

Time buffers teasing and lessens tobacco use: The moderating role of time perspective on bullying victimization and tobacco use in adolescents

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ABSTRACT

Bullying victimization is a prevalent and harmful experience for adolescents and is positively associated with risky behaviors, including tobacco use. We investigated a potential moderator for the associations between bullying victimization and tobacco use, namely time perspective, which refers to thoughts about time. Bullied adolescents may focus on past events more than present or future events, which could lead to less adaptive coping mechanisms in response to stress, such as tobacco use. Multiple time perspective dimensions and time periods (past, present, and future) were examined. Time orientation refers to the relative emphasis placed on a time period. Time relation refers to the perceived relationship among the time periods. Bullying victimization and tobacco use were self-reported. Participants included 758 adolescents ($M_{\text{age}} = 15.81$, $SD_{\text{age}} = 1.22$; 54% female). Multiple linear regression analysis indicated that bullying victimization was positively associated with tobacco use. Moderated regression analyses indicated that perceiving all time periods as important (time orientation) and interrelated (time relation) buffered the positive association between bullying victimization and tobacco use in adolescents. Analyses controlled for demographics, sensation seeking, and stress. Results suggest that future research should examine the viability of time perspective-based interventions for bullying victimization and tobacco use in adolescents.

1. Introduction

Time perspective refers to the thoughts and feelings one has toward the past, present, and future (Mello and Worrell, 2015; Zimbardo and Boyd, 1999). This psychological construct has captured the attention of researchers who are interested in using time to predict human behavior for almost a hundred years (Cottle, 1967b; Frank, 1939; Lewin, 1939). Research has focused on bivariate associations showing that time perspective is associated with academic achievement (Andretta et al., 2014; Mello et al., 2013; Yacob et al., 2020); psychological well-being, such as anxiety, self-esteem, and self-concept (Finan et al., 2020; Konowalczyk et al., 2018; Mello et al., 2018); and negative life events (Chandler and Mello, 2021). Research has also examined behavioral outcomes and indicated their bivariate associations with time perspective, including physical activity (Konowalczyk et al., 2018; Konowalczyk, Rade, et al., 2019), healthy eating (Vásquez-Echeverría et al., 2020), risky behaviors (Konowalczyk, Buhl, et al., 2019; Mello et al., 2019, 2018; Worrell et al., 2021), and substance use (Apostolidis et al.,

2006; Assylkhan et al., 2021; Finan et al., 2021; McKay et al., 2016; Wells et al., 2018).

In an effort to provide knowledge for behavioral interventions, researchers have turned their attention to examining time perspective as a moderator. In particular, studies have shown how time perspective moderates the association between bullying victimization and self-esteem (Moon and Mello, 2021). Other research has examined future consequences, a conceptually-akin topic, and has shown how it moderates the association between aggression and alcohol use (McKay et al., 2015). Additional research has demonstrated that time perspective is distinct from personality (Assylkhan et al., 2021), providing more evidence that time perspective could be a meaningful construct for interventions. However, more research is needed in this area.

To contribute toward creating knowledge that can inform behavioral interventions, the current study examined how time perspective moderated the association between bullying victimization and tobacco use in adolescents. We focused on tobacco use given the high prevalence and serious health consequences of this behavior. The majority of adult

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tobacco users begin as adolescents (Johnston et al., 2020). Every day, more than 3200 adolescents smoke their first cigarette (National Center for Chronic Disease Prevention and Health Promotion, 2014), and nearly one in four high school students has reported using a tobacco product—such as tobacco cigarettes and e-cigarettes—within the past 30 days (Centers for Disease Control and Prevention [CDC], 2020). Critically, it is estimated that 5.6 million youth will die prematurely in their lifetime from tobacco-related illnesses (CDC, 2015). Thus, we sought to determine if time perspective could be a new mechanism to effectively reduce or prevent tobacco use in adolescents.

