summarized the existing psychological research on time perspective. Several researchers have examined the correlation between time perspective and meaningful demographic, environmental antecedent, and concomitant variables. Others have linked time perspective to anticipation of future consequences, and a variety of relevant behaviors, including health practices. As indicated earlier, the goal of the first two studies in this dissertation was to develop a self-report measure of time perspective that would be general enough to be applicable across a broad range of situations and for a broad range of populations. I describe the construction of such a measure—the Time Perspective Questionnaire (TPQ)—and report its psychometric and structural properties in Study 1, and then its validity in predicting an index of general health behavior in Study 2.

Virtually all of the existing research on time perspective employs correlational designs. But the existing correlational studies and theoretical framework articulated here

point to the possibility—indeed, the likelihood—that time perspective may be causally related to health behavior. If so, it might be possible to increase healthy behavioral practices through an intervention that is designed to increase long-term time perspective. Thus, Studies 3 and 4 report the findings of two experimental studies that tested the effectiveness of a time perspective intervention for promoting physical activity. These two studies, to our knowledge, are the first reported experimental studies demonstrating the causal influence of time perspective on health behavior.

CHAPTER 2

Overview of Studies 1 and 2

In Study 1, an individual differences measure of time perspective, the Time Perspective Questionnaire (TPQ), was developed and administered to several samples of undergraduate students at the University of Waterloo. The psychometric properties of the TPQ were assessed from its factor structure, the internal consistency of its items, and from its stability over time. In Study 2, the validity of the TPQ was examined by determining the extent to which unique variance in health behavior could be predicted by the TPQ over and above scores on a measure of a conceptually similar construct, impulsivity. Together, these studies demonstrate that the TPQ is a reliable and valid measure of individual differences in time perspective.

Study 1

There is a striking tendency for some individuals to engage in actions that they perceive to be beneficial in the short-term, despite the potentially disastrous long-term consequences of these same actions. This is particularly true in the domain of physical health, where there are observable differences between individuals in the extent to which they consistently engage in health protective behaviors (e.g., engaging in regular exercise, maintaining a healthy diet) and avoid health damaging behaviors (e.g., smoking cigarettes, eating fatty foods). Time perspective is a construct that may help explain these behavioral tendencies.

In Study 1, a new individual differences measure of time perspective was developed, and its psychometric properties were assessed using a sample of undergraduate students. The Time Perspective Questionnaire, or TPQ, contains positively worded items indicative of a long-term orientation (e.g., "People who know me would describe me as a person who plans for the future.") and those indicative of a short-term orientation (e.g., "Living for the here-and-now is important for me."). To offset the potential for response sets, the scale also contains several negatively worded items designed to tap the same dimensions of temporal orientation (e.g., "I do not spend much time thinking about the future," and "I do not consider my long-term plans to be more important to me than my short-term plans.").

Like the CFC scale, then, the TPQ contains items pertaining to pure long-term orientation, pure short-term orientation and the tendency to make trade-offs among short- and long-term considerations. However, the items of the TPQ were purposely designed to be more colloquial and less technical than those of the CFC, and we expect that this will facilitate the use of the scale with populations of varying educational levels and cultural

backgrounds. In addition, the TPQ contains more items pertaining to long-term goals and plans than the CFC, along with items pertaining to self-concept that are notably absent from CFC.

As mentioned earlier, the conceptualization of time perspective underlying the TPQ is quite different from that underlying the construction of the ZTPI. The TPQ is much more concerned with outcome focus, and therefore it does not include items measuring past orientation. In addition, the items comprising the ZTPI are quite different from the items comprising the TPQ, in that the TPQ does not contain items that could easily be interpreted as measuring conceptually similar constructs. The ZTPI, for example, contains items that appear to measure impulsivity ("Before making a decision, I weigh the costs against the benefits."; reverse scored), delay of gratification ("Meeting tomorrow's deadlines and doing other necessary work comes before tonight's play."), and conscientiousness ("I complete projects on time by making steady progress."). Thus, the conceptual basis for the TPQ is distinct from the ZTPI, and it contains item refinements that make it less confounded with other constructs.

Method

Participants

We administered the TPQ to a sample of 529 undergraduate males and females with a mean age of 19 years. The measure was included in a mass testing booklet that participants voluntarily completed in partial fulfillment of their course requirements for introductory psychology.

Measures

The Time Perspective Questionnaire (TPQ). The TPQ is a 19-item self-report questionnaire measuring the degree to which individuals habitually consider the short- versus long-term consequences of their own actions (Appendix A). The TPQ includes items that reflect a long-term time perspective (e.g., "I have a good sense of what my long-term priorities are in life."), and items that reflect a short-term time perspective (e.g., "Living for the moment is more important than planning for the future."). Participants used a 7-point scale to indicate their level of endorsement of each item, where 1 = "disagree very strongly" and 7 = "agree very strongly." To obtain a total TPQ score for each individual, scores on short-term items were reverse scored, and thus, higher scores on the TPQ reflect greater levels of long-term thinking.

Items for the TPQ were generated in consultation with experts in scale development and personality measurement to sample the universe of relevant content. Items were re-worded and refined on a case-by-case basis until an initial pool of 13 items was generated. This initial pool of items was then augmented to 19 items in order to balance the number of short- and long-term items containing positive versus negative, and unipolar versus bipolar wording.

Results

The TPQ demonstrated very good psychometric properties. The item-total correlations ranged from .13 to .64 (M =.43), and the Cronbach's alpha was .84, indicating that the TPQ had a high degree of internal consistency. Means and standard deviations were quite comparable across items, ranging from 3.6 to 5.3 (M = 4.33) and 1.04 to 1.44 (M = 1.22) respectively. Item intercorrelations are presented in Appendix B; descriptive statistics for each item are presented in Table 3.

Table 3

TPQ Item Means, Standard Deviations, and Item-Total Correlations

Item		Mean	SD	Item-total r
1.	I have a defined set of long-term goals that I think about when I make decisions in my life.	5.07	1.34	.587
2.	People who know me would describe me as a person who plans for the future.	4.66	1.35	.642
3.	"Eat, drink, and be merry, for tomorrow we die" is a good philosophy to follow in life. (*reverse scored*)	4.19	1.44	.349
4.	Long-term goals are more important to me than short-term goals.	4.31	1.26	.476
5.	I do not spend much time thinking about the future. (*reverse scored*)	5.27	1.15	.487
6.	Living for the here-and-now is important to me. (*reverse scored*)	3.56	1.19	.357
7.	I don't place much importance on exclusively short-term considerations.	3.57	1.09	.132
8.	It's really difficult to predict what will happen in the future, so it's more important to focus on today. (*reverse scored*)	3.97	1.27	.416
9.	I spend a great deal of time thinking about how my present actions will have an impact on my life later on.	4.69	1.26	.398
10.	Many people are disappointed in life because they sacrificed their daily enjoyment for a better future that never came. (*reverse scored*)	3.69	1.39	.198
11.	I consider the long-term consequences of an action before I do it.	4.54	1.26	.399
12.	I do not often make long-range plans. (*reverse scored*)	4.64	1.23	.576
13.	I try to do things that are good for me in the long run, even if they require sacrifice at the time.	4.68	1.09	.481
14.	Living for the moment is more important to me than planning for the future. (*reverse scored*)	4.47	1.11	.582
15.	I have a good sense of what my long-term priorities are in life.	5.04	1.28	.455
16.	When making decisions about what to do, the potential short-term consequences of my actions carry more weight than the potential long-term consequences. (*reverse scored*)	4.21	1.05	.449
17.	The immediate consequences of my actions are not as important to me as the long-range consequences of my actions.	4.09	1.04	.383
18.	I spend more time thinking about the future than thinking about today.	4.06	1.22	.445
19.	I do not consider my long-term plans to be more important to me than my short-term plans. (*reverse scored*)	4.18	1.18	.416

Stability of TPQ Scores Over Time

Conceptualized as a personality variable, time perspective is presumed to be relatively stable over time. Accordingly, scores on self-report measures like the TPQ should show consistency from one measurement to the next. To address this issue, the TPQ was administered to two samples of undergraduate students at the University of Waterloo. The first sample consisted of 38 male and female students who filled out the TPQ at three different time points during the term. The second sample consisted of 6 participants from Study 3 who were assigned to the "no treatment" condition; they also filled out the TPQ at three different time points.

The TPQ demonstrated very good stability in both samples. The two-week test-retest reliability for TPQ scores was .83 ($p < .001$) for the first sample; the four-week test-retest reliability was similarly impressive ($r = .80$; $p < .001$). Among participants in the second sample, TPQ scores demonstrated even stronger stability over a four-week period ($r = .94$; $p = .003$), and over a ten-week period ($r = .96$; $p < .001$). It is clear, then, that TPQ scores are very stable over time.

Factor Structure of the TPQ

Although we conceptualize time perspective as a single dimension, it could reasonably be suggested that short- and long-term time perspective represent two distinct factors. That is, one might suggest that the TPQ is, in fact, two dimensional with a subscale measuring individual differences in degree of responsiveness to short-term contingencies, and another measuring individual differences in responsiveness to long-term contingencies. For instance, Zimbardo and Boyd (1999) proposed that future orientation is a "top down" cognitive process, whereas present orientation can be best be characterized as a "bottom-up"

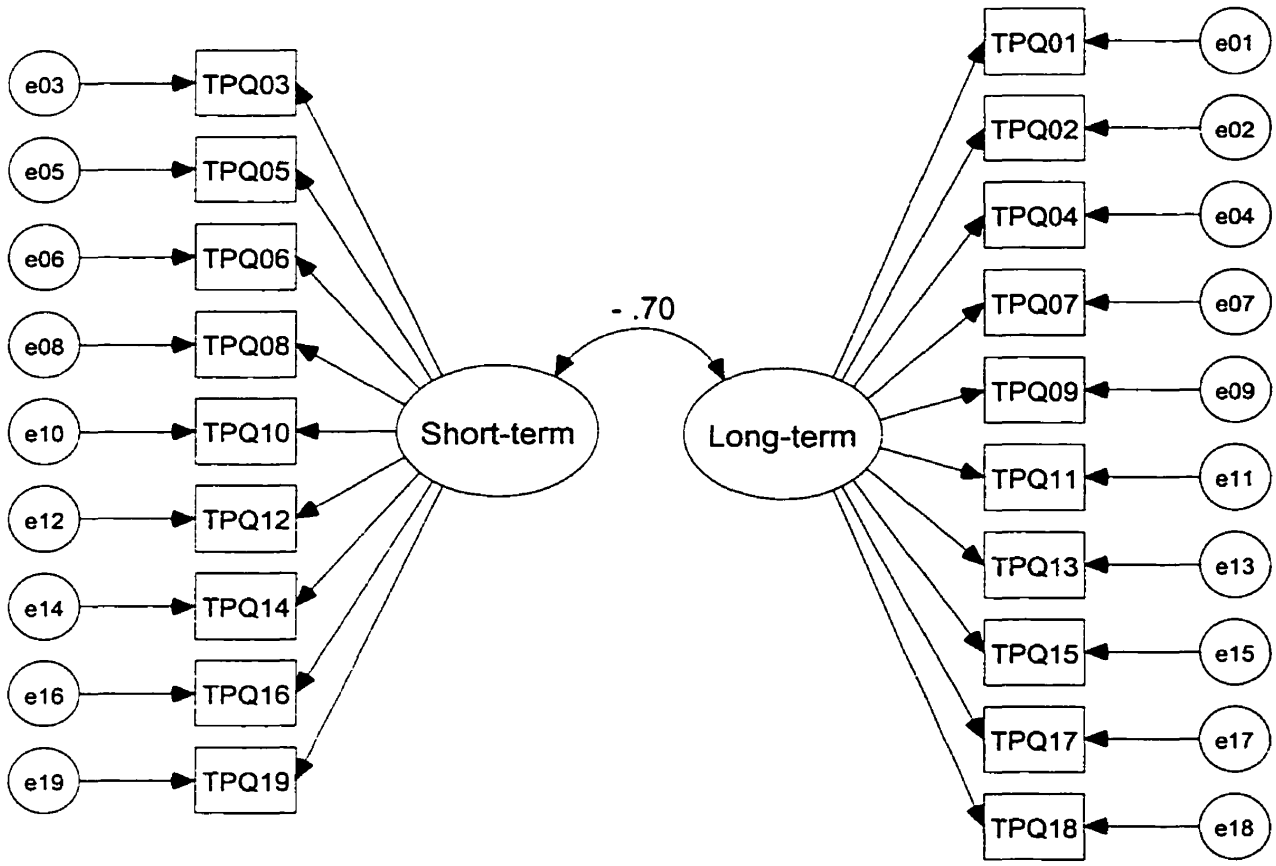
cognitive process. Conceptualised this way, long-term time perspective could be different in kind from short-term time perspective, arising from an entirely separate cognitive process. If is the case, one might expect only a low to moderate correlation between scores on the short- and long-term items of the TPQ.

An examination of the zero-order correlation between the two sets of items in our original sample ($N = 529$) lends initial support for this notion ($r = -.53$; $p < .001$). On the surface, the moderate correlation observed between the subscales seems to suggest that the two factors, though moderately correlated, are far from redundant. However, there are a number of variables that can attenuate correlations between subscales within a measure, including the characteristics of the items comprising each subscale, and the reliability of each subscale as a whole (Kline, 1998). A more stringent test of the strength of association between the subscales is to test the fit of the two-factor model while disattenuating the correlation for measurement error using confirmatory factor analytic techniques.

To examine the factor structure of the TPQ, we conducted a confirmatory factor analysis using AMOS (Arbuckle, 1999). In this analysis we tested a two-factor model in which items loaded on two correlated factors—one representing a propensity toward short-term thinking, and another representing a propensity toward long-term thinking—against a second model in which all items loaded on two orthogonal factors. The correlated two-factor model fit the data reasonably well (χ^2 (151) = 648.86, $p < .01$; GFI = .869; AGFI = .836; RMSEA = .079), with an estimated correlation of -.70 (95% CI = -.66 to -.73) between the short- and long-term factors (Figure 1). However, when the inter-factor correlation was constrained to equal zero—consistent with a completely orthogonal two-factor model—the fit of the model decreased substantially (χ^2 (152) = 842.75). Not

surprisingly, the decrement in model fit between the orthogonal and correlated factor model was highly statistically significant (χ^2 (1) = 193.89, $p < .01$). It appears then, that the correlated factor model fits the observed data significantly better than the orthogonal two-factor model.

Figure 1. Correlated Two Factor model for the TPQ (N = 529)



Note. Chi-square (151) = 648.86, p = .01; GFI = .869; AGFI = .836; RMSEA = .079

Conversely, the short- and long-term factors do not appear to be perfectly polar opposites of each other. Because the confidence interval for the inter-factor correlation did not include 1.0, it appears that the correlated two-factor model describes the factor structure of the TPQ better than a single-factor model. Further support for this conclusion was provided when we attempted to fit the one factor model by constraining the inter-factor correlation 1.0. This model yielded a non-admissible solution, which is consistent with the notion that the TPQ does not possess a simple, one-factor structure.

Discussion

In this study, it was demonstrated that the TPQ exhibits good psychometric qualities—the scale is internally consistent, and scores are very stable over time. A stringent competitive test of the factor structure of the TPQ suggested that the correlated two factor model fit the scale better then either a two orthogonal factor model, or a single factor model. Although fit indices of the two correlated factor model do not indicate an excellent fit by any means, it is noteworthy that the model proposed here is being tested competitively against other competing models for the purpose of making a conceptual point. The point that the two correlated factor model demonstrates superior fit to the data than either of the competing models can be made without adding post-hoc model adjustments, which undoubtedly would improve model fit but would make little conceptual sense.

Given that the correlated two-factor model provided the best fit, and the two factors are highly negatively correlated ($r = -.70$), it seems reasonable that the TPQ can be meaningfully be scored as a unidimensional scale. The competitive model tests and the magnitude of the disattenuated inter-factor correlation presented here provide a powerful

test of the factor structure of the TPQ, and represent the most stringent factor analytic investigation of any measure of time perspective to date.

Study 2

The balance of costs and benefits associated with any course of action can differ dramatically depending on the time frame that one chooses to focus on. Many health behaviors, for instance, involve numerous immediate costs coupled with few immediate benefits. In the long-term, however these same behaviors involve minimal costs and very substantial benefits. For example, if an adolescent smoker were to quit smoking, he might face withdrawal symptoms, increased irritability, and perhaps even peer rejection. In the long run, however, he might expect a longer life span, and perhaps higher feelings of self-worth for overcoming the habit. One's dispositional tendency to focus on short- versus long-term contingencies for one's own behavior might be an important predictor of behavioral practices in the domain of health, where healthy behaviors require endurance of subtle short-term costs (e.g., inconvenience, discomfort, embarrassment, withdrawal symptoms), for the sake of long-term reward (e.g., longer life, superior mobility, improved quality of living, greater sense of efficacy and control).

Study 2 tests the hypothesis that long-term thinking is positively associated with healthier behavioral practices. For this study, participants filled out the TPQ, the impulsivity subscale of the Eysenck Personality Inventory (EPI), and a general health behavior questionnaire. Using the responses from this sample, internal consistency of the TPQ was examined, as well as its ability to predict health behavior over and above a distinct, but conceptually similar personality construct (impulsivity).

Impulsivity as a Personality Variable

Zuckerman and Kuhlman (2000) describe impulsivity as "...the tendency to enter into situations or rapidly respond to cues for potential reward, without much planning or

deliberation and without consideration of potential punishment or loss of reward." (p. 1000). Two facets of this definition are noteworthy: 1) reward orientation, and 2) insensitivity to loss. The conceptual overlap between impulsivity and time perspective is largely attributable to the first facet of the definition.

Similar to highly impulsive individuals, those who possess a short-term time perspective would be expected to be highly responsive to immediate rewards. This increased sensitivity might manifest itself in a variety of ways. Both impulsive and short-term oriented individuals would be likely, for instance, to choose a high-fat dessert over a low-fat alternative despite the potential for weight gain and generally poor health outcomes over time. Because of the conceptual overlap between time perspective and impulsivity, it was hypothesized that there would be a positive association between measures of these two constructs in our sample.

However, there are important conceptual differences between impulsivity and time perspective. First, individuals who are dispositionally inclined to consider the long-term implications of their actions are not necessarily deliberative by nature, nor do choice situations always permit deliberation. For example, it is possible to be dispositionally cognizant of long-term considerations but still be overwhelmed by immediately available rewards in situations where quick responses are required. A highly impulsive individual might <u>care</u> about the long-term implications of eating fatty foods and strongly <u>believe</u> that eating fatty foods leads to these same adverse outcomes, but still impulsively eat a piece of chocolate cake put in front of them during dinner at a friend's house. Similarly, it is possible for an individual to be dispositionally non-impulsive, but still arrive at the conclusion that the cake is worth eating after rational deliberation over the costs and benefits

associated with eating it. Someone who genuinely values satisfaction in the here-and-now over long-term weight gain might behave in this manner. Individual differences in time perspective, then, are likely to manifest themselves in behavioral choices when deliberation is permitted by the situation, or by the nature of the choice itself. Important differences should emerge between low-impulsive and long-term oriented individuals, for example, when they are allowed time to mull over their decisions.

Second, the behavior of short-term thinkers should be highly responsive to the expected balance of immediate rewards and punishments associated with that behavior, not the potential for immediate reward alone. The behavior of a highly impulsive individual, on the other hand, would be responsive to expected immediate benefits (i.e., reward sensitivity) but relatively unresponsive to the expected immediate costs. Thus, important differences in behavioral patterns between impulsive individuals and short-term thinkers should emerge under conditions where immediate costs are salient. Due to these important conceptual differences between the constructs, then, I expected that the association between impulsivity and time perspective would be positive but small in magnitude.

Impulsivity and Health Behavior

There is good theoretical precedent for suggesting that impulsivity is associated with unhealthy behavioral practices. Because of their reward sensitivity, highly impulsive individuals should be prone to engaging in hedonistic pursuits despite the potential for incurring later harm as a result. For example, highly impulsive individuals might be likely to engage in risky sexual intercourse if the situation presents itself due to their heightened responsivity to immediate hedonic factors. In contrast, less impulsive individuals may be more responsive to the potential hazards associated with risky sexual intercourse, and would

therefore be more likely to take measures to reduce their risk. As a second example of how impulsivity might be related to negative health behaviors, a highly impulsive individual might be more responsive to the hedonic aspects of habitual consumption of recreational drugs (e.g., alcohol, tobacco, marijuana) than a more deliberative individual who might be more responsive to the potential long-term harm that might be incurred as a result of doing so. In these and other domains of health behavior, impulsive responding to immediately available rewards facilitates risky health behaviors and contraindicates many health protective behaviors.

Not surprisingly, much empirical work has confirmed that impulsivity is indeed associated with a variety of unhealthy practices, including unsafe sexual behavior (Ball & Schottenfeld, 1997; Breakwell, 1996; Clift, Wilkins, & Davidson, 1993; Cooper, Agocha, & Sheldon, 2000; Horvath & Zuckerman, 1993; Temple, Leigh, & Schafer, 1993; White & Johnson, 1988; Wulfert, Safren, Brown, & Wan, 1999) and substance use (e.g., Zuckerman & Kuhlman, 2000). There is strong theoretical and empirical precedent, then, for suggesting that impulsivity should be negatively associated with healthy behavioral patterns in our sample.

However, for many health behaviors, there is an inherent trade-off between short-term pain and long-term gain, regardless of the risky nature of the behavior itself. Indeed, some health behaviors would not be classified as "risky" at all (e.g., flossing teeth, wearing seatbelts, engaging in regular physical activity). For this reason, time perspective should be uniquely associated with health behavior over and above impulsivity.

Note on Measurement of Time Perspective

It should be noted in passing that the content of the items of the TPQ are free of any particular reference to health practices. Measures of other individual differences constructs purported to be related to health behavior have sometimes been revised to make the content of the items domain-specific, in order to improve prediction of health behaviors. A prime example of this is the Multidimensional Health Locus of Control Scale (MHLC; Wallston, Wallston, & DeVellis, 1978). The TPQ has undergone no such content transformations designed to enhance its predictive power. For this reason, it would be all the more impressive if the expected positive association is found between this domain-general version of the TPQ and health behavior.

Method

Participants

Participants were 357 undergraduates (99 males, 258 females) from an introductory psychology class at the University of Waterloo, with a mean age of 19. All participants voluntarily completed the three measures used for the present study in partial fulfillment of their course requirements. The three measures were included in a mass testing booklet containing a variety of other scales submitted by other researchers, and were separated from each other within the booklet.

Measures

Time Perspective Questionnaire (TPQ). An abbreviated, 13-item version of the TPQ was used for this study (Appendix C). This earlier version of the TPQ was identical to the longer version except that it does not include any negatively worded items, and it contains fewer pure short-term items. Per usual, participants used a used a 7-point scale to indicate

their level of endorsement of each item, where 1 = "disagree very strongly" and 7 = "agree very strongly." To obtain a total TPQ score for each individual, scores on short-term items were reverse scored and averaged together with long-term items. Thus higher overall scores on the TPQ reflect greater degrees of long-term thinking.

Eysenck Personality Inventory - Impulsivity Subscale (EPI-I). The Impulsivity subscale of the EPI consists of 24 items measuring the tendency to act quickly with little consideration of adverse consequences. As measured by the EPI, impulsivity has been shown to be related to a variety of unsafe behavioral practices (e.g., Cooper et al., 2000).

Health Behavior Index (HBI). A global health behavior index was developed to measure individuals' tendency to engage in health-protective and health damaging behavior across a wide variety of domains (Appendix C). We used the items of the HBI that were judged to be most relevant to university students: alcohol consumption, condom use, dental hygiene, diet, and use of seat belts. Scores on this measure were standardized and averaged together across domains to yield a single score to be used as an index of general health behavior.

Results and Discussion

Reliability and Validity of the TPQ

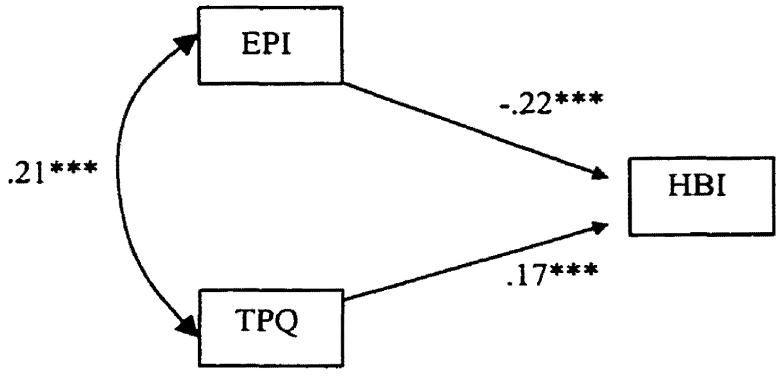
This abbreviated, 13-item version of the TPQ demonstrated psychometric properties that were very similar to the 19-item version. Coefficient alpha was computed at .83, and item-total correlations ranged from .29 to .60 ($\underline{M}$ =.42). Means and standard deviations were quite comparable across items. The means ranged from 3.6 to 4.9 ($\underline{M}$ = 4.33) and the standard deviations ranged from 1.14 to 1.39 ($\underline{M}$ = 1.29).

To examine predictive and discriminant validity, inter-correlations among the TPQ, the EPI-I, and the HBI were computed. Results revealed a surprisingly low but statistically significant correlation between the TPQ and the EPI-I ($r = -.21$; $p = .001$). This finding is consistent with the earlier proposition that the two constructs are conceptually related but not redundant.

As predicted, the TPQ was also correlated with the HBI ($r = .21$; $p = .001$). That is, having a long-term time perspective was associated with engaging in healthy behaviors and avoiding unhealthy behaviors across a wide variety of domains.

In order to test whether the power of the TPQ to predict health behaviors would be evident even when controlling for impulsivity, a multiple regression analysis was conducted in which the TPQ and the EPI-I were entered as simultaneous predictors of HBI scores. In this analysis, presented in Figure 2, the TPQ emerged as a significant predictor of HBI scores, even after controlling for impulsivity ($\beta = .166$, $p < .001$). Impulsivity, as measured by the EPI-I, was also a significant predictor of HBI scores when controlling for TPQ scores ($\beta = -.219$, $p < .001$). In short, the TPQ appears to be a reliable and predictively valid self-report measure that taps a construct that is conceptually and empirically distinct from impulsivity.

Figure 2. Path model for Health Behavior as Predicted by Time Perspective and Impulsivity Scores (N = 357)



Note. *** $p < .001$; $R^2 = .091$, $p < .001$.

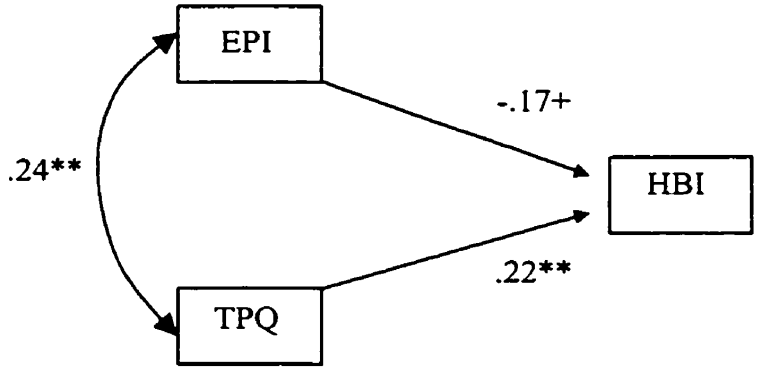
Gender Differences

It is possible that the TPQ demonstrates different psychometric properties for males and females. Although I have no a priori reason to assume that this is the case, it was important to test this possibility. Accordingly, I analyzed the reliability and validity of the TPQ for males and females separately. The TPQ was similarly reliable for males and females (alpha = .84 and .83, respectively), and the pattern of associations between TPQ scores with HBI scores when controlling for Impulsivity was identical (presented in Figures 3 and 4).

