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RESEARCH PAPER

Time perspective and substance use: an examination across three adolescent samples

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ABSTRACT

Time perspective is conceptualized as a multidimensional construct that assesses individuals' feelings and thoughts about the past, present, and future. The current study examined relationships between feelings (time attitudes) and thoughts (time orientation) about time and substance use behaviors across three adolescent samples. Participants included a high-risk sample of adjudicated youth ($N = 124$; $M_{age} = 15.54$, $SD = 1.69$; 51.61% female) and two general population school samples ($N = 777$; $M_{age} = 15.82$, $SD = 1.23$; 53.41% female; $N = 1873$; $M_{age} = 15.87$, $SD = 1.28$; 52.22% female). Cross-sectional survey data were collected from samples in schools during 2010, 2016, and 2011, respectively. Poisson and negative binomial regression analyses indicated that overall, more positive feelings about time were associated with fewer substances used and, conversely, more negative feelings about time were associated with more substances used. These findings were particularly salient for participants with stronger positive and negative feelings toward the past and present time periods. Further, across the three samples, adolescents with a balanced time orientation (i.e. equal emphasis on all three time periods) generally reported less substance use than individuals who emphasized only one or two time periods. Findings highlight relationships between time perspective dimensions and substance use across diverse samples and illustrate opportunities for adapting time perspective-based substance use interventions for adolescents.

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Time perspective; time attitudes; time orientation; substance use; adolescents

Although prevalence rates of alcohol, marijuana, and illicit drug use among adolescents have remained fairly steady or have even slightly declined across the past two decades (Miech et al. 2019), many adolescents have and continue to report heavy and frequent substance use. Recent *Monitoring the Future* (Miech et al. 2019) survey data suggest that among US 12th graders, 58.5% report having used alcohol at least once in their lifetime, 42.9% report having been drunk at least once, 43.6% report having used marijuana/hashish, and 18.9% report having used at least one illicit drug other than marijuana. Moreover, rates of vaping nicotine and vaping marijuana have recently risen dramatically, with 34.0% having ever vaped nicotine and 15.6% having ever vaped marijuana by 12th grade. Given adolescents continued engagement with these health risk behaviors, it is critical to identify modifiable contributing factors.

Time perspective, or one's feelings (time attitudes) and thoughts (time orientation) about the past, present, and future, is theorized to be a cognitive-motivational construct (Zimbardo and Boyd 1999; Stolarski et al. 2015). These scholars have argued that time perspective underlies human behaviors. Zimbardo's seminal research with adults shows how time perspective is associated with physical exercise (Griva et al. 2015) and risky driving (Zimbardo et al. 1997). A large body of research with adults supports a relationship between time perspective and substance use (e.g. Smart, 1968; Levy and Earleywine 2004; Daugherty and Brase 2010; Fieulaine and Martinez 2010; Linden et al. 2014; Chavarria et al. 2015). Focusing on the future was associated with less substance use, whereas focusing on the present was associated with more substance use (Henson et al. 2006). Research has shown that time perspective is modifiable through intervention (Marko and Savickas 1998), suggesting the importance of examining the mechanisms linking time perspective to human behaviors, including substance use, to better inform prevention interventions.

Research examining the associations between time perspective and substance use in adolescents has focused on time attitudes resulting in a gap in our knowledge about other time perspective dimensions, even though scholars have argued that the construct is multidimensional (Zimbardo and Boyd 1999; Mello 2019). Time attitudes or one's positive or negative feelings about the past, present, or future were conceptualized as a means of measuring distinct positive and negative feelings about each time period (Mello and Worrell 2015). Time attitudes are tied to psychological outcomes including hope, self-esteem, perceived stress (Worrell and Mello 2009; Andretta et al. 2014) and

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substance use (McKay et al. 2014). McKay et al. (2019) examined adolescents time attitude profiles and alcohol-related outcomes. Results indicated that adolescents with high positive attitudes toward the time periods were more likely to abstain from alcohol use. Combined, findings indicate that more positive feelings about time are generally correlated with more favorable cognitive and behavioral outcomes.

