Psychometric properties of time attitude scores in young, middle, and older adult samples

Article *in* Personality and Individual Differences · October 2016

DOI: 10.1016/j.paid.2016.05.037

CITATIONS
22

READS
269

6 authors, including:

Zena R. Mello
San Francisco State University
43 PUBLICATIONS **1,046** CITATIONS

SEE PROFILE

Sarah J Barber
Georgia State University
31 PUBLICATIONS **533** CITATIONS

SEE PROFILE

Ryan Howell
San Francisco State University
52 PUBLICATIONS **2,162** CITATIONS

SEE PROFILE

Personality and Individual Differences 101 (2016) 57–61

Contents lists available at ScienceDirect

Personality and Individual Differences

journal homepage: www.elsevier.com/locate/paid

Psychometric properties of time attitude scores in young, middle, and older adult samples

Zena R. Mello [a,*], Jia Wei Zhang [b,1], Sarah J. Barber [a,2], Victoria C. Paoloni [a], Ryan T. Howell [a], Frank C. Worrell [c]

[a] Department of Psychology, San Francisco State University, United States
[b] Department of Psychology, University of California, Berkeley, United States
[c] Cognition and Development, University of California, Berkeley, United States

ARTICLE INFO

Article history:
Received 11 March 2016
Received in revised form 12 May 2016
Accepted 15 May 2016
Available online xxxx

Keywords:
Time attitudes
Time perspective
Future time perspective
Future orientation
Young adults
Middle adults
Older adults

ABSTRACT

In an effort to provide a measure of time perspective that can be used across the life-span, we examined the psychometric properties of the Adolescent Time Inventory-Time Attitude Scale (ATI-TA; Mello & Worrell, 2007) in three independent samples of young ($N = 388$), middle ($N = 201$), and older adults ($N = 189$). Results provided strong psychometric evidence that the ATI-TA can be used appropriately with individuals across adolescence and adulthood. Specifically, internal consistency estimates indicated that scores on the six subscales (Past Positive, Past Negative, Present Positive, Present Negative, Future Positive, & Future Negative) were reliable across the three samples. Confirmatory factor analyses showed that the theorized six-factor structure had acceptable fit and fit the data better than alternate models. Subsequent analyses provided support for invariance across young, middle, and older adults. Overall, these results show that the ATI-TA yields reliable scores and a valid structure across adulthood and can be used to measure time perspective throughout the life-span.

1. Introduction

Time perspective is an individually varying and multidimensional construct that comprises thoughts and attitudes toward the past, the present, and the future, and is conceptualized to underlie many human behaviors (Mello & Worrell, 2015; Zimbardo & Boyd, 1999). Developmental theories suggest that time perspective will be related to age across the life-span (Carstensen, 2006; Erikson, 1968; Lewin, 1939; Mello & Worrell, 2015; Piaget, 1955). Cross-sectional studies focusing solely on the future have shown that between childhood and young adulthood, an orientation toward the future increased with age (Steinberg et al., 2009), whereas research with younger and older adults has indicated that future time perspectives become increasingly limited with age (Lang & Carstensen, 2002; Rakowski, 1979). A study on future opportunities also showed a decline from young adulthood to middle age and stability from early to late middle age (Cate & John, 2007). However, a challenge to interpreting these findings is that different measures are used across the life-span and that they assess different aspects of time perspective.

Research comparing young and older adults has often included the Future Time Perspective Scale (Carstensen & Lang, 1996; Lang & Carstensen, 2002). This measure includes 10 items and draws from socioemotional selectivity theory's prediction that individuals' subjective perception about the amount of time they have remaining in life predicts the relative priority of specific goals (Carstensen, 2006; Reed & Carstensen, 2012). For example, when people perceive their futures as limited, they prioritize goals related to emotional well-being and generativity (Lang & Carstensen, 2002). In studies with young adults, a frequently used measure is the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999). The ZTPI includes five subscales: Past Positive, Past Negative, Present Hedonism, Present Fatalism, and Future. The ZTPI was normed with primarily college students and assesses attitudes, orientations, and behaviors associated with time. However, research with adolescents has indicated that the ZTPI does not consistently yield structurally valid or reliable scores (McKay, Worrell, et al., 2015; Worrell & Mello, 2007).