As a more stringent test of gender differences in validity indices, interaction terms were created between a dummy-coded gender variable and each of the two personality variables. The main effect variables (gender, EPI-I, and TPQ) were entered on the first step of a multiple regression analyses predicting HBI scores. Both product terms (Gender x EPI-

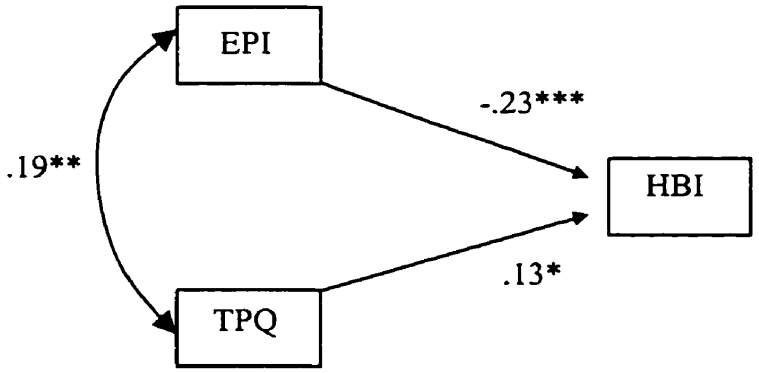
I and Gender x TPQ) were entered on the second step, and the change in R^2 was calculated. In this case, the additional variance in HBI scores accounted for by the addition of the interaction terms was not statistically significant (R^2 change = .002, F (2, 351) = .309, p = .734), providing conclusive evidence that there were no significant gender differences in the magnitude of the β coefficients between males and females. It seems warranted, then, to conclude that the reliability and validity of the TPQ does not differ as a function of gender.

Figure 3. Path model for Health Behavior as Predicted by Time Perspective and Impulsivity Scores for Males Only (n = 99)



Note. + p < .10, ** p < .01; R^2 = .095, p < .01.

Figure 4. Path Model for Health Behavior as Predicted by Time Perspective and Impulsivity Scores for Females Only (n = 258)



Note. * p < .05, ** p < .01, *** p < .001; R^2 = .081, p < .001.

Summary of Studies 1 and 2

In this chapter, a new measure of time perspective was developed and validated by examining its psychometric properties and observing its associations with other theoretically meaningful variables. Study 1 demonstrated that the TPQ is a reliable measure of individual differences in the propensity towards long-term thinking. The scale as a whole demonstrated good internal consistency, and scores were very stable over time. Confirmatory factor analysis revealed that a correlated two-factor model fit the scale better than either an orthogonal two-factor model, or a unidimensional one-factor model. However, the large magnitude of the inter-factor correlation suggests that the TPQ can be meaningfully scored and interpreted as a one dimensional scale, consistent with our theoretical conceptualization of time perspective.

Study 2 demonstrated that TPQ scores were useful in explaining general patterns in health behavior, even when controlling for impulsivity—a conceptually similar construct. An analysis of gender differences revealed that the validity indices of the TPQ do not differ significantly for males and females, attesting to the generalizability of the scale. Study 2, therefore, provides good preliminary evidence for the validity of the TPQ.

Although the size of the correlation between the TPQ and the index of health behavior is not high, measures of personality do not usually explain much variance in discreet behaviors (Mischel, 1973). This general rule holds true in the domain of health where correlations between well-validated measures of personality and risky health behaviors rarely exceed .20 (e.g., Zuckerman & Kuhlman, 2000; Cooper et al., 2000). Such personality measures are typically even less successful at predicting health protective behaviors such as condom use (e.g., Cooper et al., 2000) and physical activity (Courneya &

Hellsten, 1998). Thus, the TPQ appears to predict health behavior at a level consistent with or better than other well validated measures of personality.

Previous investigations of time perspective have demonstrated that individual differences in time perspective are related to a variety of other concomitant variables including academic achievement, demographics (e.g., Lessing, 1968; 1972; Nurmi, 1987) , and more recently, health behavior patterns (e.g., Keough et al., 1999; Rothspan & Read, 1996; Strathman et al., 1994; Zimbardo & Boyd, 1999). The underlying assumption of the latter approaches is that time perspective is causally associated with health behavior. However, this assumption has, to date, remained untested.

In addition, previous approaches to understanding time perspective have focused almost exclusively on individual differences in temporal orientation. However, the conceptualization of time perspective presented in this thesis suggests that temporal orientation should be a an important determinant of health behavior for all individuals, regardless of their dispositions. Studies relating time perspective to health behavior have not examined temporal orientation as a determinant of health behavior in general, nor have they successfully manipulated temporal focus for the purpose of changing patterns of health behavior.

Studies 3 and 4 test the presumed causal association between time perspective and health behavior, and expand the conceptual application of the time perspective construct to universal determinants of human behavior in the domain of health. As such, these last two studies make unique contributions to the existing literature on time perspective and health behavior.

CHAPTER 3

There were two goals of the present research. The first goal was to develop an individual differences measure of time perspective and to assess its utility in predicting health behavior. The second goal was to test the extent to which the association between time perspective and health behavior is causal in nature by manipulating time perspective and observing its impact on health behavior. It is to this second goal that I now turn.

Time Perspective and Behavioral Intervention

The theory of time perspective presented here holds much promise for guiding the development of effective interventions for promoting health behavior change. It has already been argued that most (if not all) health behaviors are associated with minor costs experienced at the time of performance, and few benefits. For this reason, the net valence of any health behavior is negative in the short-term. These same behaviors, however, are associated with many benefits and few costs in the long run. Thus, the net valence of these behaviors becomes strongly positive when the temporal frame is extended beyond the here-and-now. To the extent that health behaviors are at least partially driven by implicit or explicit evaluations of their associated costs and benefits, their successful performance requires an orientation toward the future. From this perspective, health behavior interventions will be successful to the extent that they help move individuals toward a greater appreciation of how costs and benefits of the health behavior differ in dramatic ways over time and include explicit implications for the here-and-now.

There seems to be good theoretical justification for assuming, then, that temporal focus is a causally important variable in predicting health behavior. However, to this point empirical evidence for the causal primacy of time perspective in the domain of health

behavior is lacking. Study 2 demonstrated that individual differences in time perspective are associated with healthier self-reported behavioral practices, thus replicating the findings of several other investigators (Keough et al., 1999; Rothspan & Read, 1996; Zimbardo & Boyd, 1999). However, the existence of this positive correlation is not sufficient for drawing causal inferences.

Although it is possible that individual differences in time perspective cause people to behave in ways that are more or less healthy, it is equally plausible that the direction of causality is reversed. That is, one might assert that individuals who habitually and knowingly engage in a variety of dangerous and unhealthy behavioral practices have an objectively shorter life expectancy, and therefore avoid thinking about the future, instead choosing to focus on the here-and-now. Alternatively, it is possible that some unknown third variable causes both time perspective and health behavior patterns. Correlational designs do not allow us to distinguish among these equally plausible alternative explanations for the observed association between time perspective and health behavior. Only by experimentally manipulating time perspective and observing its impact on health behavior can we determine if time perspective can cause health behavior.

Manipulating Time Perspective

How can one manipulate time perspective? There are several possibilities. The first would be to construct a laboratory task that temporarily induces individuals to focus on the long-term implications of their actions. Participants could then be randomly assigned to receive either the time perspective manipulation or a sensible control condition. Any subsequent difference in health behaviors observed between these two groups could logically be attributed to the time perspective manipulation. Although this kind of

laboratory study would provide tight control over experimental conditions, it is difficult to manipulate some variables in the laboratory. Indeed, time perspective may be one variable that is not easily manipulated by a light-handed experimental task—note that the observed correlation between time perspective measured at different time points was strong, indicating a high degree of stability associated with this individual difference variable. Moreover, even if it were possible to manipulate time perspective experimentally, it may be difficult to generalize the observed effects to real-world situations.

A second approach to manipulating time perspective is within the context of an intervention trial. It is conceivable that one could develop a more heavy-handed manipulation designed to change time perspective in a more profound and enduring way than would be possible in the laboratory. Indeed, the central goal of intervention design within any context is to develop a manipulation that promotes observable and enduring changes in an outcome variable of interest. One can test the efficacy of such interventions using an experimental design directly analogous to that used in the laboratory setting. For example, one could randomly assign participants to receive a time perspective intervention or a control intervention, and then measure the effect of group membership on the outcome variable. Thus the difference between the laboratory manipulation and the intervention manipulation is one of magnitude, and not necessarily one of kind. Experimental manipulations in the social sciences are designed to produce necessarily ephemeral changes in participants. Interventions, on the other hand, are designed explicitly to produce enduring changes. As a result, the effects of interventions are usually evaluated over much longer time periods than laboratory studies, and measurements occur in the natural environment instead of in the laboratory.

This latter approach to understanding the causal status of the association between time perspective and health behavior was chosen for this investigation. There were several reasons for this. First, as mentioned earlier, time perspective might not lend itself to manipulation in the laboratory due to the enduring nature of individual differences in temporal focus. Second, intervention studies allow us to generalize more easily from an experimental effect to the "real world." For this reason, it would be possible to draw theoretically meaningful conclusions while simultaneously maximizing the generalizability of the findings. Third, there are many areas of health where effective behavior change interventions are sorely needed. Any manipulation that successfully promotes healthy behaviors would be genuinely useful to those health professionals who require them.

Time Perspective and Physical Activity Maintenance

Physical activity maintenance is one area where effective interventions are very much needed (Dishman, 1988). Accordingly, in Studies 3 and 4 I conducted two field experiments that were designed to test the efficacy of a time perspective intervention designed to promote physical activity maintenance among young adults. The experimental design of these studies made it possible to evaluate the extent to which a time perspective intervention is truly effective for promoting physical activity maintenance while simultaneously addressing a question of great theoretical importance: Is time perspective causally associated with health behavior?

In the next section I describe research on physical activity and health, and the existing state of intervention research in this domain. In the context of this review, I establish that behavior change interventions for physical activity are very much needed, and that time perspective is a promising theme around which to design intervention content.

Finally, I will argue that physical activity is an ideal behavior for application of a time perspective intervention to promote behavior change maintenance.

Overview of Studies 3 and 4

In Studies 3 and 4, I developed and tested a brief exercise maintenance intervention that focused on: a) enhancing the salience of the long-term benefits of physical activity, and b) building the psychological connections between current exercise-relevant behavior and these future outcomes. In both studies, the time perspective intervention was compared to both a standard goal-setting intervention, which acted as a control intervention, and to a no-treatment condition. Study 3 was a pilot study in which 18 participants were followed for 7 weeks post-intervention using self-report measures of physical activity and a variety of psychosocial variables purported to mediate intervention effects. Study 4 was a larger scale efficacy trial with a an extended follow-up period (6 months). Thus, Study 4 includes a number of methodological improvements over Study 3, including a longer follow-up interval, improved measures of outcome, and a larger sample size to facilitate mediational analysis of intervention effects.

Study 3

Despite the substantial long-term health benefits to be gained from regular physical activity (Sallis & Owen, 1999), many people who initiate exercise routines have difficulty adhering to them. In fact, high dropout rates are more the norm than the exception (Dishman, 1988). This is unfortunate because many of the health benefits of exercise are only attainable for those who manage to stick to their schedule faithfully. Paffenbarger, Hyde, Wing, Lee, Jung, & Kampert (1993), for instance, found that of those men who reported engaging in vigorous exercise, only those who continued to do so over the course of the six-year follow-up period were at significantly less risk for developing cardiovascular disease. Even many of the appearance and subjective well-being outcomes (which are usually seen as being more proximal than health outcomes) typically only appear after several weeks or months of committed training.

One reason why people have difficulty initiating and maintaining a program of regular physical activity despite the inherent long-term advantages is that there are short-term costs associated with physical activity that loom larger than the long-term benefits when people make decisions about exercise. Engaging in physical activity can be inconvenient, uncomfortable, and even embarrassing, and this may be particularly true for beginners. For example, those who take up fitness classes for the first time may be especially likely to feel self-conscious of their physical appearance, and are likely to experience pain and discomfort as a consequence of their initial efforts. Although these aversive short-term outcomes may be experienced by even veteran exercisers, they may be particularly salient for beginners and therefore may carry more weight when they make decisions about whether or not to attend their next fitness class, for example.

As has been argued earlier, interventions designed to increase the frequency of physical activity are likely to be successful to the extent that they orient participants towards future consequences of present behavior, and reinforce the fundamental connectedness of the two. This latter step is particularly important when the immediate consequences associated with the desired healthy behavior are, on the balance, aversive (e.g., inconvenient, painful, embarrassing), as is often the case for individuals who are in the early stages of initiating a physical activity regimen.

The Health Benefits of Physical Activity

Physical activity is one lifestyle factor that has received a great deal of attention in the past 20 years with the advent of large scale epidemiological studies using the risk factor approach to investigate the relation between activity patterns and health outcomes of large segments of the adult population (e.g., Blair, Kohl, Paffenbarger, Clark, Cooper, & Gibbons, 1995; Leon, Connett, Jacobs, & Rauramaa, 1987; Paffenbarger, Wing, Hyde, & Jung, 1983). Using the risk factor approach, one may look at physical activity from two perspectives: a) sedentary behavior as a behavioral risk factor negative health outcomes, or b) physical activity as a protective factor for negative health outcomes. Most epidemiological studies relating physical activity and health have focused on the latter conceptualisation—physical activity as a protective factor for negative health outcomes. Compared to the status of other risk factors, such as smoking, diet, and substance abuse, the importance of physical activity as a protective factor against development of disease and promotion of longevity is relatively new. In the next section, I will review the evidence concerning the status of physical activity as a protective factor against disease and premature mortality.

Key Terms and Definitions

For the purposes of this dissertation, the terms "physical activity," "exercise," and "physical fitness" are defined in accordance with the conventions proposed by Caspersen, Powell, and Christensen (1985). According to these authors, physical activity is defined as any behavior that involves muscle use and results in energy expenditure. Physical activity can be further reduced to health-related components (e.g., endurance, strength), and performance-related components (e.g., speed, agility; U.S. Department of Health and Human Services, 1996). For practical purposes, conventions have been outlined by Sallis and Owen (1999) to further break down physical activity into "moderate intensity" and "vigorous intensity;" intensity of any given form of physical activity can also be estimated by calculating metabolic units of energy expenditure, or METs (see Table 4, reprinted from Sallis & Owen, 1999).

Exercise is a special kind of physical activity that is usually planned, structured, and repetitive, and is performed with the purpose of maintaining physical fitness. Physical fitness, on the other hand, is a physiological state related to one's ability to perform physical activity of some kind. Physical fitness is an index of physiological capacity and can therefore be differentiated from the behavioral dimension inherent in the terms "physical activity" and "exercise."

Table 4

Key Terms and Definitions

Term	Definition
Physical Activity	"Any bodily movement produced by skeletal muscles that results in energy expenditure" (Caspersen, Powell, & Christenson, 1985)
Exercise	A subset of physical activity defined as "planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness" (Caspersen et al., 1985)
Physical Fitness	"A set of attributes that people have or achieve that relates to the ability to perform physical activity" (Caspersen et al., 1985)
Health-related fitness components	a. Cardiorespiratory endurance (also known as aerobic fitness) b. Muscular endurance c. Body composition d. Flexibility (Caspersen et al., 1985)
Performance-related fitness components	a. Muscular power b. Speed c. Agility d. Balance e. Reaction time (U.S. Department of Health and Human Services, 1996)
Moderate intensity physical activity	For young adults, activity requiring approximately 3 to 6 times as much energy as rest. Equivalent to brisk walking.
Vigorous intensity physical activity	For young adults, activity requiring 7 times as much energy as rest, or greater. Equivalent to jogging.
Metabolic Units (METs)	Metabolic equivalent. Used as an index of intensity of activities. 1 MET is resting energy expenditure (3.5 ml O_2*kg^{-1}*min^{-1}), so 4 METs = four times the resting rate.

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Health Benefits of Physical Activity

One of the earliest studies to focus the interest of researchers and the general public on the health benefits of physical activity was conducted by Morris, Heady, Raffle, Roberts, and Parks (1953) in England. They compared the frequency of heart disease in different employee groups for the London Bus Company, and found that bus drivers had significantly higher rates of heart disease than conductors. Morris et al. (1953) explained this difference by noting that drivers spent most of their time seated, while conductors were continually on the move collecting fairs and walking the aisles of the buses. As these two groups of employees were largely of the same socio-economic stratum and shared the same working environment, one likely reason for the difference in heart disease frequency between the groups was the difference in the amount of job-related physical activity experienced by the two groups. Despite this initial peak of interest in the relation between physical activity and health, several decades passed before the risk factor approach emerged, and interest in physical activity was renewed.

In a classic study, Paffenbarger et al. (1986) examined the lifestyle characteristics of 16,936 Harvard alumni who were initially free of clinically recognized coronary heart disease at baseline and collected mortality data during a 12 to 16 year follow-up period. Mortality was related to initial levels of reported exercise in the form of walking, stair climbing, and sports; death rates declined as rates of energy expenditure increased. There was a 53% reduction in all cause mortality among men who played at least three hours of

sports per week, compared with those who played less than one hour. Paffenbarger et al. (1986) also demonstrated that moderate intensity activity had benefits including a 33% reduction in all cause mortality among men who walked more than fifteen kilometers per week, compared with those who walked less than 5 kilometers per week. Finally, the overall life span of men initially active was two years longer than those who were initially inactive. This study provided early evidence of a strong association between physical activity and longevity using the risk factor approach.

Subsequently, Blair, Kohl, Paffenbarger, Clark, Cooper, & Gibbons (1989) examined the prospective relationship between cardiorespiratory fitness and longevity in 10,224 men and 3,120 women referred to a clinic in Dallas, Texas for a routine preventive medical examination. In this study, the investigators found that the association between physical fitness and longevity was even stronger than the previously established association between physical activity and longevity. At the end of an 8 year follow-up, those men who were initially in the highest fitness category as measured by a treadmill endurance test had a mortality rate 71% lower at follow-up than those men in the lowest fitness category. In fact, those in the next to lowest fitness category still had a 60% lower death rate than those in the lowest fitness category. The findings were even more pronounced for women: those women in the most fit category were 79% less likely to have died at follow-up. These trends remained after statistical adjustment for statistical adjustment for age, smoking habit, cholesterol level, systolic blood pressure, fasting glucose level, parental history of heart disease, and length of follow-up interval. The authors concluded that the reduction in mortality observed between the most and least fit groups were primarily attributable to lowered rates of cardiovascular disease and cancer in the most fit group.

These studies and many others since (e.g., Blair et al., 1989; Leon et al., 1987; Pekkanen, Marti, Nissinen, Tuomilehto, Punsar, & Karvonen, 1987) have confirmed that a relationship exists between physical activity and longevity, and that this association is evident even when there is a substantial time lag between when the two are measured. However, as with all epidemiological studies, these studies do not confirm that the protective behavior in question (physical activity) actually causes the outcome of interest (increased longevity). Although covariation and temporal precedence are necessary conditions for establishing causality, they are not sufficient conditions. Given that experimental manipulation of physical activity is difficult on a population level, one feasible way of attempting to pin down the issue of causality more firmly would be to establish that naturally occurring changes in physical activity level and/or fitness level are associated with corresponding changes in longevity.

Paffenbarger et al. (1993) found evidence of such an association when he followed men from his Harvard alumni study who had initially reported no life-threatening disease on questionnaires completed in 1962 or 1966 and again in 1977. Participants were classified according to changes in lifestyle characteristics (physical activity, cigarette smoking, blood pressure, and body weight) between measurements. Changes on these variables were then related to mortality between 1977 and 1985. Results revealed that initiation of moderate intensity physical activity was associated with a 23% reduction in risk of mortality compared with remaining inactive. Blair et al., (1995) found similar results when he studied 9,777 men who attended two clinical examinations approximately 5 years apart, and were followed for an additional 5 years for mortality data. At both clinical examinations, participants underwent a physical assessment and a treadmill endurance test to measure

cardiorespiratory fitness. Predictably, the highest rate of mortality during the follow-up interval was observed among those men who were unfit at both examinations; in contrast, the lowest mortality rate was among those who were fit at both examinations. Interestingly though, those who moved from unfit to fit in the interim reduced their risk of mortality by 44% relative to men who remained unfit on both occasions. This pattern held for cardiovascular mortality as well as overall longevity, and was observed in men in all age groups measured (from 45 to 84 years of age). These crucial studies were the first to suggest that the association between physical activity/fitness and mortality is indeed causal in nature.

In addition to the favorable effects of physical activity on longevity, it seems that physical activity serves a health-protective function with respect to various specific disease entities and undesirable physical states. For example, Paffenbarger et al. (1983) demonstrated that participation in regular vigorous exercise reduces the risk of hypertension from 19-30% in men. Similarly, Folsom, Prineas, Kaye, & Munger (1990) observed that women who were physically active were less likely to develop hypertension than their sedentary counterparts. Physical activity has also been shown to prevent obesity. A study of Finnish men and women demonstrated that those who exercised infrequently were more than twice as likely to have gained a large amount of weight over the five year follow-up than those who exercised on a regular basis (Rissanen, Heliovaara, Knekt, Reunanen, & Aromaa, 1991). Intriguingly, a study by Barlow, Kohl, Gibbons, & Blair (1995) demonstrated that one can be obese and healthy at the same time, provided that one is aerobically fit. These investigators found that obese men who were physically fit were no more likely to die during the follow-up period than their thin and fit counterparts. In fact,

the health-protective effect of physical fitness was observable within both weight groups. Those in the obese group who were physically fit reduced their mortality risk by 71% compared to those in the obese group who were not fit. Likewise, those in the thin group who were physically fit reduced their mortality risk by 66% compared with those thin people who were not fit. It appears then, that physical fitness is more predictive of mortality than obesity, even though this runs contrary to popular intuition about the matter.

In addition to the obvious protective effects for the development of cardiovascular disease, hypertension, and obesity, physical activity also reduces the risk of a number of other diseases as well, including diabetes (Manson et al., 1991; Manson et al., 1992) and certain forms of cancer (Marrett, Theis, Ashbury et al., 2001); for example, colon cancer (Colditz, Cannuscio, & Frazier, 1997), prostate cancer (Oliveria & Lee, 1997), and breast cancer (Friedenreich, Thune, Brinton, & Albanes, 1998). A substantial literature also suggests that regular physical activity confers some benefits to the emotional well being of those who engage in it (Phillips, Kiernan, & King, 2001).

In short, there is ample empirical justification for societies to promote, and for individuals to engage in regular physical activity from a health perspective.

Exercise Promotion and Maintenance

Although the public possesses favorable attitudes towards exercise in general (McAuley & Courneya, 1993), it is quite clear that even individuals who initiate programs of regular exercise have difficulty sticking to them. In fact, drop out rates are quite high among all age groups who initiate a program of regular exercise: according to Dishman (1988), approximately 50% drop out within the first six months. Unfortunately, one must

maintain their level of physical activity and physical fitness over time in order to reap the associated health benefits (Blair et al., 1995; Paffenbarger et al., 1993).

Over the years, many exercise promotion and a few physical activity maintenance interventions have been designed to help individuals initiate and stick with their physical activity regimens. Dishman and Buckworth (1996) conducted a comprehensive review of 127 outcome studies designed to evaluate the efficacy of such interventions. From their review, the authors concluded that such programs are generally effective, and are associated with a moderately large effect size (.34). Despite this encouraging conclusion about the general efficacy of such programs, the authors were able to identify some common characteristics of more successful interventions reviewed. Namely, the authors observed that the most effective interventions were those designed based on principles of behavior modification and delivered to healthy people in the community, particularly when delivered in groups using mediated approaches. The authors noted, however, that the effects of most interventions decreased substantially over time, suggesting that maintenance is problematic for individuals even when they receive specialized behavior change interventions.

Time Perspective and Physical Activity

Physical activity represents an ideal domain to test the causal status of time perspective. As reviewed in the previous section, the long-term benefits of physical activity are numerous and substantial. However, in order for these future outcomes to influence one's present behavior, one must both perceive them and appreciate their magnitude. For this reason, interventions designed to increase the frequency of physical activity among youth are likely to be successful to the extent that they orient participants towards future consequences of present behavior. This is particularly true when the immediate

consequences associated with the desired healthy behavior are, on the balance, aversive (e.g., inconvenient, painful, embarrassing), as is often the case when individuals choose to initiate exercise routines for the first time.

Existing interventions have been predominantly psychoeducational in nature (e.g., project GRAD; Sallis, Calfas, Nichols, Sarkin, Johnson, Caparosa, Thompson, & Alcaraz, 1999). As such, many (if not all) physical activity interventions present information regarding the benefits of physical activity, and some deal with barriers to adopting a regular routine. However, references to temporal frames are typically quite vague, and explicit attempts are not made to build a bridge between current behavior and later outcomes. Finally, and perhaps most importantly, existing interventions do not point out the dynamic nature of contingencies associated with physical activity.

The time perspective intervention developed for Studies 3 and 4 differed from these earlier interventions in several important ways. Like earlier interventions, I attempted to include informational content to make participants keenly aware of what the long-term benefits of regular physical activity are. However, I included exercises and discussions intended to reinforce the fundamental connectedness between their behavior and these outcomes. I also included exercises that highlighted the inherent trade-offs associated with physical activity (and other health-relevant behaviors), so that they might anticipate this dynamic inconsistency when they are making decisions as to whether or not they will exercise. Thus, the time perspective intervention was more focussed and strategic than existing interventions, in that long-term benefits were couched within a framework that emphasized the connections to present behavior.

Method

Participants

Eighteen undergraduate students enrolled in one of three step aerobics classes at the University of Waterloo Physical Activities Complex were recruited for participation at the beginning of their first fitness class of the term. Participants were predominantly female (17 female, 1 male), and were an average age of 21 years old at the time of recruitment (see Table 5 for sample characteristics).

Participants in all conditions were paid the same amount for their participation ($35 at post intervention, and $10 at follow-up).

Table 5

Sample Characteristics for Study 3

		M	SD
Age		21.3	1.9
Year of Study		2.8	1.3
Weight (lbs.)		146.7	27.7
		n	% of total N
Gender	Female	17	94.4
	Male	1	5.6

Note. N = 18.

Classes were randomly assigned to conditions such that participants from each aerobics class were all assigned to the same condition. This approach to assignment was taken for logistical reasons, and to minimize communication between participants who were assigned to different conditions. All participants and fitness class instructors were blind to condition. Retention of participants was excellent, with all 18 (100%) participants returning completed questionnaires at each measurement point, and only one participant from the no-treatment group lost to attrition at the follow-up measurement. Attendance was 100% for both of the treatment groups at all three intervention sessions.

Measures

Demographic Questionnaire. Participants were asked to fill out a sheet containing basic demographic information including age, gender, height, weight, fitness class time, and marital status.

Time Perspective Questionnaire - Exercise Version (TPQ-E). The TPQ-E is an 8-item scale, comprised of statements tapping the habitual tendency to think about and weigh heavily short- versus long-term considerations when it comes to thinking about exercise (see Appendix D). This scale was derived from the domain-general measure of time perspective as validated in Studies 1 and 2. Participants indicated their level of agreement with each item using a 7-point response scale, where 1 = "Disagree very strongly," and 7 = "Agree very strongly." Items tapping short-term thinking (e.g., "I do not have long range fitness plans.") were reverse-scored and averaged together with items tapping long-term thinking (e.g., "I spend a great deal of time thinking about how my present exercise habits will affect my life later on."). Higher scores therefore reflected a propensity towards long-term thinking, whereas lower scores reflect a propensity towards short-term thinking. The TPQ-E

demonstrated acceptable internal consistency at all three measurement points (alpha = .77 at pre-intervention, .52 at post-intervention, and .59 at follow-up).

Physical Activity. Physical activity was measured by self-report using a 30-day recall measure, derived from the Stanford 7-Day Recall (Blair et al., 1985). Participants were asked to estimate the number of hours they had engaged in vigorous and moderate intensity physical activity over the course of the past 30 days, to the nearest half hour, by responding to the following question: "During the last month, how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting)." The vigorous dimension of this measure has been shown to have high one week test-retest reliability in the past (Smith, 1994). The reliability of the moderate dimension of this scale, on the other hand, is poor. For this reason, my analysis will be restricted to vigorous physical activity.

