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Bidirectional Associations Between Future Time Perspective and Substance Use Among Continuation High-School Students

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Abstract

We examined whether a bidirectional, longitudinal relationship exists between future time perspective (FTP), measured with the Zimbardo Time Perspective Inventory, and any past 30-day use of alcohol, tobacco, marijuana, or hard drugs among continuation high school students ($N = 1,310$, mean age 16.8 years) in a large urban area. We found increased FTP to be protective against drug use for all substances except alcohol. While any baseline use of substances did not predict changes in FTP 1 year later. The discussion explores why alcohol findings may differ from other substances. Future consideration of FTP as a mediator of program effects is explored.

Keywords

future time perspective; future orientation; continuation high school; tobacco; alcohol; marijuana; hard drugs; adolescent; toward no drug abuse; substance use

INTRODUCTION

Substance use is a leading cause of morbidity and mortality among adolescents in the United States (Brannigan, Schackman, Falco, & Millman, 2004) and has been associated with poor academic performance (Diego, Field, & Sanders, 2003; Englund, Egeland, Oliva, & Collins, 2008), job instability (Krohn, Lizotte, & Perez, 1997), teen pregnancy (Krohn et al., 1997), transmission of sexually transmitted diseases (Wu, Ringwalt, Patkar, Hubbard, & Blazer, 2009), and crimes such as stealing, vandalism, driving under the influence, and violence

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Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

(D'Amico, Edelen, Miles, & Morral, 2008). Also, youth who use drugs often develop disorganized thinking and unusual beliefs (Kandel, Yamaguchi, & Chen, 1992) that may interfere with problem-solving abilities and emotional functioning, which in turn contributes to greater social isolation and depression (Sussman & Ames, 2001).

Substance use prevention programs for adolescents typically focus on “risk factors,” or identifying characteristics of the adolescent and/or the surrounding social and physical environment that increase the likelihood of engaging in substance use (Hawkins, Catalano, & Miller, 1992). Increasingly, however, research has begun to focus on understanding the protective factors that enable some youth to resist, avoid, or delay substance use when compared to their peers (Fergus & Zimmerman, 2005; Luthar & Cicchetti, 2000). One such protective factor is future orientation or future time perspective (FTP). FTP refers to a person's ability or inclination to focus one's attention on the future, as opposed to focusing on the past or present moments (Henson, Carey, Carey, & Maisto, 2006; Zimbardo & Boyd, 1999). This inclination may be related to an individual's decision not to use drugs (Zimbardo & Boyd, 1999).

At least ten cross-sectional studies have shown consistent inverse associations between FTP and alcohol, cigarette, marijuana, and other hard drug use (Apostolidis, Fieulaine, Simonin, & Rolland, 2006a; Apostolidis, Fieulaine, & Soule, 2006b; Henson et al., 2006; Keough, Zimbardo, & Boyd, 1999; Levy & Earleywine, 2004; MacKillop, Mattson, MacKillop, Castelda, & Donovan, 2007; Peters Jr, et al., 2005; Piko, Luszczynska, Gibbons, & Teközel, 2005; Robbins & Bryan, 2004; Wills, Sandy, & Yaeger, 2001). Findings show that higher FTP is protective against drug use with odds ratios (OR) = .29 for alcohol, OR = .30 for smoking cigarettes, and OR = .50 for marijuana use (Apostolidis et al., 2006a), and OR = .88 for measures of composite hard drug use (Peters Jr. et al., 2005). Further, Keough et al. (1999) established a record of convergent and divergent validity to establish FTP as a construct able to explain unique variance of substance use.

While findings from these studies suggest FTP to be an important correlate, without longitudinal evidence of this relationship FTP cannot be considered an important protective factor for avoiding drug use. Furthermore, it is possible that there is a bidirectional relationship between these two variables; whereby, substance use may impact one's ability to focus on future events, by impeding executive cognitive function (Stacy, Ames, & Knowlton, 2004). FTP may be an important part of a causal chain in the initiation or cessation of substance use. Although no formal discussion of FTP as a mediator was found, we located two intervention studies that successfully targeted FTP for change (Hall & Fong, 2003; Marko & Savickas, 1998); meanwhile the vast majority of studies have considered it an individual difference variable and discussed ways that program effects may differ or program messages may need to be tailored to accommodate an individual's time perspective (Carey, Henson, Carey, & Maisto, 2007; Keough et al., 1999; Kovac & Rise, 2007).

