

Thinking about the past, present, and future: Time perspective and self-esteem in adolescents, young adults, middle-aged adults, and older adults

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We examined time perspective and self-esteem in adolescents, young adults, middle-aged adults, and older adults. Time perspective was measured with scales that assess relative orientations and relationships among the past, present, and future. Age effects were examined with standard analytic strategies to determine categorical differences between age groups and with new statistical techniques designed to show continuous age patterns. Findings indicated that (1) thinking about the future was greatest for adolescents and young adults and lowest for middle-aged and older adults, and thinking about the present increased across ages; (2) fewer adolescents and middle-aged participants perceived that the time periods were interrelated compared to younger and older adults; and (3) across ages, a greater emphasis towards the past compared to other time periods was associated with lower self-esteem, whereas emphasizing the present and the future jointly was associated with higher self-esteem.

Statement of contribution

What is already known on this subject?

- Time perspective differs within adolescence and between younger and older adults.
- Thinking about the future decreases with age.
- Thinking about the past is associated with lower self-esteem.

What does this study add?

- Thinking about the future was greatest for adolescents and young adults and lowest for middle-aged and older adults.
- Younger and older adults were more likely to perceive an interrelated time than adolescents and middle-aged adults.
- Emphasizing the present and the future jointly was associated with higher self-esteem.

Background

How individuals are oriented towards the past, present, and future has long been thought to be associated with age (Frank, 1939; Lewin, 1939), and there is now a substantial body

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of research showing that there are age-related shifts in time perspective (Butler, 1963; Carstensen, 2006; Laureiro-Martinez, Trujillo, & Unda, 2017). However, as we describe below, time perspective is a multidimensional construct (Mello & Worrell, 2015; Zimbardo & Boyd, 1999), and the field would benefit from knowledge about how certain time perspective dimensions vary (or not) with age. Thus, this study focused on how multiple dimensions of time perspective differ across adolescents, young adults, middle-aged adults, and older adults. In doing so, we also evaluated how dimensions of time perspective relate to self-esteem. Prior research has shown some associations between time perspective and self-esteem in adolescents (Mello, Finan, & Worrell, 2013), young adults (Chishima, McKay, & Murakami, 2017), and adults (Webster, 2011). However, different conceptualizations of time perspective have been used for different age groups, so we do not yet know how specific time perspective dimensions are associated with self-esteem, and whether or not this varies with age. Self-esteem has powerful implications for mental health across the lifespan (Mann, Hosman, Schaalma, & de Vries, 2004), including risky behaviours in adolescents (Wheeler, 2010) and job satisfaction in adulthood (Pierce & Gardner, 2004). Thus, this study aimed to contribute new knowledge about the associations among time perspective dimensions, self-esteem, and age, which is important for ultimately informing the development of intervention programmes that use time perspective to foster psychological health.

Theories about time perspective

Time perspective has been conceptualized in a variety of ways (Carstensen, 2006; Cottle, 1967; Lewin, 1939; Mello & Worrell, 2015; Zimbardo & Boyd, 1999). Zimbardo and Boyd's (1999) theory includes the past, present, and future and several dimensions, such as orientations, feelings, and behaviours. These dimensions are captured by The Zimbardo Time Perspective Inventory (ZTPI), an instrument that assesses past positive, past negative, hedonism (a focus on pleasure in the present), fatalism (events are predetermined), and future planning. Carstensen's (2006) socioemotional selectivity theory focuses on whether people view their future as expansive or as 'running out' and being limited. These theories have been influential in generating knowledge about time perspective.

However, in an effort to further clarify the unique contributions of particular time periods and dimensions, Mello and Worrell (2015) and Mello (2019) proposed a new conceptual model. This model includes three time periods (past, present, and future) and several dimensions, including time orientation, time relation, and time frequency. This conceptualization of time perspective enables researchers to parse the specific elements of the construct. *Time orientation* refers to the emphasis one has towards a particular time period or periods (Cottle, 1967; Mello et al., 2013). Individuals may be oriented solely towards the future, whereas others may have a 'balanced' view that emphasizes the time periods equally (Cottle, 1967; Mello et al., 2013; Zimbardo & Boyd, 1999). *Time relation* refers to the perceived relationships among the time periods, where some individuals think that time periods are unrelated and others perceive them to be completely interrelated (Cottle, 1967; Mello et al., 2013). *Time frequency* is the degree that people think about each time period; for instance, some people think about the past most of the time and others think about the past very little (Konowalczyk, Moon, Buhl, & Mello, 2019; Mello, Worrell, & Andretta, 2009).

Time perspective and age

Many developmental theories suggest that time perspective varies with age. For instance, Lewin (1939) posited that with increased life experience individuals would widen their orientation towards the future from days to months and years from childhood to adolescence. Mello (2019) described how improved cognitive abilities and the processes of identity formation in adolescence allow an increased ability to think about the relationships between the past, present, and future. Carstensen (2006) discussed how older adults would be more likely to see the future as limited than younger adults, and this would result in an emphasis towards emotionally salient goals. Combined, time perspective theories have drawn from maturational, cognitive, and emotional development to describe how time perspectives change with age. However, each of these theories has focused on different dimensions of time.

Some research has also shown age differences in time perspective. For instance, in a cross-sectional study, Lang and Carstensen (2002) showed that older adults (aged 70–90) viewed their future as more limited than younger adults (aged 45–65). Relatedly, in another study, older participants (aged 60–81) thought less far into the future than younger participants (aged 20–37; Fingerman & Perlmutter, 1995). More recently, researchers examined individuals aged 13.5–75.5 and showed that negative attitudes towards the past were inversely associated with age (Laureiro-Martinez et al., 2017).

There has also been some research examining how time orientation and time relation are related to age. Regarding time orientation (i.e., the emphasis one has towards a particular time period or periods), a cross-sectional study found that an orientation towards the future was greater among participants aged 10–16 than those aged 16–30 (Steinberg et al., 2009). Young participants (15–25) were more oriented towards the present, whereas older participants (aged 35–55) were more future oriented (Siu, Lam, Le, & Przepiorka, 2014). In contrast, adolescents (aged 16–20) were most oriented towards the past, young adults to the future (aged 21–34), and middle-aged adults towards the present (aged 35–63; Ortuño, Janeiro, & Paixão, 2011). With regards to time relation and age, to our knowledge, there is only one study available. Cottle, Howard, and Pleck (1968) examined the time relations of adolescents aged 12–18 and showed that older adolescents were more likely to report an interrelated view of the past, present, and future than younger adolescents.

In contrast, there has been greater attention paid to how age affects time frequency (i.e., the degree that people think about the past, present, and future). Butler's (1963) landmark article argued that older adults were more likely to reminisce about the past than other age groups. The emphasis towards the past in old age is also inherent in Erikson's (1959) notion of a life review that was thought to occur at the final stage of life. However, some research has failed to support the idea that older adults are more past focused (Hyland & Ackerman, 1988; Merriam & Cross, 1982; Parker, 1995; Webster, 1994). One study found that increasing age did not affect the frequency with which people thought about the past; however, compared to other age groups, older adults thought more about the present and less about the future (Cameron, 1972; Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010).