Time orientation is another dimension of time perspective that has yet to be examined in association with substance use in adolescent samples. Research has shown that time orientation is a key factor associated with health and developmental outcomes (Mello et al. 2013, 2018). A study with elementary school students showed that being oriented more toward the future and less toward the present was associated with less substance use (Wills et al. 2001), and a study of late adolescents indicated that being oriented more toward the future was associated with less heavy episodic drinking (Laghi et al. 2012). Other research that has included adolescents has examined solely the future (e.g. Oyserman and Markus 1990; Nurmi 1991). For example, studies suggest being more oriented toward the future is associated with less substance use (McKay et al. 2013). Thus, to extend research investigating associations between time perspective and substance use among adolescents, it is important to consider diverse dimensions of time perspective (i.e. feelings and thoughts) as well as adolescents' perspective across multiple the time periods (i.e. the past, present, and future). Further, replication across independent samples is needed to support generalizability of the relationship between time perspective and substance use among this population.

Current study

The present study examined associations between adolescents' feelings (time attitudes) and thoughts (time orientation) about time and their substance use behaviors across three independent samples of adolescents (i.e. a high-risk sample of adjudicated adolescents and two general population school samples). Examination of study relationship across samples was conducted given the limited research in this area with adolescents and to increase generalizability of findings through replication. The current study had three aims. First, we investigated how adolescents' feelings toward the past, present, and future were associated with the number of substances they used. Second, we examined how adolescents' thoughts about which time period(s) they perceived to be most important were associated with the number of substances used. Third, we assessed how these feelings and thoughts about time were associated with frequency of individual substances used, including marijuana, alcohol, and tobacco. Drawing from past research, we expect that positive feelings about time will be negatively associated with number of substances used and adolescent's substance use frequency, whereas negative feelings about time will be positively associated with number of substances used and adolescent's substance use frequency. We also expected that adolescents who report a balanced time orientation (i.e. equal emphasis on all three time periods) will report fewer substances used and lesser frequency than their counterparts.

Materials and methods

Participants and procedures

Table 1 displays descriptive information for the three samples. The *high-risk sample* comprised adolescents from an alternative school serving behaviorally troubled and adjudicated middle and high school aged adolescents. Survey data were collected from the high-risk sample in 2010. The *general population school sample 1* comprised adolescents from two general population public high schools; data were collected from both schools in 2016. The *general population school sample 2* also comprised adolescents from a general population public high school. Survey data were collected from a single public high school in 2011. Data from all three samples were collected in the US.

Table 1. Descriptives and substance use distributions across samples.

	High-risk sample	General population school sample 1	General population school sample 2
N	124	777	1873
Age (*M*, *SD*)	15.54 (1.69)	15.82 (1.23)	15.87 (1.28)
Female	51.61%	53.41%	52.22%
Grades	6th–12th	9th–12th	9th–12th
Race/ethnicity			
African American/Black	14.52%	6.31%	22.69%
American Indian/Alaskan Native	0.81%	0.39%	0.53%
Asian American/Pacific Islander	0.00%	19.31%	9.61%
European American/White/Caucasian	25.00%	16.73%	40.58%
Hispanic/Latino(a) American	38.71%	41.44%	12.71%
Multi/other[a]	18.55%	13.77%	10.46%
Substances used			
Marijuana	65.32%	37.84%	30.75%
Tobacco	46.77%	15.57%	8.44%
Alcohol	64.52%	51.35%	36.73%
Cocaine/crack	13.71%	6.69%	2.78%
Inhalants	12.90%	5.92%	3.74%
Psychedelics	16.94%	9.65%	5.07%
Methamphetamines	5.65%	4.89%	2.56%

[a]For the general population school sample 2, participants who 'declined to state' their race were included in this category.

Across the samples, students were provided with information about the study and an invitation to participate from trained research staff. Those who returned the survey and signed parental consent and adolescent assent forms constituted the samples. All participants were compensated $10.00 for their participation. All study procedures were approved by the IRB at the affiliated universities.

Measures

Substance use

For the high-risk sample and the general population school sample 1, participants reported how frequently they used the following seven substances: marijuana, alcohol, tobacco, cocaine/crack, inhalants, psychedelics, and methamphetamines (see Table 1). No specific time frame of use was referenced. The five response options ranged from 0 = Never to 4 = Very Often. Responses were recoded to indicate any use of each substance and a count score was generated to indicate the number of substances the participant used. Marijuana, alcohol, and tobacco use frequency outcomes were also examined separately on the full Likert scale.

For the general population school sample 2, participants indicated how frequently in the past month they used the same seven substances as the other samples (see Table 1). Six response options ranged from 0 days to 20–30 days. Responses were recoded to indicate any use of each substance and a count score was generated to indicate the number of substances each participant used. Marijuana, alcohol, and tobacco use frequency outcomes were also examined separately on the full Likert scale.