1.1. Bullying victimization and tobacco use in adolescents

Bullying victimization afflicts one in five adolescents (CDC, 2018) via physical or verbal harassment or social exclusion (Olweus, 1994). A large body of research has demonstrated the wide range of negative implications associated with bullying victimization, such as lower self-esteem (Rigby and Slee, 1993), greater anxiety, depression (Garnefski and Kraaij, 2014; Schoeler et al., 2018), and suicidal ideation (Kowalski and Limber, 2013). In particular, bullying victimization has been associated with greater risks in smoking and misusing other substances in adolescents (Hong et al., 2014; Livingston et al., 2019). To address these associations, researchers have examined temporal constructs. For example, Garnefski and Kraaij (2014) showed that rumination, the emphasis toward the past, strengthened associations between bullying victimization and mental health issues, such as anxiety and depression. McKay et al. (2015) demonstrated that greater consideration of future consequences moderated the associations between aggression and alcohol use. Audrain-McGovern et al. (2004) showed that delay discounting indirectly influenced the odds of smoking via peer smoking and substance use. However, to our knowledge, there has yet to be a study that has examined how temporal constructs moderate the associations between bullying victimization and tobacco use in particular. This line of inquiry remains an important research goal.

1.2. Time perspective

1.2.1. A brief history of the theory

Time perspective is a cognitive and motivational construct that broadly refers to the thoughts and feelings one has toward the past, present, and future (Mello, 2019; Stolarski et al., 2015; Zimbardo and Boyd, 1999). Researchers have been examining the psychological aspects of time since Lewin (1939) proposed that time perspective referred to the past, present, and future and could be used to understand human development. Frank (1939) distinguished time perspective from the physiological and biological aspects of time and suggested that this construct could have immense value in predicting human behavior.

Perhaps, no area is more in need of exploration for its temporal implications than the field of human conduct and none offers more promise of fruitful reward for imaginative speculation, since all human conduct (and probably all organic behavior) is conditioned by the time perspectives of the individual... (p. 294).

In the 1960s, Cottle (1967a, 1967b, 1969a, 1969b) sought to understand how time perspective could be associated with resilience in response to economic adversity. He proposed that time perspective could be best understood as time dominance and time relatedness. These dimensions referred to the degree to which one emphasizes a particular time period over another (e.g., the future more than the past or present) and the relationships one perceived among the time periods, respectively. He developed a set of projective tests and a complex coding scheme to address these dimensions (1967b). Zimbardo and Boyd (1999) then proposed that time perspective comprised orientations, feelings, and behaviors. They created the Zimbardo Time Perspective Inventory (ZTPI) to assess multiple dimensions including Past Positive, Past Negative, Present Hedonism, Present Fatalism, and Future. The ZTPI has spawned hundreds of studies and a renewed interest in the

topic (for a review, see Stolarski et al., 2015). However, research using the ZTPI has focused mostly on adults (Stolarski et al., 2015), and there have been several studies indicating that the ZTPI is not appropriate for adolescents (Perry et al., 2015; Worrell and Mello, 2007).

Recognizing that the time perspectives of adolescents would be different than those of adults, Mello and Worrell (2015) proposed a conceptualization that operationalized time perspective as several distinct dimensions that would be particularly salient for adolescents. In this paper, we focused on two dimensions: time orientation and time relation. These dimensions address the ways in which individuals collectively view the past, present, and future. More specifically, *time orientation* refers to the relative emphasis one places on a particular time period or time periods. For example, some adolescents may emphasize the future over the past or present (option #3, Table 1, top). Whereas, other adolescents may emphasize the present and future but deemphasize the past (option #6). The time orientation dimension extends prior research that focused on future orientation (Seginer, 2009; Steinberg et al., 2009) by including multiple time periods. *Time relation* refers to the perceived relationship among the past, present, and future. For example, some adolescents may view time to be unrelated (option #1, Table 1, bottom) whereas others may view the all time periods to be interrelated (option #4). To assess time orientation and time relation, Mello et al. (2013) created a set of single-item self-reported scales. These instruments were informed by Cottle's (1967c) projective tests and have been shown to yield valid and reliable scores in prior research (Mello et al., 2013; Moon et al., 2022).

