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Time beyond traits: Time perspective dimensions, personality traits, and substance use in adolescents☆

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ABSTRACT

We examined associations between time perspective dimensions and substance use, after controlling for personality traits in adolescents. Time perspective was defined as feelings and orientations toward the past, present, and future, and substance use included tobacco, alcohol, marijuana, and illicit drugs. The Five-Factor Model of personality (extraversion, agreeableness, conscientiousness, emotional stability, and openness) was used. Participants were 791 adolescents (M_{age} = 15.82, SD = 1.23; 56% female). Findings indicated that (a) negative feelings about time and (b) having an orientation toward the past over the present and future were positively associated with greater substance use. Sequential regression analyses indicated that both time feelings and time orientation were associated with substance use above and beyond personality traits. Multivariate analyses also indicated that time perspective dimensions were related to personality traits with generally small to moderate associations, showing that the constructs were independent. Results support the notions that time perspective dimensions are distinct from personality traits in adolescents and that time perspective dimensions may be modifiable mechanisms used to change human behaviors including substance use in adolescents. The findings have implications for adolescent substance use interventions that target time perspective dimensions.

1. Introduction

Adolescent substance use is a critical public health concern and a crucial area of intervention (Johnston et al., 2019). Most adult users begin using as an adolescent (Kann et al., 2016), and substance use has adverse consequences for health across the life-span (National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health [NCCDPHP, OSH], 2014; Singh et al., 2016). Identifying mechanisms that may prevent and reduce adolescent substance use is an important line of inquiry. Time perspective dimensions may be viable targets for interventions aimed at adolescent substance use.

Time perspective is a multi-dimensional construct that includes feelings and thoughts about the past, present, and future (Mello, 2019; Zimbardo & Boyd, 1999). Studies have shown that time perspective dimensions are associated with substance use in adolescents (Apostolidis et al., 2006; Keough et al., 1999; McKay, Percy, Cole, Worrell, & Andretta, 2016; Wills et al., 2001). However, there is also some evidence that time perspective dimensions are akin to personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Kairys, 2010; Zimbardo & Boyd, 1999). If time perspective dimensions are strongly associated with personality traits, then they may have limited utility as substance use intervention targets. Thus, with an adolescent sample, this study sought to investigate (a) how time perspective dimensions were associated with personality traits, and (b) how time perspective dimensions were associated with substance use, controlling for personality traits.

1.1. Time perspective dimensions and personality traits

Some research has demonstrated associations between time perspective dimensions and personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Kairys, 2010; Zimbardo & Boyd, 1999). For example, the future dimension of time perspective, as measured by the

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Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999), was strongly associated with conscientiousness (Adams & Nettle, 2009). In another study, Dunkel and Weber (2010) showed that time perspective dimensions assessed in the ZTPI (Zimbardo & Boyd, 1999) were associated with all Big Five personality traits. These effects ranged from small to large.

In contrast, other scholars have posited that time perspective dimensions are developmental and are distinct from personality traits (Carstensen, 2006; Lewin, 1939; Mello, 2019). This research draws from perspectives showing that time perspective dimensions are age-related and change across the life-span (Blinded; Laureiro-Martinez et al., 2017; Lewin, 1939). Some empirical research supports the notion that time perspective dimensions are distinct from personality traits (Zhang & Howell, 2011). For example, Zhang and Howell (2011) reported mostly small associations between time perspective dimensions and the Big Five personality traits.

1.2. Time perspective dimensions and substance use

Research has consistently demonstrated associations between time perspective dimensions and substance use (Apostolidis et al., 2006; Keough et al., 1999; McKay, Percy, Cole, Worrell, & Andretta, 2016; Wills et al., 2001). Specifically, the present orientation was positively associated with substance use in adolescents and adults (Keough et al., 1999; Wills et al., 2001). Other time perspectives have been associated with lower substance use. For example, feeling more positively about the past, present, and future and less negatively about these time periods were associated with lower alcohol use in adolescents (McKay, Percy, Cole, Worrell, & Andretta, 2016). Further, the future orientation was negatively associated with substance use in studies that included adolescents and adults (Keough et al., 1999; Wills et al., 2001). Similarly, future time perspective—defined as planning, goal orientation, and conscientiousness—was associated with lower cannabis use in adolescents (Apostolidis et al., 2006).

