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Associations Among Health Behaviors and Time Perspective in Young Adults:

Model Testing with Boot-Strapping Replication

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Abstract

Previous research suggests that time perspective relates to health behavior; however, researchers have frequently employed inconsistent operational definitions and have often used projective or unpublished measures. The Zimbardo Time Perspective Inventory was created to provide a sound, objective measure of five distinct time perspective components. We examined the independent prediction of both risky and protective health behaviors from future, hedonistic, and fatalistic time perspective in 1,568 undergraduates using the ZTPI. Health behaviors included alcohol, drug, tobacco, and seat belt use, sex behaviors, and exercise. Future time perspective was related to increased protective and decreased risky health behaviors, whereas hedonism exhibited an opposite pattern though was a stronger predictor; fatalism was related only to health-destructive behaviors. Gender interactions reveal that hedonism is a stronger predictor of risky health behaviors for females.

Health behaviors contribute to half of all deaths annually (Mokdad, Marks, Stroup, & Gerberding, 2004). Health-related *risk behaviors* (e.g., smoking, excessive drinking) are actions that may result in immediate or long-term negative health consequences, whereas health-related *protective behaviors* (e.g., condom use, seat belt use) are actions that maintain or improve health status. Public health efforts to enhance population health attempt to reduce risk behaviors and to promote protective behaviors (see *Healthy People 2010*; USDHHS, 2000), and are considered most successful when guided by theory (Fishbein, 2000; Fishbein & Yzer, 2003).

Many behavioral theories purport to explain health behavior and to facilitate risk reduction and health promotion. Theories that are purely informational provide incomplete explanations and poor prediction of existing behavior and behavior change; more sophisticated theories recognize the important role played by motivational forces (Fisher & Fisher, 1992; Miller, 1985; Prochaska, DiClemente, & Norcross, 1992). One motivational construct that shows considerable promise in predicting health-related risk and protective behaviors is time perspective.

Generally, time perspective refers to the relative temporal orientation that motivates (i.e., guides and influences) an individual's typical actions and goals. Zimbardo and Boyd (1999) theorize that time perspective consists of five factors: past-positive, past-negative, present-hedonistic, present-fatalistic, and future orientation (see Boyd & Zimbardo, 2005, for a thorough discussion). In health-related research, past orientation has demonstrated little explanatory capability among young adults; consequently, the preponderance of research with this population focuses on an analysis of present and future time perspective as predictors of health behavior.

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In general, *present time perspective* refers to a primary orientation to the here-and-now, and an inclination to form goals and adopt behaviors that meet immediate desires. There are two components of present time perspective that are theorized to operate differently, such that (a) *hedonistic time perspective* evokes immediate, pleasure-oriented goals, whereas (b) *fatalistic time perspective* is characterized by a general pessimism and self-destructive behavior. Independent of present time perspective, *future time perspective* represents one's tendency to abstain from immediate pleasure in order to obtain long-term rewards.

Several studies have examined the relationships between time perspective and health behaviors. *Present time perspective* frequently forecasts *risky health behaviors*. For example, Zimbardo, Keough, and Boyd (1997) found that present time perspective was positively related to risky driving, whereas Rothspan and Read (1996) reported associations with frequent sexual behavior and more sexual partners. Wills, Sandy, and Yaeger (2001) and Keough, Zimbardo, and Boyd (1999) found positive relationships between present time perspective and substance use. Overall, the relationship between present time perspective and risk behavior is well-established, but the link with *protective behaviors* has not been well-studied.

Researchers have also examined the influence of *future time perspective* on health behaviors. In general, this research indicates that individuals with a stronger future time perspective tend to report fewer risk behaviors, including less risky driving (Zimbardo et al., 1997), delayed onset of sexual activity with fewer number of sexual partners (Rothspan & Read, 1996), and less substance use (Wills et al., 2001). Moreover, future time perspective correlates positively with health protective behaviors such as condom use (DiIorio, Parsons, Lehr, Adame, & Carlone, 1993), exercise, and healthy eating (e.g., Mahon, Yarcheski, & Yarcheski, 1997).

Despite the consistent pattern of findings, confidence in the relationship between time perspective and health behavior is constrained by conceptual and methodological limitations. Conceptually, researchers have been inconsistent in defining time perspective. Time perspective has been operationalized as (a) the length of time an individual envisions their future and sets goals (Klineberg, 1968; Lessing, 1972); as (b) a motivational construct consisting of a propensity to engage in goal-setting coupled with a realistic evaluation of the required costs and time (de Volder & Lens, 1982); as (c) the degree to which an individual's future years were perceived as worthwhile, lengthy, and opportunistic (Lang & Carstensen, 2002); and (d) as the inverse of fatalism (Kalichman, Kelly, Morgan, & Rompa, 1997).