1.2.2. Time perspective and tobacco use

Several studies have shown how time perspective dimensions are associated with tobacco use in adolescents. For example, Finan et al. (2021) examined tobacco use in three independent adolescent samples: a high-risk sample that included students facing expulsion and two general population samples. Tobacco use was assessed as a binary outcome (yes/no). Findings indicated that among adolescents in the

Table 1
Time orientation, time relation, and tobacco use in adolescents.

Time perspective		Distribution	Tobacco use
		<i>n</i> (% ^a)	<i>M</i> (<i>SD</i>)
Time orientation			
1. Past		17 (2)	2.06 _a (1.57)
2. Present		49 (7)	1.40 _{ab} (0.75)
3. Future		83 (12)	1.44 _{ab} (1.00)
4. Past–future		102 (15)	1.42 _b (0.96)
5. Past–present		22 (3)	1.45 _{ab} (1.06)
6. Present–future		303 (44)	1.23 _b (0.64)
7. Balanced		120 (17)	1.19 _b (0.64)
<i>F</i> ratio			4.25***
η^2			.04
Time relation			
1. Unrelated		69 (10)	1.45 (1.00)
2. Present–future related		207 (30)	1.32 (0.79)
3. Linearly related		188 (27)	1.29 (0.77)
4. Interrelated		235 (34)	1.28 (0.78)
<i>F</i> ratio			0.92
η^2			.00

Note. Tukey's test was used for comparisons. Means with different subscripts differ at $p = .05$. ^aPercentages may not add to 100 due to rounding. *** $p < .001$.

high-risk sample, those who emphasized the present over the past and future used three times as much tobacco than their counterparts. Whereas, for adolescents from the general population samples, those who emphasized the past and future over the present reported 1.5 times the use of tobacco compared to their counterparts.

Further, this line of inquiry has been extended to younger and older individuals. For example, Wills et al. (2001) examined elementary school students and showed that substance use including tobacco was positively associated with an orientation toward the present and inversely associated with an orientation toward the future. Similar findings were observed in a study with several samples that included adolescents and adults. Specifically, Keough et al. (1999) indicated that substance use including tobacco was positively associated with an orientation toward the present and negatively associated with an orientation toward the future. However, Wills et al. (2001) and Keough et al. (1999) both conceptualized time perspective dimensions to include distinct time periods rather than their relational qualities.

1.2.3. Time perspective as a moderator

Scholars have theorized that time perspective and other temporal constructs such as future orientation change when individuals experience stress and that this change, in turn, is associated with changes in behaviors (Holman, 2015; Nurmi, 1991; Zimbardo and Boyd, 1999). Empirically, researchers have begun to examine the degree to which time perspective dimensions moderate associations between psychological outcomes and risky behaviors. For example, Moon and Mello (2021) examined how time relation moderated the association between bullying victimization and self-esteem in adolescents. Findings indicated that the negative relationship between bullying victimization and self-esteem was buffered for adolescents who viewed all time periods as interrelated compared to those who viewed them as unrelated. In another study, McKay et al. (2015) examined how perceiving future consequences moderated the association between trait aggression and self-reported alcohol use. Future consequences were operationalized as immediate (present) and future consequences. Results showed that the positive association between aggression and alcohol use was buffered for adolescents who reported more consideration of immediate and future consequences.

1.3. The present study

To address these critical gaps in the literature, the present study addressed the following research question: How does time perspective (orientation and relation) moderate the association between bullying victimization and tobacco use in adolescents? Given past research on time perspective and on tobacco use in adolescents (Finan et al., 2021; Keough et al., 1999; Mello et al., 2013), ideal time orientations and time relations were expected to moderate this association. Specifically, compared to other time perspectives, perceiving multiple time periods to be important (time orientation) and related (time relation) were expected to buffer the positive association between bullying victimization and tobacco use in adolescents.