1.3. Time perspective dimensions, substance use, and personality traits

To our knowledge, only one study has investigated how time perspective dimensions are associated with substance use, while controlling for personality traits (Daugherty & Brase, 2010). Findings showed that among college students, hedonism—defined as present-oriented enjoyment and pleasure—was positively associated with alcohol use, whereas fatalism—defined as having a rigid view of the future—was positively associated with tobacco use. These results remained after controlling for the Big Five personality traits.

1.4. Current study

In an effort to provide information about time perspective dimensions as potential intervention targets for the prevention and reduction of adolescent substance use, we conducted a cross-sectional study to address the following two research questions: in a sample of adolescents, (a) are time perspective dimensions associated with personality traits, and (b) are time perspective dimensions associated with substance use above and beyond personality traits?

2. Method

2.1. Participants and procedure

A convenience sampling strategy was used to recruit 791 adolescents (M_{age} = 15.82, SD = 1.23; 56% female) from two public 9th to 12th grade high schools in the western United States. We surveyed mostly 9th and 11th grade adolescents per the preference of the principals. Participants were 6% African American/Black, < 1% American Indian/Alaskan Native, 19% Asian American/Pacific Islander, 16% European American/White, 41% Hispanic/Latino(a) American, 11% multi-group, 3% other, and 4% non-response. The sample average maternal education was between a High School Diploma/G.E.D. and an Associate's degree.

Recruitment was conducted over a two-week period. Trained researchers delivered recruitment speeches during school hours. Participants submitted an assent form, a parental consent form, and the study survey, which they completed on their own time. Compensation was $10. The study procedure was approved by the institutional review board of the affiliated university (H15-33c).

2.2. Measures

2.2.1. Time perspective dimensions

Time perspective dimensions were assessed with the Adolescent and Adult Time Inventory (Mello & Worrell, 2007). We selected this measure because of its wide use in studies of adolescents (McKay, Percy, Cole, Worrell, & Andretta, 2016; Mello et al., 2013; Mello et al., 2019).

2.2.1.1. Time feelings. Time feelings—positive and negative feelings about the past, present, and future—were measured with six five-item subscales: Past Positive (α = 0.83; "*My past is full of happy memories*"), Past Negative (α = 0.85; "*My past makes me sad*"), Present Positive (α = 0.85; "*I am content with the present*"), Present Negative (α = 0.85; "*I am not satisfied with my life right now*"), Future Positive (α = 0.88; "*I am excited about my future*"), and Future Negative (α = 0.82; "*I don't think I'll amount to much when I grow up*"). Response options ranged from 1 (*totally disagree*) to 5 (*totally agree*). Variables were generated by averaging responses (Table 1). The subscales were treated separately, given the support for their six-factor structure (Worrell et al., 2013).

2.2.1.2. Time orientation. Time orientation—the perceived relative importance of the past, present, and future—was measured with a single item (Table 2). Participants were asked to indicate how relatively important the time periods were to them. Response options included seven figures that depicted the time periods as circles, with larger circles indicating greater importance and smaller circles indicating less importance.

2.2.2. Substance use

Substance use was assessed with nine items that surveyed the frequency of using substances such as tobacco, alcohol, marijuana, and illicit substances. Response options were 1 (*never*), 2 (*once*), 3 (*sometimes*), 4 (*often*), and 5 (*very often*). Composite scores were generated by averaging responses across substances (α = 0.90). This method of analysis is common with research on substance use in adolescents (Wills et al., 2001). The sample reported an average substance use between "never" and "once" (M = 1.37, SD = 0.62). Alcohol was the most frequently used substance, with 56% of the sample having used it at least once. These patterns of substance use are comparable to national rates (Johnston et al., 2019).

2.2.3. Personality traits

The Big Five personality traits were assessed with the 48-item Adolescent Personal Style Inventory (APSI; Lounsbury et al., 2003): Extraversion (9 items; α = 0.76; "*I like meeting new people*"), Agreeableness[1] (6 items; α = 0.74; "*I am very easy to get along with*"), Conscientiousness (9 items; α = 0.86; "*I am always very careful when I am doing school work*"), Emotional Stability (9 items; α = 0.83; "*I often feel*

[1] The agreeableness subscale had an initial low internal consistency (α = 0.67). We conducted an item analysis (see author for details). Four items (6, 16, 26, and 36) were identified as ineffective and were excluded. This approach is consistent with prior studies that have used variations of the APSI (Brown et al., 2011; Martin, 2012).

