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**Time Beyond Traits:**

**Time Perspective Dimensions, Personality Traits, and Substance Use in Adolescents**

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1 represent those of The Regents of the University of California, or of any of its programs.

2 **Abstract**

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

19 *Keywords:* time perspective dimensions, time feelings, time orientation, substance use,  
20 tobacco use, marijuana use, Five-Factor Model of personality, adolescents

## **Time Beyond Traits:**

### **Time Perspective Dimensions, Personality Traits, and Substance Use in Adolescents**

#### **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 et al., 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

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1 personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Kairys, 2010; Zimbardo &  
2 Boyd, 1999). For example, the future dimension of time perspective, as measured by the  
3 Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999), was strongly associated  
4 with conscientiousness (Adams & Nettle, 2009). In another study, Dunkel and Weber (2010)  
5 showed that time perspective dimensions assessed in the ZTPI (Zimbardo & Boyd, 1999) were  
6 associated with all Big Five personality traits. These effects ranged from small to large.

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1 In contrast, other scholars have posited that time perspective dimensions are  
8 developmental and are distinct from personality traits (Carstensen, 2006; Lewin, 1939; Mello,  
9 2019). This research draws from perspectives showing that time perspective dimensions are age-  
10 related and change across the life-span (Blinded; Laureiro-Martinez et al., 2017; Lewin, 1939).  
11 Some empirical research supports the notion that time perspective dimensions are distinct from  
12 personality traits (Zhang & Howell, 2011). For example, Zhang and Howell (2011) reported  
13 mostly small associations between time perspective dimensions and the Big Five personality  
14 traits.

## 15 **1.2 Time Perspective Dimensions and Substance Use**

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17 Research has consistently demonstrated associations between time perspective  
18 dimensions and substance use (Apostolidis et al., 2006; Keough et al., 1999; McKay et al., 2016;  
19 Wills et al., 2001). Specifically, the present orientation was positively associated with substance  
20 use in adolescents and adults (Keough et al., 1999; Wills et al., 2001). Other time perspectives  
21 have been associated with lower substance use. For example, feeling more positively about the  
22 past, present, and future and less negatively about these time periods were associated with lower  
23 alcohol use in adolescents (McKay et al., 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 9<sup>th</sup> to 12<sup>th</sup> grade high schools in the western United States. We surveyed mostly 9<sup>th</sup> and 11<sup>th</sup> 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%

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1 Hispanic/Latino(a) American, 11% multi-group, 3% other, and 4% non-response. The sample  
2 average maternal education was between a High School Diploma/G.E.D. and an Associate's  
3 degree.

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

## 9 **2.2 Measures**

### 10 ***2.2.1 Time Perspective Dimensions***

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

14 **2.2.1.1 Time Feelings.** Time feelings—positive and negative feelings about the past,  
15 present, and future—were measured with six five-item subscales: Past Positive ( $\alpha = .83$ ; “*My*  
16 *past is full of happy memories*”), Past Negative ( $\alpha = .85$ ; “*My past makes me sad*”), Present  
17 Positive ( $\alpha = .85$ ; “*I am content with the present*”), Present Negative ( $\alpha = .85$ ; “*I am not satisfied*  
18 *with my life right now*”), Future Positive ( $\alpha = .88$ ; “*I am excited about my future*”), and Future  
19 Negative ( $\alpha = .82$ ; “*I don't think I'll amount to much when I grow up*”). Response options ranged  
20 from 1 (*totally disagree*) to 5 (*totally agree*). Variables were generated by averaging responses  
21 (Table 1). The subscales were treated separately, given the support for their six-factor structure  
22 (Worrell et al., 2013).

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1           **2.2.1.2 Time Orientation.** Time orientation—the perceived relative importance of the  
2 past, present, and future—was measured with a single item (Table 2). Participants were asked to  
3 indicate how relatively important the time periods were to them. Response options included  
4 seven figures that depicted the time periods as circles, with larger circles indicating greater  
5 importance and smaller circles indicating less importance.