Time perspective, age, and self-esteem

Research has also shown that for adolescents and younger adults, time orientation, time relation, and time frequency are each related to self-esteem. In a study with two independent samples of adolescents, relationships were demonstrated among time

orientation, time relation, and self-esteem (Mello et al., 2013). For time orientation, the study found that emphasizing both the present and the future jointly and de-emphasizing the past were associated with higher self-esteem. For time relation, the study found that perceiving time periods to be unrelated to one another was associated with the lowest self-esteem. Whereas, a study with adults showed that a time orientation indicated by 'balanced' time perspective, one emphasizing the past, present, and future simultaneously, was positively associated with happiness, positive affect, vitality, as well as decreased negative affect (Zhang, Howell, & Stolarski, 2013). Similarly, Webster (2011) showed that adults who emphasized both the present and the future had higher self-esteem than their counterparts. When considering the time frequency dimension of time perspective, research has indicated that focusing more on the future was associated with higher self-esteem in studies with college students (Lyu, Du, & Rios, 2019; Zimbardo & Boyd, 1999). Other research has indicated that focusing on the past was negatively related to self-esteem, whereas focusing on the present was positively associated, and that the degree of emphasis towards the future was unrelated to self-esteem (Chishima et al., 2017).

Although no research has yet examined how time orientation, time relation, and time frequency relate to self-esteem in older adults, other time constructs have been shown to affect emotional processing. Seeing the future as temporally constrained affects emotional and social processing (Barber, Opitz, Martins, Sakaki, & Mather, 2016; Fung, Carstensen, & Lutz, 1999). For example, a study with participants aged 17–87 indicated that perceiving the future as limited was negatively associated with psychological well-being (Grühn, Sharifian, & Chu, 2015). Likewise, in another study with participants aged 18–93, perceiving the future as limited was associated with a preoccupation with negative events (Strough et al., 2016).

The present study

The first aim of this study was to contribute towards the existing literature (Carstensen, 2006; Laureiro-Martinez et al., 2017) by examining differences in multiple time perspective dimensions across adolescents, young adults, middle-aged adults, and older adults. We examined age in two ways: between categorical age groups and across continuous age. Our measures of time perspective included multiple dimensions: *time orientation* (relative emphasis towards a time period), *time relation* (perceived relationship among time periods), and *time frequency* (frequency with which one thinks about the time periods). As the literature review showed, prior research has sometimes used different time perspective conceptualizations (Cottle et al., 1968; Siu et al., 2014), which has resulted in mixed findings. Thus, we base our hypotheses on the majority of the results reported. Regarding time orientation and time frequency, we hypothesized that (1) adolescents and young adults would be more oriented to the future and would think more often about the future than the past and the present, and (2) older adults would be characterized by a focus on the present and the past, given prior studies (Cohen & Taylor, 1998; Steinberg et al., 2009). For time relation, we hypothesized that fewer adolescents and young adults would view the time periods as interrelated compared to middle-aged and older adults, given prior research (Cottle et al., 1968).

A second aim of this study was to generate new knowledge about the associations between time perspective and self-esteem across developmental periods. Based on prior studies (Chishima et al., 2017; Mello et al., 2013), we hypothesized that focusing on the (1) future would be positively associated with self-esteem and (2) past would be negatively

associated with self-esteem. We further hypothesized that (3) emphasizing multiple time periods simultaneously would be associated with higher self-esteem, given extant research (Zhang et al., 2013; Zimbardo & Boyd, 1999).

Method

Participants

Table 1 shows the participant demographic characteristics. Four samples were included: adolescents ($N = 760$), young adults ($N = 398$), middle-aged adults ($N = 312$), and older adults ($N = 189$). Data were evaluated for missingness. Less than 10% ($n = 129$, 8%) of the participants across the samples were missing data on either one ($n = 60$, 4%) or more ($n = 69$, 4%) key study variables (i.e., time orientation, time relation, time frequency, and self-esteem). We used listwise deletion in multiple regression and ANOVA analyses. Participants with missing responses did not differ from the rest of the samples in self-esteem scores ($p = .32$).

Procedures

Adolescents were recruited from two public high schools in the United States. Data were collected with anonymous surveys. Parental consent and adolescent assent were obtained. Adolescents received \$10 compensation (Institutional Review Board [IRB]# H15-33c). Young adults were recruited from psychology courses at a public four-year university in the United States. Participants completed an online survey and received

Table 1. Participant demographic characteristics

	Adolescents	Young adults	Middle-aged adults	Older adults
<i>N</i>	760	398	312	189
Age				
Mean	15.81	20.52	36.27	69.99
SD	1.22	1.82	7.10	6.08
Range	12–18	18–24	25–51	60–85
Gender				
Female	413 (56%)	310 (78%)	174 (56%)	138 (73%)
Male	311 (42%)	87 (22%)	133 (44%)	50 (26%)
Transgender female	2 (0.27%)	n/a	n/a	n/a
Transgender male	1 (0.14%)	n/a	n/a	n/a
Gender queer/nonbinary	n/a	1 (0.25%)	2 (0.50%)	n/a
Intersex	n/a	n/a	n/a	1 (0.50%)
Racial/ethnic groups				
African American/Black	46 (6%)	20 (5%)	12 (4%)	11 (6%)
American Indian/Alaskan Native	3 (0.50%)	1 (0.25%)	1 (0.30%)	3 (2%)
Asian American/Pacific Islander	136 (18%)	109 (27%)	16 (5%)	6 (3%)
Hispanic/Latino(a) American	319 (43%)	120 (30%)	16 (5%)	1 (0.50%)
European American/White	114 (15%)	86 (17%)	234 (75%)	159 (84%)
Other racial/ethnic group	18 (2%)	31 (8%)	12 (4%)	3 (2%)
Mixed racial/ethnic groups	116 (15%)	52 (13%)	22 (7%)	6 (3%)

Note. n/a = not applicable.

course credit at the discretion of instructors (IRB# X15-08R1). Middle-aged adults self-selected via the website BeyondThePurchase.org. We included participants who completed all measures in this study (IRB# X12-03). Older adults were recruited from databases from the western United States. Participants completed the study through an online system. Participants were offered a \$10 gift card upon completion (IRB# X14-37).

Measures

Time perspective

We used the Adolescent and Adult Time Inventory (AATI; Mello & Worrell, 2007) to measure time perspective. First, *time orientation* was measured with the Time Orientation Scale (TOS). The TOS is a single-item categorical variable that determines the emphasis one places on the past, present, and future. Participants were instructed to select a set of circles among seven options that reflected their time orientation (see Table 2). Circles differed in size, with larger circles representing more important time periods. The test–retest reliability of the TOS has been shown with young adults (Cramer’s $V = 0.50$; Moon et al., (manuscript under review for publication)). The validity of the TOS has been shown with studies demonstrating that individuals who are oriented towards all three time periods equally (‘balanced’, option #7) or the present-future evenly (option #6) report higher self-esteem and lower risk-taking than their counterparts with other time orientations (Mello et al., 2013).
















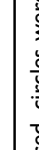






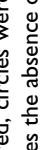
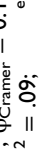

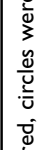


Second, *time relation* was assessed with the Time Relation Scale (TRS). The TRS is a single-item categorical variable that determines the perceived relationships among the past, present, and future. Participants were asked to select one among four sets of circles with varying degrees of overlap that reflected their perceived relationship among the time periods (see Table 3). The test–retest reliability of the TRS has been shown with young adults (Cramer’s $V = 0.33$; Moon et al., (manuscript under review for publication)). The validity of the TRS has been shown with studies demonstrating that individuals who perceive time periods to be interrelated (option #4) report higher academic achievement and lower risk-taking than their counterparts who perceive time periods to be unrelated (option #1; Mello et al., 2013).