Table 1
Correlations and descriptive statistics for time feelings, personality traits, and substance use in adolescents.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Time feelings												
1. Past positive	–											
2. Past negative	−0.55***	–										
3. Present positive	0.48***	−0.32***	–									
4. Present negative	−0.26***	0.54***	−0.62***	–								
5. Future positive	0.30***	−0.08*	0.56***	−0.33***	–							
6. Future negative	−0.13***	0.41***	−0.34***	0.58***	−0.53***	–						
Personality traits												
7. Extraversion	0.23***	−0.16***	0.26***	−0.19***	0.30***	−0.26***	–					
8. Agreeableness	0.18***	−0.14***	0.21***	−0.16***	0.25***	−0.29***	0.46***	–				
9. Conscientiousness	0.15***	−0.05	0.19***	−0.12***	0.25***	−0.18***	0.35***	0.61***	–			
10. Emotional Stability	0.23***	−0.42***	0.39***	−0.52***	0.16***	−0.32***	−0.01	−0.11**	−0.21***	–		
11. Openness	0.19***	−0.07+	0.21***	−0.08*	0.30***	−0.24***	0.51***	0.65***	0.62***	−0.27***	–	
Substance use												
12. Substance use	−0.11**	0.15***	−0.08*	0.13***	−0.11**	0.16***	−0.16***	−0.11**	−0.09*	0.03	−0.06+	–
Mean	3.38	2.75	3.41	2.70	3.68	2.39	3.26	3.57	3.33	2.99	3.48	1.37
SD	0.79	0.90	0.76	0.83	0.82	0.84	0.64	0.69	0.70	0.73	0.71	0.62
Min, Max	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5	1, 5	1.1, 5	1, 5	1, 5

+ $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

Table 2
Associations between time orientation, personality traits, and substance use in adolescents.

Time orientation[a]		Distribution	Personality traits					Substance use
			Extraversion	Agreeableness	Conscientiousness	Emotional stability	Openness	
		%[b]	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Past		2	3.09 (.64)	3.31 (.90)	3.11 (.84)	2.33[e] (.92)	3.45 (.63)	1.81[g] (1.09)
Present		7	3.19 (.62)	3.49 (.60)	3.23 (.60)	3.18[e,f] (.68)	3.39 (.67)	1.48 (.83)
Future		12	3.29 (.59)	3.40[c] (.72)	3.27 (.72)	3.02[e,f] (.72)	3.43 (.77)	1.48 (.84)
Past-Future		15	3.20 (.67)	3.54 (.64)	3.31 (.76)	2.61[f] (.76)	3.48 (.70)	1.45 (.79)
Past-Present		3	3.02 (.54)	3.30[d] (.74)	3.18 (.66)	2.90 (.63)	3.27 (.73)	1.46 (.69)
Present-Future		43	3.35 (.63)	3.72[c,d] (.64)	3.44 (.63)	3.09[e,f] (.65)	3.59 (.61)	1.30[g] (.47)
Balanced		17	3.24 (.61)	3.69[c] (.62)	3.41 (.62)	2.95[e,f] (.74)	3.57 (.63)	1.26[g] (.34)
F			1.98+	4.84***	2.03+	8.96***	1.84+	3.61**
η^2			.02	.04	.02	.07	.02	.03

Note. Tukey's tests were used for comparisons.
[a] Response option labels were included for clarity and were not displayed in the instrument.
[b] Percentages do not sum to 100 due to rounding.
[c] 3 < 6**, $d = -0.49$. 3 < 7*, $d = -0.44$.
[d] 5 < 6+, $d = -0.64$.
[e] 1 < 2**, $d = -1.22$. 1 < 3**, $d = -0.99$. 1 < 6**, $d = -1.09$. 1 < 7*, $d = -0.89$.
[f] 4 < 2***, $d = -0.82$. 4 < 3**, $d = -0.59$. 4 < 6***, $d = -0.69$. 4 < 7**, $d = -0.49$.
[g] 1 > 6*, $d = 0.83$. 1 > 7*, $d = 0.89$.
+ $p < .10$.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

tense or stressed out" [reverse-coded]), and Openness (11 items; $\alpha = 0.87$; "*I like to learn about new ways of doing things*"). Fifteen items were reverse-coded according to the inventory guidelines. Response options ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Variables were generated by averaging responses.