### 6 **2.2.2 Substance Use**

7           Substance use was assessed with nine items that surveyed the frequency of using  
8 substances such as tobacco, alcohol, marijuana, and illicit substances. Response options were 1  
9 (*never*), 2 (*once*), 3 (*sometimes*), 4 (*often*), and 5 (*very often*). Composite scores were generated  
10 by averaging responses across substances ( $\alpha = .90$ ). This method of analysis is common with  
11 research on substance use in adolescents (Wills et al., 2001). The sample reported an average  
12 substance use between “never” and “once” ( $M = 1.37$ ,  $SD = .62$ ). Alcohol was the most  
13 frequently used substance, with 56% of the sample having used it at least once. These patterns of  
14 substance use are comparable to national rates (Johnston et al., 2019).

### 15 **2.2.3 Personality Traits**

16           The Big Five personality traits were assessed with the 48-item Adolescent Personal Style  
17 Inventory (APSI; Lounsbury et al., 2003): Extraversion (9 items;  $\alpha = .76$ ; “*I like meeting new*  
18 *people*”), Agreeableness<sup>1</sup> (6 items;  $\alpha = .74$ ; “*I am very easy to get along with*”),  
19 Conscientiousness (9 items;  $\alpha = .86$ ; “*I am always very careful when I am doing school work*”),  
20 Emotional Stability (9 items;  $\alpha = .83$ ; “*I often feel tense or stressed out*” [reverse-coded]), and  
21 Openness (11 items;  $\alpha = .87$ ; “*I like to learn about new ways of doing things*”). Fifteen items

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2 <sup>1</sup> The agreeableness subscale had an initial low internal consistency ( $\alpha = .67$ ). We conducted an item analysis (see  
3 author for details). Four items (6, 16, 26, and 36) were identified as ineffective and were excluded. This approach is  
4 consistent with prior studies that have used variations of the APSI (Brown et al., 2011; Martin, 2012).



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2 were reverse-coded according to the inventory guidelines. Response options ranged from 1  
3 (*strongly disagree*) to 5 (*strongly agree*). Variables were generated by averaging responses.

### 3. Results

#### 3.1 Time Perspective Dimensions and Personality Traits

5 Time perspective dimensions were associated with personality traits (Table 1). Positive  
6 time feelings were positively correlated with personality traits, with the strongest associations  
7 between positive feelings about the present and emotional stability and between positive feelings  
8 about the future and extraversion and openness. Negative time feelings were negatively  
9 correlated with personality traits, with the strongest associations shown for negative feelings  
10 about the past, present, and future with emotional stability. These effects were mostly small to  
11 moderate in size ( $r = .07 \mid .52, M_r = .23$ ).

12 Time orientation was associated with personality traits, as indicated by ANOVAs (Table  
13 2). These effects were small in size ( $\eta^2 = .02 \mid .07, M_{\eta^2} = .03$ ). Tukey's tests indicated pairwise  
14 differences for agreeableness and emotional stability. Adolescents who were present-future or  
15 balanced oriented also reported more agreeableness than those who were future oriented. Further,  
16 adolescents who were present-future oriented also reported more agreeableness than those who  
17 were past-present oriented. For emotional stability, adolescents who were present, future,  
18 present-future, or balanced oriented also reported greater levels than those who were past  
19 oriented. Further, adolescents who were present, future, present-future, or balanced oriented also  
20 reported greater emotional stability than those who were past-future oriented.

21 [Tables 1-2 about here]

#### 3.2 Time Perspective Dimensions and Substance Use

23 Time perspective dimensions were associated with substance use after controlling for

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1 personality traits. Time feelings were examined with six sequential regression models (Table 3),  
2 given prior evidence showing a six-factor structure for the time feeling subscales (Mello, 2019;  
3 Worrell et al., 2013). A Dunn-Bonferroni correction was made for the multiple models ( $\alpha$   
4  $< .008$ ). The past negative and future negative subscales accounted for unique variance in  
5 substance use after controlling for personality traits. The remaining time feeling subscales did  
6 not account for additional variance. Further, time orientation accounted for unique variance in  
7 substance use after controlling for personality traits (Table 4).