Third, *time frequency* was assessed with three items that asked participants how frequently they thought about the past, the present, or the future. Response options ranged from 1 (*Almost Never*) to 5 (*Almost Always*). These items have been used to measure time frequency in prior research (Konowalczyk et al., 2019).

Self-esteem

The Rosenberg Self-Esteem Scale (Rosenberg, 1965) was used to assess self-esteem. This 10-item scale measures an individual’s global self-esteem. Response options ranged from 1 (*Strongly Disagree*) to 4 (*Strongly Agree*), with greater scores indicating higher self-esteem. Five of the 10 items were reverse-coded. Prior studies have demonstrated strong internal consistency estimates ($\alpha = .91$; Sinclair et al., 2010). In this study, internal consistency for self-esteem scores were acceptable across samples (adolescents: $\alpha = .85$, young adults: $\alpha = .89$, middle-aged adults: $\alpha = .94$, and older adults: $\alpha = .87$).

Table 2. Time orientation, age groups, and self-esteem

Time orientation	Age group ^a				Self-esteem and age groups			
	Adolescent	Young adult	Middle-aged adult	Older adult	Adolescent ^b M (SD)	Young adult ^c M (SD)	Middle-aged adult ^d M (SD)	Older adult ^e M (SD)
Response option								
1 Past	2% 	1% 	2% 	2% 	2.36 (0.61) ^f	3.40 (N/A)	2.82 (0.88)	2.53 (0.38)
2 Present	7% 	8% 	17% 	27% 	2.81 (0.55)	2.83 (0.51) ^g	3.10 (0.81)	2.60 (0.22)
3 Future	12% 	7% 	9% 	4% 	2.83 (0.52) ^{f,h}	2.95 (0.49)	3.01 (0.59)	2.57 (0.21)
4 Past-Future	15% 	13% 	10% 	2% 	2.55 (0.57) ^f	2.79 (0.60) ^g	2.80 (0.80) ⁱ	2.43 (0.06)
5 Past-Present	3% 	3% 	7% 	5% 	2.63 (0.40)	2.53 (0.51) ^g	2.74 (0.66) ^j	2.50 (0.20)
6 Present-Future	44% 	48% 	46% 	39% 	2.95 (0.57) ^f	3.19 (0.50) ^g	3.33 (0.63) ^j	2.60 (0.19)
7 Balanced	17% 	21% 	8% 	22% 	2.85 (0.48) ^f	3.02 (0.59)	2.97 (0.81)	2.57 (0.20)

Note. When administered, circles were labeled "past," "present," and "future." Circle configuration names are shown for clarity and are not included on actual instrument. N/A denotes the absence of a standard deviation given that there was a single participant who selected the option. Bonferroni tests used for comparisons.

^a $\chi^2 = 139.13, p < .001, \phi_{\text{Cramer}} = 0.17$; ^b $F(6, 674) = 8.76, p < .001, R^2_{\text{adj}} = .07, \eta^2 = .08$; ^c $F(6, 377) = 7.27, p < .001, R^2_{\text{adj}} = .09, \eta^2 = .10$; ^d $F(6, 297) = 5.09, p < .001, R^2_{\text{adj}} = .07, \eta^2 = .09$; ^e $F(6, 180) = 0.74, p = .62, R^2_{\text{adj}} = .01, \eta^2 = .02$; ^f $(3, 7 > 1, p < .05; 6 > 1, p < .01)$; ^g $(2 < 6, p < .05; 4 < 6, p < .001; 5 < 6, p < .01)$; ^h $(3 > 4; p < .05)$; ⁱ $(4, 5 > 6, p < .01)$; ^j $(3 > 4; p < .01, **p < .01, ***p < .05)$.

Table 3. Time relation, age groups, and self-esteem

Time relation	Age group ^a				Self-esteem and age groups			
	Response option							
	Adolescent	Young adult	Middle-aged adult	Older adult	Adolescent ^b M (SD)	Young adult ^c M (SD)	Middle-aged adult ^d M (SD)	Older adult ^e M (SD)
1 Unrelated	10%	5%	10%	4%	2.72 (0.66)	2.78 (0.68)	3.15 (0.66)	2.58 (0.16)
2 Present-Future Related	30%	21%	30%	26%	2.84 (0.57)	2.92 (0.55)	3.16 (0.74)	2.60 (0.19)
3 Linear Related	27%	24%	29%	20%	2.89 (0.55)	3.09 (0.56)	3.03 (0.77)	2.55 (0.19)
4 Interrelated	34%	50%	30%	49%	2.79 (0.60)	3.08 (0.54)	3.15 (0.69)	2.59 (0.21)

Note. When administered, circles were labeled "past," "present," and "future." Circle configuration names are shown for clarity and are not included on actual instrument.
^a $\chi^2 = 52.630, p < .001, \phi_{\text{Cramer}} = 0.11$; ^b $p = .181$; ^c $F(3, 372) = 3.23, p < .05, R^2_{\text{adj}} = .003, \eta^2 = .008$, Bonferonni indicated no pairwise differences; ^d $p = .60$; ^e $p = .72$; *** $p < .001, *p < .05$.

Results

Analytic strategy

We employed standard and new statistical techniques to determine how time perspective was associated with age and how associations between time perspective and self-esteem were associated with age. First, we treated age categorically and used chi-square and ANOVAs to examine differences among the samples (adolescents, young adults, middle-aged adults, and older adults). We interpreted effect sizes based on Cohen's guidelines (1992). Second, we treated age continuously and used time-varying effect models (TVEMs; Tan, Shiyko, Li, Li, & Dierker, 2012). Age was measured chronologically in years (12–85), in line with prior TVEM studies (Douglass & Umaña-Taylor, 2016; Thompson, Roemer, & Leadbeater, 2015; Vasilenko, 2017; Vasilenko & Lanza, 2014).

TVEM is an analytic method that demonstrates how associations between variables change over the course of continuous time. This method has been applied to developmental constructs (Douglass & Umaña-Taylor, 2016; Vasilenko, Evans-Polce, & Lanza, 2017). TVEM does not require associations to take on any particular parametric form, but flexibly estimates associations over time, allowing for identification of more precise periods where changes are occurring (Lanza, Vasilenko, Liu, Li, & Piper, 2014; Vasilenko et al., 2017). Like many prior TVEM studies on age-related differences, this study uses cross-sectional data (Evans-Polce, Veliz, Boyd, Hughes, & McCabe, 2020; Lee & Chopik, 2018; Rice, Vasilenko, Fish, & Lanza, 2019; Thapa, Selya, & Jonk, 2017; Vasilenko et al., 2017). This is appropriate given that TVEM's primary usage of looking at how within wave/time associations differ across various times or ages. However, like all cross-sectional studies of age-related differences, findings must be interpreted in light of limitations, such as the difficulty of disentangling age and cohort effects.

To examine the associations between each time perspective dimension and continuous age, we generated five intercept-only TVEM models (Figure 1a–e). The first two models included time orientation (Figure 1a) and time relation (Figure 1b). Given that these variables were assessed with single-items with multiple response options, the variables were recoded to binary to facilitate the interpretation of TVEM. For time orientation, we compared responses indicating an orientation towards all time periods simultaneously or the present and future to orientations towards fewer time periods. Specifically, we compared response options 7 and 6 to response options 1–5 (see Table 2). For time relation, we compared response options indicating time periods as related to those indicating no relationships. Specifically, we compared response options 4 and 3 to response options 1 and 2 (see Table 3). We organized time orientation and time relation response options into binary variables following past research that has indicated the particular response options were associated with healthy outcomes (Mello et al., 2013).