Of the studies, only three included high-risk adolescent populations in the United States (Keough et al., 1999; Peters Jr et al., 2005; Robbins & Bryan, 2004). The data presented here extend the research on FTP to a longitudinal study of high-risk adolescents recruited from 24 continuation high schools in a large urban area. Continuation high schools are

attended primarily by students who are missing school credits for various reasons (e.g., truancy and related problem behaviors). Little research has focused on assessing levels of protective factors such as FTP in high-risk adolescents, or whether the associations detected in other samples hold for this higher risk group. It is possible that high-risk adolescents may benefit more from interventions focused on enhancing protective factors such as FTP.

This secondary analysis was undertaken to investigate the temporal association between FTP and alcohol, cigarette, marijuana, and hard drug use. Based on our review of the literature, we hypothesized that baseline FTP (T1 FTP) would predict lower levels of alcohol, cigarette, marijuana, and a composite measure of hard drug use at one-year follow-up (T2 SU) and that T1 substance use would predict lower levels of T2 FTP.

METHODS

Subjects and Data Collection

Schools from four counties in southern California were recruited to participate in a randomized controlled trial of the Toward No Drug Abuse Program, a 12-session classroom based substance use prevention program. Twenty-four schools participated in the study. For more details about school selection and the intervention, see (Sussman, Sun, Rohrbach, & Spruijt-Metz, 2012).

Trained data collectors administered survey questionnaires to students at pretest, posttest, and approximately one year later. If a student was absent during a data collection day, an absentee packet was left with instructions. At 1-year follow-up, surveys were administered at the school. If the student was no longer enrolled at the school, surveys were administered by telephone. Of the enrolled students, 1,704 (71.1%) were consented to participate in the study. Of these, 1,676 (98.4%) completed the pretest survey, 1,426 (85.1%) completed the posttest survey, and 1,186 (70.8%) completed 1-year follow-up surveys. For the current study, we used students who had complete FTP data at posttest, as this was the first measurement point. For the remainder of this article, this posttest measure is referred to a time point 1 (T1). Study participants were surveyed between April 2008 and December 2010. The University of Southern California's Institutional Review Board approved all study procedures.

Measures

Demographics—Demographics assessed included age, gender, ethnicity (measured using seven response options including: Latino, White, African American, Asian, Native American, Mixed, and an open-ended “Other” option) and socio-economic status analyzed using the number of rooms in the primary residence divided by the number of people typically residing there (Galobardes, 2006).

Future Orientation—FTP was measured using 10 items adapted from the future time perspective scale of the Zimbardo Time Perspective Inventory (ZTPI) (Zimbardo & Boyd, 1999). Item wording was altered for easier comprehension by the target audience. For instance, “It upsets me to be late to appointments” was changed to “It upsets me to be late for school or other commitments.” Students were asked to identify how well each item

describes themselves or their beliefs. Items were measured on a 5-point likert scale; responses ranged from 1 (Not at All) to 5 (Very Well). Cronbach's alpha for the scale was .89. Factor analysis using promax rotation showed that 7 of the 10 items loaded onto one factor (loadings .50 or higher). Therefore, the 7-item one-factor solution was used to measure FTP. Items included the following statements: Finishing homework and doing other jobs at home comes before play; I finish projects on time by working on them a little bit every day; I can resist temptations when I know that there is work to be done; When I want to achieve something, I set goals and then figure out ways to reach them; I keep working at difficult, boring tasks if they will help me get ahead; It upsets me to be late for school or other commitments; I meet my obligations to my friends, parents, teachers, and other authority figures on time.

Substance Use—Substance use was measured by asking respondents how many times they used each of the following drugs during the past 30 days. Subjects were provided with 12 response categories, which included 0, 1–10, 11–20, 21–30, 31–40, 41–50, 51–60, 61–70, 71–80, 81–90, and 91–100+ times for each of the following substances: alcohol, cigarette, marijuana, cocaine, hallucinogens, stimulants, inhalants, ecstasy, pain killers, tranquilizers, or other drugs such as phencyclidine, steroids, gamma-hydroxybutyric, and K. The composite hard drug category was created summing responses to all of the substances except alcohol, cigarette, and marijuana. For data analyses, a dichotomous variable was created where the outcome was defined as “true” if a specific substance was used one or more times in the past 30 days.