Time perspective

Across samples, participants' feelings and thoughts about time were assessed using the Adolescent and Adult Time Inventory (AATI; Mello and Worrell 2010). Feelings about time were captured with the *time attitudes* scale, which contained 30 items evaluating positive and negative attitudes toward the past, the present, and the future on a scale ranging from 1 = Totally Disagree to 5 = Totally Agree. Time attitudes produced six subscales including *past positive* (α=.85, .83, .86 for the high-risk sample, general population school sample 1, and general population school sample 2, respectively; 'I have happy thoughts about my past'), *past negative* (α=.83, .85, .86, respectively; 'I am not satisfied with my past'), *present positive* (α=.78, .85, .90, respectively; 'I am pleased with the present'), *present negative* (α=.79, .85, .86, respectively; 'My current life worries me'), *future positive* (α=.86, .88, .90, respectively; 'I look forward to my future'), and *future negative* (α=.75, .82, .82, respectively; 'Thinking ahead is pointless'). For each subscale, average scores were calculated such that higher scores indicated greater positive or negative feelings about each time period. Reliability and convergent and discriminant validity of this scale have been established with adolescent samples (Worrell and Mello 2009; Worrell et al. 2013) and numerous studies have supported the theorized six-factor structure of the time attitudes scale (e.g. McKay et al. 2020).

Thoughts about time were assessed using the AATI single-item *time orientation* scale (see Table 2 for illustration; Mello et al. 2013). This item contained several sets of three circles labeled 'past,' 'present,' and 'future.' Participants selected *one set of circles* that showed the specific time period(s) they believed to be most important, with larger circles indicating greater importance or emphasis. In the high-risk sample, an earlier version of the scale was administered that included the following five time orientation response options: present, future, past-future, present-future, and balanced (i.e. equal emphasis on all three time periods). Response options were slightly more numerous in the two general population school samples after scale development. Specifically, the following seven time orientation response options were represented: past, present, future, past-future, past-present, present-future, and balanced. The term 'balanced' has been used differently in the field (e.g. Cottle 1967; Mello et al. 2013; Stolarski et al. 2020) and has more recently become associated with the Zimbardo Time Perspective Inventory (Zimbardo and Boyd 1999). In this study, we use the term 'balanced time orientation' to note its association with the AATI. Previous studies have used the time orientation scale to explore a range of adolescent developmental outcomes (Mello et al. 2013, 2018).

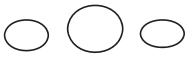
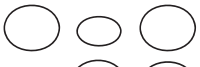
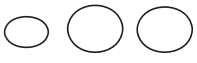
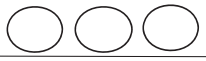
Demographics and controls

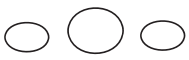
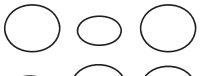
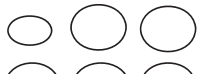
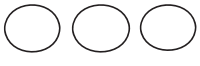
Across samples, participants' gender (0 = male; 1 = female), race/ethnicity (0 = non-Hispanic white; 1 = other), and continuously coded age were controlled. Maternal level of education was included as a control as a proxy indicator for socioeconomic status (1 = No High School Diploma/G.E.D. to 6 = Doctorate degree (M.D./Ph.D./J.D.). The average reported mother's level of education was approximately a High School Diploma/G.E.D. ($M = 2.17$; SD=.88) in the high-risk sample, an Associate's degree ($M = 2.77$; $SD = 1.61$) in the general population school sample 1, and a college graduate ($M = 3.78$; $SD = 1.21$) in general population school sample 2.

Analytic strategy

Poisson and negative binomial regression analyses were used to examine associations between adolescents' feelings (time attitudes) and thoughts (time orientation) about time and their substance use behaviors. These analytic approaches were selected given the count nature of the response options, shape of the observed distributions within and across samples and outcomes, and the mean and variance estimates. Likelihood ratio tests were used to evaluate whether Poisson or negative binomial models were a better fit to the data for each model. Based on these tests, Poisson models were used in models for the high-risk sample. Negative binomial models were used for models with the general population school samples. Tables 2 and 3 indicate which models were used across the substance use outcomes and samples. Incidence rate ratio (IRR) estimates were reported for each model. These estimates represent factor increases (or decreases) in the substance use outcome for each unit shift in time feelings or factor increases (or decreases) compared to the reference group for time orientation. Separate analyses were

Table 2. Associations between thoughts about time and adolescents' substance use across three samples.