TVEM models were generated for each time perspective dimension and indicated the prevalence of being oriented towards multiple time periods (Figure 1a) and perceiving that time periods were related (Figure 1b) across ages. Three models were generated to show how the frequency of thinking about the past, present, and future were each associated with age (Figure 1c–e). We examined age-varying associations between time perspective dimensions and self-esteem. These models estimated the strength of the associations between each time perspective dimension and self-esteem as a function of age (Figure 2a–e). Below, we present results using standard (categorical age) and TVEM (continuous age) statistical techniques for each time perspective dimension showing (1)

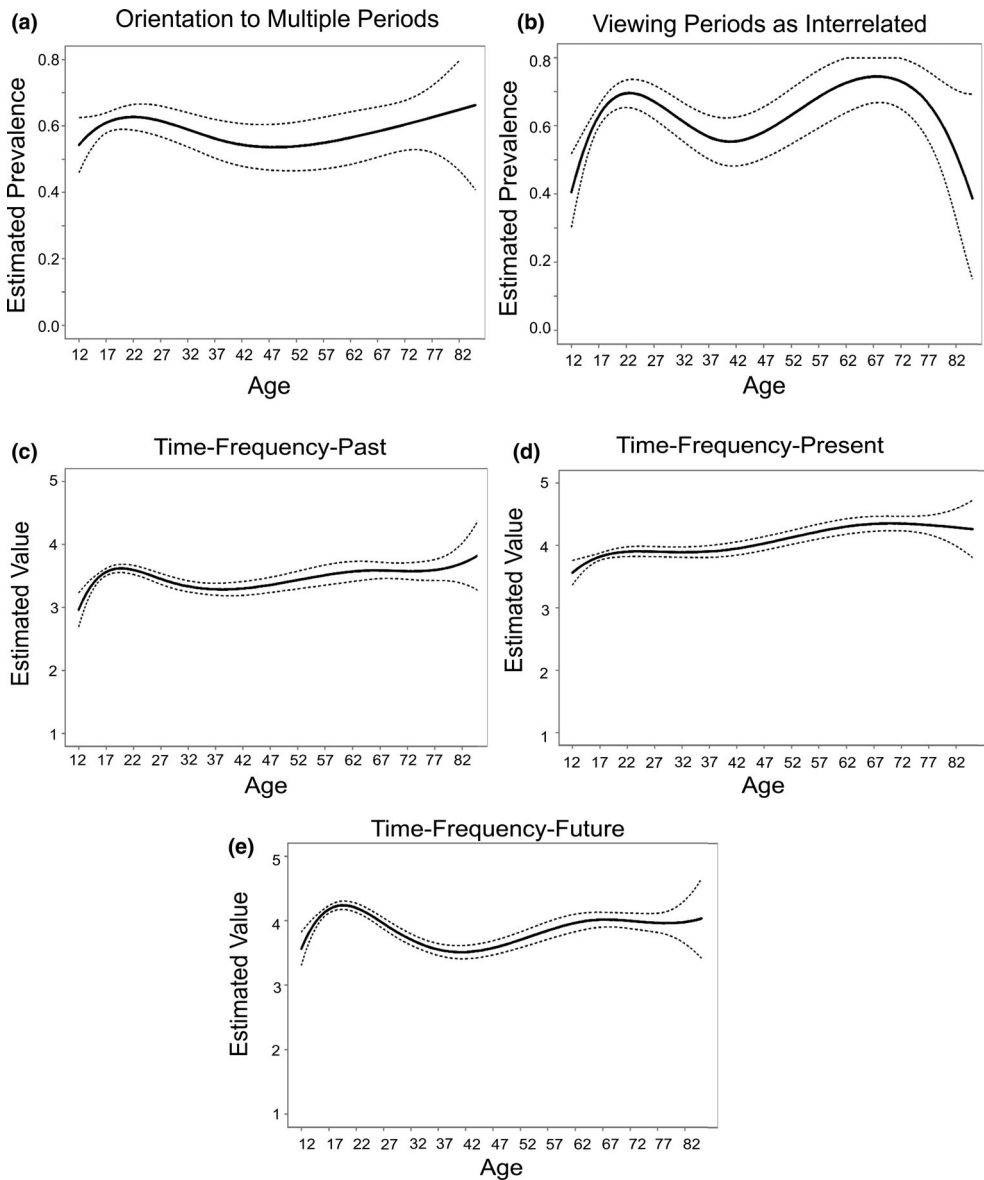


Figure 1. Intercept-only TVEMs showing differences in time perspective dimensions across ages 12–85. Dashed lines indicate 95% confidence intervals.

how time perspective and age are associated and (2) how associations between time perspective and self-esteem differ across ages.

Time perspective and age

Time orientation

The chi-square statistic (Table 2, left portion) showed an association between time orientation and age. For ‘balanced orientation’, in which the past, present, and future are