2. Method

2.1. Participants

The sample was recruited from two public high schools in the western United States in 2015–2016. Participants older than 18 years of age ($n = 2$) were excluded from analyses. The final sample included 758 adolescents aged 12–18 years ($M_{\text{age}} = 15.81$, $SD_{\text{age}} = 1.22$; 54% female). The following racial/ethnic groups were reported: African American/Black (6%), American Indian/Alaskan Native (<1%), Asian American/Pacific Islander (20%), European American/White (17%), Hispanic/Latino(a) American (42%), multiple races/ethnicities (11%), other race/ethnicity (3%), and no response (<1%). Socioeconomic status (SES) was

assessed with maternal education, with the sample average being below an Associate's degree. Maternal education is a valid and reliable indicator of SES (Diemer et al., 2013).

Regarding missingness, some participants did not respond to one ($n = 43$, 6%) or more ($n = 62$, 8%) items on key study variables (i.e., bullying victimization, tobacco use, and time perspective). Those with missing responses indicated greater bullying victimization ($M = 1.91$, $SD = 1.34$) than their counterparts ($M = 1.49$, $SD = 0.82$; $p < .001$) but did not differ in tobacco use ($p = .72$).

2.2. Measures

2.2.1. Bullying victimization

Bullying victimization was measured with the 18-item Adolescent Peer Relations Instrument: Target ("I was pushed or shoved"; $M = 1.53$, $SD = 0.89$; $\alpha = 0.97$; Marsh et al., 2011). Response options ranged from 1 (Never) to 6 (Every Day). Scores were generated by averaging the responses, with higher scores indicating greater levels of bullying victimization. Prior research has used this measure to generate valid and reliable scores of bullying victimization with adolescent participants (Marsh et al., 2011; Moon and Mello, 2021).

2.2.2. Tobacco use

Tobacco use was assessed with a single item ("How frequently do you use tobacco?"; $M = 1.31$, $SD = 0.80$), with response options ranging from 1 (Never) to 5 (Very Often). This assessment is consistent with prior studies that have measured tobacco use in adolescents (Wills et al., 2001).

2.2.3. Time perspective

Time orientation and time relation were measured with the Adolescent and Adult Time Inventory (Mello and Worrell, 2007).

2.2.3.1. Time orientation. Time orientation was assessed with a single item (see Table 1, top). The item included seven response options that depicted the past, present, and future as circles. Participants were asked to "select one figure below that shows how important the past, the present, and the future are to you, with larger circles being more important to you." The response options included (1) Past (past is more important than the present and future), (2) Present, (3) Future, (4) Past–Future (past and future are more important than the present), (5) Past–Present, (6) Present–Future, and (7) Balanced (all time periods are equally important).

2.2.3.2. Time relation. Time relation was measured with a single item (see Table 1, bottom). The item included four response options that depicted the past, present, and future as circles, with overlapping circles representing related time periods. Participants were asked to "select one figure below that shows how you view the relationship among the past, the present, and the future." The response options included (1) Unrelated, (2) Present–Future Related (only the present and future are related), (3) Linearly Related (all time periods are related in a linear fashion), and (4) Interrelated (all time periods are related to one another).

Prior research has shown that the Time Orientation and Time Relation Scales yield reliable scores via test–retest (Moon et al., 2022). Other studies have demonstrated that emphasizing multiple time periods (time orientation) and perceiving relationships among multiple time periods (time relation) are associated with positive mental health outcomes, higher academic achievement, and less substance use (Finan et al., 2020; Mello et al., 2013; Moon and Mello, 2021).