		Substances Used			Marijuana Use		
		High-risk sample	General population school sample 1	General population school sample 2	High-risk sample	General population school sample 1	General population school sample 2
		IRR(SE)[T]	IRR(SE)	IRR(SE)	IRR(SE)[T]	IRR(SE)	IRR(SE)
Past		NA	1.79(.55)	2.39(1.09)	NA	1.32(.56)	.74(.62)
Present		2.98(.87)***	1.16(.24)	1.41(.25)	2.23(.84)*	.98(.27)	1.45(.39)
Future		.65(.19)	1.20(.21)	1.13(.18)	.90(.28)	.99(.23)	1.06(.26)
Past - Future		1.77(.49)*	1.41(.23)*	1.43(.24)**	1.73(.56)	1.21(.27)	1.35(.34)
Past-Present		NA	1.33(.37)	.59(.20)	NA	.83(.33)	.61(.27)
Present-Future		1.12(.20)	1.00(.14)	1.15(.10)	1.06(.22)	.88(.16)	1.21(.16)
Balanced		Reference category			Reference category		

		Alcohol Use			Tobacco Use		
		IRR(SE)[T]	IRR(SE)	IRR(SE)	IRR(SE)	IRR(SE)	IRR(SE)
Past		NA	1.37(.36)	1.68(.98)	NA	3.76(2.61)	6.16(10.31)
Present		1.45(.62)	.97(.19)	1.39(.30)	4.07(2.61)*	1.97(.99)	2.77(1.81)
Future		.46(.17)*	1.15(.18)	1.29(.25)	.60(.34)	1.99(.86)	2.28(1.28)
Past - Future		.82(.35)	1.23(.18)	1.48(.30)*	2.61(1.52)	3.04(1.27)**	5.37(3.27)***
Past-Present		NA	1.17(.28)	.86(.29)	NA	4.36(2.83)*	1.44(1.41)
Present-Future		.94(.19)	1.05(.13)	1.15(.12)	1.35(.45)	1.37(.48)	1.81(.59)
Balanced		Reference category			Reference category		

Note. All analyses control for gender, race, age, and maternal education level. T=indicates a Poisson model was selected over a negative binomial model based on likelihood ratio tests examining model fit. All mother models were negative binomial.
*$p < .05$; **$p < .01$; ***$p < .001$

conducted for each study. Consistent with prior research showing that the six time attitudes subscales are distinct from one another (McKay et al. 2020), scales were assessed in separate models to explore each unique time perspective dimension. To account for the use of multiple tests, we used the Bonferroni correction within each sample and substance use outcome (Warner 2007). All models controlled for gender, race/ethnicity, age, and maternal education level.

Results

Feelings about time

Table 3 displays findings for models examining relationships between adolescents' feelings about time and their substance use behaviors, controlling for demographic characteristics.

Number of substances used

Across the two general population samples, positive feelings about the past and present were fairly consistently associated with fewer substances used. Conversely, negative feelings about the past and present were consistently associated with more substances used. For example, in the general population school sample 1, increases in past positive feelings were associated with substance use incident rate decreases of IRR=.80. However, increases in past negative feelings were associated with substance use incident rate increases of IRR = 1.22. These associations were not consistently observed across the high-risk sample.

Marijuana, alcohol, and tobacco use frequency

Although relationships were in expected directions for frequency of marijuana, alcohol, and tobacco use, findings

Table 3. Associations between feelings about time and adolescents' substance use across three samples.

	Substances used			Marijuana use		
	High-risk sample IRR (SE)	General population school sample 1 IRR (SE)	General population school sample 2 IRR (SE)	High-risk sample IRR (SE)[a]	General population school sample 1 IRR (SE)	General population school sample 2 IRR (SE)
Past positive	.78 (.06)*	.80 (.05)*	.92 (.04)	.77 (.06)*	.78 (.07)*	.89 (.06)
Past negative	1.21 (.10)	1.22 (.07)*	1.15 (.05)*	1.19 (.10)	1.24 (.09)*	1.11 (.07)
Present positive	.84 (.09)	.79 (.05)*	.89 (.04)*	.82 (.09)	.79 (.07)*	.88 (.06)
Present negative	1.24 (.12)	1.20 (.07)*	1.15 (.05)*	1.25 (.12)	1.20 (.10)	1.08 (.07)
Future positive	.82 (.08)	.88 (.05)	.93 (.04)	.85 (.09)	.94 (.08)	.99 (.07)
Future negative	1.17 (.12)	1.19 (.07)*	1.21 (.06)*	1.05 (.12)	1.10 (.09)	1.11 (.08)