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[Tables 3-4 about here]

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#### 4. Discussion

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Identifying effective mechanisms for preventing and reducing substance use in  
11 adolescents remains a critical area of research (Johnston et al., 2019). Time perspective  
12 dimensions have emerged as consistent correlates of substance use in adolescents (e.g., McKay  
13 et al., 2016). As time perspective is especially salient during adolescence (Mello, 2019),  
14 substance use interventions targeting time perspective dimensions may be particularly useful for  
15 adolescents. However, studies examining time perspective and substance use have not yet  
16 considered personality traits. Given that there is some evidence that time perspective dimensions  
17 are associated with personality traits (Adams & Nettle, 2009; Dunkel & Weber, 2010; Kairys,  
18 2010), we sought to investigate the associations between time perspective dimensions and  
19 substance use independent of personality traits in adolescents.

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#### 4.1 Time Perspective Dimensions are Associated with Substance Use Independent of

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#### Personality Traits

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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

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

#### 12 **4.2 Time Perspective Dimensions and Personality Traits are Distinct Constructs**

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

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### 1 **4.3 Implications**

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

### 15 **4.4 Limitations and Future Directions**

16 A limitation of the current study is the cross-sectional research design, which does not  
17 provide information on the direction of the observed relationships in the study. Additional  
18 research that is longitudinal in design is needed to replicate the patterns observed in this study  
19 and to determine the direction of the associations between time perspective dimensions and  
20 substance use. These efforts are critical for determining causality and for providing evidence that  
21 time perspective dimensions are effective mechanisms that prevent and reduce substance use in  
22 adolescents. A related direction of research is to examine these relationships during critical age  
23 periods including early adolescence. Another limitation centers on the characteristics of the

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2 sample. Given the convenience sampling strategy, female and male genders were not equally  
3 represented in our sample. We encourage additional research that focuses specifically on  
4 examining gender differences in the associations among time perspective dimensions and  
5 substance use. Further, although the amount of substances used by the adolescents in this study  
6 was comparable to national rates (Johnston et al., 2019), future studies are needed that examine  
7 adolescents who use extensively, such as adolescents in addiction treatment programs. Lastly,  
8 this study examined many commonly used substances including tobacco, alcohol, and marijuana  
9 use. Notably, there have been significant increases in vaping among adolescents (Miech et al.,  
10 2019). Future research should extend this research to include emergent substances such as vaping  
11 and e-cigarettes.

## 11 **5. Conclusion**

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

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1 reducing substance use in adolescents.

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## References

- Adams, J., & Nettle, D. (2009). Time perspective, personality and smoking, body mass, and physical activity: An empirical study. *British Journal of Health Psychology, 14*(1), 83–105. <https://doi.org/10.1348/135910708x299664>
- Apostolidis, T., Fieulaine, N., & Soule, F. (2006). Future time perspective as a predictor of cannabis use: Exploring the role of substance perception among French adolescents. *Addictive Behaviors, 31*(12), 2339–2343.
- Boniwell, I., Osin, E., & Sircova, A. (2014). Introducing time perspective coaching: A new approach to improve time management and enhance well-being. *International Journal of Evidence Based Coaching and Mentoring, 12*(2), 24–40.
- Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (2011). Assessing adolescent mindfulness: Validation of an adapted Mindful Attention Awareness Scale in adolescent normative and psychiatric populations. *Psychological Assessment, 23*(4), 1023–1033. <https://doi.org/10.1037/a0021338>
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science, 312*(5782), 1913–1915. <https://doi.org/10.1126/science.1127488>
- Daugherty, J. R., & Brase, G. L. (2010). Taking time to be healthy: Predicting health behaviors with delay discounting and time perspective. *Personality and Individual Differences, 48*(2), 202–207. <https://doi.org/10.1016/j.paid.2009.10.007>
- Dunkel, C. S., & Weber, J. L. (2010). Using three levels of personality to predict time perspective. *Current Psychology, 29*(2), 95–103. <https://doi.org/10.1007/s12144-010-9074-x>