In addition to the conceptual inconsistencies, the assessment of time perspective has been problematic as well. Initially investigators used unreliable projective measures and clinical interviews (Lessing, 1972; Teahan, 1958); more recently, investigators have relied upon a poorly validated and unpublished measure (e.g., Kalichman et al., 1997; DiIorio et al., 1993; Lang & Carstensen, 2002; Mahon & Yarcheski, 1997; Yarcheski et al., 1997). Thus, inconsistent conceptual definitions and measurement constraints limit the validity and generalizability of much of the existing research on time perspective and health behaviors.

A recent advance in the conceptualization and measurement of time perspective promises to allay these concerns. Regarding the measurement of time perspective, Zimbardo and Boyd (1999) developed and validated an objective measure called the Zimbardo Time Perspective Inventory (ZTPI). The ZTPI has a replicable factor structure, convergent and discriminate validity, and appropriate scale reliabilities. Zimbardo and Boyd also improved the theoretical basis of time perspective when they reconceptualized this construct as an overarching, non-conscious psychological process that includes social, personality, affective, and cognitive influences, and that shapes a person's perceptions, actions, and goals.

Zimbardo and Boyd's (1999) improved conceptualization reveals a possible confound in previous research, namely: Future, hedonistic, and fatalistic time perspective are correlated in

practice (despite their theoretical independence) so failing to control for other aspects of time perspective may provide misleading results; that is, the relationships between future time perspective and health behaviors may by an artifact of the shared present time perspective variance. Generally, the two components of present time perspective correlate moderately ($.2 \leq r \leq .5$; Rothspan & Read, 1996; Zimbardo & Boyd, 1999), and negatively with future time perspective (Keough et al., 1999; Rothspan & Read, 1996; Zimbardo & Boyd, 1999). Furthermore, most research has examined present time perspective--health behavior relationships using hedonism but not fatalism, and often researchers do not distinguish between the two types when examining present oriented time perspective. To advance our understanding of these motivational constructs, it is essential to determine the independent contributions of these three components of time perspective and to clarify how they relate to both health-related risk and protective behaviors.

In summary, extant research demonstrates that (a) future time perspective correlates positively with protective health behaviors, and negatively with risky health behaviors; and (b) hedonistic time perspective forecasts increased risky health behaviors. Although this pattern of relationships is consistent, time perspective has been inconsistently defined and frequently assessed with questionable measures. Moreover, few studies have examined (a) the independent contribution of each time perspective component in the prediction of health behavior; (b) the prediction of health behavior from a fatalistic time perspective; (c) the relationship between present time perspective and protective health behaviors; and (d) whether the associations between time perspective and health behavior are moderated by gender.

Given the limitations of extant research, we had five goals for the present study. First, we sought to replicate previous findings linking time perspective and health behaviors with stronger methods, using a psychometrically-sound, empirically-validated, multi-dimensional assessment of time perspective. Second, we sought to investigate the independent time perspective effects while controlling for shared relationships, including gender, to explore the relative strength of each component in the prediction of health behaviors. This effort to parse the independent effects of each time perspective component will enhance our understanding of the unique contributions of these constructs. Third, we sought to extend previous research by examining the relationship between hedonistic present time perspective and both risky and protective health behaviors. Based on theory as well as empirical precedent, we predict that hedonistic present time perspective will be positively associated with risky behaviors and negatively associated with protective behaviors. Fourth, we address whether fatalistic present time perspective is independently associated with risky or protective health behaviors. This extends previous findings because previously published studies assessing present time perspective and health behaviors have failed to examine the fatalistic aspect of present time perspective. Finally, to minimize the problem of "overfitting," and to strengthen the confidence in our findings, we sought to cross-validate our findings using boot-strapping procedures.

Method

Participants

Participants (n = 1,568) were college undergraduates enrolled in an introductory psychology course who participated for course credit. The average age in the sample was 19.3 (SD = 1.0), and ages ranged from 18 to 25. The sample was 81% White, 8% Asian, 6% Black, 1% Latino/Latina, and 4% other. Furthermore, 64% were women, 53% were freshmen, and 81% lived in an on-campus residence. Most people rated their overall physical health as good (27%), very good (37%), or excellent (23%), whereas 12% rated it as poor (2%) or fair (10%).