Physical Activity Intentions. Intentions to engage in exercise over the next month were measured by self-report using a re-worded version of the physical activity measure described above. Participants were asked to state the number of hours that they intend to engage in vigorous and moderate intensity physical activity over the course of the next 30 days, to the nearest half hour by responding to the following question: "During the next month, how much total time do you intend to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving

sitting)." This scale has been found to have high one week test-retest reliability (Smith, 1994).

Attitudes. Attitudes were measured by a series of semantic differential scales, where participants responded to the following item: "For me to participate in regular vigorous or moderate physical activity or exercise would be...", using a response scale consisting of 14 sets of polar-opposite adjectives relating to exercise ("wise" / "foolish", "not enjoyable" / "enjoyable"). Participants were asked to put a check mark along a continuum of seven blanks between the two adjectives to represent their attitude towards exercise on each dimension. Internal consistency for this scale was high at all three measurement points (alpha = .90 at pre-intervention, .93 at post-intervention, and .91 at follow-up).

Subjective Norms. Subjective norms were measured with the following item: "Do most people who are important to you think you should or should not exercise on a regular basis?" Participants responded on a 1-7 response scale, where 1 = "Strongly think I should not," and 7 = "Strongly think I should."

Behavioral Beliefs. Behavioral beliefs were assessed with 7 items measuring the extent to which participants judged the likelihood that they would receive a variety of benefits as a result of engaging in exercise behavior. An example of one such item is: "How likely is it that you personally will receive health benefits from exercising regularly?" Responses were made by placing a check mark in one of seven boxes, ranging from "Extremely unlikely" to "Extremely likely." Internal consistency for this scale was acceptable at all three measurement points (alpha = .68 at pre-intervention, .56 at post-intervention, .55 at follow-up).

Normative Beliefs. Normative beliefs were measured with 6 items asking respondents to indicate their the extent of their beliefs that significant others think that they should or should not exercise on a regular basis, for example: "Does your spouse (girlfriend/boyfriend) think you should or should not exercise on a regular basis?" Participants responded on a 1-7 scale, where 1 = "Strongly thinks I should not," 4 = "Neither/Nor," 7 = "Strongly thinks I should." Internal consistency for this scale was acceptable at all three measurement points (alpha=.66 at pre-intervention, .80 at post-intervention, and .64 at follow-up).

Scheduling Efficacy. Scheduling efficacy was designed to measure domain-specific efficacy beliefs regarding one's ability to fit an exercise routine into one's everyday life (e.g., "I am confident that I can organize my time/work around my scheduled workouts."). This scale consisted of 6 items, and used a 1-10 response scale, where 1 = "not at all confident," 5 = "moderately confident," and 10 = "extremely confident." Internal consistency for this scale was very high at all measurement points (alpha = .94 at pre-intervention, .98 at post-intervention, and .98 at follow-up).

Barrier Efficacy. Confidence in one's own ability to overcome barriers associated with exercise was measured using a 15-item scale. Participants provided a 0-100% confidence rating that they would be able to maintain a program of regular exercise despite the presence of a number of potential barriers (e.g., "Rate your confidence (0 - 100%) that you could exercise when tired.") Internal consistency for this scale was very high at all measurement points (alpha=.88 at pre-intervention, .89 at post-intervention, and .89 at follow-up).

Outcome Expectancies. Outcome expectancies were measured with a 25-item scale tapping the extent to which participants expected to experience positive outcomes of exercise. (e.g., "How confident are you that regular exercise would lead to increased self-confidence?") Responses were given on a 1-10 scale, where 1 = "not at all confident," 5 = "moderately confident," and 10 = "extremely confident." Internal consistency for this scale was very high at all measurement points (alpha = .98 at pre-intervention, .95 at post-intervention, and .96 at follow-up).

Intervention Conditions

There were two intervention conditions and one no-treatment condition: 1) time perspective intervention, 2) goal setting control intervention, and 3) no treatment. There was a hierarchical relationship between the time perspective intervention and the goal-setting control intervention: the time perspective intervention included essentially all of the informational material covered in the goal-setting control intervention and differed only in the addition of material designed to enhance long-term thinking about physical activity.

Time Perspective Intervention. The time perspective intervention consisted of three, 30-minute long weekly classroom sessions substituted for the first 30 minutes of participants' mid-week fitness class. The intervention was implemented during the first three weeks of the 10-week fitness class. Intervention content consisted of education and activities designed to help participants become more cognizant of, and responsive to the long-term implications of their present actions, and to keep such cognitions active at the time of participation in, or decision making around exercise behavior.

In general, the material in the time perspective intervention was designed to provide participants with a conceptual framework for understanding why focusing on the immediate

or short-term consequences of exercising regularly would lead them to conclude that exercise is not worth the effort, whereas focusing on the long-term benefits would lead them to conclude that those benefits outweigh the short-term costs. For example, one of the central activities during the second intervention session was a decisional balance activity with a temporal dimension added. This activity required group members to generate a list of immediate costs and benefits of exercising, and then to contrast those short-term costs and benefits of exercising with the balance of long-term costs and benefits of exercising. Inevitably, participants discover that almost all of the costs associated with exercise appear at the time of decision making, while almost all of the benefits accrue over long periods of time. This activity was designed to sensitise participants to the notion that the benefits of exercise greatly outweigh the costs when taking a long-term perspective, even though the opposite might be the case when taking a short-term perspective.

The time perspective intervention also included a long-term goal setting activity. This activity required participants to set lifetime fitness goals, followed by weekly and intermediate goals that were logically connected to these longer-term goals. Participants are encouraged to conceptualize all three sets of goals as being inexorably linked together, and to consider how they will structure their lives to do what is necessary to accomplish them (e.g., implementation intentions).

Throughout the intervention, the discussions emphasized the connections between present behavior and future outcomes, and pointed out that people often lose sight of these connections in their lives.

Goal-Setting Control Intervention. The goal-setting control intervention also consisted of three 30-minute long weekly classroom sessions substituted for the first 30

minutes of participants' mid-week fitness class. Like the time perspective intervention, the goal-setting control intervention was implemented during the first three weeks of the 10-week fitness class. This control intervention was a standard informational intervention that provided participants with all of the major informational components of the time perspective intervention, without the thematic component of long-term time perspective.

Because the time perspective intervention differed from the goal-setting control intervention only in the inclusion of temporal orientation material, comparisons between the efficacy of the time perspective intervention vis-à-vis the goal-setting control intervention represent a stringent test of the power of the time perspective activities and material above and beyond the goal-setting activities and material. Activities were designed to mirror the structural aspects of the time perspective condition, including weekly goal-setting tasks, and were matched for informational content relative to the time perspective intervention (although the material could be covered at a more leisurely pace in the goal-setting intervention because of the lower content to time ratio).

No Treatment Condition. Those assigned to the no treatment condition attended all fitness classes per usual, and filled out the same package of measures as the other two groups at the same time points.

Results

Effects of the Time Perspective Intervention on Self-Reported Physical Activity

Did the three groups differ in their level of physical activity at post-intervention and at follow-up, controlling for their pre-intervention levels of physical activity? I conducted a repeated measures ANOVAs and planned contrasts to answer this question. The main dependent variable was hours engaged in vigorous physical activity over the past month.

The means, standard deviations, and change scores for each of the three groups at each of the three measurement points are presented in Table 6.

Table 6

Means, Standard Deviations, and Change Scores for Hours of Vigorous Physical Activity Over the Past Month

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	7.83 n = 6 (9.52)	18.75 n = 6 (13.73)	16.33 n = 6 (12.19)	**+10.92[b,e]** **n = 6** **(5.90)**	**+8.50[d]** **n = 6** **(5.32)**
GS	9.67 n = 6 (4.59)	12.36 n = 6 (7.38)	12.20 n = 5 (7.66)	**+2.69** **n = 6** **(5.55)**	**+3.60** **n = 5** **(6.31)**
NT	13.92 n = 6 (10.87)	14.83 n = 6 (6.46)	12.33 n = 6 (4.03)	**+0.92** **n = 6** **(4.88)**	**-1.58** **n = 6** **(8.02)**
Total	10.47 N = 18 (8.63)	15.31 N = 18 (9.54)	13.71 N = 17 (8.38)	+4.84 N = 18 (6.81)	+3.50 N = 17 (7.61)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[b] = contrast between TP condition and GS condition is significant at $p < .01$.

[d] = contrast between TP condition and NT condition is significant at $p < .05$.

[e] = contrast between TP condition and NT condition is significant at $p < .01$.

In the first analysis, I compared the difference between pre-intervention and post-intervention vigorous physical activity levels for the three groups. There was a statistically significant group x time interaction, $F(2, 15) = 5.73$, $p = .014$. Specifically, participants receiving the time perspective intervention exercised an average of 10.92 hours longer than they had at pre-intervention, a significantly greater increase than for those receiving the goal-setting control intervention (mean increase = 2.69 hours; difference: $p = .010$), and for those in the no treatment condition (mean increase = 0.92 hours; difference: $p = .003$).

At the follow-up (10 weeks after the start of the intervention, 7 weeks after the end of the intervention), the same basic pattern of results were obtained, although slightly attenuated. The group x time interaction approached statistical significance, $F(2, 14) = 3.43$, $p = .06$). The participants in the time perspective group now reported exercising an average of 16.3 hours (8.5 hours more than at pre-intervention and 2.4 hours less than at post-intervention). The observed increase in vigorous physical activity from pre-intervention to follow-up for the time perspective group was still significantly greater than the no treatment group ($M = 12.3$ hours, 1.6 hours less than at pre-intervention and 2.5 hours less than at post-intervention), $p = .010$. The time perspective group still reported higher levels of exercise than did the goal-setting control intervention group ($M = 12.2$ hours, 2.5 hours more than at pre-intervention and 0.2 hours less than at post-intervention), but this comparison was not statistically significant ($p = .12$).

Effects of the Time Perspective Intervention on Long-Term Thinking About Exercise

I conducted analyses to assess whether the time perspective intervention enhanced long-term thinking about exercise relative to the other two groups. Additional analyses were

conducted to determine if changes in physical activity by group over time could be attributed to similar changes in time perspective, or any competing psychosocial variables.

A repeated measures ANOVA was conducted using group as the between-subjects variable, time as the within-subjects variable, and TPQ-E scores as the dependent measure. The group by time interaction term was statistically significant from pre-intervention to post-intervention, F (2, 15) = 4.96, p =.02, and attained borderline statistical significance from pre-intervention to follow-up, F (2, 14) = 3.09, p = .08.

Planned comparisons revealed that those receiving the time perspective intervention reported greater increases in long-term thinking about exercise (M increase = .604) than the no treatment group (M increase = -.229) from pre- to post-intervention (difference: p = .004), and from pre-intervention to follow-up (M increase = .725 for the time perspective group, and M increase = -0.125 for the no treatment group; difference: p = .017). Although increases in long-term thinking about exercise observed from pre- to post-intervention for those receiving the time perspective intervention were not significantly greater than those receiving the goal-setting intervention (M increase = .354; difference: p = .186), the difference between increases in the two groups' TPQ-E scores attained significance at follow-up (M increase = .025; difference: p = .017), mainly due to the ephemeral nature of the initial increases in long-term thinking about exercise observed in the control group (probably attributable to the informational content of the goal-setting sessions). As can be seen in Table 7, significant increases in time perspective were evident in both intervention conditions from pre-intervention to post-intervention, but these increases were maintained from pre-intervention to follow-up by the time perspective intervention group only.

Table 7

Means, Standard Deviations, and Change Scores for TPQ-E Scores

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	3.73 n = 6 (0.82)	4.33 n = 6 (0.63)	4.15 n = 5 (0.61)	**+0.60[e]** **n = 6** **(0.68)**	**+0.73[a,d]** **n = 5** **(0.87)**
GS	4.10 n = 6 (0.44)	4.46 n = 6 (0.47)	4.10 n = 5 (0.42)	**+0.35** **n = 6** **(0.26)**	**+0.02** **n = 5** **(0.27)**
NT	4.81 n = 6 (0.66)	4.58 n = 6 (0.58)	4.69 n = 6 (0.56)	**-0.23** **n = 6** **(0.37)**	**-0.13** **n = 6** **(0.50)**
Total	4.22 N = 18 (0.77)	4.46 N = 18 (0.54)	4.34 N = 16 (0.58)	+0.24 N = 18 (0.57)	+0.19 N = 16 (0.67)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses

[a] = contrast between TP condition and GS condition is significant at $p < .05$.

[d] = contrast between TP condition and NT condition is significant at $p < .05$.

[e] = contrast between TP condition and NT condition is significant at $p < .01$.

The Effect of the Time Perspective Intervention on Other Psychosocial Variables

I conducted similar analyses to test for intervention effects on the psychosocial variables derived from the theory of reasoned action/planned behavior (attitudes, subjective norms, behavioral beliefs, normative beliefs; Fishbein & Ajzen, 1975) and social learning theory (scheduling efficacy, barrier efficacy, outcome expectancies; Bandura, 1986).

Attitudes. For the attitudes measure, no significant main effects of time (F (1, 15) = 0.03, p = .878) or group x time interactions (F (2, 15) = 0.52, p = .608) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 14) = 0.24, p = .629) or interactions (F (2, 14) = 0.27, p = .768) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 8.

Table 8

Means, Standard Deviations, and Change Scores for Attitudes

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	5.25 n = 6 (0.83)	5.08 n = 6 (1.06)	5.29 n = 6 (0.89)	-0.17 n = 6 (0.66)	+0.04 n = 6 (0.74)
GS	5.40 n = 6 (0.91)	5.60 n = 6 (0.22)	5.61 n = 5 (0.65)	+0.19 n = 6 (0.88)	+0.33 n = 5 (1.41)
NT	6.33 n = 6 (0.19)	6.24 n = 6 (0.29)	6.29 n = 6 (0.27)	-0.09 n = 6 (0.19)	-0.05 n = 6 (0.13)
Total	5.66 N = 18 (0.84)	5.64 N = 18 (0.78)	5.74 N = 17 (0.75)	-0.02 N = 18 (0.63)	+0.09 N = 17 (0.84)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Subjective Norms.

For the subjective norms measure, no significant main effects of time (F (1, 15) = 0.14, p = .711) or group x time interactions (F (2, 15) = 0.74, p = .497) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 13) = 1.89, p = .193) or interactions (F (2, 13) = 2.31, p = .138) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 9.

Table 9

Means, Standard Deviations, and Change Scores for Subjective Norms

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	5.80 n = 5 (0.45)	5.60 n = 5 (0.55)	5.60 n = 5 (0.55)	-0.20 n = 5 (0.45)	-0.20 n = 5 (0.84)
GS	5.83 n = 6 (0.75)	6.00 n = 5 (1.00)	6.20 n = 5 (1.10)	+0.20 n = 5 (0.45)	+0.20 n = 5 (0.84)
NT	4.67 n = 6 (1.37)	4.83 n = 6 (1.17)	5.50 n = 6 (0.84)	+0.17 n = 6 (0.75)	+0.83 n = 6 (0.75)
Total	5.41 N = 17 (1.06)	5.44 N = 16 (1.03)	5.75 N = 16 (0.86)	+0.06 N = 16 (0.57)	+0.31 N = 16 (0.87)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Behavioral Beliefs. For the behavioral beliefs measure, no significant main effects of time (F (1, 15) = 0.25, p = .625) or group x time interactions (F (2, 15) = 0.35, p = .708) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 14) = 0.62, p = .446) or interactions (F (2, 14) = 0.15, p = .860) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 10.

Table 10

Means, Standard Deviations, and Change Scores for Behavioural Beliefs

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	5.19 n = 6 (0.73)	5.40 n = 6 (0.56)	5.31 n = 6 (0.65)	+0.21 n = 6 (0.47)	+0.12 n = 6 (0.94)
GS	5.21 n = 6 (0.48)	5.21 n = 6 (0.15)	5.40 n = 5 (0.40)	+0.00 n = 6 (0.55)	+0.26 n = 5 (0.29)
NT	6.17 n = 6 (0.46)	6.14 n = 6 (0.18)	6.19 n = 6 (0.33)	-0.02 n = 6 (0.60)	+0.02 n = 6 (0.65)
Total	5.52 N = 18 (0.71)	5.59 N = 18 (0.53)	5.65 N = 17 (0.61)	+0.06 N = 18 (0.520	+0.13 N = 17 (0.66)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Normative Beliefs. For the normative beliefs measure, no significant main effects of time (F (1, 15) = 1.28, p = .276) or group x time interactions (F (2, 15) = 0.82, p = .461) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 14) = 0.49, p = .494) or interactions (F (2, 14) = 0.57, p = .576) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 11.

Table 11

Means, Standard Deviations, and Change Scores for Normative Beliefs

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	6.03 n = 6 (0.96)	5.53 n = 6 (1.08)	5.75 n = 6 (0.79)	-0.50 n = 6 (0.91)	-0.28 n = 6 (0.36)
GS	6.14 n = 6 (1.03)	6.11 n = 6 (1.12)	6.37 n = 5 (0.86)	-0.03 n = 6 (0.64)	-0.07 n = 5 (0.38)
NT	5.74 n = 6 (0.31)	5.69 n = 6 (0.55)	5.81 n = 6 (0.73)	-0.05 n = 6 (0.56)	+0.06 n = 6 (0.78)
Total	5.97 N = 18 (0.80)	5.78 N = 18 (0.930	5.95 N = 17 (0.79)	-0.19 N = 18 (0.71)	-0.10 N = 17 (0.54)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Scheduling Efficacy. For the scheduling efficacy measure, no significant main effects of time (F (1, 15) = 0.02, p = .902) or group x time interactions (F (2, 15) = 2.08, p = .160) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 14) = 0.67, p = .426) or interactions (F (2, 14) = 0.68, p = .524) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 12.

Table 12

Means, Standard Deviations, and Change Scores for Scheduling Efficacy

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	6.64 n = 6 (2.03)	7.42 n = 6 (2.18)	6.94 n = 6 (1.83)	+0.78 n = 6 (1.07)	+0.31 n = 6 (1.46)
GS	6.44 n = 6 (0.77)	5.78 n = 6 (1.82)	5.50 n = 5 (2.55)	-0.67 n = 6 (1.74)	-0.73 n = 5 (2.19)
NT	8.31 n = 6 (1.71)	8.08 n = 6 (1.60)	7.78 n = 6 (1.89)	-0.22 n = 6 (0.76)	-0.53 n = 6 (1.09)
Total	7.13 N = 18 (1.73)	7.09 N = 18 (2.03)	6.81 N = 17 (2.16)	-0.04 N = 18 (1.33)	-0.29 N = 17 (1.56)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Barrier Efficacy. Again, no significant main effects of time (F (1, 15) = 0.41, p = .533) or group x time interactions (F (2, 15) = 0.00, p = .997) emerged from pre- to post-intervention for the barrier efficacy measure, and no main effects of time (F (1, 14) = 0.07, p = .794) or interactions (F (2, 14) = 0.39, p = .684) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 13.

Table 13

Means, Standard Deviations, and Change Scores for Barrier Efficacy

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	63.79 n = 6 (14.73)	63.06 n = 6 (14.40)	67.22 n = 6 (9.86)	-0.73 n = 6 (6.67)	+3.43 n = 6 (13.12)
GS	63.71 n = 6 (12.62)	62.72 n = 6 (8.90)	60.09 n = 5 (14.56)	-0.99 n = 6 (6.53)	-1.18 n = 5 (8.52)
NT	80.02 n = 6 (8.96)	79.21 n = 6 (10.78)	79.61 n = 6 (9.73)	-0.81 n = 6 (2.67)	-0.41 n = 6 (4.55)
Total	69.17 N = 18 (14.02)	68.33 N = 18 (13.46)	69.50 N = 17 (13.45)	-0.84 N = 18 (5.27)	+0.72 N = 17 (9.10)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Outcome Expectancies. Finally, for the measure of outcome expectancies, no significant main effects of time (F (1, 15) = 1.87, p = .192) or group x time interactions (F (2, 15) = 0.46, p = .641) emerged from pre- to post-intervention. Likewise, no main effects of time (F (1, 14) = 0.83, p = .377) or interactions (F (2, 14) = 0.90, p = .429) emerged from pre-intervention to follow-up. Means, standard deviations, and change scores are presented in Table 14.

Table 14

Means and Standard Deviations for Outcome Expectancies

	Means			Change Scores	
Group	Pre	Post	Follow-up (10 weeks)	Pre to Post	Pre to Follow-up
TP	4.92 n = 6 (3.61)	4.83 n = 6 (3.60)	3.67 n = 6 (3.27)	+0.61 n = 6 (1.34)	+0.75 n = 6 (2.01)
GS	4.67 n = 6 (1.66)	4.08 n = 6 (1.02)	2.20 n = 5 (1.92)	+0.33 n = 6 (0.98)	+0.30 n = 5 (0.60)
NT	4.25 n = 6 (1.33)	4.17 n = 6 (1.03)	4.00 n = 6 (1.92)	+0.05 n = 6 (0.56)	-0.22 n = 6 (0.31)
Total	4.61 N = 18 (2.29)	4.36 N = 18 (2.13)	3.35 N = 17 (2.45)	+0.33 N = 18 (0.98)	+0.28 N = 17 (1.25)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Summary of Study 3 Results

In this study it was found that participants receiving the time perspective intervention reported engaging in significantly more vigorous physical activity than those receiving either the goal setting intervention or no treatment from pre- to post-intervention. Participants receiving the time perspective intervention also engaged in significantly more vigorous physical activity than both groups at follow-up, although the difference between the two intervention conditions did not attain statistical significance.

In addition, participants receiving the time perspective intervention showed significantly larger increases in long-term thinking about exercise than either of the other groups, as measured by the domain specific version of the TPQ. Similar effects were not evident on any of the other psychosocial variables measured.

Discussion

These findings provide support for the notion that time perspective can be a causally important component in interventions for increasing physical activity. Participants receiving the time perspective intervention reported engaging in more vigorous physical activity than did participants receiving either the goal-setting intervention or no intervention at both follow-up points. Additional analyses showed that these changes were accompanied by increases in long-term thinking about exercise. Moreover, these effects showed considerable specificity: the intervention effects were not matched by like changes in psychosocial variables derived from other prominent theories of health behavior, such as the theory of reasoned action (Fishbein & Ajzen, 1975) or social cognitive theory (Bandura, 1986).

Despite the apparently strong findings presented in Study 3, some may argue that the small size of the present sample calls into question the reliability of the findings. This is not a substantive issue given that the statistical tests conducted take sample size into account. That is, intervention studies with low sample sizes require a greater intervention effect to yield reliable differences among intervention conditions. In short, statistical significance was obtained despite the low sample size, not because of it.

However, it is possible that some of the null findings involving the psychosocial mediating variables observed here are a function of low power to detect effects in such a small sample. In other words, we can safely conclude that the intervention effects enhanced long-term thinking about exercise among participants in the time perspective intervention relative to the control intervention and the no-treatment group. We cannot confidently conclude that other psychosocial mediators are not similarly effected selectively among

participants in the time perspective group. A larger sample size would be required in order to make any definitive statements of this sort.

In addition, the follow-up period for this study was relatively brief (7 weeks). It is possible that the observed intervention effects would not translate into lasting changes in physical activity patterns. Indeed, the usual convention for testing behavior change maintenance for physical activity is 6 months at minimum, as this is the point at which approximately 50% of participants in structured exercise programs usually drop out (Dishman, 1988), and is the criterion identified as achieving maintenance by popular theories of behavior change (Prochaska, DiClemente, & Norcross, 1992).

Study 4

Study 3 demonstrated that an intervention designed to enhance time perspective was superior to a goal setting control intervention and a no-treatment group in promoting physical activity. In addition, it was demonstrated that increases in long-term thinking about exercise were greater and more enduring among those receiving the time perspective intervention compared with those receiving either the goal setting control intervention, or no treatment. Consequently, Study 3 provided the first experimental evidence that time perspective is causally associated with health behavior.

Although Study 3 provided interesting initial information regarding the efficacy of a time perspective intervention, and about the causal primacy of time perspective in changing health behavior, it left some questions unanswered. First, it is unclear what factors are responsible for the observed intervention effects. Due to the small sample size, there was not sufficient power to test for any mediational effects among the measured variables. A larger sample would be required to conduct such analyses with confidence.

Second, it is unclear how enduring the observed intervention effects were. The follow-up period for Study 3 was only seven weeks in duration. Although the superiority of the time perspective intervention was evident at the end of this time interval, it is not possible to speculate how long it would have endured beyond that. Given that the convention for claiming "maintenance" of behavior change in intervention studies of this type is six months (Prochaska, DiClemente, & Norcross, 1992), we are not able to say whether or not maintenance was achieved, at least not in the technical sense of term. A longer follow-up interval would be necessary to determine whether or not the beneficial

effects of the time perspective intervention were lasting. For this reason, a six month follow-up measurement point was added in Study 4.

Another limitation of Study 3 was its reliance on un-cued recall measures of physical activity. While the measure used has demonstrated good reliability and validity in previous studies (e.g., Blair et al., 1985; Smith, 1994), the Seven-Day Physical Activity Recall (7-Day PAR; Sallis, Haskell, Wood, Fortman, Rogers, Blair, & Paffenbarger, 1985) is one of the most widely used and well-validated measures of physical activity, and is generally considered to be the "gold standard" (Montoye, Kemper, Saris, & Washburn, 1996). This interview-based, cued-recall measure assesses the number hours spent engaged in various intensities of physical activity each day over the past week. Inclusion of this measure in Study 4 at all measurement points represents a significant improvement in outcome measurement over Study 3.

Finally, testing the efficacy of the time perspective intervention in a second study will reveal how robust the intervention effects observed in Study 3 were. If significant effects emerge in favor of the time perspective intervention in a second sample of participants (to be drawn from a larger range of fitness classes, not just step aerobics), we can be more confident that the effect is not spurious or somehow specific to our first sample.

Method

Participants

Participants were 81 University of Waterloo students who enrolled in one of nine aerobics classes offered in the Fall of 2000 at the university recreation complex. As in Study 3, they were recruited for participation at the beginning of their first fitness class of the term, and were all paid equally for participation ($35 at post intervention, and $10 at each of the

follow-up points). Participants were predominantly female (77 females, 4 males), and were an average age of 21 years old at the time of recruitment (see Table 15 for a summary of sample characteristics). Retention was very good overall, with 79 (97%) participants returning questionnaire packages for the post-intervention measurement, 65 (80%) returning packages for the first (10-week) follow-up, and 56 (70%) returning packages for the second (6-month) follow-up.

Table 15

Sample Characteristics for Study 4

		M	SD
Age		21.2	2.6
Year of Study		2.4	1.4
Weight (lbs.)		135.2	22.6
		n	% of total N
Gender	Female	77	95.1
	Male	4	4.9

Note. N = 81.

Classes were randomly assigned to conditions, such that participants from each aerobics class were all assigned to the same condition. Again, this approach to assignment was taken for logistical reasons, and to minimize communication between participants that

were assigned to different conditions. All participants and fitness class instructors were blind to condition. Again, attendance was 100% for both of the treatment groups at all three intervention sessions.

Measures

Measures filled out by participants in Study 4 were similar to those filled out in Study 3, except that items were eliminated from several scales in order to reduce the overall completion time of the questionnaire package. In all instances, items removed were those with the lowest item-total correlations.

In most cases, participants filled out questionnaire packages at home and returned them to a drop box located in the Athletics Office at the campus recreation complex at pre-specified time points. Others filled out questionnaire packages in person when picking up their payments within these same time points. All telephone interviews in which participants reported their physical activity were completed within these same time frames.

Demographic Questionnaire. Participants were asked to fill out a sheet containing basic demographic information including age, gender, height, weight, fitness class time, and marital status.