- 1  
2 Hall, P. A., & Fong, G. T. (2003). The effects of a brief time perspective intervention for  
3 increasing physical activity among young adults. *Psychology & Health, 18*(6), 685–706.  
4 <https://doi.org/10.1080/0887044031000110447>
- 5 John, O. P., & Srivastava, S. (1999). The Big Five Trait taxonomy: History, measurement, and  
6 theoretical perspectives. In *Handbook of personality: Theory and research, 2nd ed.* (pp.  
7 102–138). Guilford Press.
- 8 Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick,  
9 M. E. (2019). *Monitoring the Future national survey results on drug use, 1975-2018:*  
10 *Overview, key findings on adolescent drug use.* <https://eric.ed.gov/?id=ED594190>
- 11 Kairys, A. (2010). Correlations between time perspectives and personality traits in different age  
12 groups. *Tiltai, 51*(2), 159–172.
- 13 Kann, L., McManus, T., Harris, W. A., Shanklin, S. L., Flint, K. H., Hawkins, J., Queen, B.,  
14 Lowry, R., Olsen, E. O., Chyen, D., Whittle, L., Thornton, J., Lim, C., Yamakawa, Y.,  
15 Brener, N., & Zaza, S. (2016). Youth risk behavior surveillance - United States, 2015.  
16 *Morbidity and Mortality Weekly Report Surveillance Summaries, 65*(6), 1–174.  
17 <https://doi.org/10.15585/mmwr.ss6506a1>
- 18 Keough, K. A., Zimbardo, P. G., & Boyd, J. N. (1999). Who's smoking, drinking, and using  
19 drugs?: Time perspective as a predictor of substance use. *Basic and Applied Social*  
20 *Psychology, 21*(2), 149–164.
- 21 Laureiro-Martinez, D., Trujillo, C. A., & Unda, J. (2017). Time perspective and age: A review of  
22 age associated differences. *Frontiers in Psychology, 8*, 101.  
<https://doi.org/10.3389/fpsyg.2017.00101>



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- Lewin, K. (1939). Field theory and experiment in social psychology: Concepts and methods. *The American Journal of Sociology*, *44*, 868–897.
- Lounsbury, J. W., Tatum, H., Gibson, L. W., Park, S. H., Sundstrom, E. D., Hamrick, F. L., & Wilburn, D. (2003). The development of a Big Five Adolescent Personality Inventory. *Journal of Psychoeducational Assessment*, *21*(2), 111–133.  
<https://doi.org/10.1177/073428290302100201>
- Marko, K. W., & Savickas, M. L. (1998). Effectiveness of a career time perspective intervention. *Journal of Vocational Behavior*, *52*(1), 106–119. <https://doi.org/10.1006/jvbe.1996.1566>
- Martin, A. J. (2012). The role of personal best (PB) goals in the achievement and behavioral engagement of students with ADHD and students without ADHD. *Contemporary Educational Psychology*, *37*(2), 91–105. <https://doi.org/10.1016/j.cedpsych.2012.01.002>
- McKay, M. T., Percy, A., Cole, J. C., Worrell, F. C., & Andretta, J. R. (2016). The relationship between time attitudes profiles and self-efficacy, sensation seeking, and alcohol use: An exploratory study [Article]. *Personality and Individual Differences*, *97*, 203–209. <https://doi.org/10.1016/j.paid.2016.03.060>
- Mello, Z. R. (2019). A construct matures: Time perspective's multidimensional, developmental, and modifiable qualities. *Research in Human Development*, *16*(2), 93–101.  
<https://doi.org/10.1080/15427609.2019.1651156>
- Mello, Z. R., Finan, L. J., & Worrell, F. C. (2013). Introducing an instrument to assess time orientation and time relation in adolescence. *Journal of Adolescence*, *36*, 551–563.  
<https://doi.org/http://dx.doi.org/10.1016/j.adolescence.2013.03.005>