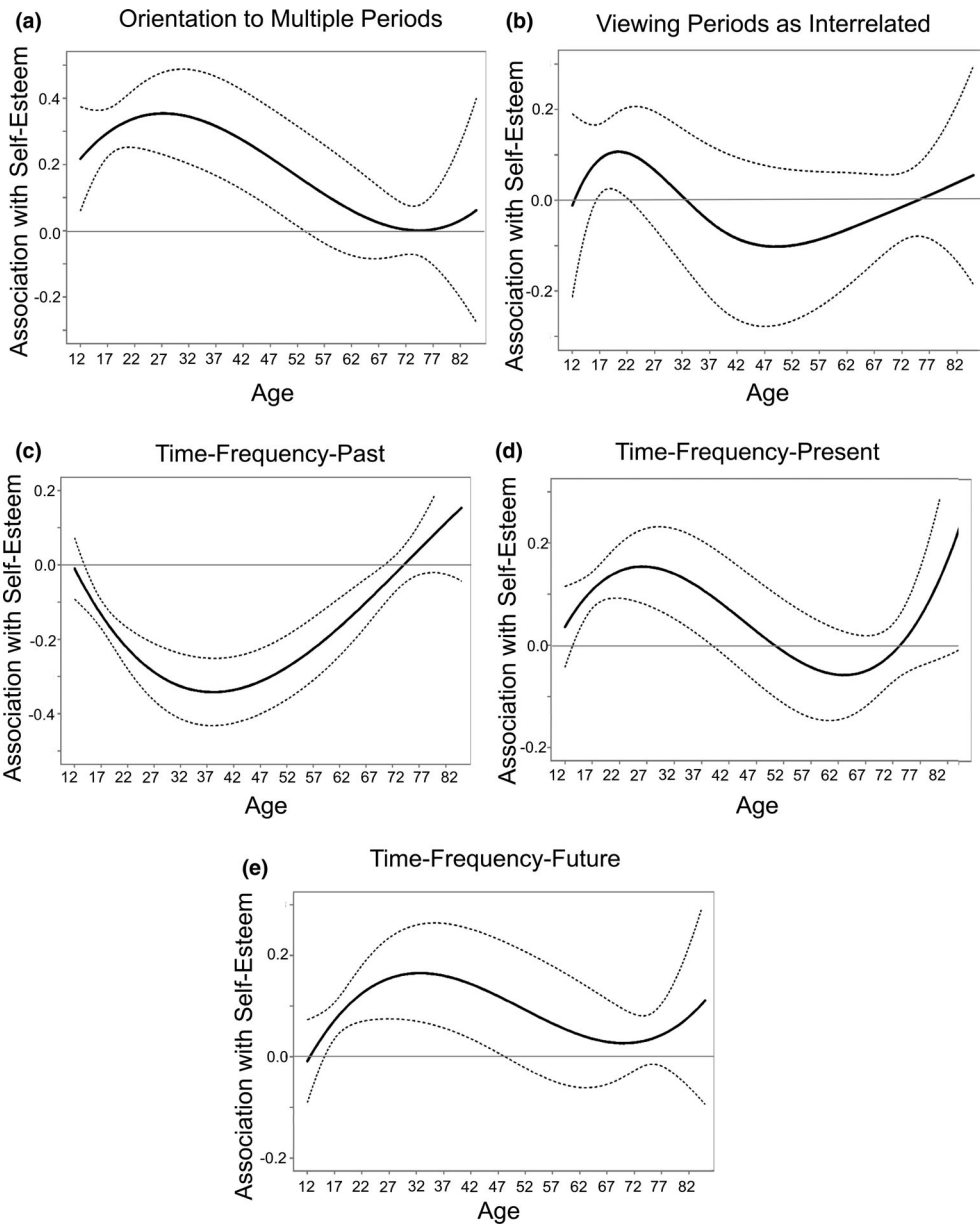


Figure 2. TVEMs showing associations between time perspective dimensions and self-esteem across ages 12–85. Dashed lines indicate 95% confidence intervals.

equally emphasized (option #7), more young and older adults selected this option compared to adolescents and middle-aged adults. The present-only orientation (option #2) was chosen more often by middle-aged and older adults than adolescents and young adults. TVEM (Figure 1a) indicated that about half of the participants reported an orientation towards all three time periods or the present and the future equally (option #6 or #7) at age 12. This percentage increased until about age 22, decreased until about age 45, and then increased again through age 85.

Time relation

The chi-square statistic (Table 3, left portion) showed an association between time relation and age. Compared to younger and older adults, fewer adolescents and middle-aged adults reported interrelated time relations (option #4). TVEM (Figure 1b) showed that about half of the participants perceived that the time periods were either linearly related or interrelated (option #3 or #4) at age 12; this increased until about age 22, then decreased until about age 41, increased again to age 69, and then decreased again through age 85.

Time frequency

For the past, an ANOVA (Table 4, left portion) showed that adolescents and middle-aged adults thought about this time period less often than young adults and older adults. TVEM (Figure 1c) showed that thinking about the past was the least frequent at age 12, increased until about age 19, declined until about 35, after which it increased through age 85. For the present, an ANOVA (Table 4, left portion) showed that older adults reported thinking about this time period more frequently than any other age group. TVEM (Figure 1d) showed that the frequency of thinking about the present increased in a linear fashion from ages 12 to 85. For the future time period, an ANOVA (Table 4, left portion) showed that young adults thought most often about the future, followed by adolescents, older adults, and middle-aged adults. TVEM (Figure 1e) showed that the frequency of thinking about the future was lowest at age 12, increased until about age 19, declined until about 47, after which it increased again through 67.

Time perspective, self-esteem, and age*Time orientation*

The relationship between time orientation and self-esteem varied with age. The chi-square statistic (Table 2, right portion) showed that in the adolescents and middle-aged adults, participants with a present-future orientation (option #6) had the highest self-esteem. The lowest self-esteem was reported by adolescents with a past orientation (option #1), and by young adults and middle-aged adults with a past-present orientation (option #5). Note that for young adults, the highest self-esteem was reported by a single participant who had a past orientation (option #1). Time orientation was not related to self-esteem in older adults. TVEM (Figure 2a) showed that the association between time orientation and self-esteem was significant until age 53, with participants who were oriented towards all time periods or the present and the future equally (option #6 or #7) reported higher self-esteem. This orientation was associated with an increase of .22 points on the self-esteem scale at age 12; this increased to about .36 points at age 27, and declined through age 53.

Time relation

Time relation was associated with self-esteem for younger adults. The chi-square statistic (Table 3, right portion) showed that young adults who perceived the time periods as unrelated (option #1) also reported lower self-esteem than those who perceived time periods as interrelated (option #4). However, time relation was not associated with self-esteem for adolescents, middle-aged adults, or older adults. TVEM (Figure 2b) showed that the association between perceiving time periods to be interrelated (option #3 or #4)

Table 4. Time frequency, age group, and self-esteem

Time frequency	Age group		Self-esteem and age groups									
			Middle-aged adults		Adolescents ^a		Young adults ^b		Middle-aged adults ^c		Older adults ^d	
	Adolescents M (SD)	Young adults M (SD)	M (SD)	M (SD)	Coeff.	SE	β	Coeff.	SE	β	Coeff.	SE
Past ^e	3.47 (0.95)	3.61 (0.76) ^f	3.34 (0.73) ^f	3.60 (0.77) ^f	-.15***	.02	-0.24	-.20***	.04	-0.24	-.38***	.05
Present ^g	3.75 (1.00) ^h	3.92 (0.90) ^{h,i}	3.91 (0.74) ⁱ	4.34 (0.74) ^{h,i,j}	.12***	.02	0.21	.08***	.03	0.14	.08	.05
Future ^k	4.06 (0.97) ^l	4.27 (0.76) ^{l,m}	3.64 (0.70) ^{l,m,n}	3.99 (0.69) ^{l,m}	.04*	.02	0.08	.14***	.03	0.20	.11	.05

Bonferroni tests used for comparisons.

^a $\beta_{\text{intercept}} = 2.71, p < .001, R^2_{\text{adj}} = .08$; ^b $\beta_{\text{intercept}} = 2.75, p < .001, R^2_{\text{adj}} = .12$; ^c $\beta_{\text{intercept}} = 3.67, p < .001, R^2_{\text{adj}} = .15$; ^d $\beta_{\text{intercept}} = 2.43, p < .001, R^2_{\text{adj}} = .06$.

^e $F(3, 1,633) = 6.70, p < .001, R^2_{\text{adj}} = .01, \eta^2 = .01$; ^fyoung adults > middle-aged adults, $p < .001$; middle-aged adults < older adults, $p < .01$.

^g $F(3, 1,635) = 21.85, p < .001, R^2_{\text{adj}} = .04, \eta^2 = .04$.

^h(adolescents < young adults, $p < .05$; adolescents < older adults, $p < .001$).

ⁱ(young adults < older adults, $p < .001$); ^j(middle-aged adults < older adults, $p < .001$).

^k $F(3, 1,634) = 33.82, p < .0001, R^2_{\text{adj}} = .06, \eta^2 = .06$.

^l(adolescents < young adults, $p < .001$; adolescents > middle-aged adults; $p < .001$).

^m(young adults > middle-aged adults, $p < .001$; young adults > older adults, $p < .01$).

ⁿ(middle-aged adults < older adults, $p < .001$); *** $p < .001$, ** $p < .01$, * $p < .05$.

and having greater self-esteem was only significant between ages 17 and 23, where individuals who perceived time as interrelated had an increase of up to .10 points on the self-esteem scale.