Analytical Approach

Multilevel mixed modeling (PROC GLIMMIX & PROC MIXED) was used to capture the random effects of data nested within schools (*SAS Institute, 2008*). We analyzed two models for each substance use variable to analyze the bidirectional relationships between FTP and usage: (a) T1 FTP predicting T2 substance use controlling for T1 substance use and (b) T1 substance use predicting T2 FTP controlling for T1 FTP. All models controlled for age, gender, ethnicity, rooms per people, and program condition (nuisance variable in the present study). For analysis, T1 and T2 FTP were standardized to school means.

RESULTS

The sample ($N = 1,310$) investigated in this study was 58.2% male, with a mean age of 16.8 years. Sixty-four percent (64%) of participants were Latino, 11% Caucasian, 14% identified as mixed race, 5% African American, 3% Asian, <1% Native American, and 2.5% other. At time point 1, 38.7% indicated that they had smoked cigarettes in the past 30 days, 56.8% drank alcohol, 44.6% smoked marijuana, and 28.2% used hard drugs. Of the 1,310 participants with complete data at T1, 358 (27.3%) were lost at follow-up. Significant differences between participants with complete versus incomplete data for age, cigarette use and marijuana use at time point 1 were found. (Demographic characteristics and retention data are shown in Table 1.) Student's t tests were conducted to determine whether mean FTP score differed by user status at T1. We found significant differences between users and nonuser FTP for all drugs (see Table 2).

As hypothesized, analyses using T1 FTP to predict drug use in the past 30 days at 1-year follow-up showed FTP to be significantly inversely associated with cigarettes, marijuana, and hard drug use. Only the relationship between alcohol use and FTP was not significant. ORs are interpreted as a one unit increase in FTP results in being 16% less likely to smoke cigarettes, 15% less likely to use marijuana, and 30% less likely to use hard drugs (Table 3). As for baseline drug use predicting FTP at 1-year follow-up, there appeared to be no significant relationship between drug use at T1 and T2 FTP, specifically, for alcohol ($\beta = .06, p = .32$), cigarettes ($\beta = .03, p = .66$), marijuana ($\beta = .06, p = .30$), and hard drug use ($\beta = -.04, p = .55$).

DISCUSSION

Our results support the hypothesis that FTP is protective against cigarette, marijuana, and hard drug use. Changes in FTP were shown to increase the likelihood of cessation, suggesting that targeted efforts to enhance FTP would likely result in decreases in use. Interventionists should consider targeting FTP by adding FTP exercises to existing programs. This approach appears warranted, as two existing interventions, one targeting physical activity (Hall & Fong, 2003) and the other targeting career planning (Marko & Savickas, 1998) showed programmatic effects of FTP on behavior change. Hall & Fong's 90-minute intervention used a decisional balance exercise with an added temporal dimension, asking participants to identify the costs and benefits of exercise in the immediate, short-term, and long-term and a long-term goal-setting activity to influence FTP. While Marko and Savickas' used a series of activities including the Circles Test, which asks participants to complete lifelines from birth to death, and long-term planning to address the different phases of the intervention (Cottle, 1967).

Our failure to find this longitudinal relationship with alcohol use requires further discussion. Alcohol use had the highest prevalence in our sample with more than half of respondents reporting some use in the past 30 days. We hypothesize that perhaps the findings for alcohol use differ from the other substances due to the normative nature of alcohol use among high-risk youth (Sussman et al., 1995). It is also possible that alcohol differs from the other drugs due to the perceived risk associated with each drug. According to the 2011 Monitoring the Future, Johnston, O'Malley, Bachman, & Schulenberg (2010) report that 9.4% of 12th graders reported a "great risk" in trying alcohol while 24.6% said there was a "great risk" for having 1–2 drinks every day. For marijuana use, 15.6% of 12th graders reported a "great risk" for trying it and 22.7% for occasional use. For hard drugs, trying was associated with "great risk" ranging from 31.2% for trying Adderall to 63.6% for crystal meth. Unfortunately, no trying or occasional use measure was reported for cigarette use, but "great risk" for smoking one pack or more per day was reported by 69.5% of 12th graders. From these numbers, we can conclude that alcohol use may be associated with lower perceived risk, and therefore, may not be considered a behavior to be avoided regardless of one's FTP.