2.2.4. Covariates

To address plausible alternative hypotheses, we included sensation seeking and stress, which have been associated with tobacco use in

adolescents (Leventhal et al., 2017; Lydon-Staley and Geier, 2018). Sensation seeking was measured with the 8-item Brief Sensation Seeking Scale ("I prefer friends who are excitingly unpredictable"; $M = 3.42$, $SD = 0.82$; $\alpha = 0.84$; Hoyle et al., 2002). Stress was measured with a single item ("What do you feel your stress level is today?"; $M = 5.58$, $SD = 2.24$), with response options ranging from 1 (*Very Low*) to 9 (*Very High*). Demographics were also included such as age, gender, and maternal education, given their associations with bullying victimization (Hymel and Swearer, 2015; Tippett and Wolke, 2014). In addition, given that data were collected from several schools, high school membership was included as a covariate.

2.3. Procedures

Recruitment speeches were given in classrooms during school hours by trained researchers. Printed study materials that included the participant assent form, parental consent form, and study survey were distributed to interested students. Surveys were completed on the students' time and returned to the research team at the high school. Anonymity was preserved by providing separate envelopes to enclose the completed surveys. Compensation was \$10. The affiliated institutional review board of the university approved the procedure (H15-33c). The authors have reported on some of these data in prior research, including a study that examined time perspective as a moderator of the associations between bullying victimization and self-esteem (Moon and Mello, 2021) and another study that examined bivariate associations between time perspective and substance use (Finan et al., 2021). However, the data have not yet been published for the specific purposes of the current study. Data were analyzed using Stata (Version 14).

2.4. Data analysis plan

Preliminary analyses will include correlations to determine the associations among bullying victimization, sensation seeking, and tobacco use. ANOVA will be used to examine the associations between time perspective (orientation, relation) and bullying victimization. ANOVA will also be used to examine associations between time perspective (orientation, relation) and tobacco use. Tukey's test will be used to identify significant pairwise comparisons. Primary analyses will include multiple linear regression analyses with bullying victimization as a predictor variable and tobacco use as the outcome variable. Covariates will include age, gender, maternal education, school, sensation seeking, and stress given evidence that these variables are associated with tobacco use and bullying victimization (Hymel and Swearer, 2015; Leventhal et al., 2017; Lydon-Staley and Geier, 2018; Tippett and Wolke, 2014). Additional models will determine how time perspective (orientation, relation) moderates the associations between bullying victimization and time perspective; a separate model will be used for each time perspective dimension. For statistically significant moderation effects, simple slopes analysis will be conducted.

3. Results

3.1. Preliminary analyses

Correlational analyses showed that bullying victimization and sensation seeking were positively associated with tobacco use ($r_s = 0.22$ and 0.11 , $p_s < 0.01$). ANOVA showed that time orientation was associated with bullying victimization, $F(6, 659) = 4.27$, $p < .001$, $\eta^2 = .04$. Specifically, the past option was associated with higher levels ($M = 2.20$, $SD = 1.41$) compared to the present ($M = 1.47$, $SD = 0.72$), present-future ($M = 1.36$, $SD = 0.67$), and balanced options ($M = 1.49$, $SD = 0.84$; $p_s < 0.05$). Time relation was not associated with bullying victimization (see author for analyses).

Table 1 displays distributions for time orientation and time relation and their associations with tobacco use. Predominant time orientation

responses were present-future (#6; 44%), balanced (#7; 17%), and past-future (#4; 15%; see Table 1, top). Time orientation was associated with tobacco use, with the past option being associated with higher levels ($M = 2.06$, $SD = 1.57$) compared to the past-future ($M = 1.42$, $SD = 0.96$), present-future ($M = 1.23$, $SD = 0.64$), and balanced options ($M = 1.19$, $SD = 0.64$; $p_s < 0.05$). Predominant time relation responses were interrelated (#4; 34%), present-future related (#2; 30%), and linearly related (#3; 27%; see Table 1, bottom). Time relation was not associated with tobacco use (see Appendices A and B for data across low and high levels of bullying victimization).