Measures

***Zimbardo Time Perspective Inventory* (ZTPI; see Appendix A)—**We collected data using the future, hedonistic, and fatalistic time perspective scales of the ZTPI. All scales use a five-point Likert-type response format that ranges from "very uncharacteristic" to "very characteristic." The future scale includes 13 items, the hedonistic scale includes 15 items, and the fatalistic scale includes 9 items. The average inter-item correlation for the future scale was .24, the average corrected item-total correlation was .44, and the alpha reliability was .81. The average inter-item correlation of the hedonism scale was .22, the average corrected item-total correlation was .41, and alpha was .80. The average inter-item correlation for the fatalistic scale was .25, the average corrected item-total correlation was .42, and the alpha reliability coefficient was .74. Research has also provided convergent and discriminant evidence for the validity of the ZTPI (Zimbardo & Boyd, 1999).

Risk behaviors—The assessed risk behaviors included typical and most extreme alcohol consumption, lifetime drug use, drug use over the previous month, number of lifetime sexual partners, number of sexual partners over the previous year, and smoking frequency. Participants reported alcohol use by estimating the specific number of drinks consumed per day for a typical drinking week and for the heaviest drinking week during the previous 30 days. A drink was defined as 12oz beer, 4oz wine, or 1oz liquor. Drug use was assessed with a series of yes/no questions that determined if a participant has used any of the following 15 recreational substances during the past 30 days and throughout their lifetime: marijuana, PCP, sedatives, GHB, ecstacy, hallucinogens, inhalants, opiates, roofies, cocaine, ecstasy, amphetamines, heroin, over-the-counter stimulants, and other). Participants were categorized as drug-users (coded '1') if any substance was endorsed or non-users (coded '0'). Participants also reported the number of sexual partners during the previous year and throughout their lifetime. Smoking frequency was assessed with a categorical item that used the following response choices: "never smoked regularly," "smoked in past but quit now," "less than once per month," "at least monthly," "at least weekly," and "daily."

Protective behaviors—A series of categorical items were used to assess seat belt use ("never," "occasionally," "half of the time," "most of the time," or "always"), vigorous physical exercise ("rarely/never," "1-2 times a month," "once or twice a week," "several times a week," and "every day"), and condom and birth control use during the past three months ("never," "rarely," "sometimes," "often," "most of the time," "always," and "have not had sex").

Procedures

Students from an introductory psychology course volunteered for a "College Health Study." The students then met in groups led by research assistants (RAs) where they learned more about the study and its procedures. RAs explained that all responses were strictly confidential, and that the study was protected by a Federal Certificate of Confidentiality. Once all questions were answered, the RAs had the students who wished to participate sign a written consent form. Participants then completed the survey that included all of the measures using a scannable packet. Data for this project were collected regularly throughout each of seven consecutive academic semesters (Fall, 2001 through Fall, 2003).

Statistical Analyses

To replicate that present and future time perspective are associated with risk behavior, a series of multiple regression analyses were performed to predict risky behavior from future, hedonistic, and fatalistic time perspectives; we also included gender as a predictor to control for gender differences and test for moderation of risky health behaviors. The criterion risk behaviors included (a) number of alcoholic drinks consumed during a typical week in the last

month, (b) drinks consumed during the heaviest week in the last month, (c) any recreational drug use (excluding alcohol) over their lifetime versus no use, (d) any drug use over the past 30 days versus no use, (e) number of lifetime sexual partners (where sex is defined as oral, anal, or vaginal sex), (f) number of partners during the previous year, and (g) smoking frequency. To examine how time perspective relates to health protective behaviors, we examined the following criterion variables: (a) vigorous exercise, (b) seat belt use, (c) condom use, and (d) any form of birth control as the criterion variables.

The continuous alcohol consumption and sexual partner variables were transformed with a square root transformation because they exhibited significant positive skew. The vigorous exercise item was approximately normal and was treated as continuous; drug use was coded ‘0’ for no and ‘1’ for any drug use.

To increase power and simplify the analyses, we collapsed across infrequently-endorsed response categories (see Table 1). For smoking behavior, new response categories can be interpreted as “non-smoker” (“never smoked,” “quit”), “occasional-smoker” (“< 1 per month,” “monthly”), and “regular-smoker” (“weekly,” “daily”). For seat belt use, “most of the time” was combined with “always” and was coded ‘1’, whereas the remaining categories were combined and coded ‘0’. For condom and birth control use, we combined the three categories that denoted regular condom and birth control use (coded ‘1’), and the three categories that denoted occasional or no use (coded ‘0’).