	Alcohol use			Tobacco use		
	IRR (SE) [a]	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)	IRR (SE)
Past positive	.84 (.07)	.86 (.05)*	.99 (.05)	.91 (.12)	.78 (.12)	.84 (.12)
Past negative	1.11 (.10)	1.19 (.06)*	1.05 (.05)	1.18 (.16)	1.48 (.19)*	1.39 (.19)
Present positive	.89 (.10)	.88 (.05)	.99 (.05)	.73 (.13)	.80 (.13)	.76 (.12)
Present negative	1.14 (.12)	1.08 (.06)	1.03 (.05)	1.24 (.19)	1.40 (.20)	1.39 (.19)
Future positive	.74 (.08)*	.97 (.05)	1.00 (.05)	.76 (.13)	.80 (.12)	.73 (.12)
Future negative	1.19 (.13)	1.07 (.06)	1.09 (.06)	1.23 (.21)	1.72 (.23)*	1.73 (.27)*

All analyses control for gender, race, age, and maternal education level. The count of substances used outcomes included all assessed substances. Time attitudes is abbreviated in this table (TA).
[a]A Poisson model was selected over a negative binomial model based on likelihood ratio tests examining model fit. All mother models were negative binomial.
*Bonferroni's adjusted p value: $p<.008$.

were not consistently observed across the time feelings indicators and three samples. However, results highlighted the role of past positive and negative feelings, especially for the general population school sample 1. For example, positive feelings toward the past were associated with lower frequency of marijuana use (IRR=.78) and alcohol use (IRR=.86), whereas negative feelings toward this period was associated with higher frequency of marijuana use (IRR = 1.24), alcohol use (IRR = 1.19), and tobacco use (IRR = 1.48). Further, the importance of the future time period emerged. Specifically, whereas positive feelings toward the future were associated with lower frequency of alcohol use (IRR=.74) for the high-risk sample, negative feelings about the future were associated with higher frequencies of tobacco use among the two general population school samples (IRR = 1.72 and IRR = 1.73, respectively).

Thoughts about time

Table 2 displays findings for models examining relationships between adolescents' thoughts about time and their substance use behaviors, controlling for demographic characteristics.

Number of substances used

Adolescents with present or past-future orientations used more substances than those with a balanced time orientation. For example, in the high-risk sample, adolescents who thought the present alone was the most important time period were expected to have a substance use incident rate IRR = 2.98 times greater than those with a balanced-time orientation. Similarly, for both the high-risk and the general populations school sample 2, adolescents with past-future orientations used more substances than those with a balanced time orientation (IRR = 1.77 and IRR = 1.43, respectively).

Marijuana, alcohol, and tobacco use frequency

Findings from analyses of the relationship between thoughts about time and the individual substance use frequency were less uniform across the three substances and samples. However, results indicated that compared to adolescents with a balanced time orientation, adolescents who emphasized the present time period, past-future, and past-present time periods reported greater frequency of substance use. For instance, compared to those with a balanced time orientation, high-risk sample adolescents who emphasized the present alone were expected to have marijuana use incident rates IRR = 2.23 times greater and tobacco use incident rates IRR = 4.07 times greater. Similarly, past-present time orientations were associated with greater tobacco use frequency for the general population school sample 1 (IRR = 4.36). Finally, past-future time orientations were associated with greater frequency alcohol use the general population school sample 2 (IRR = 1.48) and tobacco use for both the general population school samples (IRR = 3.04 and IRR = 5.37, respectively).

Discussion

Despite the robust body of research linking diverse time perspective dimensions to substance use in adults (Linden et al. 2014), research with adolescents as focused largely on the time attitude dimension of time perspective (e.g. McKay et al. 2013, 2018). This study extended this line of inquiry by investigating multiple dimensions of time perspective (feelings and thoughts about time) as correlates of substance use behaviors in adolescents. Further, we compared study associations across multiple samples of adolescents to increase the generalizability of our findings.