Time frequency

An ANOVA (Table 4, right portion) showed that for all age groups, thinking about the past was negatively associated with self-esteem. This effect was stronger for middle-aged and older adults than young adults and adolescents. Regarding the present, an ANOVA (Table 4, right portion) showed that thinking about this time period was positively associated with self-esteem for adolescents and young adults. Regarding the future, an ANOVA (Table 4, right portion) showed that thinking about this time period was positively associated with self-esteem for adolescents, young adults, and older adults. TVEM (Figure 2c) showed that thinking more often about the past was associated with lower self-esteem from ages 14 to 70. This association was the strongest at around age 40, when an increase of 1 point on the time-frequency-past scale was associated with a decrease in self-esteem of .35. Thinking more frequently about both the present (Figure 2d) and future (Figure 2e) was associated with higher self-esteem from ages 15 through the 40s, with the strongest associations at around age 30.

Discussion

Drawing from a multidimensional model of time perspective (Mello & Worrell, 2015), we added to the existing literature on time perspective differences across the lifespan (Carstensen, 2006; Laureiro-Martinez et al., 2017) by showing how adolescents, young adults, middle-aged adults, and older adults differed across multiple time perspective dimensions. We used this information about developmental differences in time perspective to generate new knowledge about the associations between time perspective and self-esteem across the lifespan. This information is useful for informing programmes that use time perspective to foster psychological health.

Time perspective, age, and self-esteem

Consistent with our predictions, time perspective was associated with self-esteem across age groups. Specific dimensions of time perspective had different relationships with self-esteem. In particular, adolescents, young adults, and middle-aged adults who emphasized the present *and* the future (i.e., time orientation) had higher self-esteem than their counterparts with other time orientations. These results are consistent with prior research that has included adolescents (Mello et al., 2013). This study demonstrated that individuals who emphasized the present and the future also reported higher self-esteem than their counterparts with other time orientations. Our finding complements and extends existing research that has focused on the past and future (Webster, 2011) to show that thoughts about the present and the future time periods are associated with self-esteem.

A multi-temporal perspective was associated with higher self-esteem, consistent with theory that posits that focusing on more than one time period is useful (Mello, 2019; Zimbardo & Boyd, 1999). However, this finding deviates from research that has shown that focusing on all three time periods is the healthiest time perspective (Zhang et al.,

2013; Zimbardo & Boyd, 1999). It may be that the time periods that one emphasizes are differentially associated with outcomes. Focusing on the present and future (and, thereby de-emphasizing the past) may be particularly useful for self-esteem. Whereas, focusing on all three time periods may be beneficial for other outcomes, as past research has shown this association with academic achievement (Mello et al., 2013) and subjective well-being (Zhang et al., 2013). Further, discrepancies in findings about self-esteem across studies may be due to differences among the time-related constructs and measures.

This study showed that thinking more about the past was associated with lower self-esteem, and that this relationship was observed across *all* age groups. This result is similar to prior research with young adults (Chishima et al., 2017) and shows that the same pattern exists in other periods of the lifespan. Of particular note, this relationship holds in midlife and older adulthood, during which past reflection is thought to be particularly important, as noted by Lachman (2004, p. 310): 'When in the middle, it is natural to look back to see what has come before'.

Time perspective and age

We also added to the literature on time perspective differences across the lifespan (Laureiro-Martinez et al., 2017) by using a multidimensional model of time perspective (Mello & Worrell, 2015). Findings indicated that thinking about the future was greatest for adolescents and young adults and lowest for middle-aged and older adults. This pattern was accompanied by an increase in thinking about the present across age. This was observed both when asking participants about their relative emphasis towards the past, present, and future time periods (i.e., time orientation) and when asking about the degree to which they thought about each time period individually (i.e., time frequency). Our study highlights the value of examining multiple time periods and is consistent with work showing that older adults' definitions of successful aging include 'living one day at a time' and seeing the present as the only time period that truly matters (Reichstadt et al., 2010).

Younger and older adults were more likely to perceive that the time periods were interrelated compared to adolescents and middle-aged adults. We had expected that with age more individuals would view time as interrelated given prior research (Cottle et al., 1968). One way to interpret these findings is that the temporal pattern reflects life-transitions. According to life-course theory (Elder, Johnson, & Crosnoe, 2003), the lifespan may be organized into life-transitions, such as finishing college, starting a career, becoming a parent, marrying, retiring, and the death of a spouse, with many of these transitions occurring in younger and older adulthood. In this way, the time perspectives of younger and older adults, in which they see the time periods as more interrelated, may be indicative of the changes in careers, family, and health that are associated with these periods of the lifespan (Erikson, 1968; Lachman, Teshale, & Agrigoroaei, 2014). Future research should examine the associations between life-transitions and time perspectives explicitly.

Implications

Results of this study have implications for researchers who aim to develop interventions based on time perspective. Existing research has indicated that some dimensions of time perspective are modifiable. Marko and Savickas (1998) used time perspective theory in an intervention programme about career development with adolescents and young adults. Findings indicated that time perspectives, defined as orientation and relation, changed in

the experimental group and were associated with an increase in career development compared to a control group. The findings from this study indicate that time perspective may be a useful mechanism in changing self-esteem. Our findings support efforts by Boniwell et al. (2014) who have created a coaching technique that uses time perspective to diagnose, treat, and promote psychological well-being. More recent evidence indicates that time perspective may be a valuable intervention target with findings from a study showing that time perspective mediated the associations between family functioning and couple satisfaction (Gugliandolo, Costa, Cricchio, & Liga, 2021).

Our results also have implications for reminiscence therapy (Westerhof, Bohlmeijer, & Webster, 2010). Based upon Butler's (1963) theory, this therapeutic technique is used with older adults and involves the recollection of past memories, often in group settings, and aided by external prompts (such as photographs). Although research has found that reminiscence therapy improves psychological outcomes for older adults (Cotelli, Manenti, & Zanetti, 2012), one study has indicated that reminiscence that originated from guilt over past failings is associated with poorer outcomes (Wong & Watt, 1991). Combined with our results, a past focus that is not guided by specific therapeutic goals may be detrimental.

Limitations and future directions

This study makes several contributions but has limitations. First, a cross-sectional research design was used, which is unable to separate cohort from age effects. Longitudinal data would be preferred, although it would take 70 years to be achieved. Cross-sectional data prevents our understanding of the directionality of associations between time perspective and self-esteem. It is possible that these associations are mutually influencing or that self-esteem underlies time perspective. Second, the methods were confounded with the samples. The adolescent data were paper-and-pencil surveys and the other data were collected online. The middle-aged adult sample was obtained through an academic website and studies have shown these participants to have similar characteristics to those with other recruitment methods (Zhang et al., 2013). Findings may be attributed to method rather than age. Future research should use similar data collection methods. Third, we were unable to consider alternate explanations for the associations between time perspective and self-esteem. It is possible that life-events could contribute towards either self-esteem and time perspective. Lastly, an important direction of future research would be to examine the interrelated nature of the time perspective dimensions. Despite these limitations, this study offers the field knowledge about the associations between time perspective dimensions and self-esteem among individuals that span adolescence to adulthood.

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Conflicts of interest

All authors declare no conflict of interest.

Author contribution

Zena R. Mello: Conceptualization (equal); Data curation (equal); Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (equal); Software (equal); Writing – original draft (equal); Writing – review & editing (equal). **Sarah J. Barber:** Conceptualization (equal); Data curation (equal); Investigation (equal); Writing – original draft (equal); Writing – review & editing (equal). **Sara A. Vasilenko:** Conceptualization (equal); Formal analysis (equal); Investigation (equal); Methodology (equal); Resources (equal); Software (equal); Writing – original draft (equal); Writing – review & editing (equal). **Julie Chandler:** Conceptualization (equal); Methodology (equal); Writing – original draft (equal). **Ryan Howell:** Conceptualization (equal); Data curation (equal); Investigation (equal); Writing – original draft (equal); Writing – review & editing (equal).