The time perspective relationships were modeled using multiple regressions for each criterion variable. Predictors (i.e., time perspective, gender) were entered simultaneously into the regression equation, and then a forward stepwise procedure was used to add any interaction term that significantly increased the prediction of the model. The ZTPI predictors were centered on their respective grand means to minimize multicollinearity among predictors and to obtain more meaningful intercept estimates; gender was coded ‘0’ for males and ‘1’ for females. Analyses involving categorical criterion variables (e.g., drug use, smoking) used logistic or multinomial logistic regression procedures for dichotomous and polytomous variables, respectively.

For the time perspective variables, only 11 cases of 1,568 possible (< 1%) lacked complete data. Across the various criterion variables, the number of cases that exhibited missing data ranged from 0 to 23, with two exceptions. The perceived general health and exercise data were unavailable for one wave of data collection, which resulted in 126 missing cases (8%). Moreover, the assessment of birth control and condom use over the past three months inherently creates missing data by excluding people who were not sexually active (~29%). Cases with missing data were eliminated from analyses for which they did not contribute complete data across all the variables in the model being tested. Furthermore, outliers (i.e., values that exceeded 3 standard deviations) were dropped from the analysis; however, no more than ten outliers were omitted from any one model.

To address the robustness of the estimated confidence intervals and *p*-values for the time perspective relationships, all results were bootstrapped using Stata (ver. 8; StataCorp., 2003). Bootstrapping essentially treats the sample as a population and repeatedly resamples the data with replacement to create alternate samples on which to fit the regressions (Efron & Tibshirani, 1993). Bootstrapping is a non-parametric technique that yields accurate parameter estimates even with highly skewed variables, and can be used to assess the degree to which the estimated regression coefficients would be likely to vary across other random samples of the same population. Moreover, if a sample is representative of the target population, bootstrapping also controls for the family-wise Type I error rate associated with multiple statistical tests by yielding an empirical sampling distribution for each coefficient. (A Type I error is the result

of an improbable sampling of the null population, such that an extreme sample regression estimate falsely appears to be significantly different from zero. However, improbable, extreme regression coefficients are readily identified as aberrant through the repeated resampling procedure via the bootstrap.) We bootstrapped each regression 1,000 times using samples of size *n*.

Results

Descriptive statistics for the predictor and criterion variables are listed in Table 1. The ZTPI items were scored on a 1 to 5 point scale, and items within a scale were averaged to produce the respective future, hedonistic, and fatalistic scale scores. The average future score was 3.6 (*SD* = .5), the average hedonistic score was 3.4 (*SD* = .5), and the average fatalistic score was 2.4 (*SD* = .5). The hedonism and fatalism scales correlated modestly (*r* = .36), and correlated negatively with future orientation (*r* = -.32 and *r* = -.40 respectively) indicating that these are related but distinct constructs.

During a typical week, the average participant consumed 12.9 drinks (*SD* = 13.6), and 18.0 (*SD* = 14.0) drinks during the week of heaviest consumption. On average, participants had 1.8 (*SD* = 2.5) sexual partners within the last year and 3.7 (*SD* = 5.1) in their lifetime. Furthermore, 56% of the sexually active students reported always using some form of birth control and 37% reported always using condoms. Twenty-nine percent of students had never used drugs (excluding alcohol), and 55% had not used drugs within the past month. Moreover, 70% reported exercising at least once a week, 67% of participants reported always wearing their seat belt, and 72% reported that they never smoked regularly.

Risk Behavior Relationships

The *continuous* dependent variable regression results (i.e., alcohol consumption and sexual partners) are summarized in Table 2, whereas the *categorical* dependent variable regression results are summarized in Table 3. The results indicate that future orientation independently predicted less risky health behaviors; that is, a stronger future orientation was associated with less drinking, drug use, and smoking. However, the relationship between non-smokers and occasional smokers was only marginally predicted ($p < .10$) by future time perspective. Future time perspective was not associated with the number of sexual partners.

Present hedonism was related to more frequent risky behaviors, which included drinking, drug use, smoking, and number of sexual partners. Furthermore, there were four significant gender × hedonism interactions. For women, hedonism was a much stronger factor in the prediction of lifetime drug use (odds ratio (OR) = 2.01 [95% CI = 1.2, 3.4], *SE* = .27, $p < .01$), sex partners in the previous year (β = .11, *SE* = .09, $p < .05$), and lifetime sex partners (β = .10, *SE* = .12, $p < .05$). In addition, whereas hedonism was not a significant predictor for regular smoking in men, hedonism was a strong predictor for regular smoking in women (OR = 2.32 [95% CI = 1.2, 4.5], *SE* = .33, $p < .05$). In contrast, fatalism predicted only regular smokers from non-smokers; the other risky health behavior relationships involving fatalism were not statistically significant.