It is also possible that the lack of effects of FTP on alcohol use indicates an interaction between perceived risk and value associated with drug use outcome expectancies (Fromme & D'Amico, 2000; Zamboanga, Schwartz, Ham, Jarvis, & Olthuis, 2009). For instance, changes in social behavior and increases in relaxation associated with alcohol use may

override any concern associated with negative outcomes, especially when considered as a function of perceived risk. Alcohol may be perceived as the most expedient and safest drug to use to achieve these outcomes.

Finally, our findings do not support the hypothesis that drug use over a 1-year period dampens one's FTP. One possible explanation is that perhaps the deleterious effects of these substances appear at higher levels of usage than those found in this sample. Furthermore, our inability to find significant relationships could be influenced by attrition, as there were significant differences between students that were lost at follow-up for cigarette and marijuana use. Another explanation for these finding is that perhaps the effects of substance use on cognitive functioning do not appear quickly. Unfortunately, we were unable to include duration of use in our analysis to test this.

Findings from this study should be considered in light of a few limitations. First, our sample is an at-risk population comprised of 64% Latino students. Second, as previously mentioned, we did experience differential attrition with heavier cigarette and marijuana users not completing the 1-year follow-up survey. However, as we were still able to detect a longitudinal effect of FTP on drug use it is unlikely that this caused problems for interpretation. Third, all data was self-reported and thus may suffer from social-desirability bias. Finally, though our internal reliability was high ($\alpha = .89$), we used a shortened version of ZTPI with some editing to items.

Future directions in research should focus on (1) using a continuous measure of drug use in order to detect changes in FTP being associated with changes in drug use, (2) replicating these longitudinal findings in different samples with an emphasis on controlling for length of usage in order to confirm FTP as a protective factor, and (3) testing FTP as a mediator of program outcomes by developing time-perspective interventions that “build the psychological architecture required to link long-term benefits to present behaviors” (Hall & Fong, 2003). Until more interventions are shown to be successful in modifying FTP, researchers may continue to treat FTP as a stable moderating personality trait, instead of a mediator that helps us understand the mechanisms through which programs work and behavior change occurs.

Biographies



Ms. Elizabeth Barnett received her MSW from Boston University in 2000 and will receive her doctorate from University of Southern California Keck School of Medicine in May 2013. Her primary research interests include the use of Motivational Interviewing with adolescent substance users as well as psychosocial predictors of adolescent drug use.



Dr. Donna Spruijt-Metz' research focuses on pediatric obesity, and is particularly concerned with understanding how psychosocial, metabolic built environmental, and social environmental forces interact to influence behavior and health. She has studied child feeding practices and the impact that these have on childhood obesity. She received her PhD in Adolescent Medicine and Medical Ethics from the Vrije Universiteit Amsterdam. She is Associate Professor University of Southern California's Department of Preventive Medicine and Director, Responsible Conduct in Research for the Keck School of Medicine.



Dr. Louise A. Rohrbach is currently an Associate Professor of Preventive Medicine at the University of Southern California, Institute for Health Promotion and Disease Prevention Research, in the Keck School of Medicine. Her research focuses on interventions to prevent tobacco, alcohol, and other drug abuse among youth. Currently, her primary emphasis is translational research, including investigation of factors that explain and strategies that enhance the dissemination and implementation of evidence-based programs and practices in real-world settings. She has been the principal investigator on a number of NIH-funded studies and program evaluations and has published widely in the areas of substance use prevention, school-based health, and etiology of adolescent substance use.



Dr. Jennifer B. Unger is a Professor of Preventive Medicine at the University of Southern California Keck School of Medicine. Her research focuses on psychological, social, and cultural risk and protective factors for substance use among adolescents.



Dr. Ping Sun received his PhD in Preventive Medicine in 1999 from USC School of Medicine. His current research interests include the etiology of addiction and outcome evaluation for group randomized health studies.