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- Mello, Z. R., Oladipo, S. E., Paoloni, V. C., & Worrell, F. C. (2019). Time perspective and risky behaviors among Nigerian young adults. *Journal of Adult Development, 26*, 161–171. <https://doi.org/10.1007/s10804-018-9304-2>
- Mello, Z. R., & Worrell, F. C. (2007). *The Adolescent and Adult Time Inventory-English*. University of California, Berkeley.
- Mello, Z. R., & Worrell, F. C. (2015). The past, the present, and the future: A conceptual model of time perspective in adolescence. In M. Stolarski, N. Fieulaine, & W. van Beek (Eds.), *Time perspective theory; Review, research and application: Essays in honor of Philip G. Zimbardo*. (pp. 115–129). Springer International Publishing. [https://doi.org/10.1007/978-3-319-07368-2\\_7](https://doi.org/10.1007/978-3-319-07368-2_7)
- Miech, R., Johnston, L., O’Malley, P. M., Bachman, J. G., & Patrick, M. E. (2019). Adolescent vaping and nicotine use in 2017–2018—US national estimates. *New England Journal of Medicine, 380*, 192–193.
- National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health. (2014). *The health consequences of smoking—50 years of progress: A report of the Surgeon General*.
- Singh, T., Arrazola, R. A., Corey, C. G., Husten, C. G., Neff, L. J., Homa, D. M., & King, B. A. (2016). Tobacco use among middle and high school students — United States, 2011–2015. *Morbidity and Mortality Weekly Report, 65*(14), 361–367. <https://doi.org/http://dx.doi.org/10.15585/mmwr.mm6514a1>
- Wills, T. A., Sandy, J. M., & Yaeger, A. M. (2001). Time perspective and early-onset substance use: A model based on stress–coping theory. *Psychology of Addictive Behaviors, 15*(2), 118–125. <https://doi.org/10.1037/0893-164X.15.2.118>

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1 Worrell, F. C., Mello, Z. R., & Buhl, M. (2013). Introducing English and German versions of the  
2 Adolescent Time Attitude Scale (ATAS). *Assessment*, 20, 496–510.

3 <https://doi.org/10.1177/1073191110396202>

4 Zhang, J. W., & Howell, R. T. (2011). Do time perspectives predict unique variance in life  
5 satisfaction beyond personality traits? *Personality and Individual Differences*, 50(8),

6 1261–1266. <https://doi.org/10.1016/j.paid.2011.02.021>

7 Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-  
8 differences metric. *Journal of Personality and Social Psychology*, 77(6), 1271–1288.

9 <https://doi.org/http://0-dx.doi.org.opac.sfsu.edu/10.1037/0022-3514.77.6.1271>

1

1 **Table 1**

2 *Correlations and Descriptive Statistics for Time Feelings, Personality Traits, and Substance Use*

3 *in Adolescents*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Time Feelings												
1. Past Positive	-											
2. Past Negative	-.55***	-										
3. Present Positive	.48***	-.32***	-									
4. Present Negative	-.26***	.54***	-.62***	-								
5. Future Positive	.30***	-.08*	.56***	-.33***	-							
6. Future Negative	-.13***	.41***	-.34***	.58***	-.53***	-						
Personality Traits												
7. Extraversion	.23***	-.16***	.26***	-.19***	.30***	-.26***	-					
8. Agreeableness	.18***	-.14***	.21***	-.16***	.25***	-.29***	.46***	-				
9. Conscientiousness	.15***	-.05	.19***	-.12***	.25***	-.18***	.35***	.61***	-			
10. Emotional Stability	.23***	-.42***	.39***	-.52***	.16***	-.32***	-.01	-.11**	-.21***	-		
11. Openness	.19***	-.07 <sup>+</sup>	.21***	-.08*	.30***	-.24***	.51***	.65***	.62***	-.27***	-	
Substance Use												
12. Substance Use	-.11**	.15***	-.08*	.13***	-.11**	.16***	-.16***	-.11**	-.09*	.03	-.06 <sup>+</sup>	-
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	.79	.90	.76	.83	.82	.84	.64	.69	.70	.73	.71	.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