3. Results

3.1. Time perspective dimensions and personality traits

Time perspective dimensions were associated with personality traits (Table 1). Positive time feelings were positively correlated with personality traits, with the strongest associations between positive feelings about the present and emotional stability and between positive feelings about the future and extraversion and openness. Negative time feelings were negatively correlated with personality traits, with the strongest associations shown for negative feelings about the past, present, and future with emotional stability. These effects were mostly small to moderate in size ($r = 0.07 \mid 0.52$, $M_r = 0.23$).

Time orientation was associated with personality traits, as indicated by ANOVAs (Table 2). These effects were small in size ($\eta^2 = 0.02 \mid 0.07$, $M_{\eta 2} = 0.03$). Tukey's tests indicated pairwise differences for

agreeableness and emotional stability. Adolescents who were present-future or balanced oriented also reported more agreeableness than those who were future oriented. Further, adolescents who were present-future oriented also reported more agreeableness than those who were past-present oriented. For emotional stability, adolescents who were present, future, present-future, or balanced oriented also reported greater levels than those who were past oriented. Further, adolescents who were present, future, present-future, or balanced oriented also reported greater emotional stability than those who were past-future oriented.

3.2. Time perspective dimensions and substance use

Time perspective dimensions were associated with substance use after controlling for personality traits. Time feelings were examined with six sequential regression models (Table 3), given prior evidence showing a six-factor structure for the time feeling subscales (Mello, 2019; Worrell et al., 2013). A Dunn-Bonferroni correction was made for the multiple models ($\alpha < 0.008$). The past negative and future negative subscales accounted for unique variance in substance use after controlling for personality traits. The remaining time feeling subscales did not account for additional variance. Further, time orientation accounted for unique variance in substance use after controlling for personality traits (Table 4).

4. Discussion

Identifying effective mechanisms for preventing and reducing substance use in adolescents remains a critical area of research (Johnston et al., 2019). Time perspective dimensions have emerged as consistent correlates of substance use in adolescents (e.g., McKay, Percy, Cole, Worrell, & Andretta, 2016). As time perspective is especially salient during adolescence (Mello, 2019), substance use interventions targeting time perspective dimensions may be particularly useful for adolescents. However, studies examining time perspective and substance use have not yet considered personality traits. Given that there is some evidence that time perspective dimensions are associated with personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Kairys, 2010), we sought to investigate the associations between time perspective dimensions and substance use independent of personality traits in adolescents.

4.1. Time perspective dimensions are associated with substance use independent of personality traits

Our study showed that time perspective dimensions—time feelings and time orientation—were associated with substance use independent of personality traits in a sample of adolescents. We included measures that were age-appropriate for adolescent for a rigorous examination. These included the Adolescent and Adult Time Inventory (Mello & Worrell, 2007) and the Adolescent Personal Style Inventory (Lounsbury et al., 2003). Findings replicated prior research with college students that identified hedonism and fatalism as unique correlates of substance use (Daugherty & Brase, 2010). Results extend prior research on adolescents that has shown associations with time feelings (McKay, Percy, Cole, Worrell, & Andretta, 2016) and present and future orientations (Wills et al., 2001) with substance use without controlling for personality traits. Combined, we offer the field evidence that multiple dimensions of time perspective are uniquely associated with substance use in adolescents. These findings support the examination of time perspective as both a multi-temporal (past, present, and future) and multi-dimensional (time feelings and time orientation) construct (Mello, 2019).