Time Perspective Questionnaire - Exercise Version (TPQ-E). The 8-item version of the TPQ-E used in Study 3 was used again in the present study. Participants indicated their level of agreement with each item using a 7-point response scale, where 1 = "Disagree very strongly," and 7 = "Agree very strongly." Items tapping short-term thinking were reverse-scored and averaged together with items tapping long-term thinking. The TPQ-E demonstrated only passably acceptable internal consistency at all three measurement points (alpha = .69 at pre-intervention, .47 at post-intervention, .71 at first follow-up, and .63 at

second follow-up). A closer examination of individual items revealed that a single item ("I exercise mainly for my current enjoyment.") was negatively correlated with the scale total score. After deletion of this item, the internal consistency of the scale improved somewhat (alpha = .75 at pre-intervention, .61 at post-intervention, .76 at first follow-up, and .70 at second follow-up). All analyses reported here are based on this edited version of the TPQ-E. However, the pattern of results observed using the edited version did not change noticeably from those observed using the original version in this sample.

Physical Activity. Physical activity was measured using the same 30-day recall measure used in Study 3: "During the last month, how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting)." Again, only the vigorous dimension was used for subsequent analyses.

Physical Activity Intentions. Intentions to engage in physical activity over the next month were measured by self-report using a re-worded version of the physical activity measure described above (Smith, 1994). Participants were asked to state the number of hours that they intend to engage in vigorous and moderate intensity physical activity over the course of the next 30 days, to the nearest half hour by responding to the following question: "During the next month, how much total time do you intend to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record

any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting)."

Attitudes. Attitudes were measured by a series of semantic differential scales, this time consisting of 10 (rather than 14) sets of polar opposite adjectives relating to physical activity. Per usual, participants were asked to put a check mark along a continuum of seven blanks between the two adjectives to represent their attitude towards physical activity on each dimension. Internal consistency for this scale was high at all three measurement points (alpha = .83 at pre-intervention, .83 at post-intervention, .84 at first follow-up, and .85 at second follow-up).

Subjective Norms. Subjective norms were again measured with the following item: "Do most people who are important to you think you should or should not exercise on a regular basis?" Participants responded on a 1-7 response scale, where 1 = "Strongly think I should not", and 7 = "Strongly think I should."

Behavioral Beliefs. Behavioral beliefs were assessed with 5 items; two were dropped from Study 3 due to low item-total correlations. Responses to each item were again made by placing a check mark in one of seven boxes, ranging from "Extremely unlikely" to "Extremely likely." Internal consistency for this scale was high at all measurement points (alpha = .84 at pre-intervention, .87 at post-intervention, .89 at first follow-up, and .88 at second follow-up).

Normative Beliefs. Normative beliefs were measured with a 5-item scale. Participants again responded to each item using a 1-7 scale, where 1 = "Strongly thinks I should not," 4 = "Neither/Nor," 7 = "Strongly thinks I should." Internal consistency for this

scale was acceptable at all three measurement points (alpha = .71 at pre-intervention, .64 at post-intervention, .71 at first follow-up, and .77 at second follow-up).

Scheduling Efficacy. Scheduling efficacy was again measured by 6 items. Participants indicated their confidence that they could find time to exercise despite a variety of impediments using a 1-10 response scale, where 1 = "not at all confident," 5 = "moderately confident," and 10 = "extremely confident." Internal consistency for this scale was very high at all measurement points (alpha = .92 at pre-intervention, .96 at post-intervention, .97 at first follow-up, and .97 at second follow-up).

Barrier Efficacy. Confidence in one's own ability to overcome barriers associated with exercise was measured using a 10-item scale. Based on item total correlations, 5 items were dropped from the original scale to reduce completion time. Participants again provided a 0-100% confidence rating that they would be able to maintain a program of regular exercise despite the presence of a number of potential barriers. Internal consistency for this scale was high at all measurement points (alpha = .84 at pre-intervention, .88 at post-intervention, .89 at first follow-up, and .92 at second follow-up).

Interview-Based Physical Activity Recall (PAR)

Participants were administered a standardized telephone version of the 7-Day Physical Activity Recall (Sallis et al., 1985). As mentioned earlier, this is an interview-based, cued recall measure in which the participant is required to estimate the number of minutes engaged in various intensities of physical activity each day, for the seven days prior to the interview. Intensity of each activity is coded based on the subjective impressions of the participant using the following three categories: "moderate" (e.g., "similar to how you feel when you are walking at a normal pace."), "very hard" (e.g., "similar to how you feel

when you are running"), and "hard" (e.g., "in between moderate and very hard"). Activities of light intensity are not counted, presumably because of low reliability. Participants are also asked to estimate the number of minutes spent engaged in strength and flexibility exercises each day, and the amount of sleep each night. Total number of hours spent engaged in each category of activity were calculated for each participant to the nearest quarter hour. All scores were submitted to a log transformation to normalize the distributions, which were highly positively skewed.

The 7-Day PAR has previously demonstrated good inter-rater reliability and test-retest reliability (Sallis et al., 1985). In addition, it shows good convergent validity with other measures of physical activity, including other self-report measures, metabolic measures, and accelerometers (Montoye et al., 1996; Sallis et al., 1985).

Because the PAR was administered by telephone, there were different numbers of participants at each wave of data collection than for the self-report measures. Proportion of total sample ($\underline{N}$ = 81) interviewed for each wave of data collection are: pre-intervention (86%; $\underline{n}$ = 70), post-intervention (90%; $\underline{n}$ = 73), first follow-up (90%; $\underline{n}$ = 73), second follow-up (78%; $\underline{n}$ = 63). These numbers include several people who did not return questionnaire packages, but still agreed to be interviewed by telephone.

Intervention Conditions

As in Study 3, there were two intervention conditions (time perspective intervention, and goal setting control intervention) and one no-treatment condition. The form, content, and number of sessions of the intervention were the same as those outlined for Study 3.

Results

Attrition Across Groups

Before presenting the primary outcome measures, it is important to establish that there was no differential attrition across groups. In any intervention study, it is possible that aspects of either intervention cause participants to drop out of the intervention at different rates. For example, it might be that most participants in the time perspective group find the intervention to be interesting and motivating, and therefore do not drop out of the study. Meanwhile, it is possible that those in the control intervention do not find the intervention to be interesting or motivating, and therefore do not feel compelled to remain in the study at follow-up. This differential dropout could create bias in the outcome measures if those remaining in the control group are somehow systematically different from the original cohort (e.g., more motivated to exercise on average). In this case, any treatment effects could be eliminated if only the highly intrinsically motivated participants remain in the control group at follow-up. For this reason, it is important to establish that attrition did not differ between the three participant groups, and that attrition did not interact with other important variables of interest.

Analyses confirmed that no differential attrition was evident across groups at post-intervention (F (2, 78) = 0.49, p = .612), first follow-up (F (2, 78) = 1.56, p = .217), or second follow-up (F (2, 78) = 2.20, p = .117) for any of the groups in this study.

There were also no differences between the intervention groups with respect to how much they liked the intervention (F (2, 43) = 1.79, p = .179), how informative they thought the intervention was (F (2, 43) = 1.20, p = .310), or how interesting they thought the intervention was (F (2, 43) = 1.64, p = .207). Finally, there were no between-group differences in how enthusiastic they found the facilitator to be (F (2, 43) = 1.00, p = .376),

or how prepared they found the facilitator to be (F (2, 43) = 0.35, p = .704).

Ratings of the intervention and facilitator characteristics did not differ for those who dropped out versus those to remained in the study. Participants ratings of how much they liked the intervention (F (1,41) = 0.16, p = .688), how informative the intervention was (F (1,41) = 0.43, p = .518), or how interesting the intervention was (F (1, 41) = 0.27, p = .604) did not differ for those who dropped out at first follow-up. Likewise, participants ratings of the instructor's enthusiasm (F (1, 41) = 0.11, p = .739) and preparedness (F (1, 41) = 0.50, p = .484) also did not differ from those who remained in the study at first follow-up.

Together these analyses confirm that attrition rates were comparable for each of the groups, and attrition among the participants assigned to either of the intervention groups did not interact with general impressions of the interventions, or of the facilitator who delivered them.

Pre-Intervention Physical Activity Levels

Another potential confound that must be guarded against in intervention research is the possibility that the intervention groups differed with respect to their scores on the primary outcome measures before the intervention was delivered. If this is the case, there exists the possibility that any treatment effects can be attributed to floor effects or ceiling effects on the primary outcome measures for one or more of the treatment groups. For example, if one treatment group is already exercising at a maximum number of hours per week (by chance selection), it is unlikely that they can benefit further from outside intervention.

No pre-intervention differences were evident among the three groups with respect to levels of vigorous physical activity (F (2, 78) = 0.578, p = .563), levels of moderate (F (2,

66) = 0.447, p = .641), hard (F (2, 67) = 1.034, p = .361), very hard physical activity (F (2, 66) = 0.730, p = .486), or hours of strength and flexibility exercises (F (2, 67) = 0.844, p = .434) as assessed by the PAR interview. Likewise, there were no pre-intervention differences between the groups with respect to intentions to engage in physical activity (F (2, 77) = 0.539, p = .586), or TPQ-E scores (F (2, 78) = 1.519, p = .225). Together these analyses demonstrate that the three groups did not differ at pre-intervention with respect to how much physical activity they engaged in, and those who dropped out from the study did not differ from those who remained with respect to these same variables.

Primary Measures of Outcome

To determine whether or not the three groups differ in their exercise behavior at post-intervention and at follow-up measurements, controlling for their pre-intervention levels of exercise I conducted repeated measures ANOVAs and planned contrasts that were identical to those performed in Study 3.

Given that all participants were recruited from fitness classes of a vigorous intensity (e.g., step, and medium-impact aerobics), we considered vigorous exercise behavior as measured by the 30-day recall, and "hard" intensity physical activity as measured by the PAR to be the most appropriate measures by which to evaluate intervention efficacy. It is important to note that these measures include all kinds of physical activity, and are not limited to that performed within the context of participants' weekly fitness classes. They include participation in the fitness class along with a broad range of more incidental forms of physical activity (e.g., walking, dancing), and are therefore very comprehensive measures of outcome.

Vigorous Physical Activity Over the Past Month

For the first analysis, the main dependent variable was self-reported hours engaged in vigorous physical activity over the past month. Although no significant group x time interaction effects emerged from pre- to post-intervention, and pre-intervention to first follow-up (10 weeks), a borderline significant effect did emerge at pre-intervention to second follow-up (F (2,53) = 2.84, p = .067). Planned comparisons revealed that participants receiving the time perspective intervention exercised an average of 5.82 hours longer than they had at pre-intervention, a significantly greater increase than for those receiving the goal-setting control intervention (mean increase = -0.28 hours; difference: p = .023), but not significantly larger than those receiving the no treatment condition (mean increase = 3.67 hours; difference: p = .499). Table 16 presents the group means, standard deviations, and change scores for each group.

Table 16

Means, Standard Deviations, and Change Scores for Hours of Vigorous Physical Activity Over the Past Month

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	7.18 n = 25 (7.14)	14.91 n = 24 (8.21)	10.47 n = 21 (7.97)	12.89 n = 19 (12.91)	**+7.43** **n = 24** **(5.58)**	**+3.45** **n = 21** **(8.13)**	**+5.81[a]** **n = 19** **(10.79)**
GS	8.32 n = 33 (7.30)	13.95 n = 32 (8.31)	9.04 n = 28 (5.08)	7.26 n = 25 (5.21)	**+5.69** **n = 32** **(6.93)**	**+0.77** **n = 28** **(6.08)**	**-0.28** **n = 25** **(5.61)**
NT	6.28 n = 23 (6.62)	11.91 n = 22 (6.83)	10.25 n = 14 (12.61)	9.46 n = 12 (9.41)	**+5.57** **n = 22** **(6.91)**	**+4.00** **n = 14** **(9.02)**	**+3.67** **n = 12** **(9.72)**
Total	7.39 N = 81 (7.03)	13.67 N = 78 (7.88)	9.79 N = 63 (8.10)	9.64 N = 56 (9.50)	+6.19 N = 78 (6.51)	+2.38 N = 63 (7.53)	+2.63 N = 56 (8.85)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[a] = contrast between TP condition and GS condition significant at $p < .05$.

Hard Intensity Physical Activity (7-Day PAR).

A significant group x time interaction effect emerged for changes in hard exercise behavior over past week from pre- to post-intervention (F (2, 66) = 5.70, p = .005). Planned comparisons revealed that participants receiving the Time Perspective intervention engaged in 0.181 standardized units more hard exercise than they had at pre-intervention on average. This difference was not a significantly greater increase than for those receiving the goal-setting control intervention (mean increase = 0.85 units; difference: p = .311), but was significantly larger than those receiving the no treatment condition (mean increase = -0.150 units; difference: p = .002).

No significant interactions were observed from pre-intervention to first follow-up (F (2, 59) = 16.50, p = .707), or from pre-intervention to second follow-up (F (2, 51) = 1.19, p = .311. However, significant main effects of time emerged at both of these time points (F (1, 59) = 16.50, p = .001, and F (1, 51) = 9.84, p = .003, respectively), suggesting a general decrease in hard intensity physical activity over time for all groups combined. Table 17 shows the means, standard deviations, and change scores for each of the three groups.

Table 17

Means, Standard Deviations, and Change Scores for Log Transformed Hours of Hard Intensity Physical Activity (7-Day PAR)

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	.278 n = 21 (.247)	.436 n = 20 (.227)	.129 n = 25 (.178)	.175 n = 22 (.292)	**+.181[r]** **n = 20** **(.319)**	**-.138** **n = 21** **(.350)**	**-.129** **n = 18** **(.320)**
GS	.302 n = 29 (.251)	.395 n = 31 (.188)	.150 n = 31 (.205)	.238 n = 26 (.285)	**+.085** **n = 29** **(.248)**	**-.168** **n = 27** **(.312)**	**-.070** **n = 24** **(.353)**
NT	.393 n = 20 (.326)	.263 n = 22 (.309)	.154 n = 17 (.207)	.211 n = 14 (.345)	**-.150** **n = 20** **(.408)**	**-.234** **n = 14** **(.363)**	**-.257** **n = 12** **(.351)**
Total	.321 N = 70 (.274)	.366 N = 73 (.247)	.144 N = 73 (.194)	.209 N = 62 (.298)	+.045 N = 69 (.343)	-.173 N = 62 (.333)	-.131 N = 54 (.343)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[r] = contrast between TP condition and NT condition significant at $p < .001$.

Other Measures of Physical Activity

Strength and Flexibility Exercises (7-Day PAR)

A significant group x time interaction (F (2,51) = 4.044, p = .023) in favor of the time perspective intervention appeared at second follow-up. Planned comparisons revealed that participants receiving the time perspective intervention engaged in -0.049 standardized units less strength training than they had at pre-intervention on average. This difference was not a significantly smaller drop than for those receiving the goal-setting control intervention (mean decrease = -0.133 units; difference: p = -.183), but was significantly smaller than those receiving the no treatment condition (mean increase = -0.260 units; difference: p = .006). The means, standard deviations, and change scores for each of the three groups at each of the three measurement points are presented in Figure 18.

Table 18

Means, Standard Deviations, and Change Scores for Log Transformed Hours of Strength and Flexibility Exercises (7-Day PAR)

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	.287 n = 21 (.125)	.192 n = 20 (.157)	.155 n = 24 (.196)	.211 n = 22 (.205)	**-.090** **n = 20** **(.141)**	**-.140** **n = 20** **(.194)**	**-.049[e]** **n = 18** **(.218)**
GS	.311 n = 29 (.131)	.247 n = 31 (.169)	.143 n = 31 (.210)	.169 n = 26 (.167)	**-.087** **n = 29** **(.147)**	**-.198** **n = 27** **(.128)**	**-.133** **n = 24** **(.196)**
NT	.330 n = 20 (.192)	.196 n = 22 (.155)	.155 n = 16 (.207)	.098 n = 14 (.142)	**-.123** **n = 20** **(.180)**	**-.186** **n = 13** **(.298)**	**-.260** **n = 12** **(.172)**
Total	.309 N = 70 (.148)	.217 N = 73 (.161)	.150 N = 71 (.202)	.168 N = 62 (.179)	-.099 N = 69 (.154)	-.176 N = 60 (.195)	-.133 N = 54 (.210)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[e] = contrast between TP condition and NT condition significant at $p < .01$.

Very Hard Intensity Physical Activity (7-Day PAR)

For the interview-based measure of very hard intensity physical activity, no significant group x time interaction effects emerged from pre- to post-intervention (F (2, 64) = 0.50, p = .609), pre-intervention to first follow-up (F (2, 44) = 0.50, p = .864), or pre-intervention to second follow-up (F (2, 50) = 0.05, p = .953).

However, significant main effects emerged from pre-intervention to first follow-up (F (1, 44) = 17.03, p < .001), and from pre-intervention to second follow-up (F (1, 50) = 8.50, p = .005). An inspection of the group means suggests that all participants showed a significant decrease in Very Hard intensity physical activity from pre-intervention to both follow-up points. This main effect might be driven by natural seasonal variations in highest intensity physical activities from pre-intervention (early fall) to follow-up measurement points (middle and end of the winter season). These seasons vary to the extent to which they allow individuals to engage in outdoor activities that involve running and strenuous exertion (e.g., running). This theory is supported by the fact that no significant decline was observed in levels of very hard physical activity from pre- to post-intervention measurement points (F (1, 64) = 1.63, p = .206), both of which occurred in the early fall, when outdoor activities of this sort were still feasible. The means, standard deviations, and change scores for each of the three groups at each of the three measurement points are presented in Table 19.

Table 19

Means, Standard Deviations, and Change Scores for Log Transformed Hours of Very Hard Intensity Physical Activity (7-Day PAR)

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	.331 n = 21 (.185)	.216 n = 20 (.253)	.176 n = 24 (.246)	.178 n = 22 (.264)	-.108 n = 20 (.308)	-.176 n = 20 (.238)	-.143 n = 18 (.290)
GS	.269 n = 28 (.263)	.246 n = 31 (.198)	.129 n = 31 (.193)	.149 n = 26 (.194)	-.035 n = 28 (.345)	-.188 n = 26 (.322)	-.132 n = 23 (.319)
NT	.246 n = 20 (.244)	.184 n = 21 (.198)	.101 n = 16 (.162)	.139 n = 14 (.251)	-.010 n = 19 (.302)	-.156 n = 13 (.194)	-.108 n = 12 (.311)
Total	.281 N = 69 (.235)	.220 N = 72 (.213)	(.139 N = 71 (.206)	.157 N = 62 (.231)	-.050 N = 67 (.320)	-.177 N = 59 (.267)	-.130 N = 53 (.302)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Moderate Intensity Physical Activity (7-Day PAR)

For Moderate intensity physical activity, no significant group x time interaction effects emerged from pre- to post-intervention (F (2, 65) = 0.89, p = .417), pre-intervention to first follow-up (F (2, 58) = 1.34, p = .270), or pre-intervention to second follow-up (F (2, 50) = 0.46, p = .635). No main effects emerged from pre- to post-intervention (F (1, 65) = 1.39, p = .243) or pre-intervention to first follow-up (F (1, 58) = 2.23, p = .141). However, a significant main effect of time did emerge from pre-intervention to second follow-up (F (1, 50) = 12.88, p = .001), suggesting a general increase in moderate intensity physical activity performed by all participants. Again, this could be a seasonal effect wherein high intensity outdoor activities become gradually replaced with lower (moderate) intensity indoor activities during the winter months. The means, standard deviations, and change scores for each of the three groups at each of the three measurement points are presented in Table 20.

Table 20

Means, Standard Deviations, and Change Scores for Log Transformed Hours of Moderate Intensity Physical Activity (7-Day PAR)

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	.680 n = 21 (.190)	.687 n = 20 (.251)	.687 n = 25 (.198)	.733 n = 22 (.340)	+.021 n = 20 (.265)	+.005 n = 21 (.234)	+.090 n = 18 (.313)
GS	.665 n = 29 (.226)	.664 n = 31 (.272)	.696 n = 31 (.230)	.829 n = 26 (.202)	-.004 n = 29 (.283)	+.010 n = 27 (.246)	+.159 n = 24 (.289)
NT	.624 n = 19 (.143)	.687 n = 21 (.198)	.733 n = 16 (.289)	.753 n = 14 (.140)	+.009 n = 19 (.149)	+.135 n = 13 (.281)	+.178 n = 11 (.140)
Total	.658 N = 69 (.194)	.677 N = 72 (.244)	.701 N = 72 (.231)	.778 N = 62 (.250)	+.003 N = 68 (.247)	+.003 N = 61 (.251)	+.140 N = 53 (.272)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Effects of the Time Perspective Intervention on Thinking About the Long-Term Consequences of Exercise

We conducted analyses parallel to those conducted in Study 3 to assess whether the time perspective intervention enhanced thinking about the long-term consequences of exercise relative to the other two groups. A repeated measures ANOVA was conducted using group as the between-subjects variable, time as the within-subjects variable, and TPQ-E scores as the dependent measure.

Contrary to our expectations and our findings in Study 3, the group x time interaction term did not attain statistical significance from pre- to post-intervention (F (1, 75) = 1.05, p = .354), pre-intervention to first follow-up (F (2, 62) = 0.97, p = .385), or pre-intervention to second follow-up (F (2, 52) = 0.16, p = .853). No significant main effects emerged from pre- to post-intervention (F (1, 75) = 0.55, p = .462), pre-intervention to first follow-up (F (1, 62) = 1.34, p = .252), or pre-intervention to second follow-up (F (1, 52) = 0.41, p = .526). The means, standard deviations, and change scores for each of the three groups at each of the measurement points are presented in Table 21.

Table 21

Means, Standard Deviations, and Change Scores for Time Perspective Scores (Exercise Version)

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	4.09 n = 25 (0.40)	4.15 n = 24 (0.39)	4.05 n = 22 (0.41)	4.04 n = 19 (0.54)	+0.05 n = 24 (0.43)	-0.03 n = 22 (0.49)	-0.01 n = 19 (0.63)
GS	4.14 n = 33 (0.38)	4.08 n = 32 (0.33)	4.20 n = 27 (0.47)	4.18 n = 24 (0.43)	-0.05 n = 32 (0.43)	+0.06 n = 27 (0.51)	+0.05 n = 24 (0.52)
NT	3.89 n = 23 (0.40)	4.01 n = 22 (0.40)	3.99 n = 16 (0.31)	3.90 n = 12 (0.36)	+0.11 n = 22 (0.41)	+0.18 n = 16 (0.33)	+0.10 n = 12 (0.39)
Total	4.05 N = 81 (0.40)	4.08 N = 78 (0.37)	4.10 N = 65 (0.42)	4.07 N = 55 (0.47)	+0.02 N = 78 (0.42)	+0.06 N = 65 (0.47)	+0.04 N = 55 (0.53)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Psychosocial Variables

Intentions to Engage in Physical Activity

To measure possible mediating influence of intentions on physical activity, intentions was used as a dependent measure in a repeated measures ANOVA, with group as the between-subjects factor, and time as the within-subjects factor. A strong effect in favor of the time perspective group was observed on intentions to engage in physical activity immediately following the intervention; the group x time interaction was highly statistically significant from pre- to post-intervention (F (74, 2) = 7.15, p = .001). Planned comparisons revealed that participants receiving the Time Perspective intervention intended to exercise an average of 4.56 hours longer than they had at pre-intervention, a significantly greater increase than for those receiving the goal-setting control intervention (mean increase = -1.48 hours; difference: p = .001), and those in the no treatment condition (mean increase = -1.84 hours; difference: p = .002).

Although this pattern of results was similar. The time x group interaction term did not attain statistical significance from pre-intervention to first follow-up (F (2, 60) = 1.42, p = .249), or pre-intervention to second follow-up (F (2, 52) = 1.92, p = .157). No significant main effects emerged from pre- to post-intervention (F (1, 74) = 0.29, p = .593) or from pre-intervention to second follow-up (F (1, 52) = 2.15, p = .149). However, there was a significant main effect of time from pre-intervention to second follow-up (F (1, 60) = 10.98, p = .002), attesting to the high degree of variability in change in intentions between these measurement points. Means, standard deviations, and change scores are presented in Table 22.

Table 22

Means, Standard Deviations, and Change Scores for Intentions to Engage in Vigorous Physical Activity Over the Next Month

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU1	Pre to FU 2
TP	13.67 n = 24 (6.91)	17.50 n = 25 (10.78)	12.50 n = 20 (8.98)	15.21 N = 19 (10.86)	**+4.56[c,f]** **n = 24** **(7.00)**	**-1.60** **n = 20** **(6.03)**	**+1.72** **n = 18** **(8.11)**
GS	15.38 n = 33 (7.97)	14.24 n = 31 (7.80)	9.54 n = 27 (6.51)	11.02 N = 25 (7.70)	**-1.48** **n = 31** **(5.62)**	**-6.46** **n = 27** **(7.71)**	**-3.30** **n = 25** **(9.07)**
NT	15.85 n = 23 (8.08)	14.18 n = 22 (8.13)	12.62 n = 16 (13.71)	13.67 N = 12 (10.62)	**-1.84** **n = 22** **(7.60)**	**-4.47** **n = 16** **(15.28)**	**-4.46** **n = 12** **(12.94)**
Total	15.00 N = 80 (7.66)	15.27 N = 78 (8.96)	11.26 N = 63 (9.50)	13.01 N = 56 (9.51)	+0.30 N = 77 (7.19)	-4.41 N = 63 (9.84)	-1.91 N = 55 (9.91)
	(7.66)	(8.96)	(9.50)	(9.51)	(7.19)	(9.84)	(9.91)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[c] = contrast between TP condition and GS condition significant at $p < .001$.

[f] = contrast between TP condition and NT condition significant at $p < .001$.

Attitudes Toward Engaging in Regular Physical Activity.

For the attitudes measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 76) = 0.63, p = .537), from pre-intervention to first follow-up (F (2, 62) = 1.80, p = .173), or from pre-intervention to second follow-up (F (2, 53) = 0.34, p = .711). No significant main effects of time emerged from pre- to post-intervention (F (1, 76) = 0.02, p = .882), pre-intervention to first follow-up (F (1, 62) = 0.06, p = .814), or pre-intervention to second follow-up (F (1, 53) = 0.30, p = .587). Means, standard deviations, and change scores are presented in Table 23.

Table 23

Means, Standard Deviations, and Change Scores for Attitudes

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	6.21 n = 25 (0.63)	6.21 n = 25 (0.60)	6.20 n = 21 (0.77)	6.14 N = 19 (0.73)	-0.00 n = 25 (0.47)	+0.01 n = 21 (0.69)	-0.06 n = 19 (0.61)
GS	6.30 n = 33 (0.64)	6.18 n = 32 (0.59)	6.02 n = 28 (0.65)	6.24 N = 25 (0.56)	-0.13 n = 32 (0.42)	-0.35 n = 28 (0.61)	-0.18 n = 25 (0.49)
NT	6.21 n = 23 (0.75)	6.11 n = 22 (0.83)	5.89 n = 16 (0.82)	6.16 N = 12 (0.64)	-0.12 n = 22 (0.85)	-0.18 n = 16 (0.46)	-0.08 n = 12 (0.37)
Total	6.25 N = 81 (0.67)	6.17 N = 79 (0.66)	6.05 N = 65 (0.73)	6.19 N = 56 (0.63)	-0.09 N = 79 (0.58)	-0.19 N = 65 (0.62)	-0.12 N = 56 (0.51)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Subjective Norms.

For the subjective norms measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 75) = 0.39, p = .676), or from pre-intervention to second follow-up (F (2, 52) = 1.27, p = .289). However, there was a significant group x time interaction from pre-intervention to first follow-up (F (2, 61) = 3.57, p = .034), in favor of the goal setting group. This effect was not anticipated, and I have no a priori explanation for why the goal setting group would have greater increases in subjective norms over the specified measurement interval relative to the other two groups.

No significant main effects of time emerged from pre- to post-intervention (F (1, 75) = 3.07, p = .084), pre-intervention to first follow-up (F (1, 61) = 0.06, p = .805), or pre-intervention to second follow-up (F (1, 52) = 0.28, p = .597). Means, standard deviations, and change scores are presented in Table 24.