As expected, women drank significantly less alcohol than men and had fewer sexual partners; however, women did not differ from men in their drug use or smoking frequency.

Protective Behavior Relationships

The same statistical procedures were used to examine the prediction of protective health behaviors from the three time perspective scales and gender, and the results are also depicted in the lower halves of Tables 2 and 3. Future time perspective was positively related to three

protective behaviors: exercise, condom use for both males and females, and any birth control use for females only (gender × future interaction: OR = 2.25 [95% CI = 1.3, 3.9], *SE* = .28, $p < .01$). It was not related to seat belt use.

Hedonism was related to only two health protective behaviors. First, a significant gender × hedonism interaction ($\beta = .29$, *SE* = .14, $p < .05$) indicated that hedonism was positively associated with exercise, but only for women. Second, hedonism was also positively related to safer sex behaviors (i.e., condom use, any birth control). To determine if the positive relationship between hedonism and safer sex behaviors was an artifact of sexual frequency, we conducted two post-hoc analyses that included the frequency of sexual acts over the previous three months and the number of lifetime sexual partners as predictors. The frequency of sexual acts over the previous three months and birth control use were not significantly related (OR = .99 [95% CI = .99, 1.0], *SE* = .003, $p > .05$), and the relationship between hedonism and birth control use was unaffected by the inclusion of this predictor in the model. However, number of lifetime sexual partners was strongly related to condom use (OR = 2.44 [95% CI = 2.0, 3.0], *SE* = .10, $p < .01$), and the inclusion of that variable in the model resulted in a non-significant relationship between hedonism and condom use (OR = 1.17 [95% CI = .9, 1.6], *SE* = .15, $p > .05$).

Fatalism was the only significant predictor of seat belt use, where high fatalism was predictive of less seat belt use. Moreover, fatalism was associated with less birth control use in men (OR = 1.97 [95% CI = 1.1, 3.0], *SE* = .27, $p < .05$).

In general, females tended to exercise less often but used seat belts and birth control more often.

Table 4 lists the R^2 statistics for the multiple regressions and the Nagelkerke R^2, a pseudo-R^2 statistic, for the logistic regressions. Using Cohen's (1988) guidelines, these R^2 values generally indicate medium to large effect sizes in the prediction of health behavior from gender and time perspective. The prediction of condom use yielded the smallest effect (Nagelkerke $R^2 = .02$), and the prediction of heaviest alcohol consumption revealed a large effect ($R^2 = .16$).

Cross-Validation using Bootstrapping

We bootstrapped each regression using the raw data (i.e., non-transformed) and included all significant interactions; outliers were still excluded. For each estimated time perspective regression coefficient, we constructed 95% confidence intervals based on the empirical sampling distributions created by the bootstrap using the percentile method. These confidence intervals depict the range of plausible regression coefficients one might encounter from other random samples. Table 5 lists the upper and lower bounds for the 95% confidence intervals derived from the bootstrap for the time perspective regression estimates. In general, the confidence intervals align with the results depicted in Tables 2 and 3. Most of the confidence intervals corresponding to the significant predictors do not include 0, which indicates that the findings are replicated in more than 950 of the bootstrapped samples and that the true, population relationship is indeed different from 0. The only exception was the prediction of occasional smoking from hedonism.

Discussion

The primary objective for this study was to characterize the *independent* relationships that exist among the components of time perspective and risky and protective health behaviors. Consistent with previous research (DiIorio et al., 1993; Rothspan & Read, 1996; Zimbardo et al., 1997), future time perspective proved to be a strong predictor of both risky and protective

health behaviors, and its effects were fairly robust. That is, higher levels of future time perspective were associated with more exercise and condom use, and with more birth control use for females. Furthermore, future time perspective was associated with less drinking, drug use, and smoking. However, future time perspective was not related to the number of sexual partners for males or females, which may reflect the fact that multiple sexual partners are not necessarily viewed as risky if safer sex measures are taken.