Dr. Steve Sussman, PhD, FAAHB, FAPA, received his doctorate in social-clinical psychology from the University of Illinois at Chicago in 1984. He is a professor of preventive medicine and psychology at the University of Southern California, and he has been at USC for 27 years. He studies etiology, prevention, and cessation within the addictions arena, broadly defined. He has over 385 publications. His programs include Project Toward No Tobacco Use, Project Toward No Drug Abuse, and Project EX, which are considered model programs at numerous agencies (i.e., CDC, NIDA, NCI, OJJDP, SAMSHA, CSAP, Colorado and Maryland Blueprints, Health Canada, US DOE and various State Departments of Education). He received the honor of Research Laureate for the American Academy of Health Behavior in 2005, and he was President there (2007–2008). Also, as of 2007, he received the honor of Fellow of the American Psychological Association (Division 50, Addictions). He is the current Editor of *Evaluation & the Health Professions* (SAGE Publications).

GLOSSARY

Future time perspective or future orientation A person's ability or inclination to focus one's attention on the future, as opposed to focusing on the past or present moments

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TABLE 1

Comparison of participant characteristics with complete versus incomplete FTP data

	All (<i>n</i> = 1,310)	Complete (<i>n</i> = 952)	Incomplete (<i>n</i> = 358)	<i>p</i>
Male% (<i>n</i>)	58.2 (763)	57.0 (543)	61.5 (220)	.15
Age (M ± SD)	16.8 ± .9	16.7 ± .9	16.9 ± 1.0	<.001
Race/ethnicity% (<i>n</i>)				.32
Latino/Hispanic	63.9 (837)	64.2 (611)	63.1 (226)	
Caucasian	11.3 (148)	12.3 (117)	8.7 (31)	
Mixed	13.7 (180)	13.2 (126)	15.1 (54)	
African American	4.7 (62)	4.4 (42)	5.6 (20)	
Asian	3.2 (42)	3.1 (29)	3.6 (13)	
Other	2.5 (33)	2.4 (23)	2.8 (10)	
Native American	.6 (8)	0.4 (4)	1.1 (4)	
Drug use prevalence% (<i>n</i>) at Time-point 1				
Alcohol	56.8 (727)	55.4 (517)	60.7 (210)	.09
Cigarettes	38.7 (502)	36.7 (346)	43.9 (156)	.02
Marijuana	44.6 (577)	42.3 (399)	50.6 (178)	.01
Hard drugs	28.2 (370)	27.2 (259)	31.0 (111)	.17
Future time perspective (M ± SD)	3.1 ± .9	3.1 ± .9	3.1 ± 1.0	.77

“Complete” = participants with FTP data at time point 1 and time point 2; “Incomplete” = participants with FTP data at time point 1 only.

TABLE 2

Mean differences in baseline FTP^a for users and nonusers

	FTP ^a		<i>t</i> test results	
	<i>n</i> (%)	M (SD)	<i>t</i>	<i>p</i>
Alcohol use	No	552 (43%) 3.2 (.9)	3.78	<.0001
	Yes	727 (57%) 3.0 (.9)		
Cigarette use	No	797 (61%) 3.2 (.9)	2.67	<.001
	Yes	502 (39%) 3.0 (.9)		
Marijuana use	No	718 (55%) 3.2 (.9)	4.46	<.0001
	Yes	577 (45%) 3.0 (.9)		
Hard drug use	No	940 (72%) 3.2 (.9)	5.03	<.0001
	Yes	370 (28%) 2.9 (.9)		

^aFTP: future time perspective.

TABLE 3

ORs^a for baseline FTP predicting drug use in the past 30 days

	<i>n</i>	β	<i>se</i>	<i>p</i>	Adj OR	LCI	UCI
Alcohol use	940	-.08	.07	.06	.92	.8	1.06
Cigarette use	942	-.18	.08	.03	.84	.72	.99
Marijuana use	940	-.17	.08	.04	.85	.72	.99
Hard drug use	953	-.35	.10	.001	.70	.58	.86

^aResults from mixed logistic regression predicting substance use at 1-year follow-up from baseline future time perspective controlling for age, gender, ethnicity, rooms per people, program condition, and baseline user status.