4.2. Time perspective dimensions and personality traits are distinct constructs

Our findings contribute to the conceptual debate about the distinctions between time perspective dimensions and personality traits. Theoretical and empirical research on this issue has been mixed, with time perspective dimensions being conceptualized either as developmental (Carstensen, 2006; Mello, 2019; Mello & Worrell, 2015) or personality-based (Zimbardo & Boyd, 1999) constructs. Further, studies have provided mixed evidence on the associations between time perspective dimensions and personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Zhang & Howell, 2011). The results of this study provide evidence that time perspective dimensions are independent of personality traits in adolescents. Our analyses indicated that the effects of the associations between the constructs were small to moderate in size, showing that the constructs were related but distinct. These results replicate prior research with adults (e.g., Zhang & Howell, 2011).

4.3. Implications

Results from the current study have implications for interventions that use time perspective dimensions to target substance use and other related risk behaviors in adolescents. Extant research has demonstrated that time perspective dimensions can be modified and, in turn, can change outcomes key to health. Marko and Savickas (1998) showed that when adolescents and young adults were taught how to emphasize the past, present, and future equally, their time perspective changed and their career planning increased compared to a control group. In another study, time perspective was targeted to increase physical activity in adults (Hall & Fong, 2003). The program underscored the impact of present actions (i.e., exercising) on physical health in the future. Findings showed that participants in the time perspective-based physical activity condition increased their physical activity. Overall, interventions are needed that use time perspective to reduce and prevent substance use in adolescents. Such interventions could incorporate coaching methods, as outlined by Boniwell et al. (2014), to enhance their effectiveness in promoting well-being.

4.4. Limitations and future directions

A limitation of the current study is the cross-sectional research design, which does not provide information on the direction of the observed relationships in the study. Additional research that is longitudinal in design is needed to replicate the patterns observed in this study and to determine the direction of the associations between time perspective dimensions and substance use. These efforts are critical for determining causality and for providing evidence that time perspective dimensions are effective mechanisms that prevent and reduce substance use in adolescents. A related direction of research is to examine these relationships during critical age periods including early adolescence. Another limitation centers on the characteristics of the sample. Given the convenience sampling strategy, female and male genders were not equally represented in our sample. We encourage additional research that focuses specifically on examining gender differences in the associations among time perspective dimensions and substance use. Further, although the amount of substances used by the adolescents in this study was comparable to national rates (Johnston et al., 2019), future studies are needed that examine adolescents who use extensively, such as adolescents in addiction treatment programs. Lastly, this study examined many commonly used substances including tobacco, alcohol, and marijuana use. Notably, there have been significant increases in vaping among adolescents (Miech et al., 2019). Future research should extend this research to include emergent substances such as vaping and e-cigarettes.

Table 3
Time feelings are associated with substance use after controlling for personality traits in adolescents.

Model	Variable	Substance use											
		Step 1						Step 2					
		b	*B*	*SE*	*p*	R^2_{adj}	*F*	*b*	*B*	*SE*	*p*	R^2_{adj}	*F*
Past positive	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.15	0.16	0.04	0.000	0.053	7.85***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.18	−0.20	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.06	−0.07	0.04	0.162		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.07	−0.09	0.03	0.028		
	Openness	0.00	0.00	0.05	0.931			0.00	0.00	0.05	0.963		
	Past positive							−0.05	−0.07	0.03	0.067		
	Intercept	2.02	–	0.18	0.000			2.10	–	0.18	0.000		
	ΔR^2												0.006
	ΔF												2.809
Past negative	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.15	0.16	0.04	0.000	0.062	9.14***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.17	−0.19	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.06	−0.07	0.04	0.135		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.04	−0.05	0.03	0.253		
	Openness	0.00	0.00	0.05	0.931			0.00	0.00	0.05	0.973		
	Past negative							0.09	0.13	0.03	0.001		
	Intercept	2.02	–	0.18	0.000			1.55	–	0.23	0.000		
	ΔR^2												0.016
	ΔF												10.073**
Present positive	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.14	0.15	0.04	0.001	0.049	7.26***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.18	−0.20	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.06	−0.07	0.04	0.134		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.09	−0.11	0.04	0.012		
	Openness	0.00	0.00	0.05	0.931			−0.01	−0.01	0.05	0.826		
	Present positive							0.00	0.00	0.03	0.995		
	Intercept	2.02	–	0.18	0.000			2.04	–	0.18	0.000		
	ΔR^2												0.002
	ΔF												−0.558
Present negative	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.15	0.16	0.04	0.000	0.054	7.94***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.17	−0.20	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.05	−0.06	0.04	0.211		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.05	−0.06	0.04	0.212		
	Openness	0.00	0.00	0.05	0.931			−0.01	−0.01	0.05	0.896		
	Present negative							0.06	0.09	0.03	0.049		
	Intercept	2.02	–	0.18	0.000			1.65	–	0.26	0.000		
	ΔR^2												0.007
	ΔF												3.311
Future positive	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.15	0.16	0.04	0.000	0.052	7.69***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.18	−0.20	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.06	−0.07	0.04	0.175		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.08	−0.09	0.03	0.018		
	Openness	0.00	0.00	0.05	0.931			0.00	0.00	0.05	0.985		
	Future positive							−0.05	−0.06	0.03	0.116		
	Intercept	2.02	–	0.18	0.000			2.08	–	0.18	0.000		
	ΔR^2												0.005
	ΔF												1.912
Future negative	Personality traits												
	Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.16	0.16	0.04	0.000	0.057	8.35***
	Agreeableness	−0.18	−0.20	0.05	0.000			−0.17	−0.19	0.05	0.000		
	Conscientiousness	−0.05	−0.06	0.04	0.242			−0.05	−0.05	0.04	0.277		
	Emotional stability	−0.10	−0.12	0.03	0.002			−0.06	−0.07	0.03	0.071		
	Openness	0.00	0.00	0.05	0.931			0.01	0.01	0.05	0.802		
	Future negative							0.08	0.11	0.03	0.006		
	Intercept	2.02	–	0.18	0.000			1.55	–	0.25	0.000		
	ΔR^2												0.010
	ΔF												7.681**