4

5 *Note.*

6 <sup>+</sup>*p* < .10. \**p* < .05. \*\**p* < .01. \*\*\**p* < .001.

1

1 **Table 2**

2 *Associations between Time Orientation, Personality Traits, and Substance Use in Adolescents*

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

3

4 *Note.* Tukey’s tests were used for comparisons.

5 <sup>a</sup> Response option labels were included for clarity and were not displayed in the instrument.

6 <sup>b</sup> Percentages do not sum to 100 due to rounding.

7 <sup>c</sup> 3 < 6<sup>\*\*</sup>,  $\hat{d} = -.49$ . 3 < 7<sup>\*</sup>,  $\hat{d} = -.44$ .

8 <sup>d</sup> 5 < 6<sup>+</sup>,  $\hat{d} = -.64$ .

9 <sup>e</sup> 1 < 2<sup>\*\*</sup>,  $\hat{d} = -1.22$ . 1 < 3<sup>\*\*</sup>,  $\hat{d} = -.99$ . 1 < 6<sup>\*\*</sup>,  $\hat{d} = -1.09$ . 1 < 7<sup>\*</sup>,  $\hat{d} = -.89$ .

1

1 <sup>f</sup> 4 < 2\*\*\*,  $d = -.82$ . 4 < 3\*\*,  $d = -.59$ . 4 < 6\*\*\*,  $d = -.69$ . 4 < 7\*\*,  $d = -.49$ .

2 <sup>g</sup> 1 > 6\*,  $d = .83$ . 1 > 7\*,  $d = .89$ .

3 <sup>+</sup>  $p < .10$ . \* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

1

1 **Table 3**

2 *Time Feelings are Associated with Substance Use after Controlling for Personality Traits in Adolescents*