Also congruent with previous findings (Keough et al., 1999; Wills et al., 2001) hedonism predicted several risky health behaviors. Independent of the other time perspective components, hedonism was associated with more alcohol use, drug use, and sexual partners. Conversely, hedonism was not related to regular smoking or exercise, and the association between hedonism and occasional smoking should be interpreted cautiously, as indicated by the bootstrap analyses. Surprisingly, participants high in hedonism also tended to engage in more safer sex practices, where post hoc analyses indicated that the relationship may be explained by sexual partner frequency. In other words, hedonistic people may seek more sexual partners, and people with multiple partners may be more likely to adopt safer sex practices. This research also confirms previous findings (Hamilton, Kives, Micevski, & Grace, 2003; Keough et al. 1999; Zimbardo et al. 1997) that hedonistic present time perspective is a much stronger predictor of health behaviors, relatively, than future time perspective.

In general, fatalism was not a strong predictor of health behavior. Fatalism was related to less seat belt use and to smoking regularly. Further, fatalism was related to less safer sex practices in men, which replicates the research done by Kalichman et al. (1997) who found fatalism predicted gay men's unprotected sex outside their primary relationship. It is important to note that fatalism exhibited a moderate negative correlation with future time perspective (r = -.4), which causes fatalism to appear to be a strong predictor of health behavior if future time perspective is omitted from the regression models we explored. This finding, unique to the current research, demonstrates the necessity of examining the time perspective variables concurrently because their shared variance may obscure the true, independent relationships with other variables. Further, future research should be conducted to determine if future orientation and fatalism are indeed distinct constructs or rather opposite ends of the same continuum.

Most health behavior gender differences were expected. Consistent with prior research (e.g., Ahluwalia et al., 2003; Liang et al., 1999) females drank less, had fewer sexual partners, and were more likely to use birth control and seat belts. However, there was a notable trend between gender and hedonism such that the relationships between hedonism and drug use, sexual partner frequency, and smoking were much stronger in women than in men. This finding suggests that hedonism is an important risk factor in women for increased risky health behaviors. This may reflect a cultural bias that males are typically expected to act in a hedonistic manner regardless of the strength of their hedonistic orientation. Thus, because hedonism often opposes female normative behavior, it serves as a stronger predictor for risky health behaviors in women.

Whereas hedonism was associated with pleasurable health risk behaviors (e.g., alcohol use, sex), fatalism was associated with health-damaging risk behaviors (e.g., daily smoking, no seat belt use). This suggests that processes underlying various health risk behaviors are not uniform, and that motives can be delineated along a pleasure dimension. In other words, hedonistic people would be expected to consume alcohol in excess for pleasure but remain mindful of the possible negative effects, whereas fatalistic people would be expected to drink in excess with disregard to the possible health consequences.

To sum, these results support time perspective as a valuable marker of various health practices. Young adults who were high in future time perspective tended to engage in fewer risky health

behaviors and were more likely to adopt health protective behaviors. For clinical settings, a client's future orientation would reveal how frequently and how responsibly he/she approached risky situations. Conversely, young adults with a hedonistic orientation tended to engage in risky health behaviors. Therefore, hedonistic time perspective would be informative of a young adult's propensity to engage in deviant, risky behaviors, especially for women. However, high hedonism was not necessarily associated with decreased protective health behaviors. Indeed, a person high in both future and hedonism time perspective may be likely to approach health risk situations while concurrently incorporating health protective behaviors (e.g., multiple sexual partners using condoms). Boyd and Zimbardo (2005) explain the importance of using time perspective information from all factors when examining health behaviors. Finally, fatalistic orientation strongly indicates individuals who are most at need for intervention.

The current study had several strengths that increase confidence in its findings. These strengths include use of a large sample, the assessment of the multiple components of time perspective with a psychometrically validated measure (Zimbardo & Boyd, 1999), inclusion of several health behaviors of different types consistent with the idea that health behaviors often cluster (i.e., Pronk et al., 2004; Raitakari et al., 1995), evaluation of gender effects, and use of advanced statistical methods to cross-validate our findings (Efron & Tibshirani, 1993). Two limitations also need to be acknowledged. First, the cross-sectional nature of the data precludes conclusions regarding causation. Second, the limited demographics of the participants preclude generalization to other populations of different ages, or similarly-aged young adults who are not in a college setting.