Table 24

Means, Standard Deviations, and Change Scores for Subjective Norms

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	5.28 n = 25 (1.37)	5.48 n = 25 (1.33)	5.20 n = 20 (1.11)	5.68 n = 19 (1.11)	+0.20 n = 25 (0.76)	+0.10 n = 20 (0.72)	+0.32 n = 19 (1.20)
GS	5.33 n = 33 (1.05)	5.53 n = 32 (1.08)	5.71 n = 28 (1.01)	5.54 n = 24 (1.10)	+0.25 n = 32 (0.67)	+0.36[g,h] n = 28 (0.99)	+0.29 n = 24 (1.12)
NT	5.52 n = 23 (1.20)	5.48 n = 21 (0.93)	5.19 n = 16 (1.11)	5.25 n = 12 (1.42)	+0.05 n = 21 (1.07)	-0.56 n = 16 (1.59)	-0.33 n = 12 (1.44)
Total	5.37 N = 81 (1.19)	5.50 N = 78 (1.11)	5.42 N = 64 (1.08)	5.53 N = 55 (1.17)	+0.18 N = 78 (0.82)	+0.05 N = 64 (1.15)	+0.16 N = 55 (1.23)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

[g] = contrast between GS condition and TP condition significant at $p < .05$.

[h] = contrast between GS condition and NT condition significant at $p < .01$.

Behavioral Beliefs.

For the behavioral beliefs measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 76) = 2.10, p = .130), from pre-intervention to first follow-up (F (2, 62) = 0.48, p = .619), or from pre-intervention to second follow-up (F (2, 53) = 0.79, p = .459). No significant main effects of time emerged from pre- to post-intervention (F (1, 76) = 0.00, p = .948), pre-intervention to first follow-up (F (1, 62) = 1.55, p = .218), or pre-intervention to second follow-up (F (1, 53) = 0.28, p = .598). Means, standard deviations, and change scores are presented in Table 25.

Table 25

Means, Standard Deviations, and Change Scores for Behavioral Beliefs

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	5.93 n = 25 (0.95)	6.24 n = 25 (0.63)	5.95 n = 21 (0.88)	5.73 n = 19 (1.10)	+0.31 n = 25 (0.72)	+0.03 n = 21 (0.82)	-0.15 n = 19 (1.02)
GS	5.81 n = 33 (0.81)	5.66 n = 32 (1.10)	5.84 n = 28 (0.98)	5.69 n = 25 (1.22)	-0.17 n = 32 (0.92)	-0.15 n = 28 (1.03)	-0.27 n = 25 (1.33)
NT	5.77 n = 23 (0.91)	5.78 n = 22 (0.96)	5.68 n = 16 (1.37)	6.33 n = 12 (0.62)	-0.04 n = 22 (0.96)	-0.30 n = 16 (0.99)	+0.27 n = 12 (0.34)
Total	5.84 N = 81 (0.87)	5.88 N = 79 (0.95)	5.83 N = 65 (1.05)	5.84 N = 56 (1.09)	+0.02 N = 79 (0.89)	-0.13 N = 65 (0.95)	-0.11 N = 56 (1.08)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Normative Beliefs

For the normative beliefs measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 76) = 0.09, p = .910), from pre-intervention to first follow-up (F (2, 62) = 0.42, p = .662), or from pre-intervention to second follow-up (F (2, 53) = 1.17, p = .319). No significant main effects of time emerged from pre- to post-intervention (F (2, 76) = 0.09, p = .910), pre-intervention to first follow-up (F (1, 62) = 0.20, p = .658), or pre-intervention to second follow-up (F (1, 53) = 0.16, p = .690). Means, standard deviations, and change scores are presented in Table 26.

Table 26

Means, Standard Deviations, and Change Scores for Normative Beliefs

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	5.71 n = 25 (1.15)	5.76 n = 25 (0.96)	5.57 n = 21 (0.88)	5.93 n = 19 (1.04)	+0.05 n = 25 (0.73)	+0.00 n = 21 (0.72)	+0.24 n = 19 (1.22)
GS	5.90 n = 33 (0.84)	5.96 n = 32 (0.82)	6.03 n = 28 (0.82)	5.78 n = 25 (0.97)	+0.06 n = 32 (0.64)	+0.11 n = 28 (0.54)	-0.12 n = 25 (0.58)
NT	5.89 n = 23 (0.90)	6.03 n = 22 (0.86)	6.28 n = 16 (0.76)	5.95 n = 12 (1.20)	+0.14 n = 22 (0.57)	+0.11 n = 16 (0.53)	-0.22 n = 12 (1.03)
Total	5.84 N = 81 (0.95)	5.91 N = 79 (0.87)	5.94 N = 65 (0.86)	5.86 N = 56 (1.03)	+0.08 N = 79 (0.64)	+0.08 N = 65 (0.60)	-0.02 N = 56 (0.94)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Scheduling Efficacy. For the scheduling efficacy measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 76) = 0.96, p = .387), from pre-intervention to first follow-up (F (2, 63) = 0.41, p = .668), or from pre-intervention to second follow-up (F (2, 53) = 0.03, p = .967). No significant main effects of time emerged from pre- to post-intervention (F (1, 76) = 0.30, p = .586), pre-intervention to first follow-up (F (1, 63) = 0.52, p = .473), or pre-intervention to second follow-up (F (1, 53) = 0.39, p = .535). Means, standard deviations, and change scores are presented in Table 27.

Table 27

Means, Standard Deviations, and Change Scores for Scheduling Efficacy

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	7.68 n = 25 (1.65)	7.81 n = 25 (1.95)	5.95 n = 22 (2.61)	6.92 n = 19 (2.13)	+0.13 n = 25 (1.37)	-1.81 n = 22 (1.95)	-0.99 n = 19 (1.45)
GS	7.04 n = 33 (1.75)	6.95 n = 32 (1.71)	5.89 n = 28 (2.12)	6.27 n = 25 (1.90)	-0.19 n = 32 (1.54)	-1.36 n = 28 (2.28)	-0.92 n = 25 (2.28)
NT	7.14 n = 23 (1.68)	6.76 n = 22 (2.08)	5.63 n = 16 (2.49)	6.00 n = 12 (2.59)	-0.51 n = 22 (1.62)	-1.60 n = 16 (2.05)	-1.10 n = 12 (2.52)
Total	7.27 N = 81 (1.70)	7.17 N = 79 (1.92)	5.84 N = 66 (2.35)	6.43 N = 56 (2.13)	-0.18 N = 79 (1.51)	-1.57 N = 66 (2.10)	-0.98 N = 56 (2.05)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

Barrier Efficacy. For the barrier efficacy measure, no significant group x time interactions emerged from pre- to post-intervention (F (2, 76) = 0.29, p = .751), from pre-intervention to first follow-up (F (2, 63) = 0.27, p = .765), or from pre-intervention to second follow-up (F (2, 53) = 1.55, p = .221). No significant main effects of time emerged from pre- to post-intervention (F (1, 76) = 0.38, p = .540), pre-intervention to first follow-up (F (1, 63) = 1.04, p = .312), or pre-intervention to second follow-up (F (1, 53) = 0.41, p = .523). Means, standard deviations, and change scores are presented in Table 28.

Table 28

Means, Standard Deviations, and Change Scores for Barrier Efficacy

	Means				Change Scores		
Group	Pre	Post	FU 1	FU 2	Pre to Post	Pre to FU 1	Pre to FU 2
TP	0.75 n = 25 (0.14)	0.74 n = 25 (0.19)	0.67 n = 22 (0.24)	0.67 n = 19 (0.25)	-0.01 n = 25 (0.10)	-0.08 n = 22 (0.15)	-0.08 n = 19 (0.17)
GS	0.67 n = 33 (0.15)	0.68 n = 32 (0.16)	0.63 n = 28 (0.17)	0.62 n = 25 (0.18)	-0.00 n = 32 (0.10)	-0.06 n = 28 (0.11)	-0.06 n = 25 (0.11)
NT	0.66 n = 23 (0.16)	0.69 n = 22 (0.16)	0.64 n = 16 (0.18)	0.71 n = 12 (0.10)	+0.01 n = 22 (0.09)	-0.05 n = 16 (0.16)	-0.00 n = 12 (0.11)
Total	0.69 N = 81 (0.15)	0.70 N = 79 (0.17)	0.65 N = 66 (0.19)	0.65 N = 56 (0.19)	+0.00 N = 79 (0.09)	-0.06 N = 66 (0.13)	-0.06 N = 56 (0.13)

Note. TP = time perspective intervention group, GS = goal setting intervention group, NT = no treatment group. Standard deviations are in parentheses.

The Matching Hypothesis

There exists the possibility that baseline levels of long-term thinking might interact with treatment effects, such that those individuals in the time perspective condition might be more responsive to intervention efforts if the intervention is congruent with their pre-existing levels of long-term thinking about exercise (e.g., the "matching hypothesis"). Or, it is possible that those participants who do not engage in long-term thinking about exercise might benefit most from such an intervention. Both of these hypotheses refer to moderation effects of TPQ-E scores on intervention effects.

To test these moderational effects, interaction terms were created between dummy coded variables representing group status and TPQ-E scores. These interaction terms were entered on a second step of a multiple regression analysis after entering all main effect terms on the first step. The addition of the interaction terms did not add a significant increment to R^2 when using hard physical activity at post-intervention as the dependent measure (R^2 change = .001, F (1, 27) = . 019, p = .893), or when using vigorous physical activity at second follow-up as the dependent measure (R^2 change = .032, F (1, 38) = 1.46, p = .235). In short, no support was found for the hypothesis that TPQ-E scores moderate intervention effects.

Discussion

In Study 4 a strong treatment effect emerged in favor of the time perspective intervention from pre- to post-intervention on an interview-based measure of exercise behavior. Although these treatment effects had subsided by the end of the follow-up period, significant treatment effects in favor of the time perspective intervention emerged at the end of the six month follow-up period for self-reported vigorous physical activity, and an interview-based strength and flexibility exercise behavior. These findings extend the findings of Study 3 in that they demonstrate that the effects of the time perspective intervention relative to the other groups extend to six months, both for vigorous exercise behavior as measured by the 30-day recall measure, and for strength and flexibility as measured by the 7-day recall. Thus, Study 4 provides encouraging evidence that time perspective interventions can promote maintenance of behavior change within the domain of physical activity. Although the treatment effects observed in Study 3 on the 30-day recall at post-intervention were not replicated here, a significant intervention effect did emerge in favor of the time perspective intervention at post-intervention on hours of hard exercise over the past week.

Interestingly, strong intervention effects were observed on intentions to engage in physical activity at post-intervention. Those participants receiving the time perspective intervention showed much larger increases in intentions than both other groups at this point, suggesting that the intervention was powerfully motivating for them. During the course of the intervention, many of the activities and discussions were geared towards accomplishing two primary objectives: 1) to enhance saliency of long-term outcomes, and 2) to highlight the fundamental connectedness between current behavior and these same outcomes. According to temporal orientation theory, these activities should facilitate goal pursuit by

boosting motivation to resist the pull of forces that are incompatible with those long-term goals. This explanation is entirely consistent with the strong effect of the time perspective on intentions to engage in physical activity at post-intervention.

There exist limitations of the findings of Studies 3 and 4. Because of the structure of the fitness classes, it was not possible to randomly assign individuals to different intervention conditions; instead, classes were randomly assigned. It should be noted, however, that randomization at the group level is a common occurrence in intervention studies of this kind, and that instructors were blind to conditions. Moreover, the possibility of communication between members of different intervention groups is greatly accentuated when they are drawn from the same class. This dynamic could operate in unpredictable ways including dilution of treatment effects, or induction of reactive demoralization effects among those assigned to the no treatment condition.

Second, both studies were conducted using university students. It may be the case that the concepts that were introduced in the time perspective intervention are particularly appealing to university students; it is unclear whether the intervention would have similar effects among older adults. However, it should be noted that others have made arguments to suggest that interventions characterized by a "long-term focus" (like the time perspective intervention) should be even more effective at promoting physical activity among older adults (King, 1991). Nonetheless, the generality of the observed intervention effects remains an open question.

Third, the vast majority of the participants in Studies 3 and 4 were female, and thus, it is possible that results may differ as a function of gender. I can think of no compelling reasons as to why gender should moderate the effectiveness of a time perspective

intervention. For the sake of testing this assumption, however it may be useful to conduct future studies by recruiting from fitness classes that are typically well populated by men (e.g., martial arts), or test the efficacy of the intervention in another behavioral domain where recruitment of males and females is equally probable.

Finally, it should be noted that effects in favor of the time perspective intervention emerged in both Studies 3 and 4 despite the fact that the samples used for the studies (young, educated individuals with generally positive attitudes towards physical activity) constituted a group of individuals for whom knowledge about the benefits of regular physical activity is already very high. Thus, intervention effects emerged despite "preaching to the converted." This lends further strength to the proposition that time perspective is powerful active ingredient that operates over and above simple knowledge about the benefits of physical activity.

CHAPTER 4

General Discussion

In Study 1, a new scale measuring one's tendency to consider the long-range contingencies associated with one's present behavior was developed—the Time Perspective Questionnaire (TPQ). This scale was administered to a large sample of young adults and the psychometric qualities of the items were examined, as well as the factor structure of the scale as a whole. The items demonstrated good internal consistency, as evidenced by a high average item-total correlation. Confirmatory factor analytic techniques revealed that scale items formed two highly correlated factors, one representing a propensity toward short-term thinking, and the other representing a propensity toward long-term thinking. The strong correlation observed between the two factors suggested that the scale can be meaningfully scored and interpreted as a single dimension, representing a continuum from short- to long-term thinking. Scores on this dimension were stable over time, consistent with the notion that time perspective is relatively dispositional in nature.

In Study 2 it was demonstrated that scores on the TPQ were associated with health behavior among undergraduates, even when controlling for impulsivity, a conceptually similar construct. Specifically, the TPQ and impulsivity were weakly related to each other ($r = .21$) but each was independently predictive of health behavior. It was observed that the reliability of the TPQ and its pattern of association with these other variables remained consistent across genders.

Studies 1 and 2 suggest that the TPQ is a reliable self-report measure of time perspective and is a good predictor of health behavior. Studies 3 and 4 build on these earlier findings by demonstrating that an intervention designed to enhance long-term time

perspective effectively increased physical activity of participants initially, and over an extended follow-up interval relative to a control intervention and a no-treatment group. Together, the studies outlined in this dissertation demonstrate the importance of time perspective both as a predictor of health behavior, and as a causal determinant of it.

Implications

This body of research adds significantly to existing research in the area of personality and health. It was demonstrated here that individual differences in time perspective can be reliably measured by self-report. Although there are other measures of time perspective in existence (Strathman et al., 1994; Zimbardo & Boyd, 1999), demonstrating that a novel measure of the same construct is associated with similar self-reported health practices adds strength to the argument that time perspective is an important variable in understanding this class of behavior. Moreover, the theoretical formulation of time perspective presented here is quite different from those that have been previously proposed (e.g., Zimbardo & Boyd, 1999), and is generally more well integrated with work from diverse sub-disciplines within psychology (e.g., social, personality, physiological, cognitive).

The findings of Studies 3 and 4 are genuinely novel. There have been no published attempts to systematically incorporate a time perspective component into intervention programs for health behavior change (c.f., Jemmott, Jemmott, & Fong, 1998). Typically, interventions only go so far as to present information about the benefits of healthy behaviors, but do not build the psychological architecture required to link these long-term benefits to present behaviors. In this dissertation it has been demonstrated that these latter

components are crucial ingredients in any intervention purporting to promote lasting changes in health behavior.

The intervention effects observed in Studies 3 and 4 are of considerable theoretical and practical importance. With respect to theory, these studies strongly suggest that time perspective is causally related to health behavior. As pointed out in the introduction, virtually all previous work on time perspective and health behavior has been correlational in nature. For this reason, any assumptions that long-term time perspective is causally related to health behavior were necessarily speculative. The studies presented here successfully replicate the previously observed associations between time perspective and health behavior and provide the first convincing evidence that this association is causal in nature.

On a practical level, Studies 3 and 4 show that the efficacy of physical activity maintenance interventions can be enhanced by the addition of a time perspective component. Efficacious interventions for promoting physical activity already exist (Dishman & Buckworth, 1996), however there are very few that show lasting effects on maintenance as defined in accordance with the six month criterion (Markus, Dubbert, Forsyth, McKenzie, Stone, Dunn, & Blair, 2000). Our intervention proved valuable for promoting physical activity (Study 3) and maintenance of physical activity change over time (Study 4) among recent initiators. As a result, it would seem that time perspective is an important component of any intervention program that is designed to promote physical activity change and maintenance in this population.

Discussion of Limitations

Null Mediational Effects

In Study 3, the intervention effected greater changes in long-term thinking about exercise in the time perspective group than in the other two groups. However, in Study 4 no reliable effects of the intervention at all were observed the measure of long-term thinking about exercise. There are several potential explanations for these inconsistent findings.

First, it might be suggested that the TPQ-E was simply not sufficiently sensitive to changes in long-term thinking about physical activity. Based on the findings of Study 2, we observed that the dispositional measure of TPQ demonstrated a high degree of stability, even over periods of more than a month in duration. It is possible that TPQ-E scores are similarly invariant over time, and any intervention effects observable on this measure would be very small. Although this hypothesis holds some appeal, we have some data to argue against it. As was mentioned earlier, we did observe that the intervention had significant effects on this measure in one of the two intervention studies (Study 3)—that is, the TPQ-E was sufficiently sensitive (in Study 3, at least) to show evidence of change among those in the time perspective intervention condition. This would argue against the suggestion that the measure of the mediator was not sensitive to intervention effects.

Another possible explanation concerns the reliability and validity of the TPQ-E. Although the TPQ-E was derived from a measure that demonstrated good reliability and validity, it does not necessarily follow that the TPQ-E is also reliable and valid. Indeed the internal consistency of the measure was only acceptable in Study 3, and was particularly poor in Study 4. Moreover, the validity of the measure is largely unknown. It is possible, then, that the TPQ-E does not reliably tap crucial aspects of domain-specific long-term

thinking. If this is the case, we would expect that any potential for the measure to mediate intervention effects would be significantly attenuated, as was observed in Study 4.

Time perspective is conceptualized as a dispositional trait for the most part. Although it may be possible to alter certain elements that comprise time perspective, this would not necessarily lead to differences in self-reported time perspective. One's responses on a self-report measure of time perspective are likely driven by a lifetime of experience observing one's own cognitions and behavioral tendencies. Most items of the TPQ (and the domain specific version, the TPQ-E) require implicit aggregation of observed tendencies in the self over time; such items (e.g., "I always consider the long-term consequences of an action before I do it") might not be reliably manipulable. Thus, it is entirely possible that the intervention successfully induced increased valuation of long-term outcomes, and enhanced connectedness beliefs without showing any effect on the dispositional measures of time perspective.

Consistency of Intervention Effects

Although the intervention effects observed in Study 3 were relatively consistent across measurement periods, the same could not be said of Study 4. While those receiving the time perspective intervention in the pilot study showed large increases in self-reported physical activity levels immediately post-intervention, and maintained these increases at the 7-week follow-up point in Study 3, significant increases in this same measure were not evident until the 6 month follow-up in Study 4. Although the longevity of the treatment effect in Study 4 was quite impressive, one might wonder why the intervention effect was not apparent at post-intervention and 7-week follow-up.

The null findings observed at the 7-week follow-up are likely a product of an unfortunate logistical issue. Because the fitness classes were started one week later than they had the previous year (when Study 3 was conducted), the 7-week follow-up measurement occurred during the first week of the participants' exam period. As a result, all of the participants in the study (who were all undergraduate students) would be expected to decrease their exercise behavior fairly dramatically during this week, and perhaps the week immediately preceding the measurement. In fact, careful examination of the means of each outcome measure indicates that such a drop in self-reported exercise behavior was clearly observable in all three groups. Moreover, similar drops in exercise behavior are evident on virtually all measures of exercise behavior at this time point (including interview-based measures).

In fact, the pattern of findings observed in Studies 3 and 4 is strikingly similar if one disregards the problematic 7-week measurement point. Although the comparison was not statistically significant, the rank ordering of the mean of the time perspective group relative to the means of other two groups evident at post-intervention in Study 4 is identical to that observed in Study 3. At the six month follow-up, this rank ordering is maintained, and the difference between the time perspective group and the goal setting group is statistically significant. This pattern of findings suggests that the physical activity levels observed at the 7-week follow-up in Study 4 were anomalous, and that the pattern of findings with respect to self-reported physical activity is otherwise quite consistent across Studies 3 and 4.

No support for the matching hypothesis

Another null finding that appears in need of explanation is the fact that dispositional time perspective did not interact with any of the treatment effects. One might expect, for

example, that those who are dispositionally long-term in orientation might be more responsive to an intervention that matches their pre-existing cognitive bias. If this "matching hypothesis" is correct, one might expect that treatment effects would be moderated by TPQ-E scores. In both intervention studies, this did not occur.

However, it is not necessary to assume that the effects of the intervention interact with dispositional levels of time perspective. Although individuals may indeed vary their capacity to act in accordance with long-term considerations, it does not logically follow that all individuals cannot benefit equally from interventions that motivate them to improve their responsivity to long-term goals.

By analogy, one might consider the case of memory. Although individuals may differ from each other with respect to their natural capacity to remember a list of words, they may all benefit from instruction on how to use memnotic strategies. Likewise, there may be natural variations in time perspective among our study participants. However, they may all benefit uniformly from the activities and discussions that comprise the time perspective intervention.

Measurement of Physical Activity

In this study we relied on two kinds of physical activity measures. The first has demonstrated reliability in its present form (Smith, 1994). The second measure is an interview-based recall measure, that has been extensively validated and has been shown to be responsive to intervention effects (Sallis et al., 1985). Although the pattern of intervention effects was not entirely consistent across these two kinds of measures, enough consistency was observed to lend support to contention that the intervention effects are robust and not specific to the particular measures that we selected.

However, it would have been preferable to supplement these measures with more "objective" measures of physical activity, like fitness class attendance. In fact, attendance was taken by fitness instructors in both studies. However, no intervention effects were observed with respect to class attendance in Study 3, perhaps due to low power. In Study 4, an athletics staff member inadvertently disposed of the attendance records for Study 4 before they could be analyzed.

Regardless, it would not have been wise to limit our analyses to only one indicator of physical activity, such as fitness class attendance. In both studies, the intervention focused on increasing physical activity in general (including that occurring outside of the walls of the athletics complex). Moreover, Study 4 spanned two academic terms; not all participants signed up for fitness classes during the second term of follow-up. For these reasons, it was judged that the interview and self-report based measures of physical activity were the best measures for quantifying intervention effects.

The importance of here-and-now factors

The suggestion that long-term orientation is a necessary condition for maintenance of change may seem to be at odds with literature on the motivational importance of experiential aspects of physical activity. Briefly, it has been found repeatedly that the extent to which individuals report experiencing personal enjoyment when engaging in any physical activity is a robust predictor of how often they engage in that physical activity (Kendzierski & DeCarlo, 1991; Wankel, 1985). The notion that short-term considerations (i.e., enjoyment) are predictive of physical activity levels seems antithetical to our assertions about the importance of long-term contingencies.

However, the fact that immediate factors influence behavior is not inconsistent with temporal orientation theory as it has been articulated here. Given the fact that here-and-now factors are powerful determinants of behavioral choices (Loewenstein & Elster, 1992), it may be possible to design behavioral interventions that effectively harnesses the pull of palpable immediate experiences in the interests of inducing long-term temporal focus. For example, one might instruct runners to cognitively rehearse the long-term benefits of physical activity (e.g., health, longevity, improved physical appearance) each time they feel their "runner's high". In this way, the salient immediate benefits of physical activity (e.g., feelings of enjoyment, subjective well-being), could be made iconic for longer-term considerations. As such, when individuals experience such sensations, they benefit from the powerful reinforcing effects of the immediate experience along with the maintenance-engendering effects of a long-term temporal focus.

Causality and Experimental Control

Finally, the ability of intervention studies to cleanly disentangle issues of causality is limited. Although we observed findings in Studies 3 and 4 that are consistent with the notion that time perspective is causally associated with health behavior, more well controlled laboratory studies would be necessary to make more definitive statements about issues of causality. Experimental approaches to analyzing causal influences would be complimentary in this respect.

Applications of Temporal Orientation Theory

Developmental Considerations

Some might argue that the applicability of temporal orientation theory is limited to adults, because children do not yet have the capacity to project themselves into the future.

For example, Maddux, Roberts, Sledden, and Wright (1986) argue that very young children's capacity to understand long-term implications of their actions is fairly limited, and therefore health interventions directed at this age group should focus on more proximal behavioral contingencies for health practices, rather than emphasizing longer-range health outcomes as is typically done with adults. Consistent with this notion is the fact that children respond well to skill training interventions for improving dental hygiene (Claerhout & Lutzker, 1981), fire safety behaviors (Jones, Kazdin, & Haney, 1981), and pedestrian safety skills (Yeaton & Bailey (1978). However, as was pointed out in the previous section, the fact that individuals in general (not just children) are more responsive to concrete and immediately salient cues does not preclude harnessing these same cues for the purpose of instilling a long-term orientation.

Moreover, empirical work has confirmed that the groundwork for long-term thinking is laid in early childhood, and is fully developed by late adolescence, just around the time that habitual lifestyle patterns begin to crystallize. In fact, the capacity to understand the future and its implications for present behavior emerges much earlier in development than is often assumed. Moore, Barresi, & Thompson (1998) demonstrated, for instance, that children as young as three years old have the capacity to understand the concept of future events, and can regulate their own behavior in response to anticipated future needs.

These findings suggest that the applicability of time perspective interventions may extend to children as well as adults, and particular promise lies with intervention strategies that explicitly link concrete, palpable cues with future-oriented goals. Temporal orientation theory might usefully be applied to areas as diverse as youth smoking prevention, accident prevention in children, and promotion of safer sexual behavior in adolescents.

Treatment Adherence

One area in which effective behavioral interventions are badly needed is in the domain of treatment adherence. Even fifteen years after Meichenbaum and Turk's (1987) ground-breaking book on treatment adherence, there are still very few techniques that have proven helpful to facilitate adherence to medication regimens. Temporal orientation theory may help to fill this void. Treatment adherence requires adoption of new behavioral practices in the same way that such practices are required of anyone adopting a program of regular physical activity. In both cases, an individual is faced with a recurring series of choices in which he/she must decide whether or not to endure short-term pain for the sake of long-term gain. In the case of treatment adherence, ingestion of virtually any medication involves inconvenience, mild to severe side effects, and occasional embarrassment. These aversive short-term consequences are compounded by the frequency of dosage required and the severity of side effects experienced. Despite all of the potential long-term benefits to be accrued by sticking to one's regimen of medications, one must constantly overcome the behavioral inertia associated with the unsavory immediate consequences. Interventions that effectively help individuals maintain their focus on the long-term consequences associated with behavioral choices are likely to improve treatment adherence.

Hypertension. Treatment adherence among hypertensive patients is one problem that might be best understood within the context of temporal orientation. Hypertension, or the "silent killer" as it is known colloquially, is deadly yet largely asymptomatic. Many individuals with hypertension are not aware of the fact that they have the condition. Moreover, even those who are aware of their diagnostic status do not adhere to their regimen of anti-hypertensive medications because such medications often have unpleasant

side effects. In addition, hypertensives erroneously believe that they can track fluctuations in their own blood pressure, and, as a result believe that they can self-medicate on an as-needed basis. For both of these reasons, non-adherence is a grave problem among hypertensive patients. Such patients might benefit from a time perspective component added into a general psycho-educational intervention at the time of diagnoses. In addition, it may be possible to predict which patients are likely to non-adhere in advance, through assessment of their temporal orientation. Such assessment procedures would allow us to target adherence interventions more effectively.

HIV Medication Adherence. A second area in which treatment adherence is of crucial importance is in the area of HIV treatment. With the advent of new "cocktail" anti-viral treatments, HIV patients have substantially longer life expectancies. However, these "cocktail" regimens are quite arduous for the patient; it is not uncommon for a patient to ingest 14 or more pills in a single day, at pre-specified times and dosages. For some individuals the side effects of the treatment are substantial, while for others they are only a mild annoyance. In either case, it is clear that many individuals have difficulty sticking to the prescribed regimen, even with the assistance of electronic reminder devices. Each missed round of anti-viral medication has implications for the expected survival time of the individual patient, so the personal consequences of non-adherence are potentially devastating (Paterson, Swindells, & Mohr, 2000). Even more alarming, however, is the fact that non-adherence seems to have spurred the development of mutated, treatment-resistant strains of HIV virus that have appeared in the wake of this new wave of anti-viral medications. In this sense, the societal cost of non-adherence is enormous. We stand to lose all the ground that we have gained with these cocktail treatments if something is not

done to address adherence issues in this population. Again, time perspective is a promising perspective from which to view the problem of non-adherence and to propose solutions.