3.2. Moderating effect of time perspective on bullying victimization and tobacco use

Multiple linear regression indicated that bullying victimization was negatively associated with tobacco use, controlling for age, gender, maternal education, school, sensation seeking and stress, $F(7, 651) = 8.92$, $p < .001$, $R^2_{adj} = .08$, $B = 0.21$, $SE B = 0.03$, $\beta = 0.23$, $p < .001$. Further, time perspective dimensions (orientation and relation) moderated this association with the same covariates. Continuous predictor variables were mean-centered. For simple slopes analyses, the bullying victimization scale (x-axis) ranged from the lowest observed value to 1 SD above the mean (Aiken and West, 1991). This method was used given that values 1 SD below the mean were not observed.

3.2.1. Time orientation

Time orientation moderated the association between bullying victimization and tobacco use (see Table 2, top). Simple slopes analyses indicated that adolescents who experienced greater levels of bullying victimization (i.e., 1 SD above the mean) and perceived all time periods as equally important also reported lower tobacco use than their counterparts who (a) perceived the past to be more important than the present and future, (b) perceived the past and future to be more important than the present, and (c) perceived the present and future to be more important than the past (see Figs. 1A, B, and C, respectively).

3.2.2. Time relation

Time relation moderated the association between bullying victimization and tobacco use (see Table 2, bottom). Simple slopes analysis indicated that adolescents who experienced greater levels of bullying victimization and perceived all time periods as interrelated also reported lower tobacco use than their counterparts who perceived all time periods as unrelated (see Fig. 1D).

4. Discussion

4.1. Time perspective moderated the association between bullying victimization and tobacco use in adolescents

The current study demonstrates the mitigating effect of time perspective on the negative association between bullying victimization on tobacco use in adolescents. The present study showed that the association between bullying victimization and tobacco use in adolescents was moderated by time perspective dimensions (orientation and relation). These results support theoretical assertions that temporal constructs, such as time perspective, change when individuals experience stress and that this change, in turn, is associated with changes in behaviors (Holman, 2015; Nurmi, 1991; Zimbardo and Boyd, 1999). The findings also align with prior studies that have examined the moderating effects of temporal constructs on the associations between variables similar to bullying victimization and tobacco use (Audrain-McGovern et al., 2004; Garnefski and Kraaij, 2014; McKay et al., 2015).

Table 2

Multiple linear regression models for bullying victimization, time orientation, time relation, and tobacco use in adolescents.

Variable	Tobacco use				
	<i>B</i>	<i>SE B</i>	β	<i>F</i> ratio	R^2_{adj}
Model 1: Time orientation					
Bullying victimization	−0.04	0.08	−0.05	5.98***	.15
Time orientation					
Past	0.11	0.22	.02		
Present	0.24	0.15	.07		
Future	0.16	0.11	.06		
Past–future	0.18	0.11	.08		
Past–present	0.24	0.19	.05		
Present–future	0.06	0.08	.04		
Balanced	Reference category				
Bullying victimization × Time orientation					
Bullying victimization × Past	0.95***	0.17	.26		
Bullying victimization × Present	0.37	0.22	.07		
Bullying victimization × Future	0.21	0.12	.09		
Bullying victimization × Past–future	0.32**	0.12	.15		
Bullying victimization × Past–present	0.31	0.20	.07		
Bullying victimization × Present–future	0.26*	0.11	.14		
Bullying victimization × Balanced	Reference category				
Model 2: Time relation					
Bullying victimization	0.07	0.07	.07	5.94***	.11
Time relation					
Unrelated	0.21	0.11	.08		
Present–future related	0.00	0.08	.00		
Linearly related	0.06	0.08	.03		
Interrelated	Reference category				
Bullying victimization × Time relation					
Bullying victimization × Unrelated	0.48***	0.12	.19		
Bullying victimization × Present–future related	0.13	0.10	.07		
Bullying victimization × Linearly related	0.03	0.10	.01		
Bullying victimization × Interrelated	Reference category				

Note. Age, gender, maternal education, school, sensation seeking, and stress were included as covariates in both models. Values for covariates are not shown. Continuous predictors were mean-centered. * $p < .05$. ** $p < .01$. *** $p < .001$.