These hypotheses as well as findings from the current research suggest that time perspective is an important factor in understanding health behaviors. Zimbardo and Boyd (1999) suggest that time perspective is a non-conscious, continuous process that influences our motivations and actions. Time perspective may reflect a higher-order factor that influences the proximal determinants (e.g., knowledge, attitudes) typically investigated in health behavior research. Future research should seek to determine useful typologies stemming from the interactions among all the time perspective factors for better health behavior prediction (e.g., high future / high hedonism). Further, health researchers should explore the malleability of future time perspective in an intervention context as it appears to play a protective role against risky behaviors. Finally, it is also important to determine if time perspective moderates intervention efficacy across various approaches to health behavior interventions. For example, individuals with strong future time perspective may only require an informational intervention to effect behavior change, whereas hedonistic individuals may require a behavior-based intervention to adopt more appropriate behaviors. Time perspective shows promise as an important underlying motivational influence that affects health behaviors and should be incorporated into efforts to improve health practices.

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Appendix

ZTPI - Hedonistic

1. I believe that getting together with one's friends to party is one of life's important pleasures.
2. I do things impulsively.

3. When listening to my favorite music, I often lose track of time.
4. I try to live my life as fully as possible, one day at a time.
5. Ideally, I would live each day as if it were my last.
6. I make decisions on the spur of the moment.
7. It is important to put excitement in my life.
8. I feel that it's more important to enjoy what you're doing than to get work done on time.
9. Taking risks keeps my life from becoming boring.
10. It is important for me to enjoy life's journey than to focus only on the destination.
11. I take risks to put excitement in my life.
12. I often follow my heart more than my head.
13. I find myself getting swept up in the excitement of the moment.
14. I prefer friends who are spontaneous rather than predictable.
15. I like my close relationships to be passionate.

ZTPI - Fatalistic

1. Fate determines much of my life.
2. Since whatever will be will be, it doesn't really matter what I do.
3. It takes joy out of the process and flow of my activities if I have to think about goals, outcomes, and products.
4. You can't really plan for the future because things change so much.
5. My life path is controlled by forces I cannot influence.
6. It doesn't make sense to worry about the future, since there is nothing that I can do about it anyway.
7. Life is too complicated; I would prefer the simpler life of the past.
8. Spending what I earn on pleasures today is better than saving for tomorrow's security.
9. Often luck pays off better than hard work.

ZTPI - Future Orientation

1. I believe that a person's day should be planned ahead each morning.
2. If things don't get done on time, I don't worry about it.
3. When I want to achieve something, I set goals and consider specific means for reaching those goals.
4. Meeting tomorrow's deadlines and doing necessary work comes before tonight's play.
5. It upsets me to be late for appointments.
6. I meet my obligations to friends and authorities on time.
7. I take each day as it is rather than try to plan it out.

8. Before making a decision, I weigh the costs against the benefits.
9. I complete projects on time by making steady progress.
10. I make lists of things to do.
11. I am able to resist temptations when I know that there is work to be done.
12. I keep working at difficult, uninteresting tasks if they will help me get ahead.
13. There will always be time to catch up on my work.

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Table 1

Descriptive Statistics for the Independent and Dependent Variables

	Mean	SD	Min	Max	*n*
ZTPI-Hedonistic	3.4	.48	1.7	4.9	1561
ZTPI-Fatalisitc	2.4	.54	1.0	4.4	1563
ZTPI-Future	3.6	.53	1.6	5.0	1561
Drinks per typical week	12.9	13.57	0	143	1568
Drinks for heaviest week	18.0	14.00	0	171	1568
Sexual partners (last year)	1.8	2.50	0	40	1568
Sexual partners (lifetime)	3.6	4.50	0	45	1568
Smoking frequency (*n* = 1545)					
Never	72%				
Quit	4%				
< 1 per month	5%				
Monthly	4%				
Weekly	6%				
Daily	10%				
Vigorous exercise (*n* = 1440)					
Never	15%				
1-2 times/month	15%				
1-2 times/week	27%				
Several times/week	31%				
Daily	12%				
Seat belt frequency (*n* = 1568)					
Never	1%				
Occasionally	4%				
Half the time	4%				
Most of the time	24%				
Always	67%				
Condom use (*n* = 1093)[a]					
Never	34%				
Rarely	7%				
Sometimes	5%				
Often	3%				
Most of the time	13%				
Always	37%				
Any birth control (*n* = 1107)[a]					
Never	31%				
Rarely	2%				
Sometimes	2%				
Often	2%				
Most of the time	7%				
Always	56%				
Prior month drug use (excluding alcohol)					
No	55%				
Yes	45%				
Lifetime drug use (excluding alcohol)					
No	29%				
Yes	71%				