Conclusions

Several conclusions can be drawn from the studies presented here. First, it is clear that individual differences in time perspective can be measured reliably by self-report. Second, these individual differences in time perspective are reliably associated with health behavior tendencies across a wide variety of domains. Third, the association observed between time perspective and health behavior appears to be causal in nature.

Several implications of these findings are noteworthy. First, time perspective has heuristic value as a way of understanding the determinants of behavior in general, and health behavior in particular. This remains true whether one chooses to conceptualize time perspective as an individual differences variable, or a main effect variable. Second, there appear to be specific implications for the design of behavior change programs to promote lasting changes in physical activity patterns. In this dissertation it was demonstrated that the addition of a time perspective component to a standard physical activity intervention resulted in a significant increment in physical activity maintenance over time. These findings suggest that it is not sufficient for health behavior interventions to simply provide information about the benefits of physical activity. Although information may be sufficient to induce initial behavior change, in order achieve lasting behavior change it is necessary to also build connections between present behavior and these later outcomes.

References

Ainslie, G. (1975). Specious reward: A behavioral theory of impulsiveness and impulse control. Psychological Bulletin, 82, 463-509.

Ajzen, I. (1991). The theory of planned. Organizational Behavior and Human Decision Processes, 50, 179-211.

Arbuckle, J.R. (1997). Amos: Version 3.6. SmallWaters Corporation.

Aronowitz, (1998). Making sense of illness. Cambridge: Cambridge University Press.

Ball, S.A., & Schottenfeld, R.S. (1997). A five-factor model of personality and addiction, psychiatric and AIDS risk severity in pregnant and postpartum cocaine misusers. Substance Use & Misuse, 32, 25-41.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.

Barlow, C.E., Kohl, H.W., Gibbons, L.W., & Blair, S.N. (1995). Physical fitness, mortality and obesity. International Journal of Obesity, 19(Suppl. 4), S41-S44.

Barndt, R.J., & Johnson, D.M. (1955). Time orientation in delinquents. Journal of Abnormal Social Psychology, 51, 343-345.

Becker, M.H. (1974). The Health Belief Model and personal health behavior. Health Education Monographs, 2, 324-473.

Blair, S.N., Kohl, H.W. III, Paffenbarger, R.S. Jr., Clark, D.G., Cooper, K.H., & Gibbons, L.W. (1995).Changes in physical fitness and all-cause mortality: A prospective study of healthy and unhealthy men. Journal of the American Medical Association, 273, 1093-1098.

Blair, S.N., Kohl, H.W. III, Paffenbarger, R.S. Jr., Clark, D.G., Cooper, K.H., & Gibbons, L.W. (1989). Physical fitness and all-cause mortality: a prospective study of healthy men and women. Journal of the American Medical Association, 262, 2395-2401.

Bond, M.J., & Feather, N.T. (1988). Some correlates of structure and purpose in the use of time. Journal of Personality and Social Psychology, 55, 321-329.

Breakwell, G.M. (1996). Risk estimation and sexual behavior: A longitudinal study of 16-21 year olds. Journal of Health Psychology, 1, 79-91.

Brock, T.C., & DelGuidice, C.D. (1963). Stealing and temporal orientation. Journal of Abnormal and Social Psychology, 66, 91-94.

Brownell, K.D., Marlatt, G.A., Lichtenstein, E., & Wilson, G.T. (1986). Understanding and preventing relapse. American Psychologist, 41, 765-782.

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

Claerhout, S., & Lutzker, J.R. (1981). Increasing children's self-initiated compliance to dental regimens. Behavior Therapy, 12, 165-176.

Clift, S.M., Wilkins, J.C., & Davidson, E.A. (1993). Impulsiveness, venturesomeness, and sexual risk-taking among heterosexual CUM clinic attenders. Personality and Individual Differences, 15, 403-410.

Colditz, G.A., Cannuscio, C.C., Frazier, A.L. (1997). Physical activity and reduced risk of colon cancer: Implications for prevention. Cancer Causes and Control, 8, 649-667.

Cooper, M.L., Agocha, V.B., & Sheldon, M.S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. Journal of Personality, 68, 1059-1088.

Courneya, K.S., & Hellsten, L.M. (1998). Personality correlates of exercise behavior, motives, barriers, and preferences: an application of the five-factor model. Personality and Individual Differences, 24, 625-633.

Dishman, R.K. (Ed.). (1988). Exercise adherence: Its impact on public health. Champaign, IL: Human Kinetics.

Dishman, R.K. (1994). The measurement conundrum in exercise adherence research. Medicine and Science in Sports and Exercise, 26, 1382-1390.

Dishman, R.K., & Buckworth, J. (1996). Increasing physical activity: A quantitative synthesis. Medicine and Science in Sports and Exercise, 28, 706-719.

Doll, R., Peto, R., Wheatley, K., Gray, R., & Sutherland, I. (1994). Mortality in relation to smoking: 40 years' observations on British male doctors. British Medical Journal, 309, 901-911.

Eson, M.E. (1951). An analysis of time perspective and five age levels. Unpublished doctoral dissertation, University of Chicago.

Fishbein, M., & Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley.

Folsom, A.R., Jacobs, D.R., Caspersen, C.J., Gomez-Marin, O., & Knudsen, J. (1986). Test-retest reliabilities of the Minnesota Leisure Time Physical Activity Questionnaire. Journal of Chronic Disease, 39, 505-511.

Folsom, A.R., Prineas, R.J., Kaye, S.A., & Munger, R.G. (1990). Incidence of hypertension and stroke in relation to body fat distribution and other risk factors in older women. Stroke, 21, 701-706.

Friedenreich, C.M., Thune, I., Brinton, L.A., & Albanes, D. (1998). Epidemiologic issues related to the association between physical activity and breast cancer. Cancer, 83, 600-610.

Gazzaniga, M.S. (1995). The cognitive neurosciences. Cambridge, MA: MIT Press

Gazzaniga, M.S., Ivry, R., & Mangun, G. (1998). Cognitive Neuroscience: The Biology of the Mind. New York, NY: Norton.

Goldberg, J., & Maslach, C. (1996, April). Understanding time: Connections between the past and future. Paper presented at the annual convention of the Western Psychological Association, San Jose, CA.

Goldman-Rakic, P.S. (1995). Architecture of the pre-frontal cortex and the central executive. In J. Grafman, K.J. Holyoak, and F. Baller (Eds.), Structure and Functioning of the Human Prefrontal Cortex (pp. 71-83). New York, NY: The New York Academy of Sciences.

Gollwitzer, P.M., Heckhausen, H., & Steller, B. (1990). Deliberative vs. implimental mind-sets: Cognitive tuning toward congruous thoughts and information. Journal of Personality and Social Psychology, 59, 1119-1127.

Gonzalez, A. & Zimbardo, P.G. (1984, February). A Psychology Today reader survey. Psychology Today, pp. 53-54.

Grosch, J., & Neuringer, A. (1981). Self-control in pigeons under the Mischel paradigm

Journal of the Experimental Analysis of Behavior, 35, 3-21.

Hall, P. A., & Fong, G. T. (1997, July). The health benefits of long-term thinking: a correlational study. Paper presented at the annual meeting of the Canadian Psychological Association, Toronto, ON.

Heatherton, T.F., Herman, C.P., & Polivy, J. (1991). Effects of physical threat and ego threat on eating. Journal of Personality and Social Psychology, 60, 138-143.

Heatherton, T.F., Striepe, M., & Wittenberg, L. (1998). Emotional distress and disinhibited eating: The role of the self. Personality and Social Psychology Bulletin, 24, 301-313.

Horvath, P., & Zuckerman, M. (1993). Sensation seeking, risk appraisal, and risky behavior. Personality and Individual Differences, 14, 41-52.

Hoyle, R.H., Fejfar, M.C., & Miller, J.D. (2000). Personality and sexual risk taking: A quantitative review. Journal of Personality, 68, 1203-1231.

Hull, C.L. (1943). Principles of behavior. New York, NY: Appleton-Century-Crofts.

Jeffery, R.W. (1989). Risk behaviors and health: Contrasting individual and population perspectives. American Psychologist, 44, 1194-1202.

Jemmott, J.B. (1987). Social motives and susceptibility to disease: Stalking individual differences in health risks. Journal of Personality, 55, 267-298.

Jemmott, J.B.III, Jemmott, L.S., & Fong, G.T. (1998). Abstinence and safer sex HIV risk-reduction interventions for African American adolescents: A randomized controlled trial. Journal of the American Medical Association, 279, 1529-1536.

Jones, R.T., Kazdin, A.E., & Haney, J.I. (1981). Social validation and training of emergency fire safety skills for potential injury prevention and life saving. Journal of Applied Behavior Analysis, 14, 249-260.

Kendzierski, D., & DeCarlo, K.J. (1991). Physical activity enjoyment scale: Two validation studies. Journal of Sport and Exercise Psychology, 13, 50-64.

Keough, K.A., Zimbardo, P.G., & Boyd, J.N. (1999). Who's smoking, drinking, and using drugs? Time Perspective as a predictor of substance use. Journal of Basic and Applied Social Psychology, 21, 149-164.

King, A.C. (1991). Community intervention for promotion of physical activity and fitness. In J.O. Holloszy (Ed.), Exercise and sports science reviews (Vol. 19, pp. 211-259). Baltimore, MD: Williams & Wilkins.

Kline, R.B. (1998). Principles and practice of structural equation modeling. New York, NY: Guilford Press.

Klineberg, S.L. (1968). Future time perspective and the preference for delayed reward. Journal of Personality and Social Psychology, 8, 253-257.

LaLonde, M. Comission of Canada (1974). A new perspective on the health of Canadians. Ottawa, Ontario: Ministry of National Health and Welfare.

Lamm, H., Schmidt, R.W., & Trommsdorff, G. (1976). Sex and social class as determinants of future orientation (time perspective) in adolescents. Journal of Personality and Social Psychology, 34, 317-326.

Leon, A.S., Connett, J., Jacobs, D.R. Jr., & Rauramaa, R. (1987). Leisure-time physical activity levels and risk of coronary heart disease and death: the Multiple Risk Factor Intervention Trial. Journal of the American Medical Association, 258, 2388-2395.

LeShan, L.L. (1952). Temporal orientation and social class. Journal of Abnormal Social Psychology, 47, 589-592.

Lessing, E.E. (1968). Demographic, developmental, and personality correlates of length of future time perspective. Journal of Personality, 36, 183-201.

Lessing, E.E. (1972). Extension of personal future time perspective, age, and life satisfaction of children and adolescents. Developmental Psychology, 6, 457-468.

Lhermitte, F. (1983). "Utilization behavior" and its relation to lesions of the frontal lobes. Brain, 106, 237-255.

Lhermitte, F., Pillon, B., & Serdaru, M. (1986). Human autonomy and the frontal lobes. Part I: Imitation and utilization behavior: A neuropsychological study of 75 patients. Annals of Neurology, 19, 326-334.

Loewenstein, G., & Elster, J. (Eds.) (1992). Choice over time. New York: Russell Sage Foundation.

Loewenstein, G. & Thaler, R. (1989). Amomalies: Intertemporal choice. Journal of Economic Perspectives, 3, 181-193.

Maddux, J.E., Roberts, M.C., Sledden, E.A., & Wright, L. (1986). Developmental issues in child health psychology. American Psychologist, 41, 25-34.

Manson, J.E., Nathan, D.M., Krolewski, A.S., Stampfer, M.J., Willett, W.C., & Hennekens, C.H. (1992). A prospective study of exercise and incidence of diabetes among US male physicians. Journal of the American Medical Association, 268, 63-67.

Manson, J.E., Rimm, E.B., Stampfer, M.J., Colditz, G.A., Willett, W.C., Krolewski, A.S., Rosner, B., Hennekens, C.H., & Speizer, F.E., (1991). Physical activity and incidence of non-insulin-dependent diabetes mellitus in women. Lancet, 338, 774-778.

Marcus, B.H., Dubbert, P.M., Forsyth, L.H., McKenzie, T.L., Stone, E.J., Dunn, A.L., & Blair, S.N. (2000). Physical activity behavior change: Issues in adoption and maintenance. Health Psychology, 19, 32-41.

Marrett, L.D., Theis, B., Ashbury, F.D., et al. (2001). Workshop report: Physical activity and cancer prevention. Chronic Diseases in Canada, 21, 1-10.

McAulay, E., & Courneya, K.S. (1993). Adherence to exercise and physical activity as health-promoting behaviors: Attitudinal and self-efficacy influences. Applied and Preventive Psychology, 2, 65-77.

Meichenbaum, D., & Turk, D.C. (1987). Facilitating treatment adherence : a practitioner's guidebook. New York: Plenum Press.

Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. Psychological Review, 80, 252-263.

Mischel, W., Shoda, Y., & Rodriguez, M.L. (1989). Delay of gratification in children. Science, 244, 933-938.

Montoye, H.J., Kemper, H.G.C., Saris, W.H.M., & Washburn, R.A. (1996). Measuring physical activity and energy expenditure. Champaign, IL: Human Kinetics.

Moore, C., Barresi, & Thompson, C. (1998). The cognitive basis of future-oriented prosocial behavior. Social Development, 7, 198-218.

Moore, B., Mischel, A., Zeiss, A. (1976). Comparative effects of the reward stimulus and its cognitive representation in voluntary delay. Journal of Personality and Social Psychology, 34, 419-424.

Morris, J.N., Heady, J.A., Raffle, P.A.B., Roberts, C.G., & Parks, J.A. (1953). Coronary heart disease and physical activity of work. Lancet, 2, 1053-1057, 1111-1120.

Muraven, M., & Baumeister, R.F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? Psychological Bulletin, 126, 247-259.

Muraven, M., Tice, D.M., & Baumeister, R.F. (1998). Self-control as a limited resource: Regulatory depletion patterns. Journal of Personality and Social Psychology, 74, 774-789.

Nolte, J. (1999). The human brain: An introduction to its functional anatomy (Fourth edition). New York, NY: Mosby.

Norman & Shallice (1980). Attention to action: Willed and automatic control of behavior. In R.J. Davidson, G.E. Schwartz, and D. Shapiro (Eds.), Consciousness and self-regulation, Vol. 4 (pp. 1-18). New York, NY: Plenum Press.

Nurmi, J.E. (1987). Age, sex, social class, and quality of family interaction as determinants of adolescents' future orientation: a developmental task interpretation. Adolescence, 22, 977-991.

Oliveria, S.A., & Lee, I-M. (1997). Is exercise beneficial in the prevention of prostate cancer? Sports Medicine, 23, 271-278.

Paffenbarger, R.S., Hyde, R.T., Wing, A.L., & Hsieh, C-C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. New England Journal of Medicine, 314, 605-613.

Paffenbarger, R.S., Hyde, R.T., Wing, A.L., Lee, I-M., Jung, D.L., & Kampert, J.B. (1993). The association of changes in physical-activity level and other lifestyle characteristics with mortality among men. The New England Journal of Medicine, 328, 538-545.

Paffenbarger, R.S., Wing, A.L., Hyde, R.T., & Jung, D.L. (1983). Physical activity and incidence of hypertension in college alumni. American Journal of Epidemiology, 117, 245-257.

Paterson, D.L., Swindells, S., & Mohr, J. et. al. (2000). Adherence to protease inhibitor therapy and outcomes in patients with HIV infection. Annals of Internal Medicine, 133, 21-30.

Pekkanen, J., Marti, M., Nissinen, A., Tuomilehto, J., Punsar, S., & Karvonen, M.J. (1987). Reduction of premature mortality by high physical activity: a 20-year follow-up of middle-aged Finnish men. Lancet, 1, 1473-1477.

Phillips, W.T., Kiernan, M., & King, A.C. (2001). The effects of physical activity on physical and psychological health. In A. Baum, T.A. Revenson, Singer, J.E. (Eds.), Handbook of Health Psychology (pp. 627-660). Mahawah, NJ: Lawrence Erlbaum Associates.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change: Applications to addictive behaviors. American Psychologist, 47, 1102-1114.

Rachlin, H. & Green, L. (1972). Commitment, choice, and self-control. Journal of the Experimental Analysis of Behavior, 17, 15-22.

Rachlin, H., Logue, A.W., Gibbon, J., & Frankel, M. (1986). Cognition and behavior in studies of choice. Psychological Review, 93, 33-45.

Rappaport, H. (1990). Marking time. New York: Simon & Schuster.

Reber, A. (1995). Penguin Dictionary of Psychology: Second Edition. New York, NY: Penguin Books.

Rissanen, A., Heliovaara, M., Knekt, P., Reunanen, A., & Aromaa, A. (1991). Determinants of weight gain and overweight in Finns. European Journal of Clinical Nutrition, 45, 419-430.

Roos, P. (1964). Time Reference Inventory. Austin, TX: Austin State School.

Roos, P., & Albers R. (1965a). Performance of retardates and normals on a measure of temporal orientation. American Journal of Mental Deficiency, 69, 835-838.

Roos, P., & Albers R. (1965b). Performance of alcoholics and normals on a measure of temporal orientation. Journal of Clinical Psychology, 21, 34-36.

Rothspan, S., & Read, S.J. (1996). Present versus future time perspective and HIV risk among heterosexual college students. Health Psychology, 15, 131-134.

Sallis, J.F., Calfas, K.J., Nichols, J.F., Sarkin, J.A., Johnson, M.F., Caparosa, S., Thompson, S., & Alcaraz, J.E. (1999). Evaluation of a university course to promote physical activity: Project GRAD. Research Quarterly for Exercise for Sport, 70, 1-10.

Sallis, J.F., Haskell, W.L., Wood, P.D., Fortmann, S.P., Rogers, T., Blair, S.N., & Paffenbarger, R.S. Jr. (1985). Physical activity assessment methodology in the Five-City Project. American Journal of Epidemiology, 121, 91-106.

Sallis, J.F., & Owen, N. (1999). Physical activity and behavioral medicine. New York, NY: Sage Publications.

Sheeran, P., Conner, M., & Norman, P. (2001). Can the theory of planned behavior explain patterns of health behavior change? Health Psychology, 20, 12-19.

Shiffman, S.M. (1982). Relapse following smoking cessation: A situational analysis. Journal of Consulting and Clinical Psychology, 50, 71-86.

Shallice, T., Burgess, P.W., Schon, F., & Baxter, D.M. (1989). The origins of utilization behavior. Brain, 112, 1587-1598.

Smith, P.M. (1994). Integration of the theories of reasoned action, planned behaviour, and self-efficacy in the prediction of exercise behaviour. Unpublished doctoral dissertation. University of Waterloo, Waterloo, Ontario, Canada.

Stewart, R.A.C. (1976). An experimental form of the Stewart personality inventory: A simplified-format measure of major personality dimensions. Perceptual and Motor Skills, 43, 813-814.

Stewart, R.A.C., & Ahmed, S.M.S. (1984). Factor analysis of the Stewart personality inventory research form and its correlations with some other personality instruments. Social Behavior and Personality, 12, 143-151.

Strathman, A., Gleicher, F., Boninger, D. S., & Edwards, C. S. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. Journal of Personality and Social Psychology, 66, 742-752.

Teahan, J.E. (1958). Future time perspective, optimism, and academic achievement. Journal of Abnormal and Social Psychology, 57, 379-380.

Temple, M.T., Leigh, B.C., & Schafer, J. (1993). Unsafe sexual behavior and alcohol use at the event level: Results of a national survey. Journal of AIDS, 6, 393-401.

Thompson, C., Barresi, J., & Moore, C. (1997). The development of future-oriented prudence and altruism in preschoolers. Cognitive Development, 12, 199-212.

U.S. Department of Health and Human Services. (1996). Physical activity and health: A report of the Surgeon General. Atlanta, GA: Centers for Disease Control.

U.S. Surgeon General (1979). Healthy people: The Surgeon General's report on health promotion and disease prevention. (U.S. Department of Health and Welfare publication No. 79-55071). Washington, DC: U.S. Government Printing Office.

Wallace, M. Future time perspective in schizophrenia. Journal of Abnormal and Social Psychology, 52, 240-245.

Wallstron, K.A., Wallstron, B.S., & DeVellis, R. (1978). Development of the Multidimensional Health Locus of Control (MHLC) Scale. Health Education Monographs, 6, 161-170.

Wankel, L.M. (1985). Personal and situational factors affecting exercise involvement: The importance of enjoyment. Research Quarterly, 56, 275-282.

White, H.R., & Johnson, V. (1988). Risk taking as a predictor of adolescent sexual activity and use of contraception. Journal of Adolescent Research, 3, 317-331.

Wohlford, P. (1966). Extension of personal time, affective states, and expectation of personal death. Journal of Personality and Social Psychology, 3, 559-566.

Wood, J. M., Nezworski, M. T., & Stejskal, W. J. (1996). The comprehensive system for the Rorschach: A critical examination. Psychological Science, 7, 3-17.

Wulfert, E., Safren, S.A., Brown, I., & Wan, C.K. (1999). Cognitive, behavioral, and personality correlates of HIV-positive persons' unsafe sexual behavior. Journal of Applied Social Psychology, 29, 223-244.

Yeaton, W.H., & Bailey, J.S. (1978). Teaching pedestrian safety skills to young children: An analysis and one-year follow-up. Journal of Applied Behavior Analysis, 11, 315-329.

Zimbardo, P.G. (1990). The Stanford Time Perspective Inventory. Stanford, CA: Stanford University.

Zimbardo, P.G., & Boyd, J.N. (1999). Putting time in perspective: A valid, reliable individual differences metric. Journal of Personality and Social Psychology, 77, 1271-1288.

Zimbardo, P.G., Keough, K.A., & Boyd, J.N. (1997). Present time perspective as a predictor of risky driving. Personality and Individual Differences, 23, 1007-1023.

Zuckerman, M., & Kuhlman, D.M. (2000). Personality and risk-taking: Common biosocial factors. Journal of Personality, 68, 999-1029.

Appendix A: Time Perspective Questionnaire

Time Perspective Questionnaire (TPQ)

Consider each of the statements below. For each, indicate your level of agreement or disagreement by using the following scale:

1	2	3	4	5	6	7
Disagree very strongly	Disagree strongly	Disagree	Neutral	Agree	Agree strongly	Agree very strongly

Put the appropriate number, indicating your level of agreement or disagreement, in the space to the left of each statement.

___ 1. I have a defined set of long-term goals that I think about when I make decisions in my life.
___ 2. People who know me would describe me as a person who plans for the future.
___ 3. "Eat, drink, and be merry, for tomorrow we die" is a good philosophy to follow in life.
___ 4. Long-term goals are more important to me than short-term goals.
___ 5. I dc not spend much time thinking about the future.
___ 6. Living for the here-and-now is important to me.
___ 7. I don't place much importance on exclusively short-term considerations.
___ 8. It's really difficult to predict what will happen in the future, so it's more important to focus on today.
___ 9. I spend a great deal of time thinking about how my present actions will have an impact on my life later on.
___ 10. Many people are disappointed in life because they sacrificed their daily enjoyment for a better future that never came.
___ 11. I consider the long-term consequences of an action before I do it.
___ 12. I do not often make long-range plans.
___ 13. I try to do things that are good for me in the long run, even if they require sacrifice at the time.
___ 14. Living for the moment is more important to me than planning for the future.
___ 15. I have a good sense of what my long-term priorities are in life.
___ 16. When making decisions about what to do, the potential short-term consequences of my actions carry more weight than the potential long-term consequences.
___ 17. The immediate consequences of my actions are not as important to me as the long-range consequences of my actions.
___ 18. I spend more time thinking about the future than thinking about today.
___ 19. I do not consider my long-term plans to be more important to me than my short-term plans.

Appendix B: TPQ Item Intercorrelations

HEALING NEEDS IDENTIFIED BY SURVEY POPULATION

Age	Identified Need	Code[1]
Under 21	Healing for STD's[2]	P
22-35	Shoulder lower back	P
	Frequent leg inflammation	P
36-49	Weight family relationships	PES
	Marriage and Finances Health	ES
	Arthritis Finance	PS
	High Blood Pressure Vision	P
	High Blood Pressure	P
	Marriage Health Finances	PES
50-65	Heart Condition and Spiritual Healing	PS
	Spiritual Healing	S
	Mind speaking Ability Spiritual Healing	ES
	Grief Husband's Death	ES
	Diabetes	P
	Trouble with knees	P
66-80	Sinus reflux Overweight Arteriosclerotic disease	P
	Diabetes Weight Knees	PE
	Eyesight Diabetes	P
	Heart Condition	P
	Family Relationships	ES
	Diabetes	P
	Wish only for good health	P
	Doctor messed up my right eye	P
	Hope to keep healthy	ES
	Mind Memory	E
	Loss of Memory Degeneration of Limbs	ES
	Physical Healing	P
Above 81		
	Legs numb and no feeling	P
	"Lord will take care of my healing Business	
	Worn out bladder & rectum Sprained shoulder Osteoporosis Arthritis	P
	Digestive System	P
	Be cold Arthritis	P

1. Codes: "P" Physical; "E" Emotional; "S" Spiritual

2. STD's Sexually Transmitted Disease

TPQ item intercorrelations (N = 529).

	TPQ 01	TPQ 02	TPQ 03	TPQ 04	TPQ 05	TPQ 06	TPQ 07	TPQ 08	TPQ 09	TPQ 10	TPQ 11	TPQ 12	TPQ 13	TPQ 14	TPQ 15	TPQ 16	TPQ 17	TPQ 18	TPQ 19
TPQ 01	--	.668	-.140	.342	-.356	-.138	.068	-.209	.333	-.134	.317	-.446	.362	-.301	.527	-.277	.263	.225	-.218
TPQ 02		--	-.173	.371	-.398	-.198	.063	-.258	.355	-.144	.317	-.498	.371	-.401	.442	-.304	.290	.286	-.271
TPQ 03			--	-.105	.213	.440	-.014	.295	-.139	.201	-.145	.224	-.198	.416	-.088	.137	-.092	-.113	.141
TPQ 04				--	-.143	-.203	.268	-.219	.229	-.037	.162	-.259	.263	-.284	.287	-.293	.345	.317	-.330
TPQ 05					--	.221	.001	.251	-.308	.123	-.243	.418	-.250	.356	-.210	.232	-.133	-.344	.260
TPQ 06						--	-.038	.359	-.137	.106	-.125	.184	-.086	.481	-.035	.130	-.085	-.182	.139
TPQ 07							--	.042	.041	.081	.139	-.014	.082	-.007	.153	-.123	.182	.148	-.089
TPQ 08								--	-.074	.262	-.093	.300	-.142	.444	-.135	.288	-.119	-.163	.274
TPQ 09									--	.028	.352	-.242	.274	-.219	.198	-.105	.173	.334	-.220
TPQ 10										--	-.065	.215	-.108	.199	-.133	.117	-.020	-.036	.052

TPQ 11	--	-.210	.364	-.250	.210	-.203	.201	.229	-.111
TPQ 12		--	-.298	.401	-.384	.340	-.167	-.274	.361
TPQ 13			--	-.220	.347	-.230	.326	.308	-.195
TPQ 14				--	-.207	.343	-.157	-.258	.322
TPQ 15					--	-.263	.278	.156	-.162
TPQ 16						--	-.288	-.194	.284
TPQ 17							--	.322	-.165
TPQ 18								--	-.296
TPQ19									--

Appendix C: Measures for Study 2[1]

[1] Items for the EPI cannot be reproduced here due to copyright restrictions.

Time Perspective Questionnaire (TPQ - short version)

Consider each of the statements below. For each, indicate your level of agreement or disagreement by using the following scale:

1	2	3	4	5	6	7
Disagree very strongly	Disagree strongly	Disagree	Neutral	Agree	Agree strongly	Agree very strongly

Put the appropriate number, indicating your level of agreement or disagreement, in the space to the left of each statement.