Model	Variable	Substance Use											
		Step 1						Step 2					
		<i>b</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R</i> <sup>2</sup> <sub>adj</sub>	<i>F</i>	<i>b</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R</i> <sup>2</sup> <sub>adj</sub>	<i>F</i>
Past Positive	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.15	.16	.04	.000	.053	7.85***
	Agreeableness	-.18	-.20	.05	.000			-.18	-.20	.05	.000		
	Conscientiousness	-.05	-.06	.04	.242			-.06	-.07	.04	.162		
	Emotional Stability	-.10	-.12	.03	.002			-.07	-.09	.03	.028		
	Openness	.00	.00	.05	.931			.00	.00	.05	.963		
	Past Positive							-.05	-.07	.03	.067		
	Intercept	2.0	--	.18	.000			2.10	--	.18	.000		
		2											
		$\Delta R^2$											.006
	$\Delta F$											2.809	
Past Negative	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.15	.16	.04	.000	.062	9.14***
	Agreeableness	-.18	-.20	.05	.000			-.17	-.19	.05	.000		
	Conscientiousness	-.05	-.06	.04	.242			-.06	-.07	.04	.135		
	Emotional Stability	-.10	-.12	.03	.002			-.04	-.05	.03	.253		
	Openness	.00	.00	.05	.931			.00	.00	.05	.973		
	Past Negative							.09	.13	.03	.001		
	Intercept	2.0	--	.18	.000			1.55	--	.23	.000		
		2											
		$\Delta R^2$											.016
	$\Delta F$											10.073**	
Present Positive	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.14	.15	.04	.001	.049	7.26***
	Agreeableness	-.18	-.20	.05	.000			-.18	-.20	.05	.000		
	Conscientiousness	-.05	-.06	.04	.242			-.06	-.07	.04	.134		
	Emotional Stability	-.10	-.12	.03	.002			-.09	-.11	.04	.012		
	Openness	.00	.00	.05	.931			-.01	-.01	.05	.826		
	Present Positive							.00	.00	.03	.995		
	Intercept	2.0	--	.18	.000			2.04	--	.18	.000		
		2											
		$\Delta R^2$											.002
	$\Delta F$											-5.58	
Present Negative	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.15	.16	.04	.000	.054	7.94***
	Agreeableness	-.18	-.20	.05	.000			-.17	-.20	.05	.000		
	Conscientiousness	-.05	-.06	.04	.242			-.05	-.06	.04	.211		
	Emotional Stability	-.10	-.12	.03	.002			-.05	-.06	.04	.212		
	Openness	.00	.00	.05	.931			-.01	-.01	.05	.896		
	Present Negative							.06	.09	.03	.049		
	Intercept	2.0	--	.18	.000			1.65	--	.26	.000		
		2											
		$\Delta R^2$											.007
	$\Delta F$											3.311	
Future Positive	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.15	.16	.04	.000	.052	7.69***
	Agreeableness	-.18	-.20	.05	.000			-.18	-.20	.05	.000		
	Conscientiousness	-.05	-.06	.04	.242			-.06	-.07	.04	.175		
	Emotional Stability	-.10	-.12	.03	.002			-.08	-.09	.03	.018		
	Openness	.00	.00	.05	.931			.00	.00	.05	.985		
	Future Positive							-.05	-.06	.03	.116		
	Intercept	2.0	--	.18	.000			2.08	--	.18	.000		
		2											
		$\Delta R^2$											.005
	$\Delta F$											1.912	
Future Negative	Personality Traits												
	Extraversion	.15	.15	.04	.001	.048	8.42***	.16	.16	.04	.000	.057	8.35***
	Agreeableness	-.18	-.20	.05	.000			-.17	-.19	.05	.000		

1

Conscientiousness	-.05	-.06	.04	.242		-.05	-.05	.04	.277
Emotional Stability	-.10	-.12	.03	.002		-.06	-.07	.03	.071
Openness	.00	.00	.05	.931		.01	.01	.05	.802
Future Negative						.08	.11	.03	.006
Intercept	2.0	--	.18	.000		1.55	--	.25	.000
	2								
$\Delta R^2$									.010
$\Delta F$									7.681**

1 *Note.* A Dunn-Bonferroni correction was applied for multiple models ( $\alpha < .008$ ).

2 \*\* $p < .01$ . \*\*\* $p < .001$ .



1

1 **Table 4**

2 *Time Orientation is Associated with Substance Use after Controlling for Personality Traits in*

3 *Adolescents*

Variable	Substance Use											
	Step 1						Step 2					
	<i>b</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R</i> <sup>2</sup> <sub>adj</sub>	<i>F</i>	<i>b</i>	<i>B</i>	<i>SE</i>	<i>p</i>	<i>R</i> <sup>2</sup> <sub>adj</sub>	<i>F</i>
Personality Traits												
Extraversion	.15	.15	.04	.001	.048	8.42***	.16	.16	.04	.00	.067	9.07***
Agreeableness	-.18	-.20	.05	.000			-.15	-.1	.05	.00		
Conscientiousness	-.05	-.06	.04	.242			-.06	-.0	.04	.19		
Emotional Stability	-.10	-.12	.04	.002			-.09	-.1	.03	.00		
Openness	.00	.00	.03	.931			-.05	-.0	.05	.32		
Time Orientation			.05				-.05	-.1	.01	.00		
Intercept	2.0	--	.1	.000			2.26	--	.19	.00		
$\Delta R^2$	2		.8							0		.021
$\Delta F$												11.846**

4

5 *Note.*

6 \*\**p* < .01. \*\*\**p* < .001.