Note. A Dunn-Bonferroni correction was applied for multiple models ($\alpha < 0.008$).
** $p < .01$.
*** $p < .001$.

Table 4
Time orientation is associated with substance use after controlling for personality traits in adolescents.

Variable	Substance use											
	Step 1						Step 2					
	b	*B*	*SE*	*p*	R^2_{adj}	*F*	*b*	*B*	*SE*	*p*	R^2_{adj}	*F*
Personality traits												
Extraversion	0.15	0.15	0.04	0.001	0.048	8.42***	0.16	0.16	0.04	0.000	0.067	9.07***
Agreeableness	−0.18	−0.20	0.05	0.000			−0.15	−0.15	0.05	0.003		
Conscientiousness	−0.05	−0.06	0.04	0.242			−0.06	−0.06	0.04	0.190		
Emotional stability	−0.10	−0.12	0.03	0.002			−0.09	−0.11	0.03	0.006		
Openness	0.00	0.00	0.05	0.931			−0.05	−0.05	0.05	0.326		
Time orientation							−0.05	−0.12	0.01	0.001		
Intercept	2.02	–	0.18	0.000			2.26	–	0.19	0.000		
ΔR^2												0.021
ΔF												11.846**

** $p < .01$.
*** $p < .001$.

5. Conclusion

Substance use in adolescents is a crucial area of intervention (Johnston et al., 2019). Time perspective dimensions may be effective mechanisms of intervention. To contribute toward this topic, we examined the associations between time perspective dimensions and substance use independent of personality traits in a sample of adolescents. We included multiple dimensions of time perspective including feelings and thoughts about the past, present, and future. Substance use was self-reported by adolescents and included tobacco, alcohol, marijuana, and illicit substances. The Big Five personality traits—extraversion, agreeableness, conscientiousness, emotional stability, and openness—were assessed. Results indicated that time perspective dimensions were independently associated with substance use after controlling for personality traits. Further, time perspective dimensions and personality traits generally shared small to moderate associations, supporting the notion that these constructs are distinct. Overall, our findings provide evidence that time perspective dimensions may be useful intervention targets for reducing substance use in adolescents.

CRediT authorship contribution statement

Karlygash Assylkhan: Writing – original draft, Formal analysis. **Julia Moon:** Formal analysis, Visualization, Writing – original draft. **Charlotte Chucky Tate:** Conceptualization, Writing – review & editing. **Ryan T. Howell:** Conceptualization, Writing – review & editing. **Zena R. Mello:** Supervision, Conceptualization, Writing – review & editing, Investigation, Funding acquisition.

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