4.2. Using time perspective to target risk factors for tobacco use in adolescents

Results provide evidence for associations between new dimensions of time perspective and tobacco use and contribute to the growing body of literature that has indicated associations between time perspective and tobacco use, and risky behavior in general, among adolescents (Finan et al., 2021; Keough et al., 1999; Mello et al., 2013, 2018). Importantly, time perspective has been shown to be a modifiable construct (Marko and Savickas, 1998). Hall and Fong (2003) showed that participants in an experimental group who were taught to focus on future health outcomes when engaging, or deciding to engage, in physical activities strengthened orientations to the future and increased physical activity compared to the control group. Taken together, time perspective may be an effective mechanism to prevent or reduce the effect of risk factors such as bullying victimization on tobacco use in adolescents.

4.3. Time perspective and historical time

An important consideration for time perspective researchers includes the possibility that adolescent time perspectives as a whole may shift in response to cultural and global phenomena that occur across historical periods. In return, this shift may be associated with changes in bullying victimization and tobacco use. For example, advances in technology and access to the internet afford the ability to easily retrieve information on events from the historical past. Moreover, adolescents can document their lives through countless pictures and media for future reference, which may allow them to more frequently access and think about their past. Importantly, these time perspective shifts—greater emphasis on

the past, less emphasis on the future, and stronger negative feelings toward time—have been associated with greater bullying victimization and tobacco use (Finan et al., 2021; Keough et al., 1999; Moon and Mello, 2021; Wills et al., 2001). Further, global events such as pandemics, climate change, and geopolitical conflicts may have implications on adolescents' time perspectives. Uncertainty of the future may lead to a stronger present orientation, which may increase risky behaviors such as tobacco use. Additional research is needed to determine how particular historical events shape time perspective.

4.4. Limitations and future directions

Limitations of the present research included the cross-sectional study design, which limited the ability to interpret causality between time perspective and tobacco use. Future studies can assess the variables at multiple time points to verify whether time perspective mediates the associations between bullying victimization and tobacco use. Another limitation was the convenience sampling method. Future research can use samples that are more nationally representative to enable greater generalizability. Additional studies may examine whether the observed patterns of moderation apply to bullying victimization occurring virtually, such as on social media or in online games. This is an important topic to examine given that one in six adolescents reported experiencing cyberbullying victimization in the prior year (CDC, 2018). Future research may also examine other forms of nicotine use such as vaping, which has been growing in prevalence in adolescents (Patrick et al., 2019). Further, a person-centered approach may help identify time perspective profiles based on multiple dimensions that demonstrate robust buffering effects against bullying victimization on tobacco use in