___ 1. I have a defined set of short, intermediate, and long-term goals that I think about when I make decisions in my life.
___ 2. People who know me would describe me as a person who plans for the future.
___ 3. I have a good sense of what my long-term priorities are in life.
___ 4. Living for the moment is more important than planning for the future.
___ 5. Short-term goals are more important to me than long-term goals.
___ 6. I spend a lot more time thinking about today than thinking about the future.
___ 7. I often try to do things that are good for me at the time, even if they are not good for me in the long run.
___ 8. It is really difficult to predict what will happen in the future, so it's more important to focus on today.
___ 9. Living in the here-and-now is better than living for the future.
___ 10. I consider the long-term consequences of an action before I do it.
___ 11. Many people are disappointed in life because they sacrificed their daily enjoyment for a better life that never came.
___ 12. I spend a great deal of time thinking about how my present actions will have an impact on my life later on.
___ 13. "Eat, drink, and be merry, for tomorrow we die" is a good philosophy to follow in life.

Health Behavior-Intentions Questionnaire

Listed below are a number of health behaviors. For each, we would like you to: (1) indicate how often you have performed that behavior during last term (Winter 1996); (2) then indicate your intentions about performing that behavior in this term (Spring 1996).

1. Your intentions should be realistic intentions: instead of saying "100%" for every behavior, please
   give a realistic intention.
2. Please give a precise number for each question: "20%" not "15-25%"; "12", not "10-15"

_____ %	1. During the Winter term, what percentage of the times that you were in a car (including taxis) did you wear your seat belt?
_____ %	2. During this Spring term, what percentage of the time do you intend to wear your seat belt while in a car (including taxis)?

_____ %	3. During the Winter term, what percentage of the days did you floss your teeth?
_____ %	4. During this Spring term, what percentage of the days do you intend to floss your teeth?

_____ %	5. During the Winter term, what percentage of the days were you junk-food free (that is, a day in which you did not eat junk food—e.g., chips, chocolate, candy—at anytime during that day)?
_____ %	6. During this Spring term, what percentage of the days do you intend to be junk-food free?

_____ %	7. During the Winter term, what percentage of the days did you eat a balanced diet (that is, a day in which your diet included all five food groups (meat, fish/poultry, dairy, fruit, vegetables))?
_____ %	8. During this Spring term, what percentage of the days do you intend to eat a balanced diet?

_____ %	9. During the Winter term, what percentage of the days did you engage in vigorous or moderate exercise (e.g., jogging, running, swimming, weightlifting, fitness or aerobic classes, stair-climbing, bicycle, hockey, etc.)?
_____ %	10. During this Spring term, what percentage of the days do you intend to engage in vigorous or moderate exercise?

11. Do you smoke? YES NO If "YES" answer the following questions; otherwise skip to #15:

_____	12. During the Winter term, on average, how many cigarettes did you smoke per day?
_____	13. During this Spring term, how many cigarettes do you intend to smoke per day?

14. Which statement best describes your intentions for smoking or quitting in this Spring term? (check one)

- ☐ I really do not want to quit smoking this Spring term
- ☐ I am considering cutting back my smoking this Spring term
- ☐ I am considering quitting smoking this Spring term
- ☐ I am strongly considering quitting smoking this Spring term
- ☐ I am definitely going to try to quit smoking this Spring term

15. Do you drink alcohol? YES NO If "YES" answer the following questions; otherwise skip to #19:

_____	16. During the Winter term, on average, how many alcoholic drinks did you have per week?
_____	17. During this Spring term, how many alcoholic drinks do you intend to have per week?

18. Which statement best describes your intentions for drinking alcohol in this Spring term? (check one)

- ☐ I really do not want to reduce my alcohol consumption this Spring term
- ☐ I am considering reducing my alcohol consumption this Spring term
- ☐ I am strongly considering reducing my alcohol consumption this Spring term
- ☐ I am definitely going to reduce my alcohol consumption this Spring term

For the next section, please use the following response scale:

-3	-2	-1	0	+1	+2	+3
Much less than the average UW student of my age & gender	Less than the average UW student of my age & gender	Slightly less than the average UW student of my age & gender	The same as the average UW student of my age & gender	Slightly greater than the average UW student of my age & gender	Greater than the average UW student of my age & gender	Much greater than the average UW student of my age & gender

19. As compared to a University of Waterloo student of your same age and gender, what is the likelihood that you will experience each of the following events sometime during your life?

(a) Cancer _____ (b) Heart Attack _____ (c) Hypertension _____

(d) Diabetes _____ (e) Injury in a car accident _____ (f) Nervous breakdown _____

(g) Mugging _____ (h) Divorce _____ (i) AIDS _____

(j) Sexually transmitted diseases other than AIDS _____

Appendix D: Questionnaire Package for Study 3

PERSONAL INFORMATION

•Name:_____(please print)

• Male:___ •Female:___ •Date of Birth:_____ •Height _____ •Weight _____

•Marital status: _____ University year: _____

• What percentage of your friends exercise on a regular basis? _____

• What percentage of your classmates exercise on a regular basis? _____

• Does your spouse or girlfriend/boyfriend exercise regularly? _____

•On average, how many cigarettes do you smoke per week?_____

FITNESS CLASS INFORMATION

• Fitness class name (e.g., "Fitness Express", "Step"): _____

•Fitness class day (e.g., "MWF", "TR"): _____

•Fitness class time (e.g., "4:30-5:30pm"): _____

1. During the next seven days, how much total time do you plan to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engage in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for next 7 days to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

2. During the next month how much total time do you plan to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engage in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for next month to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

3. During the last seven days, how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for last 7 days to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

4. During the last month how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for last month to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

Please answer the following question by circling the number that best reflects your answer.

Do most people who are important to you think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7
Strongly Think I Should Not			Neutral			Strongly Think I Should

For each of the following adjectives, please rate your response to the following question:

"For you to participate in regular vigorous or moderate physical activity or exercise would be..."

Wise	:___:___:___:___:___:___:___:	Foolish
Bad idea	:___:___:___:___:___:___:___:	Good idea
Harmful	:___:___:___:___:___:___:___:	Beneficial
Positive	:___:___:___:___:___:___:___:	Negative
Useless	:___:___:___:___:___:___:___:	Useful
Worthwhile	:___:___:___:___:___:___:___:	Not Worthwhile
Healthy	:___:___:___:___:___:___:___:	Unhealthy
Interesting	:___:___:___:___:___:___:___:	Boring
Not enjoyable	:___:___:___:___:___:___:___:	Enjoyable
Chore	:___:___:___:___:___:___:___:	Fun
Pleasant	:___:___:___:___:___:___:___:	Unpleasant
Stimulating	:___:___:___:___:___:___:___:	Dull
Inconvenient	:___:___:___:___:___:___:___:	Convenient
Obligation	:___:___:___:___:___:___:___:	Treat

The following questions ask about how you think other people would feel about you engaging in a program of regular exercise. Please indicate how much **YOU** feel that they think you should or should not exercise on a regular basis and how motivated you are to comply with each person.

1. Does your spouse (girlfriend/boyfriend) think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Thinks I Should Not			Neither/ Nor			Strongly Thinks I Should	Does not apply

How motivated are you to comply with your spouse's (girlfriend/boyfriend's) opinion about your exercise activities? (i.e., opinions about whether or not you are physically active, what kinds of activities you engage in, etc).

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

2. Do your friends think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

How motivated are you to comply with your friends' opinions about your exercise activities? (i.e., opinions about whether or not you are physically active, what kinds of activities you engage in, etc).

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

3. Does your family think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

How motivated are you to comply with your family's opinions about your exercise activities?

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

4. Does your doctor think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Thinks I Should Not			Neither/ Nor			Strongly Thinks I Should	Does not apply

How motivated are you to comply with your doctor's opinion about your exercise activities?

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

5. Does your employer/instructor think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Thinks I Should Not			Neither/ Nor			Strongly Thinks I Should	Does not apply

How motivated are you to comply with your employer's/instructor's opinion about your exercise activities?

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

6. Do your co-workers or classmates think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

How motivated are you to comply with your co-workers'/classmates' opinions about your exercise activities?

0	1	2	3	4	5	6	7
Not at all Motivated	Quite Unmotivated	Slightly Unmotivatec	Neither/ Nor	Slightly Motivated	Quite Motivated	Extremely Motivated	Does not apply

7. How likely is it that you personally will receive health benefits from exercising regularly? (e.g., longevity, decreased lower back pain, decreased risk of heart disease, etc.)

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

8. How likely is it that you personally will achieve or maintain good physical & cardiovascular shape from exercising regularly?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

9. How likely is it that regular exercise will personally improve your daily functioning (improved sleep & appetite, wake up more refreshed, etc.)?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

10. How likely is it that regular exercise will personally lead to a greater sense of well-being (improved self-confidence, self-esteem, well-being)?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

11. How likely is it that regular exercise will personally interfere with other obligations and social activities?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

12. How likely is it that regular exercise will provide you with personal time (competitive outlet, frustration release, fun, time to think)?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important

13. How likely is it that regular exercise will personally help you to relieve stress?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

How important to you is this outcome?

Extremely Unimportant	Not very Important	Slightly Important	Quite Important	Very Important	Extremely Important
:____:	:____:	:____:	:____:	:____:	:____:

The next set of questions is in 2 parts. The first part of each question asks you to evaluate the amount of confidence (0-100%) you have in your ability to stick to a program of regular exercise despite the given barrier. Then you are asked to rate whether or not each item is a personal barrier for you.

1. a) Rate your confidence (0 - 100%) that you could exercise when tired. Confidence rating _____%

   b) How often is being tired a barrier to exercise for you? (put an X in the appropriate space).

Never	Seldom	Sometimes	Frequently	Always
:____:	:____:	:____:	:____:	:____:

2. a) Rate your confidence (0 - 100%) that you could exercise during or following a personal crisis._____%

   b) How often is a personal crisis a barrier to exercise for you? (put an X in the appropriate space).

Never	Seldom	Sometimes	Frequently	Always
:____:	:____:	:____:	:____:	:____:

3. a) Rate your confidence (0 - 100%) that you could exercise when feeling depressed. _____%

   b) How often is depression a barrier to exercise for you? (put an X in the appropriate space).

Never	Seldom	Sometimes	Frequently	Always
:____:	:____:	:____:	:____:	:____:

4. a) Rate your confidence (0 - 100%) that you could exercise when feeling anxious. _____%

   b) How often is anxiety a barrier to exercise for you? (put an X in the appropriate space).

Never	Seldom	Sometimes	Frequently	Always
:____:	:____:	:____:	:____:	:____:

5. a) Rate your confidence (0 - 100%) that you could exercise during bad weather. _____%

   b) How often is bad weather a barrier to exercise for you? (put an X in the appropriate space).

Never	Seldom	Sometimes	Frequently	Always
:____:	:____:	:____:	:____:	:____:

6. a) Rate your confidence (0 - 100%) that you could exercise when you are slightly sore from the last time you exercised. Confidence rating _____%

b) How often is muscle soreness a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

7. a) Rate your confidence (0 - 100%) that you could exercise when you are on vacation. _____%

b) How often is vacation a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

8. a) Rate your confidence (0 - 100%) that you could exercise when you have competing interests (like a favorite TV show). Confidence rating _____%

b) How often are competing interests barriers to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

9. a) Rate your confidence (0 - 100%) that you could exercise when you have a lot of work to do. _____%

b) How often is work a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

10. a) Rate your confidence (0 - 100%) that you could exercise when you haven't reached your exercise goals. Confidence rating _____%

b) How often is not reaching your exercise goals a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

11. a) Rate your confidence (0 - 100%) that you could exercise when you don't receive support from your family or friends. Confidence rating _____%

b) How often is lack of support a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

12. a) Rate your confidence (0 - 100%) that you could exercise when you have not exercised for a prolonged period of time. Confidence rating _____%

b) How often is this a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

13. a) Rate your confidence (0 - 100%) that you could exercise when you have no one to exercise with. Confidence rating _____%

b) How often is not having someone to exercise with a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

14. a) Rate your confidence (0 - 100%) that you could exercise when your schedule is hectic. _____%

b) How often is a hectic schedule a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

15. a) Rate your confidence (0 - 100%) that you could exercise when your exercise work-out is not enjoyable. Confidence rating _____%

b) How often is your work-out not being enjoyable a barrier to exercise for you?

:___: Never :___: Seldom :___: Sometimes :___: Frequently :___: Always

The next question is in 3 parts. The first part of each question lists a possible outcome of regular exercise. You are asked to rate on a scale of 1 to 10 how much you believe that you would personally experience that possible outcome of exercise if you exercised on a regular basis. Then you are asked how important to you that particular outcome is, and to what extent you think it represents a "short-term" or a "long-term" outcome.

1. a) How confident are you that regular exercise would improve your health?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved health?

0 1 2 3 4 5 6

c) To what extent does improved health represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

2. a) How confident are you that regular exercise would lead to improved cardiovascular fitness?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved cardiovascular fitness?

0	**1**	**2**	**3**	**4**	**5**	**6**

c) To what extent does improved cardiovascular fitness represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

3. a) How confident are you that regular exercise would lead to improved body strength?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved body strength?

0	**1**	**2**	**3**	**4**	**5**	**6**

c) To what extent does improved body strength represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

4. a) How confident are you that regular exercise would provide a social outlet?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is a social outlet?

0	**1**	**2**	**3**	**4**	**5**	**6**

c) To what extent does provision of a social outlet represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

5. a) How confident are you that regular exercise would lead to improved self-image?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved self-image?

0 1 2 3 4 5 6

c) To what extent does improved self-image represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	1	2	3	4	5	6

6. a) How confident are you that regular exercise would lead to a sense of achievement?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is experiencing a sense of achievement?

0 1 2 3 4 5 6

c) To what extent does a sense of achievement represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	1	2	3	4	5	6

7. a) How confident are you that regular exercise would enhance your appearance?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is enhanced appearance?

0 1 2 3 4 5 6

c) To what extent does enhanced appearance represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	1	2	3	4	5	6

8. a) How confident are you that regular exercise would increase your mental alertness?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is mental alertness?

0 1 2 3 4 5 6

c) To what extent does improved mental alertness represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

9. a) How confident are you that regular exercise would lead to a sense of improved well-being?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is a sense of improved well-being?

0 1 2 3 4 5 6

c) To what extent does improved well-being represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

10. a) How confident are you that regular exercise would help you to control your weight (lose, maintain, or gain) ?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is weight control?

0 1 2 3 4 5 6

c) To what extent does weight control represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

11. a) How confident are you that regular exercise would decrease your risk of heart disease?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is decreased risk of heart disease?

0 1 2 3 4 5 6

c) To what extent does decreased risk of heart disease represent a "short-" vs. "long-term" outcome for you?

ST **LT**
0 1 2 3 4 5 6

12. a) How confident are you that regular exercise would lead to you feeling better in general?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is feeling better in general?

0 1 2 3 4 5 6

c) To what extent does feeling better in general represent a "short-" vs. "long-term" outcome for you?

ST **LT**
0 1 2 3 4 5 6

13 a) How confident are you that regular exercise would improve your daily functioning (e.g., sleep better, better appetite, etc.)?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is improved daily functioning?

0 1 2 3 4 5 6

c) To what extent does improved daily functioning represent a "short-" vs. "long-term" outcome for you?

ST **LT**
0 1 2 3 4 5 6

14. a) How confident are you that regular exercise would result in a sense of self-discipline?

1 2 3 4 5 6 7 8 9 10
Not Confident — Moderately Confident — Extremely Confident

b) How important to you is a sense of discipline?

0 1 2 3 4 5 6

c) To what extent does improved self-discipline represent a "short-" vs. "long-term" outcome for you?

ST **LT**
0 1 2 3 4 5 6

15. a) How confident are you that regular exercise would improve your work/school performance?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved work/school performance?

0 1 2 3 4 5 6

c) To what extent does improved improved work/school performance represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

16. a) How confident are you that regular exercise would help relieve your stress?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is stress reduction?

0 1 2 3 4 5 6

c) To what extent does stress reduction represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

17. a) How confident are you that regular exercise would provide a competitive outlet?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is a competitive outlet?

0 1 2 3 4 5 6

c) To what extent does provision of a competitive outlet represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

18. a) How confident are you that regular exercise would make you feel more in control over your body?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is control over your body?

0 1 2 3 4 5 6

c) To what extent does control over your body represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

19. a) How confident are you that regular exercise would allow you to be better able to do other physical activities and sports?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is better performance in physical activities and sports?

0 1 2 3 4 5 6

c) To what extent does better performance in physical activities and sports represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

20. a) How confident are you that regular exercise would result in youthfulness & longevity?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is youthfulness & longevity?

0 1 2 3 4 5 6

c) To what extent does youthfulness & longevity represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

21. a) How confident are you that regular exercise would lead to a sense of achievement?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is experiencing a sense of achievement?

0 1 2 3 4 5 6

c) To what extent does experiencing a sense of a achievement represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

22. a) How confident are you that regular exercise would lead to more energy overall?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is more energy?

0 1 2 3 4 5 6

c) To what extent does more energy represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

23. a) How confident are you that regular exercise would lead to improved endurance and stamina?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is improved endurance and stamina?

0 1 2 3 4 5 6

c) To what extent does improved endurance and stamina represent a "short-" vs. "long-term" outcome for you?

ST						LT
0	**1**	**2**	**3**	**4**	**5**	**6**

24. a) How confident are you that regular exercise would lead to increased self-confidence?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is increased self-confidence?

0 1 2 3 4 5 6

c) To what extent does increased self-confidence represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

25. a) How confident are you that regular exercise would provide the sense of belonging to a group?

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

b) How important to you is belonging to a group?

0 1 2 3 4 5 6

c) To what extent does a sense of belonging to a group represent a "short-" vs. "long-term" outcome for you?

ST LT
0 1 2 3 4 5 6

On a scale from 1 to 10 rate your confidence (i.e. your certainty) in your ability or knowledge in the areas listed below.

1. I am confident in my ability to schedule my time in order to fit in a program of regular exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

2. I am confident in my ability not to miss more than one week of exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

3. I am confident in my ability to make exercise high in the priority list of my weekly activities.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

4. I am confident that I can organize time/work around my scheduled workouts.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

5. I am confident in my ability to exercise regularly, each week.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

6. I am confident that I can keep to my scheduled exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

Time Perspective Questionnaire (TPQ)

Consider each of the statements below. For each, indicate your level of agreement or disagreement by using the following scale:

1	2	3	4	5	6	7
Disagree very strongly	Disagree strongly	Disagree	Neutral	Agree	Agree strongly	Agree very strongly

___ 1. I have a defined set of long-term goals that I think about when I make decisions in my life.
___ 2. People who know me would describe me as a person who plans for the future.
___ 3. "Eat, drink, and be merry, for tomorrow we die" is a good philosophy to follow in life.
___ 4. Long-term goals are more important to me than short-term goals.
___ 5. I do not spend much time thinking about the future.
___ 6. Living for the here-and-now is important to me.
___ 7. I don't place much importance on exclusively short-term considerations.
___ 8. It's really difficult to predict what will happen in the future, so it's more important to focus on today.
___ 9. I spend a great deal of time thinking about how my present actions will have an impact on my life later on.
___ 10. Many people are disappointed in life because they sacrificed their daily enjoyment for a better future that never came.
___ 11. I consider the long-term consequences of an action before I do it.
___ 12. I do not often make long-range plans.
___ 13. I try to do things that are good for me in the long run, even if they require sacrifice at the time.
___ 14. Living for the moment is more important to me than planning for the future.
___ 15. I have a good sense of what my long-term priorities are in life.
___ 16. When making decisions about what to do, the potential short-term consequences of my actions carry more weight than the potential long-term consequences.
___ 17. The immediate consequences of my actions are not as important to me as the long-range consequences of my actions.
___ 18. I spend more time thinking about the future than thinking about today.
___ 19. I do not consider my long-term plans to be more important to me than my short-term plans.

Appendix E: Time Perspective Intervention Manual

Long-term Fitness Facilitator's Manual

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Fall, 2000

SESSION 1.

I. Introduction (5 min.)

My name is _____. For the purposes of this research study, I will be meeting with you every Wednesday at this time for a half hour to chat with you about ways in which you can help yourself stick with the fitness program that you have signed up for.

Some of you may be starting a formal exercise program for the first time, and some of you may have already been in formal exercise programs a number of times. This program is designed to help you maintain the program whether this is your first time or your [nth] time.

During our three weekly sessions together, we will spend some time discussing strategies to maintain your fitness level over the long term, but you we will also be doing some activities that will help to reinforce some of the things that we have discussed. After each class I will ask you to answer a few questions that are in your guidebook. These questions will only take a few minutes to answer.

After the three weeks are over, we will be asking you to fill out some questionnaires; these will be more or less identical to the ones that you were given to fill out before this class, although some of the wording will be a little different. We will also be contacting you in six and nine weeks to have you fill out a few similar questionnaire packages. These too will be very short, and will only take a few minutes to complete.

II. Rationale (10 min.)

Fitness can be a tricky thing to maintain. I'm sure a lot of you have signed up for fitness classes or started routines in the past with the best of intentions to continue exercising on a regular basis. However, as is the case for many of us, it is easier said than done.

Questions for the class:

- How many people have attended some kind of fitness class in the past? (e.g., aerobics, dance, martial arts)
- How many people have tried to start their own regular fitness routine? (e.g., going to the gym, running)

So most people here have tried to maintain fitness classes or a fitness routine of some kind in the past. Now lets find out how well you stuck to them. By "sticking to" your fitness schedule, I mean attending all of your classes, or exercising as often as you had initially planned. For example, if you were attending aerobics classes, "sticking to" your schedule might mean attending a fitness class every Monday, Wednesday, and Friday. If your routine was jogging, "sticking to" your schedule might mean going jogging for a half hour every weekday after school. Does everybody have a sense of what I mean by "sticking to" your schedule?

If YES, then...

Raise your hand if you managed to stick to your schedule:

- for the first week
- for the first month
- for the first six months
- for a whole year

So it looks like many people start out with really good intentions to stick with fitness programs or routines, but very few if any are able to stick to their schedule for a very long time. In fact, most people only manage to stick to their schedules for a couple of weeks. The purpose of this particular fitness program will be to not only provide you with the opportunity to attend fitness classes, but more importantly, we want to help

you to find ways to stick with your fitness program for as long as possible. In short, we not only want to help you to get fit—we want to help you to stay fit for the long run.

Time Perspective

One of our goals in this program is to introduce you to a new concept in psychology known as time perspective.

Why do people fail to eat properly? Why do they fail to wear seat belts? Why do many smokers continue to smoke? Why do some pregnant mothers continue to smoke? In many areas of life, people seem to do things that are not healthy for them in the long-run, even though they know that this is the case.

A key reason why people ignore health advice by either continuing to engage in unhealthy behaviors or failing to begin or maintain healthy behaviors is because they possess what we might call short-term time perspective. That is, many people tend to focus on the short-term consequences of their actions, while ignoring or minimizing the long-term consequences.

For example, consider a smoker—let's call him Jim, who is thinking about lighting up another cigarette. For Jim, the short-term consequences are very salient to him: because nicotine is addicting, Jim is craving another cigarette—his body is telling him to satisfy that urge now! In addition, the physiological effects of nicotine can be very pleasing—you get a high within a few seconds. Again, that's a short-term consequence. Finally, there are psychological factors that enhance the physiological effects of smoking, all in the short-term.

If we look only at the short-term consequences—there is no reason in the world why Jim shouldn't light up that next cigarette. There are lots of "pros" associated with lighting up, but virtually no "cons" ...at least in the short-term.

However, when looking at the long-term consequences the opposite is true. In the long run, Jim is doing serious damage to his cardiovascular system. He stands a considerably higher risk of heart disease, stroke, and lung diseases, such as emphysema. He also has about 20 to 30 times greater likelihood of getting lung cancer than he would if he didn't smoke. All of this adds up to a considerably shorter life expectancy.

Now—these are all long-term consequences. If Jim focuses only on the short-term consequences, systems are full speed ahead for smoking and for continuing to smoke. But of course, long-term consequences tell Jim that he should throw that cigarette away!

Focusing on the short-term consequences can slowly, unnoticeably lead to long-term consequences that are disastrous.

What can Jim do? The point that is so clear is that if Jim expands his way of thinking to include long-term consequences, he will be more likely to seek out ways of cutting back on his smoking or quitting now. In other words, if Jim tries to become a long-term thinker, he will be more likely to engage in healthy behaviors now because of his realization that there is a strong relationship between what he does now, and what happens to him in the future. So part of what Jim must try to do in order to kick the habit, is to become aware of the longer-term consequences of what he is doing, and to change his present behavior accordingly.

The same is true of exercise, as we will soon see. When looking at only the short-term costs and benefits, there is little reason why we might want to attend exercise classes on a regular basis. However, when the long term cost and benefits are considered, there is very little reason NOT to keep in shape.

We believe that the key to living a healthy life is to adopt a long-term time perspective – in other words, to become a "long-term thinker".

Long-term thinking is something that some people are better at than others. But "long-term thinking" is also something that can be 1) taught and 2) practiced.

We're going to use both teaching and practice to help everybody to become long-term thinkers when it comes to your own fitness.

III. Long Term Benefits of Physical Activity

Part of becoming a long-term thinker about fitness involves becoming aware of the long-term benefits of staying fit. What I would like to do for the last few minutes of this session, is to chat with you about some of these long-term benefits.

What are some of the things that you have heard in the media about the benefits of fitness, or that they have been told by others?

List and review all of the ideas suggested by the class, and then continue on to cover the following information:

1) Reduces risk of diabetes
Regular exercise helps to keep blood sugar levels steady and control insulin activity. If you are overweight or if diabetes runs in your family, you may be especially concerned about maintaining a healthy level of fitness.

2) Maintains weight
Physical activity has been shown to be the single most important factor in successful weight maintenance. Aim for burning about 1000-2000 calories per week from activity.

3) Reduces risk of premature death
By engaging in regular physical activity (including fitness classes) you can greatly increase your life expectancy, and help to ensure that you are more mobile later in life.

4) Reduces risk of heart disease
Physical activity helps to boost levels of HDLs, or "good" cholesterol in your blood. These HDLs help you by removing the "bad" cholesterol from your arteries, and transporting it to your liver, where it can be removed from your body. For this reason, increasing your level of HDLs by adopting a long-term approach to fitness can greatly decrease your risk of a heart disease later in life.

5) Improves health of muscles and bones
By engaging in aerobic exercise on a regular basis, you can improve blood flow to your muscles, and help them use energy more efficiently. In addition, engaging in strength training can build the size of your muscles, and increase your muscle strength. Strength training along with common activities such as walking or running can help to make your bones more dense, and therefore stronger.

6) Improves mental health
Many people report being in a much better mood overall when they are exercising regularly. Furthermore, regular exercise can help to reduce both anxiety and depression. In fact, many people who treat those with depression or anxiety disorders prescribe a regimen of regular physical exercise.

7) Reduces risk of high blood pressure
Regular physical activity over the long-run can reduce your risk of acquiring high blood pressure. Moreover, it can actually help to lower blood pressure in those who already have high blood pressure (without the use of medication).

8) Reduces risk of colon cancer

By incorporating regular physical activity into your lifestyle, you may reduce your risk for colon cancer.

9) Helps older adults become stronger

Part of the reason why older adults lose strength and stamina is because of decreased levels of physical activity. As a consequence, reductions in the thickness of bones, and the strength of muscles can occur. In addition, metabolic rate can slow down, making it easier to gain weight. Physical activity can counteract or minimize the impact of many of these "natural" processes of aging.

So this has been a start along our journey to becoming long-term thinkers. You are now aware of some of the long term benefits of staying fit. Next time, we will review some of the facts that we have talked about today, and try to talk about how you might use this information when it comes to making decisions about your own personal fitness...

See you here same time and place next week.

Remind students to bring workbook with them next time (or hand in to me at the end of the class)

SESSION 2.