Across three samples, evidence supports the value of examining all three time periods and multiple dimensions of time perspective. Our findings regarding adolescents' *time attitudes* or feelings about time revealed that, unsurprisingly,

overall, more positive feelings were associated with fewer substances used and, conversely, more negative feelings were associated with more substances used. There were, however, differential results across substance use type and each time period. Present and past time perspectives were generally associated with substance use outcomes in expected directions (i.e. negative past/present related to greater substance use, positive past/present related to less substance use). For the future time period, in line with past research (McKay et al. 2019), negative feelings were associated with substance use, whereas positive feelings were not, highlighting that combining time period with valence provides a different view of these relationships. For example, in general population school samples, holding more positive thoughts about the future was not associated with number of substances used but negative thoughts about the future were associated. Moreover, alcohol use frequency was only associated with future positive time perspective in the high-risk sample. The lack of consistent associations between future time perspective and substance use outcomes among multiple adolescent samples is in contrast with some prior studies of adults (e.g. Henson et al. 2006), but McKay et al (2018) also indicated that associations between different time perspective measures and alcohol use was not consistent in a sample of university students.

Time perspective has been shown to be modifiable in samples that include adults (Marko and Savickas 1998); however, it is possible that modifying one's perspective to be more future oriented may not necessarily be the most appropriate intervention approach for adolescents. Perhaps, intervention efforts that focus on multiple time periods would best serve this population. Additional research is needed that examines multiple dimensions of time perspective and that explores the past, present, and future time periods to best inform these efforts. Notably, our study findings highlight the need for future research to move beyond the single future time perspective emphasis.

In line with past research with adolescents (Mello et al. 2018), findings concerning adolescents' *time orientation* or thoughts about time suggested a balanced time orientation in which individuals who equally emphasized the past, present, and future reported less substance use than individuals who emphasized one or two time periods. A balanced time orientation appeared to be particularly salient factor for understanding tobacco use frequency. In light of historical increases in vaping nicotine (Miech et al. 2019), focusing on a balanced time orientation may be a viable intervention strategy for reducing vaping frequency among adolescents. Importantly, our study finding extends past adolescent research that has focused solely on the future (e.g. considerations of future consequences; McKay et al. 2013).

A major strength of the study is the examination of relationships between multiple time perspective dimensions and substance use outcomes across three independent samples of adolescents. Generally, for both high-risk and general school population samples, findings demonstrate consistency in relationships between feelings and thoughts about time and substance use behaviors. The replication of findings across samples is important for advancing understanding of the relationships between these constructs and for supporting generalizability to diverse adolescents. Further, we extended past research by investigating and modeling how feelings and thoughts about time are associated with increases or decreases in the number of additional substances used. This information is important for informing time perspective-based interventions for adolescents as risks for harm and adverse health outcomes increase with use of multiple substances.

Study findings should be interpreted in light of several caveats. First, data collected from the three samples were cross-sectional which prohibits our ability to infer causality or to examine developmental changes. Second, substance use behavior and time perspective data were based on self-report, which may be impacted by social desirability or privacy concerns, particularly given that all participants sampled were under the legal drinking age. Third, while the use of three samples was a strength of the current study, there were some inconsistencies between the samples. Specifically, instruments for measuring time perspective orientation were measured slightly differently in one sample due to scale development. The data collection time frames were also inconsistent: data from the high-risk sample were collected in 2010, the general population school sample 1 were collected in 2016, and the general population school sample 2 was collected in 2011. Although substance use rates among adolescents have remained fairly steady across time (Miech et al. 2019), historical changes in marijuana legalization and availability of vape pens may have impacted study findings. Fourth, we were not able to control or test competing individual, social, and environmental factors that may contribute to adolescents' substance use. Simultaneous exploration of time perspective and other known contributing factors to adolescents' substance use will be important in future research to illuminate the unique role of time perspective in substance use. Similarly, it will be important for future research to identify the mechanisms that connect time perspective and substance use, such as decision-making or emotion regulation. Finally, the substance use outcomes in two of the samples did not include a time frame of reference.

Limitations notwithstanding, our findings indicate that, adolescents' attitudes about the past and about the present were associated with the number of substances used and frequency of use of individual substances. Further, adolescents who have a balanced time orientation also generally have more favorable substance use outcomes, particularly when examining frequency of tobacco use. As future time perspective appears to operate differently in its association with substance use outcomes in adolescent from adult samples, interventions using time perspective as an intervention target may benefit most from shaping more positive attitudes about adolescents' past and present as well as creating a more balanced time orientation.

Disclosure statement

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