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data available includes data for the middle-aged and older adult samples.

References

- Barber, S. J., Opitz, P. C., Martins, B., Sakaki, M., & Mather, M. (2016). Thinking about a limited future enhances the positivity of younger and older adults' recall: Support for socioemotional selectivity theory. *Memory & Cognition*, 44(6), 869–882. <http://dx.doi.org/jpllnet.sfsu.edu/10.3758/s13421-016-0612-0>
- 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.
- Butler, R. N. (1963). The life review: An interpretation of reminiscence in the aged. *Psychiatry*, 26, 65–76. <https://doi.org/10.1080/00332747.1963.11023339>
- Cameron, P. (1972). The generation gap: Time orientation. *The Gerontologist*, 12(2, Part 1), 117–119. http://dx.doi.org/jpllnet.sfsu.edu/10.1093/geront/12.2_Part_1.117
- Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science*, 312, 1913–1915. <https://doi.org/10.1126/science.1127488>
- Chishima, Y., McKay, M. T., & Murakami, T. (2017). The reliability and validity of the Temporal Focus Scale in young Japanese adults. *Personality and Individual Differences*, 119, 230–235. <https://doi.org/10.1016/j.paid.2017.07.031>
- Cohen, G., & Taylor, S. (1998). Reminiscence and ageing. *Ageing & Society*, 18(5), 601–610. <https://doi.org/10.1017/S0144686X98007053>
- Cohen, J. (1992). A power primer. *Psychological Bulletin*, 112(1), 155–159. <https://doi.org/10.1037/0033-2909.112.1.155>
- Cotelli, M., Manenti, R., & Zanetti, O. (2012). Reminiscence therapy in dementia: A review. *Maturitas*, 72, 203–205. <http://dx.doi.org/jpllnet.sfsu.edu/10.1016/j.maturitas.2012.04.008>
- Cottle, T. J. (1967). The Circles Test: An investigation of perceptions of temporal relatedness and dominance. *Journal of Projective Techniques & Personality Assessment*, 31, 58–71. <https://doi.org/10.1080/0091651X.1967.10120417>

- Cottle, T. J., Howard, P., & Pleck, J. (1968). Adolescent perceptions of time: The effect of age, sex, and social class. *Journal of Personality*, 37, 636–650. <https://doi.org/10.1111/j.1467-6494.1969.tb01770.x>
- Douglass, S., & Umaña-Taylor, A. J. (2016). Time-varying effects of family ethnic socialization on ethnic-racial identity development among Latino adolescents. *Developmental Psychology*, 52, 1904–1912. <https://doi.org/10.1037/dev0000141>
- Elder, G. H., Johnson, M. K., & Crosnoe, R. (2003). The emergence and development of life course theory. In J. Mortimer & M. J. Shanahan (Eds.), *Handbook of the life course* (pp. 3–19). New York, NY: Kluwer Academic/Plenum Publishers.
- Erikson, E. H. (1959). *Identity and the life cycle*. New York, NY: International Universities Press.
- Erikson, E. (1968). *Identity: Youth and crisis* (1st ed.). New York, NY: Norton.
- Evans-Polce, R. J., Veliz, P. T., Boyd, C. J., Hughes, T. L., & McCabe, S. E. (2020). Associations between sexual orientation discrimination and substance use disorders: Differences by age in US adults. *Social Psychiatry and Psychiatric Epidemiology*, 55(1), 101–110. <https://doi.org/10.1007/s00127-019-01694-x>
- Fingerman, K. L., & Perlmutter, M. (1995). Future time perspective and life events across adulthood. *Journal of General Psychology*, 122(1), 95–111. <https://doi.org/10.1080/00221309.1995.9921225>
- Frank, L. K. (1939). Time perspectives. *Journal of Social Philosophy*, 4, 293–312.
- Fung, H. H., Carstensen, L. L., & Lutz, A. M. (1999). Influence of time on social preferences: Implications for life-span development. *Psychology and Aging*, 14(4), 595–604. <https://doi.org/10.1037/0882-7974.14.4.595>
- Grühn, D., Sharifian, N., & Chu, Q. (2015). The limits of a future time perspective in explaining age differences in emotional functioning. *Psychology and Aging*, 31(6), 583–593. <https://doi.org/10.1037/pag0000060>
- Gugliandolo, M. C., Costa, S., Cricchio, L., & Liga, F. (2021). Exploring the role of time perspective in emerging adult couples: A mediation model. *Journal of Happiness Studies*, 1–19. <https://doi.org/10.1007/s10902-021-00368-3>
- Hyland, D. T., & Ackerman, A. M. (1988). Reminiscence and autobiographical memory in the study of the personal past. *Journal of Gerontology*, 43, 35–39. <http://dx.doi.org.jpllnet.sfsu.edu/10.1093/geronj/43.2.P35>
- Konowalczyk, S., Moon, J., Buhl, M., & Mello, Z. R. (2019). The past, present, and future all matter: How time perspective is associated with optimism and sensation seeking among young adults. *Research in Human Development*, 16, 119–134. <https://doi.org/10.1080/15427609.2019.1662709>
- Lachman, M. E. (2004). Development in midlife. *Annual Review of Psychology*, 55, 305–331. <https://doi.org/10.1146/annurev.psych.55.090902.141521>
- Lachman, M. E., Teshale, S., & Agrigoroaei, S. (2014). Midlife as a pivotal period in the life course: Balancing growth and decline at the crossroads of youth and old age. *International Journal of Behavioral Development*, 39, 20–31. <https://doi.org/10.1177/0165025414533223>
- Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging*, 17(1), 125–139. <https://doi.org/10.1037/0882-7974.17.1.125>
- Lanza, S. T., Vasilenko, S. A., Liu, X., Li, R., & Piper, M. E. (2014). Advancing understanding of the dynamics of smoking cessation using the time-varying effect model. *Nicotine and Tobacco Research*, 16, S127–S134. <https://doi.org/10.1093/ntr/ntt128>
- Laureiro-Martinez, D., Trujillo, C. A., & Unda, J. (2017). Time perspective and age: A review of age associated differences. *Frontiers in Psychology*, 8, 101. <https://doi.org/10.3389/fpsyg.2017.00101>
- Lee, J., & Chopik, W. (2018). Age-varying associations between perceived control, health, and cognition, and in older adulthood. *Innovation in Aging*, 2(Suppl 1), 903. <https://doi.org/10.1093/geroni/igy031.3364>