I. Recap (5 min.)

Last time we spent most of the session chatting about the purpose of these classes, and a bit about the theory behind our approach to healthy living: Time perspective. Specifically, we discussed the health benefits of being a long-term thinker, as well as some of the specific long-term benefits of keeping fit.

Today, I will continue to emphasize the benefits of being a long-term thinker, especially when it comes to personal fitness. But this time, rather than asking you to take my word for it that long-term thinking is the way to go, we are going to try a little activity that will let you decide for yourself whether or not you want to be a long-term thinker when it comes to fitness...

II. Costs and Benefits (10 min.)

Most people would agree that it is a good idea to weigh the costs and benefits before making important decisions in one's life. This holds true for many choices that we make in life, such as choosing weather or not to wear your seatbelt when you get into a car, choosing what to eat for dinner, and even whether or not to go to your next fitness class.

Making Choices

For this activity, what I would like for us to do is to take a few minutes to weigh the costs and benefits of exercising.

If you look at page __ in your workbook, you will notice two tables: one corresponding to "short-term consequences", and one corresponding to "long-term term consequences".

When you think about it, some of the consequences of exercising are things that happen pretty quickly (i.e., within the first few days, or even the first hour), while others occur much later on (i.e., a few months, or even years later). For this reason, when you think about the consequences of exercising, you will want to consider not only the immediate consequences, but the longer-term ones as well. Lets start with the first chart – "Short-term consequences of exercise".

Benefits

What I would like for you to do right now is to think for a minute about the short-term benefits of exercising. That is, think of the things that are of immediate benefit when you first start exercising. You don't have to fill in all the blanks; just generate as many benefits as you can think of.

If you are having trouble thinking of some, that's ok because we are going to take a few minutes to discuss what everybody came up with afterwards. So try your best, but you can always get some ideas from other people when we have a discussion about it later...

(give them 5 minutes to fill out the first table)

Costs

Like anything else, fitness is not a bed of roses. Certainly there has to be some reason why people don't stick with their fitness programs. Lets see if we can generate some of the short-term costs associated with exercising. I will give you 5 minutes to fill out the second table in your workbook, and then we can discuss what you all came up with...

(give them 5 minutes to fill out the second table)

Now lets do the same for the second table – "Long-term consequences of exercise".

Reminder: Remember, after you have thought of a consequence, ask yourself if the consequence is a short-term consequence (something that you experience within the first few hours or days), or a long term consequence (something that occurs months or even years later).

Now lets spend some time reviewing what you came up with...

(Review students suggestions first, making sure that they are correctly categorized as long- or short-term consequences. Then add to the list with the suggestions below if necessary.)

Short-term consequences of exercise:

Costs	Benefits
1. Inconvenient...	1. Feel good about self...
2. Sweaty...	2. Less guilty...
3. Have to take a shower...	3.
4. Feel exhausted...	4.
5. Embarrassed to be so out of shape...	5.
6. Pain...	6.
7. Expensive...	7.
8. Less time for other things (T.V. etc)...	8.
9.	9.
10.	10.

Long-term consequences of exercise:

Costs	Benefits
1. Inconvenient...	1. Better physical appearance...
2. Expensive...	2. In better shape physically...
3.	3. Lower risk of heart disease...
4.	4. Stronger...
5.	5. Happier with self...
6.	6. Longer life...
7.	7. Reduced risk of diabetes...
8.	8. Lower weight...

9.	9. Reduced risk of high blood pressure...
10.	10. Better health of bone and muscle...

Next, I would like you to take a minute to add any of the consequences that we have discussed to your own table. After you have done this, and put all of them in the correct columns, I would like you to rate from 1-10 how important each consequence is to you. For example, if having a longer life is extremely important to you, put a 9 or 10 beside it. If feeling exhausted is moderately important to you, put a 4 or 5 beside it. If something is not all that important to you, but a 1 or 2 beside it. When you are done, add up the total of the boxes... this will give you an idea of the magnitude of the short- and long-term consequences involved in the choice of whether or not to exercise...

Rationale

As you can see, although there are plenty of costs associated with exercise in the short-term, there are not that many benefits – they come later. But when you look at the sheer number of long-term benefits and the magnitude them... they sure are worth it!

As we discussed, when you take a long-term perspective (whether that involves looking months or years into the future) there are many potential benefits to exercise, and very few costs. So this demonstration illustrates why thinking in the short-term would lead people to think that fitness is not worth the trouble. But thinking in the long-term sure makes a convincing argument that fitness is worth it! (...and then some!)

In summary then, the situation with exercise is very similar to the situation that we discussed with smoking and other bad health habits. When you consider only short-term costs and benefits, there are really no good reasons to adopt a healthy lifestyle. But when you consider the long-term costs and benefits, there is no reason not to adopt a healthy lifestyle.

As you might have noticed, there are quite a few costs and benefits associated with exercising. In fact, you might even find that there were some hidden costs and benefits that you hadn't considered in the past. Often making costs and benefits explicit like this can help to reveal some of the important factors that we would not normally take into consideration when making decisions about whether or not to exercise.

For this session, you generated long-term costs and benefits of exercising. This logic can also be applied directly to your attendance of these fitness classes. When contemplating the costs and benefits of attending fitness classes, often people focus on mainly the short-term costs and benefits. That is, people usually think about costs like how much time it will take out of their week, and how sore they will be the next day. And as long as they take a short-term perspective, they will have difficulty coming up with many benefits.

In other words, when you only look at the short-term consequences of attending classes, its hard to justify coming to them. In the short-term, attending class involves a whole lot more pain than gain! ...especially when you are first starting. For this reason, its important to adopt a long-term perspective when making decisions about coming to your classes every week.

Reminder: Complete the questions at the end of the sections 1&2 of your activity book before next class. Should only take a few minutes.

SESSION 3.

Recap (5 min.)

Last session we chatted about some of the costs and benefits associated with exercising in general, and specifically associated with attending fitness classes. We also spent some time doing an activity that demonstrated how the balance of pros and cons is very different depending on whether or not you adopt a short-term perspective or a long-term perspective.

Specifically, we discovered that short-term thinking usually leads one to decide that exercising is not worth it – in the short-term, exercise involves a whole lot more pain than gain. Long-term thinking, on the other hand, leads us to consider other costs and benefits that we normally might not think of. But when we consider these long-term costs and benefits (and how important they are to us), exercise seems to be more than worth it. Any of the short-term costs seem pretty minimal in comparison to the large long-term benefits. Thinking in the long-term makes it much easier to stick with a fitness program like this one...

I. Setting short-term fitness goals

Today we are going to talk about setting fitness goals. We will talk about setting long-term goals, as well as short-term ones. Both of these are important, as you will see. Ultimately, even the short-term goals that you set should be in line with your long-term interests. This will become more clear as we continue...

Setting realistic and attainable goals in crucial for helping people to get fit and stay fit. People who don't set realistic goals usually do not attain as high a level of fitness and drop out earlier from fitness programs than those who do set fitness goals. However, those people who set their goals too high or too low do not do nearly as well as those who set their goals as being realistic but challenging. Today I would like to talk to you about setting short-term goals in particular. Tomorrow we will talk about long-term goals. By the term "short-term goals", I mean goals that can be attained within the upcoming week, and the upcoming month etc.. Turn to your sheet for session "Labeled Short-Term Goals":

SHORT-TERM GOAL	WHERE AND WHEN? (be exact)	ANTICIPATED OBSTACLES	SOLUTIONS
...for end of this week:			
... for end of next week:			
...for end of October:			

Short-term Goal

The first column entitled short-term requires you to fill in what your fitness goals are during the end of this week, the end of next week, and the end October. Go ahead and fill in your fitness goals in each of these spaces. Remember that your goals should be specific and reasonable. For example, for the end of this week your goal might be to have attended all three fitness classes, and work out in the gym for a half hour. That goal is very specific, and it is reasonable to assume that you could reach that goal this week. On the other hand, a goal of attending 5 fitness classes and work out in the gym every day for two hours is specific, but it is not a goal that you could reach. Also, if you were to state your goal as something like "to become more fit than last week", although your goal would be one that you might be able to reach, it is not specific enough (i.e., we do not know what you mean by "more fit").

In summary then: you have to set a goal that you can reach, but it must be specific enough that you know for sure when you have reached it.

Where and When

For this column, what I want you to do is to specify where and when you will be doing the things that are required to reach your fitness goal.

Obstacles

Anticipating obstacles is a very important part of overcoming them. For this part of the exercise, I would like you to think of all of the different kinds of obstacles that might stand in the way of reaching your own personal fitness goal.

But first, lets work through an example. Say your fitness goal is for the end of next week is to attend three fitness classes. What are some of the things that might get in your way of doing that? How about if your fitness goal is to attend three sessions per week for the next month. Are there any things that might come up within the next month that may not appear in the next week? (suggest exams, increased workload, etc. if no responses)

(discuss examples generated by class)

Now that you have the idea, I want you to go ahead and fill out the obstacles section in your workbook. You can use any of the ideas that we have already talked about, but we have not covered all of them. As much as possible, try to fill out the obstacles section in a way that relates to your own personal fitness goals. They may not be the same as everyone else's, and there may be things that get in the way for you that others have not mentioned.

Solutions

Now the last step is to generate some ways of overcoming the obstacles that you have already listed. The kinds of solutions that you will come up with depend on what specific obstacles you have to deal with. The important thing is that you have a workable plan to deal effectively with whatever comes up. This kind of planning ahead can be surprisingly effective.

Just as an example lets try to come up with some ways of dealing with some of the obstacles that we listed in the previous examples.

(discuss solutions generated by class)

II. Facilitating Factors for Staying Fit (5 min.)

We have spent some time talking about what kinds of things get in the way of staying fit. Now maybe we can turn our discussion to the problem of what kinds of things make it easier for someone to stay fit.

- What are some of the things that people have experienced here that might make it easier for someone to maintain their adherence to their fitness program?

Examples:
- free time
- friend who exercises
- visible gains
- encouragement from others

II. Long-term Goal Setting

We spent most of yesterday talking about short-term fitness goals, and how to best select and meet them. Today we are going to talk about selecting and meeting long-term fitness goals. As you will see, these two kinds of goals are very closely related.

First off, lets go through the same procedure for identifying long-term fitness goals as we did for short term ones.

LONG-TERM GOAL	WHERE AND WHEN? (be exact)	ANTICIPATED OBSTACLES	SOLUTIONS
...for end of this term:			
... for the end of next school year:			
...for the end of your undergraduate degree:			

Go through same procedure as for setting short-term goals

Linking short-term goals with long-term goals

By being aware that the behaviors that you engage in now have implications for your future, you can take action now to reduce health risks later on. By taking a long-term perspective on exercising in general (and attending fitness classes in particular), you will be able to maintain your motivation to stay fit for life. We hope that you have found these classes helpful in getting you to consider the long-term implications of your choice to stay fit.

Reminder: Complete the questions at the end of the sections 3 of your activity book before next class. Should only take a few minutes.

Reminder: We will be contacting you at the end of the fitness program to get you to fill out some post-testing questionnaires. They will not require much time, but it is very important that you fill them out for us.

Appendix F: Control Intervention Manual

Fitness Facilitator's Manual (Control)

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University of Waterloo
Waterloo, Ontario

Fall, 2000

SESSION 1.

I. Introduction (5 min.)

My name is _____. I will be meeting with you every Wednesday at this time for a half hour to chat with you about ways in which you can help yourself tick with the fitness program that you have signed up for.

Some of you may be starting a formal exercise program for the first time, and some of you may have already been in formal exercise programs a number of times. This program is designed to help you maintain the program whether this is your first time or your [nth] time.

During our sessions together, we will spend some time discussing strategies to help you stick to your exercise routine, but you we will also be doing some activities that will help to reinforce some of the things that we have discussed. After each class I will ask you to answer a few questions that are in your guidebook. These questions will only take a few minutes to answer.

After the three weeks are over, we will be asking you to fill out some questionnaires; these will be more or less identical to the ones that you were given to fill out before this class, although some of the wording will be a little different. We will also be contacting you in six and nine weeks to have you fill out a few similar questionnaire packages. These too will be very short, and will only take a few minutes to complete.

II. Rationale (10 min.)

Fitness can be a tricky thing to maintain. I'm sure a lot of you have signed up for fitness classes or started routines in the past with the best of intentions to continue exercising on a regular basis. However, as is the case for many of us, it is easier said than done.

Questions for the class:

- How many people have attended some kind of fitness class in the past? (e.g., aerobics, dance, martial arts)
- How many people have tried to start their own regular fitness routine? (e.g., going to the gym, running)

So most people here have tried to maintain fitness classes or a fitness routine of some kind in the past. Now lets find out how well you stuck to them. By "sticking to" your fitness schedule, I mean attending all of your classes, or exercising as often as you had initially planned. For example, if you were attending aerobics classes, "sticking to" your schedule might mean attending a fitness class every Monday, Wednesday, and Friday. If your routine was jogging, "sticking to" your schedule might mean going jogging for a half hour every weekday after school. Does everybody have a sense of what I mean by "sticking to" your schedule?

If YES, then...

Raise your hand if you managed to stick to your schedule:

- for the first week
- for the first month
- for the first six months
- for a whole year

So it looks like many people start out with really good intentions to stick with fitness programs or routines, but very few if any are able to stick to their schedule for a very long time. In fact, most people only manage to stick to their schedules for a couple of weeks. The purpose of this particular fitness program will be

to not only provide you with the opportunity to attend fitness classes, but more importantly, we want to help you to find ways to stick with your fitness program for as long as possible.

In order to accomplish this objective, we are going to discuss today some of the benefits of physical activity. This will give you some sense of why it is important for you to stick to your fitness program. Most of the benefits of physical activity are things that apply to people who adopt a fit lifestyle, and not people who just exercise on and off for a few months out of the year.

III. Benefits of Physical Activity

What are some of the things that you have heard in the media about the benefits of fitness, or that they have been told by others?

List and review all of the ideas suggested by the class, and then continue on to cover the following information:

1) Reduces risk of diabetes

Regular exercise helps to keep blood sugar levels steady and control insulin activity. If you are overweight or if diabetes runs in your family, you may be especially concerned about maintaining a healthy level of fitness.

2) Maintains weight

Physical activity has been shown to be the single most important factor in successful weight maintenance. Aim for burning about 1000-2000 calories per week from activity.

3) Reduces risk of premature death

By engaging in regular physical activity (including fitness classes) you can greatly increase your life expectancy, and help to ensure that you are more mobile later in life.

4) Reduces risk of heart disease

Physical activity helps to boost levels of HDLs, or "good" cholesterol in your blood. These HDLs help you by removing the "bad" cholesterol from your arteries, and transporting it to your liver, where it can be removed from your body. For this reason, increasing your level of HDLs by adopting a long-term approach to fitness can greatly decrease your risk of a heart disease later in life.

5) Improves health of muscles and bones

By engaging in aerobic exercise on a regular basis, you can improve blood flow to your muscles, and help them use energy more efficiently. In addition, engaging in strength training can build the size of your muscles, and increase your muscle strength. Strength training along with common activities such as walking or running can help to make your bones more dense, and therefore stronger.

6) Improves mental health

Many people report being in a much better mood overall when they are exercising regularly. Furthermore, regular exercise can help to reduce both anxiety and depression. In fact, many people who treat those with depression or anxiety disorders prescribe a regimen of regular physical exercise.

7) Reduces risk of high blood pressure

Regular physical activity over the long-run can reduce your risk of acquiring high blood pressure. Moreover, it can actually help to lower blood pressure in those who already have high blood pressure (without the use of medication).

8) Reduces risk of colon cancer

By incorporating regular physical activity into your lifestyle, you may reduce your risk for colon cancer.

9) Helps older adults become stronger

Part of the reason why older adults lose strength and stamina is because of decreased levels of physical activity. As a consequence, reductions in the thickness of bones, and the strength of muscles can occur. In addition, metabolic rate can slow down, making it easier to gain weight. Physical activity can counteract or minimize the impact of many of these "natural" processes of aging.

You are now aware of some of the benefits of staying fit. Hopefully some of these benefits will help to motivate you to stick with fitness as a lifestyle.

See you here same time and place next week.

Remind students to bring workbook with them next time (or hand in to me at the end of the class)

SESSION 2.

I. Recap (5 min.)

Last time we spent most of the session chatting about the purpose of these classes, and a bit about the benefits of staying fit for life. Today we are going to spend some more time talking about the benefits, but we will also spend some time talking about the costs. One of the reasons why people find themselves unmotivated to exercise is because there are often unanticipated costs associated with exercise. As long as you are aware of them in advance, you have the opportunity to prepare yourself for them when you experience them.

II. Costs and Benefits (10 min.)

For this activity, what I would like for us to do is to take a few minutes to list as many of the costs and benefits of exercising. If you look at page __ in your workbook, you will notice a table entitled "Costs and Benefits of Exercising".

When you think about it, some of the consequences of exercising are things that happen pretty quickly (i.e., within the first few days, or even the first hour), while others occur much later on (i.e., a few months, or even years later). Although long-term costs and benefits might seem motivating on the surface, often the most powerful determinants of whether or not people are going to exercise is the nature of the immediate consequences of exercise. That is, people who keep exercising often report that they do so because it they get a rush from the workout itself, or because they feel more relaxed immediately after their workout.

Benefits

What I would like for you to do right now is to think for a minute about the short-term benefits of exercising. That is, think of the things that are of immediate benefit when you first start exercising. You don't have to fill in all the blanks; just generate as many benefits as you can think of.

If you are having trouble thinking of some, that's ok because we are going to take a few minutes to discuss what everybody came up with afterwards. So try your best, but you can always get some ideas from other people when we have a discussion about it later...

(give them 5 minutes to fill out the first table)

Costs

Like anything else, fitness is not a bed of roses. Certainly there has to be some reason why people don't stick with their fitness programs. Lets see if we can generate some of the short-term costs associated with exercising. I will give you 5 minutes to fill out the second table in your workbook, and then we can discuss what you all came up with...

(give them 5 minutes to fill out the second table)

Now lets spend some time reviewing what you came up with...

(Review students suggestions first, making sure that they are only short-term consequences. Then add to the list with the suggestions below if necessary.)

Costs of Exercising

Benefits of Exercising

Rationale

As you might have noticed, there are quite a few costs and benefits associated with exercising. In fact, you might even find that there were some hidden costs and benefits that you hadn't considered in the past.

Reminder: Complete the questions at the end of the sections 1&2 of your activity book before next class. Should only take a few minutes.

SESSION 3.

Recap (5 min.)

I. Setting short-term fitness goals

Today we are going to talk about setting weekly fitness goals. Setting realistic and attainable weekly goals is crucial for helping people to get fit. People who don't set realistic goals usually do not attain as high a level of fitness and drop out earlier from fitness programs than those who do set fitness goals. However, those people who set their goals too high or too low do not do nearly as well as those who set their goals as being realistic but challenging.

Turn to your sheet for session "Labeled Short-Term Goals":

WEEKLY GOAL	WHERE AND WHEN? (be exact)	ANTICIPATED OBSTACLES	SOLUTIONS
...for end of this week:			
... for end of week 2:			
...for end of week 3:			

Weekly Goals

The first column entitled weekly goals requires you to fill in what your fitness goals are during the end of this week, the end of next week, and the end of next month. Go ahead and fill in your fitness goals in each of these spaces. Remember that your goals should be specific and reasonable.

For example, for the end of this week your goal might be to have attended all three fitness classes, and to go to the gym once for a half-hour workout. That goal is very specific, and it is reasonable to assume that you could reach that goal this week. On the other hand, a goal of attending 5 fitness classes and work out in the gym every day for two hours is specific, but it is not a goal that you could reach. If you were to state your goal as something like "to become more fit than last week", your goal would be one that you might be able to reach, it is not specific enough (i.e., we do not know what you mean by "more fit").

In summary then, you will want to set a goal that you can reach, but it must be specific enough that you know for sure when you have reached it.

Where and When

For this column, what I want you to do is to specify where and when you will be doing the things that are required to reach your fitness goal.

Obstacles

Anticipating obstacles is a very important part of overcoming them. For this part of the exercise, I would like you to think of all of the different kinds of obstacles that might stand in the way of reaching your own personal fitness goal.

But first, lets work through an example. Say your fitness goal is for the end of next week is to attend three fitness classes. What are some of the things that might get in the way of doing that?

(discuss examples generated by class)

Now that you have the idea, I want you to go ahead and fill out the obstacles section in your workbook. You can use any of the ideas that we have already talked about, but we have not covered all of them. As much as possible, try to fill out the obstacles section in a way that relates to your own personal fitness goals. They may not be the same as everyone else's, and there may be things that get in the way for you that others have not mentioned.

Solutions

Now the last step is to generate some ways of overcoming the obstacles that you have already listed. The kinds of solutions that you will come up with depend on what specific obstacles you have to deal with. The important thing is that you have a workable plan to deal effectively with whatever comes up. This kind of planning ahead can be surprisingly effective.

Just as an example lets try to come up with some ways of dealing with some of the obstacles that we listed in the previous examples.

(discuss solutions generated by class)

II. Facilitating Factors for Staying Fit (5 min.)

We have spent some time talking about what kinds of things get in the way of staying fit. Now maybe we can turn our discussion to the problem of what kinds of things make it easier for someone to stay fit.

- What are some of the things that people have experienced here that might make it easier for someone to maintain their adherence to their fitness program?

Examples:
- free time
- friend who exercises
- visible gains
- encouragement from others

Reminder: Complete the questions at the end of the sections 3 of your activity book before next class. Should only take a few minutes.

Reminder: We will be contacting you at the end of the fitness program to get you to fill out some post-testing questionnaires. They will not require much time, but it is very important that you fill them out for us.

Appendix G: Questionnaire Package for Study 4

PERSONAL INFORMATION

Student ID Number : _____

Today's Date: ___/___/___ (mm/dd/yy)

Gender : _____

Date of Birth : ___ / ___ / ___ (mm/dd/yy)

Height : ___ (feet), ___ (inches)

Weight : _____ (lbs)

Marital status: _____ University year: _____

FITNESS CLASS INFORMATION

• Fitness class name (e.g., "Energy Express", "Step"): _____

• Fitness class day (e.g., "MWF", "TR"): _____

• Fitness class time (e.g., "4:30-5:30pm"): _____

Time Perspective Questionnaire -Exercise Version (TPQ-E)

Consider each of the statements below. For each, indicate your level of agreement or disagreement by using the following scale:

1	2	3	4	5	6	7
Disagree very strongly	Disagree strongly	Disagree	Neutral	Agree	Agree strongly	Agree very strongly

Put the appropriate number, indicating your level of agreement or disagreement, in the box to the left of each statement.

	1.	Long-term fitness goals are at least as important to me as short-term fitness goals.
	2.	I exercise mainly for my current enjoyment.
	3.	I do not spend much time thinking about my long-term fitness.
	4.	I have a good sense of how I can keep fit throughout my life span.
	5.	I spend a great deal of time thinking about how my present exercise habits will affect my life later on.
	6.	I never consider the long-term consequences of staying fit before I exercise.
	7.	I do not have long-range fitness plans.
	8.	The immediate consequences of exercising are not as important to me as the long-range consequences.

1. During the next seven days, how much total time do you plan to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engage in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for next 7 days to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

2. During the next month how much total time do you plan to spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engage in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for next month to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

3. During the last seven days, how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for last 7 days to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

4. During the last month how much total time did you spend doing VIGOROUS physical activity and MODERATE physical activity? Record only time that you actually engaged in the activity (ignore breaks, rest periods, etc.). Please do not record any LIGHT physical activity (office work, light housework, very light sports such as bowling, or any activities involving sitting).

	Total hours for last month to nearest 1/2 hour
VIGOROUS ACTIVITY (jogging or running, swimming, strenuous sports such as singles tennis or racquetball, digging in the garden, chopping wood, etc.)	
MODERATE ACTIVITY (sports such as golf or doubles tennis, yard work, heavy housecleaning, bicycling on level ground, brisk walking, etc.)	

Please answer the following question by circling the number that best reflects your answer.

Do most people who are important to you think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7
Strongly Think I Should Not			Neutral			Strongly Think I Should

For each of the following adjectives, please rate your response to the following question: "For you to participate in regular vigorous or moderate physical activity or exercise would be..."

Wise	:____:____:____:____:____:____:____:	Foolish
Bad idea	:____:____:____:____:____:____:____:	Good idea
Useless	:____:____:____:____:____:____:____:	Useful
Worthwhile	:____:____:____:____:____:____:____:	Not Worthwhile
Healthy	:____:____:____:____:____:____:____:	Unhealthy
Interesting	:____:____:____:____:____:____:____:	Boring
Not enjoyable	:____:____:____:____:____:____:____:	Enjoyable
Chore	:____:____:____:____:____:____:____:	Fun
Pleasant	:____:____:____:____:____:____:____:	Unpleasant
Stimulating	:____:____:____:____:____:____:____:	Dull

The following questions ask about how you think other people would feel about you engaging in a program of regular exercise. Please indicate how much YOU feel that they think you should or should not exercise on a regular basis.

1. Does your spouse/partner (girlfriend/boyfriend) think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Thinks I Should Not			Neither/ Nor			Strongly Thinks I Should	Does not apply

2. Do your friends think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

3. Does your family think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

4. Does your fitness instructor think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Thinks I Should Not			Neither/ Nor			Strongly Thinks I Should	Does not apply

5. Do your co-workers or classmates think you should or should not exercise on a regular basis?

1	2	3	4	5	6	7	8
Strongly Think I Should Not			Neither/ Nor			Strongly Think I Should	Does not apply

Please indicate how likely you think it is that you would receive of the following potential benefits of physical activity by putting a check mark above the appropriate response category.

1. How likely is it that you personally will achieve or maintain good physical & cardiovascular fitness from exercising regularly?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

2. How likely is it that regular exercise will personally improve your daily functioning (improved sleep & appetite, wake up more refreshed, etc.)?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

3. How likely is it that regular exercise will personally lead to a greater sense of well-being (improved self-confidence, self-esteem, well-being)?

:_____:	:_____:	:_____:	:_____:	:_____:	:_____:	:_____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

4. How likely is it that regular exercise will provide you with personal time (competitive outlet, frustration release, fun, time to think)?

:____:	:____:	:____:	:____:	:____:	:____:	:____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

5. How likely is it that regular exercise will personally help you to relieve stress?

:____:	:____:	:____:	:____:	:____:	:____:	:____:
Extremely Unlikely	Quite Unlikely	Slightly Unlikely	In the Middle	Slightly Likely	Quite Likely	Extremely Likely

Each of the following questions asks you to evaluate the amount of confidence (0-100%) you have in your ability to stick to a program of regular exercise despite a variety given barriers.

1. Rate your confidence (0 - 100%) that you could exercise when tired. _____%

2. Rate your confidence (0 - 100%) that you could exercise when feeling depressed. _____%

3. Rate your confidence (0 - 100%) that you could exercise when feeling anxious. _____%

4. Rate your confidence (0 - 100%) that you could exercise during bad weather. _____%

5. Rate your confidence (0 - 100%) that you could exercise when you are slightly sore from the last time you exercised. _____%

6. Rate your confidence (0 - 100%) that you could exercise when you have a lot of work to do. _____%

7. Rate your confidence (0 - 100%) that you could exercise when you don't receive support from your family or friends. _____%

8. Rate your confidence (0 - 100%) that you could exercise when you have not exercised for a prolonged period of time. _____%

9. Rate your confidence (0 - 100%) that you could exercise when you have no one to exercise with. _____%

10. Rate your confidence (0 - 100%) that you could exercise when your schedule is hectic. _____%

On a scale from 1 to 10 rate your confidence (i.e. your certainty) in your ability or knowledge in the areas listed below.

1. I am confident in my ability to schedule my time in order to fit in a program of regular exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

2. I am confident in my ability not to miss more than one week of exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

3. I am confident in my ability to make exercise high in the priority list of my weekly activities.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

4. I am confident that I can organize time/work around my scheduled workouts.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

5. I am confident in my ability to exercise regularly, each week.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident

6. I am confident that I can keep to my scheduled exercise.

1	2	3	4	5	6	7	8	9	10
Not Confident				Moderately Confident					Extremely Confident