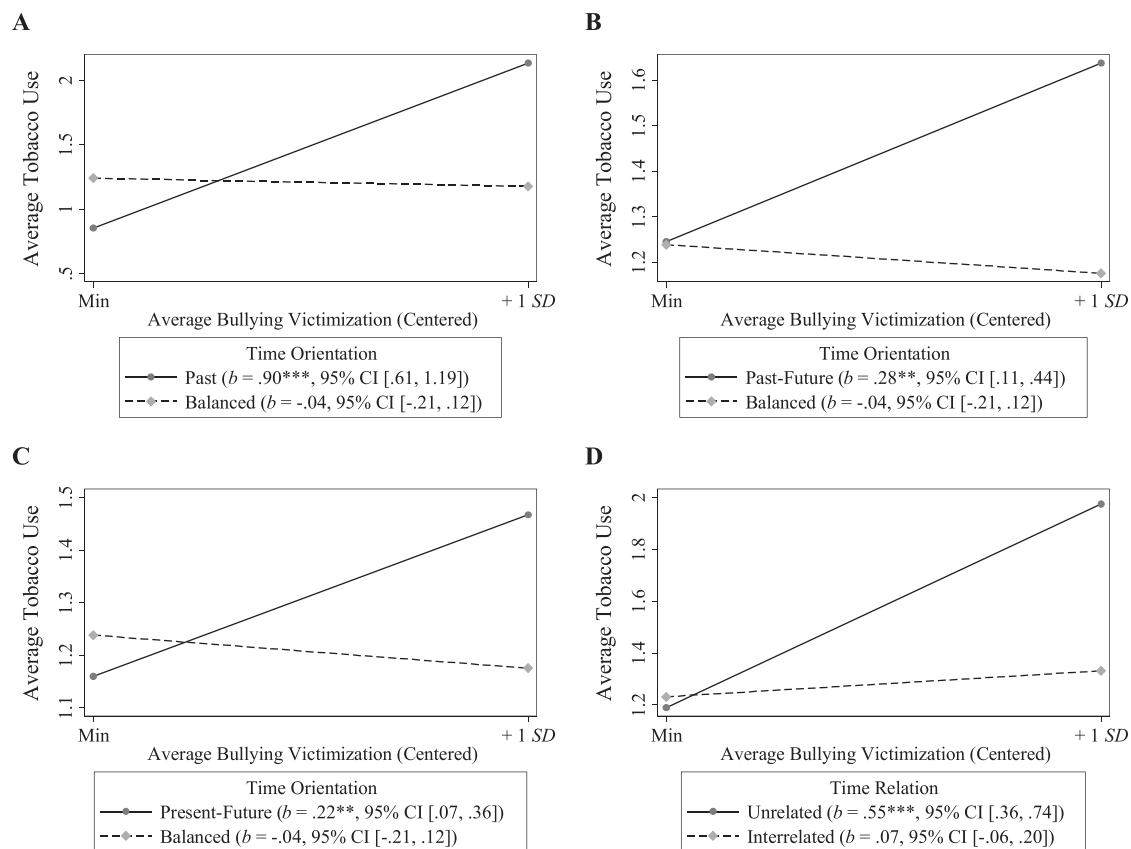


Fig. 1. Estimated interactions for bullying victimization, time orientation, time relation, and tobacco use in adolescents. Note. Unstandardized coefficients, p values, and 95% confidence intervals for the simple slopes are located in the legends. Age, gender, maternal education, high school, sensation seeking, and stress were controlled. The x-axes ranged from the lowest observed value to 1 SD above the mean. This method was used given that values 1 SD below the mean were not observed. Panel A: Past versus balanced (time orientation). Panel B: Past–future versus balanced (time orientation). Panel C: Present–future versus balanced (time orientation). Panel D: Unrelated versus interrelated (time relation). ** $p < .01$. *** $p < .001$.

adolescents. Notably, a past study has demonstrated that profiles based on time feelings, another dimension of time perspective, are associated with healthy food consumption and attitudes toward physical activity (Vásquez-Echeverría et al., 2020). Lastly, given that research has shown how time perspective differs across adolescents, adults, and older adults (Mello et al., 2021), it will be important for future studies to examine whether the current findings with adolescents replicate in older individuals.

5. Conclusions

The present study examined the moderating effect of time perspective (orientation and relation) on the association between bullying victimization and tobacco use in adolescents. Time perspective included multiple time periods (past, present, and future). Specifically, perceiving all time periods as equally important (time orientation) and as interrelated (time relation) moderated the positive association between bullying victimization and tobacco use in adolescents. Results suggest that future research should examine the potential viability of time perspective-based interventions for addressing bullying victimization and tobacco use in adolescents.

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CRediT authorship contribution statement

Zena R. Mello: Conceptualization, Investigation, Writing - original draft, Writing - review & editing, Supervision, Funding acquisition. **Julia Moon:** Conceptualization, Formal analysis, Writing - original draft, Writing - review & editing, Visualization.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.beproc.2022.104693](https://doi.org/10.1016/j.beproc.2022.104693).

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