- Lewin, K. (1939). Field theory and experiment in social psychology: Concepts and methods. *The American Journal of Sociology*, 44, 868–897. <http://dx.doi.org/jpllnet.sfsu.edu/10.1086/218177>
- Lyu, H., Du, G., & Rios, K. (2019). The relationship between future time perspective and self-esteem: A cross-cultural study of Chinese and American College Students. *Frontiers in Psychology*, 10, 1–7. <https://doi.org/10.3389/fpsyg.2019.01518>
- Mann, M., Hosman, C. M. H., Schaalma, H. P., & de Vries, N. K. (2004). Self-esteem in a broad-spectrum approach for mental health promotion. *Health Education Research: Theory and Practice*, 19, 357–372. <https://doi.org/10.1093/her/cyg041>
- Marko, K. W., & Savickas, M. L. (1998). Effectiveness of a career time perspective intervention. *Journal of Vocational Behavior*, 52, 106–119. <https://doi.org/10.1006/jvbe.1996.1566>
- Mello, Z. R. (2019). A construct matures: Time perspective's multidimensional, developmental, and modifiable qualities. *Research in Human Development*, 16, 93–102. <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/10.1016/j.adolescence.2013.03.005>
- Mello, Z. R., & Worrell, F. C. (2007). *The Adolescent and Adult Time Inventory-English*. Berkeley, CA: University of California.
- 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, 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). Cham, Switzerland: Springer International Publishing.
- Mello, Z. R., Worrell, F. C. & Andretta, J. R. (2009). Variation in how frequently adolescents think about the past, the present, and the future in relation to academic achievement. Research on Child and Adolescent Development. [Diskurs Kindheits- und Jugendforschung].
- Merriam, S. B., & Cross, L. H. (1982). Adulthood and reminiscence: A descriptive study. *Educational Gerontology*, 8, 275–290. <http://dx.doi.org/jpllnet.sfsu.edu/10.1080/0360127820080307>
- Moon, J., Hoff, C., Lieber, R., Lieber, R., & Mello, Z. R. (manuscript under review for publication). Psychometrics and Psychological Well-Being: The Test-Retest Reliability of the Adolescent and Adult Time Inventory and Associations With Mental Health Outcomes.
- Ortuño, V. E. C., Janeiro, I. & Paixão, M. P. (2011). Time across time: Study of Time Perspective differences across several age groups. Paper presented at the 1st International Conference of Time Perspective, Coimbra, Portugal.
- Parker, R. G. (1995). Reminiscence: A community theory framework. *The Gerontologist*, 35, 515–525. <http://dx.doi.org/jpllnet.sfsu.edu/10.1093/geront/35.4.515>
- Pierce, J. L., & Gardner, D. G. (2004). Self-esteem within the work and organizational context: A review of the organization-based self-esteem literature. *Journal of Management*, 30, 591–622. <http://dx.doi.org/jpllnet.sfsu.edu/10.1016/j.jm.2003.10.001>
- Reichstadt, J., Sengupta, G., Depp, C. A., Palinkas, L. A., & Jeste, D. V. (2010). Older adults' perspectives on successful aging: Qualitative interviews. *The American Journal of Geriatric Psychiatry*, 18(7), 567–575. <http://dx.doi.org/jpllnet.sfsu.edu/10.1097/JGP.0b013e3181e040bb>
- Rice, C. E., Vasilenko, S. A., Fish, J. N., & Lanza, S. T. (2019). Sexual minority health disparities: An examination of age-related trends across adulthood in a national cross-sectional sample. *Annals of Epidemiology*, 31, 20–25. <https://doi.org/10.1016/j.annepidem.2019.01.001>
- Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.
- Sinclair, S. J., Blais, M. A., Gansler, D. A., Sandberg, E., Bistis, K., & LoCicero, A. (2010). Psychometric properties of the Rosenberg Self-Esteem Scale: Overall and across demographic groups living within the United States. *Evaluation & the Health Professions*, 33, 56–80. <https://doi.org/10.1177/0163278709356187>
- Siu, N. Y. F., Lam, H. H. Y., Le, J. J. Y., & Przepiorka, A. M. (2014). Time perception and time perspective differences between adolescents and adults. *Acta Psychologica*, 151, 222–229. <https://doi.org/10.1016/j.actpsy.2014.06.013>

- Steinberg, L., Graham, S., O'Brien, L., Woolard, J., Cauffman, E., & Banich, M. (2009). Age differences in future orientation and delay discounting. *Child Development, 1*, 28–44. <https://doi.org/10.1111/j.1467-8624.2008.01244.x>
- Strough, J., Bruine de Bruin, W., Parker, A. M., Lemaster, P., Pichayayothin, N., & Delaney, R. (2016). Hour glass half full or half empty? Future time perspective and preoccupation with negative events across the life span. *Psychology and aging, 31*(6), 558–573. <https://doi.org/10.1037/pag0000097>
- Tan, X., Shiyko, M. P., Li, R., Li, Y., & Dierker, L. (2012). A time-varying effect model for intensive longitudinal data. *Psychological Methods, 17*, 61–77. <https://doi.org/10.1037/a0025814>
- Thapa, S., Selya, A. S., & Jonk, Y. (2017). Time-varying effects of parental alcoholism on depression. *Preventing Chronic Disease, 14*, 1–7. <https://doi.org/10.5888/pcd14.170100>
- Thompson, K., Roemer, A., & Leadbeater, B. (2015). Impulsive personality, parental monitoring, and alcohol outcomes from adolescence through young adulthood. *Journal of Adolescent Health, 57*(3), 320–326. <https://doi.org/10.1016/j.jadohealth.2015.05.005>
- Vasilenko, S. (2017). Age-varying associations between nonmarital sexual behavior and depressive symptoms across adolescence and young adulthood. *Developmental Psychology, 53*(2), 366–378. <http://dx.doi.org.jpallnet.sfsu.edu/10.1037/dev0000229>
- Vasilenko, S. A., Evans-Polce, R. J., & Lanza, S. T. (2017). Age trends in rates of substance use disorders across ages 18–90: Differences by gender and race/ethnicity. *Drug and Alcohol Dependence, 180*, 260–264. <http://dx.doi.org.jpallnet.sfsu.edu/10.1016/j.drugalcdep.2017.08.027>
- Vasilenko, S. A., & Lanza, S. T. (2014). Predictors of multiple sexual partners from adolescence through young adulthood. *Journal of Adolescent Health, 56*, 491–497. <https://doi.org/10.1016/j.jadohealth.2013.12.025>
- Webster, J. D. (1994). Predictors of reminiscence: A lifespan perspective. *Canadian Journal on Aging/La Revue Canadienne Du Vieillessement, 13*, 66–78. <http://dx.doi.org.jpallnet.sfsu.edu/10.1017/S0714980800006565>
- Webster, J. D. (2011). A new measure of time perspective: Initial psychometric findings for the Balanced Time Perspective Scale (BTPS). *Canadian Journal of Behavioural Science/Revue Canadienne Des Sciences Du Comportement, 43*(2), 111–118. <https://doi.org/10.1037/a0022801>
- Westerhof, G. J., Bohlmeijer, E., & Webster, J. D. (2010). Reminiscence and mental health: A review of recent progress in theory, research and interventions. *Ageing & Society, 30*(4), 697–721. <http://dx.doi.org.jpallnet.sfsu.edu/10.1017/S0144686X09990328>
- Wheeler, S. B. (2010). Effects of self-esteem and academic performance on adolescent decision-making: An examination of early sexual intercourse and illegal substance use. *Journal of Adolescent Health, 47*, 582–590. <http://dx.doi.org.jpallnet.sfsu.edu/10.1016/j.jadohealth.2010.04.009>
- Wong, P. T., & Watt, L. M. (1991). What types of reminiscence are associated with successful aging? *Psychology and Aging, 6*, 272–279. <http://dx.doi.org.jpallnet.sfsu.edu/10.1037/0882-7974.6.2.272>
- Zhang, J. W., Howell, R., & Stolarski, M. (2013). Comparing three methods to measure a balanced time perspective: The relationship between a balanced time perspective and subjective well-being. *Journal of Happiness Studies, 14*(1), 169–184. <https://doi.org/10.1007/s10902-012-9322-x>
- Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology, 77*(6), 1271–1288. http://dx.doi.org.jpallnet.sfsu.edu/10.1007/978-3-319-07368-2_2