[a] 443 reported no sexual activity

Table 2

Multiple Regression for Health Behaviors with Continuous Data

Criterion	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β	*B*	*SE B*	β
	Future			Hedonism			Fatalism			Gender		
Risky health behaviors												
Typical drinking	-.27	.09	-.08**	.95	.10	.24**	-.03	.09	-.01	-.90	.09	-.23**
Heaviest drinking	-.33	.11	-.08**	1.15	.12	.25**	-.06	.11	-.01	-1.15	.11	-.25**
Sexual partners (year)	-.03	.04	-.02	.24	.07	.15**	-.06	.04	-.04	- .08	.04	-.05*
Sexual partners (lifetime)	-.06	.06	-.03	.29	.10	.13**	-.07	.06	-.03	- .17	.06	-.08**
Protective health behaviors												
Exercise	.31	.07	.13**	-.04	.12	-.02	-.09	.07	-.04	-.51	.07	-.20**

* $p < .10$

** $p < .05$.

Table 3

Logistic Regression for Health Behaviors with Categorical Data

Criterion	*B*	*SE B*	OR	*B*	*SE B*	OR	*B*	*SE B*	OR	*B*	*SE B*	OR
	Future			Hedonism			Fatalism			Gender		
Risky health behaviors												
Past month drug use	-.53	.12	.59**	.77	.13	2.16**	-.10	.11	.90	-.05	.11	.95
Lifetime drug use	-.39	.13	.68**	.52	.22	1.68**	-.15	.12	.86	-.01	.12	.99
Non-smokers vs. occasional-smokers	-.36	.20	.70*	.54	.22	1.72**	-.07	.20	.94	.06	.15	1.05
Non-smokers vs. regular-smokers	-.58	.15	.56**	.03	.27	1.03	.33	.15	1.40**	-.05	.16	.95
Protective health behaviors												
Seat belt use	-.09	.19	.91	-.04	.21	.96	-.76	.18	.47**	.43	.18	1.53**
Condom use	.41	.13	1.50**	.40	.14	1.49**	-.09	.13	.91	-.10	.13	.91
Any birth control	-.28	.22	.75	.74	.16	2.09**	-.99	.22	.37**	.49	.14	1.63**

Note. *B* coefficients represent logits and OR represents odds ratio.

* p < .10

** p < .05.

Table 4

R^2Effect Sizes Associated with the Prediction of Eleven Health Behaviors from Time Perspective and Gender

Criterion	R^2	Criterion	Nagelkerke R^2
Typical drinking	.14	Past month drug use	.08
Heaviest drinking	.16	Lifetime drug use	.08
Sexual partners (year)	.06	Smoking	.06
Sexual partners (lifetime)	.05	Seat belt use	.04
Exercise	.05	Condom use	.02
		Any birth control	.07

Note. For logistic regression only pseudo R^2(e.g., Nagelkerke R^2) statistics are available.

Table 5

Empirical Upper and Lower Bounds of the 95% Confidence Intervals for the Bootstrapped Time Perspective Regression Coefficients

	Future		Hedonism		Fatalism	
	Lower Bound	**Upper Bound**	**Lower Bound**	**Upper Bound**	**Lower Bound**	**Upper Bound**
Typical Drinking	**-2.9**	**-0.4**	**4.1**	**6.6**	-1.2	1.2
Heaviest Drinking	**-4.2**	**-0.5**	**6.2**	**9.9**	-2.0	1.3
Sexual Partners (year)	-0.3	0.1	**0.2**	**1.0**	-0.3	0.7
Sexual Partners (lifetime)	-0.7	0.2	0.0	2.0	-0.6	0.2
Exercise	**0.2**	**0.4**	-0.3	0.2	-0.2	0.0
Past month drug use	**-0.8**	**-0.3**	**0.5**	**1.0**	-0.3	0.1
Lifetime drug use	**-0.7**	**-0.1**	**0.1**	**1.0**	-0.4	0.1
Non-smokers vs. Occasional-smokers	-0.7	0.0	-0.1	1.4	-0.4	0.3
Non-smokers vs. Regular-smokers	**-1.0**	**-0.3**	-0.4	0.5	**0.1**	**0.6**
Seat Belt Use	-0.5	0.3	-0.4	0.4	**-1.1**	**-0.4**
Condom Use	**0.1**	**0.7**	**0.1**	**0.7**	-0.3	0.2
Any Birth Control	-0.7	0.1	**0.4**	**1.1**	**-1.5**	**-0.6**

Note. Values in bold indicate that at least 950 of the bootstrapped regressions yielded relationships consistent with the original data.