Mello and Worrell (2007) created the Adolescent Time Inventory-Time Attitude Scale (ATI-TA) for researchers to use when studying time perspective with adolescents. An additional goal with the ATI-TA was to develop a measure that assessed positive and negative attitudes toward each time period *exclusively* to reduce construct-irrelevant variance (Hubley & Zumbo, 2011). ATI-TA scores have consistently yielded a theorized six-factor structure and strong reliability estimates among adolescent samples in America and Germany (Worrell, Mello, & Buhl, 2013), New Zealand (Alansari, Worrell, Rubie-Davies, & Webber,

* Corresponding author at: Department of Psychology, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132, United States.
E-mail address: zmello@sfsu.edu (Z.R. Mello).

[1] Jia Wei Zhang is supported by the National Science Foundation Graduate Research Fellowship.
[2] Sarah Barber's contributions are supported by a grant from the National Institute on Aging (grant number R01-AG046464).

http://dx.doi.org/10.1016/j.paid.2016.05.037
0191-8869/

2013), and Scotland and Northern Ireland (McKay, Cole, Percy, Worrell & Mello, 2015). However, the ATI-TA has not yet been validated with adults.

The goal of the current study was to provide the field with psychometric evidence that the ATI-TA may be appropriately employed with individuals across adulthood. Generating a measure that yields valid and reliable scores for adolescent *and* adult age groups will enable researchers to conduct cross-sectional and longitudinal studies that illustrate how time perspective changes in relation to age. Such an instrument has considerable implications for the field, given the recent surge in research on time perspective (Stolarski, Fieulaine, & Beek, 2015). Thus, we examined the internal consistency, structural validity, and invariance of ATI-TA scores in young (aged 18–24), middle (aged 25–59), and older adult (aged 60–85) samples.

2. Method

2.1. Participants and procedures

Data came from young, middle, and older adult samples. The young adult sample included 388 individuals aged 18 to 24 ($M_{age} = 20.50$, $SD_{age} = 1.86$), with 78% females, 22% males, and 0.25% gender queer/nonbinary. The sample was 5% African American, 24% Asian American, 18% European American, 30% Latino, and the remainder other or mixed groups. Average maternal education was 2.65 ($SD = 1.21$) on scale from 1 (*no high school diploma*) to 6 (*doctoral degree*); and, the data included 0.27% missing responses. These participants were recruited from psychology courses at a public university on the West coast and completed the study via an on-line survey.

The middle adult sample included 201 individuals aged from 25 to 59 ($M_{age} = 36.60$, $SD_{age} = 10.13$), with 71% females, 29% males, and 1 participant who did not report gender (0.5%). Self-reported racial/ethnic groups included 44% White/Caucasian, 10% Latino/Latina, 10% East Asian, 8% South Asian, and all other ethnic groups were less than 5%, and 43% obtained a college degree. The data included 1% missing cases. The sample was adult volunteers who were recruited through the academic website, BeyondThePurchase.org. This website attracts a more diverse and older population than recruitment from traditional college student samples. Importantly, these volunteers have similar characteristics to opt-in volunteers who have been used in previous studies (Zhang, Howell, & Iyer, 2014; Zhang, Howell, Caprariello, & Guevarra, 2014; Zhang, Piff, Iyer, Koleva, & Keltner, 2014).

The older adult sample included 189 individuals aged 60 to 85 ($M_{age} = 70$, $SD_{age} = 6.10$) with 73% females, 26% males, and 0.5% intersex. The samples were 6% African American, 3% Asian American, 84% European American, 1% Latino, and the remainder other or mixed groups. Average maternal education was 2.51 ($SD = 1.14$) on a scale from 1 (*no high school diploma*) to 6 (*doctoral degree*) and the data included 1% missing responses. Participants were recruited from existing databases of older adult volunteers interested in research studies related to aging. Participants completed the study through an on-line system.

2.2. Measures

All participants completed the ATI-TA (see Mello & Worrell, 2007, for a description of the full ATI). The ATI-TA is comprised of six five-item subscales that assess positive and negative attitudes about one's past, present, and future. Sample items include "*I have very happy memories of my childhood*" (Past Positive), "*My past makes me sad*" (Past Negative), "*I am pleased with the present*" (Present Positive), "*My current life worries me*" (Present Negative), "*My future makes me smile*" (Future Positive), and "*Thinking about my future makes me sad*" (Future Negative). Response options were from 1 (*Totally Disagree*) to 5 (*Totally Agree*).

Prior studies with adolescents have shown that the scale yields valid and reliable scores and a six-factor structure (Alansari et al., 2013). Table 1 includes descriptive statistics (i.e., means and standard deviations of ATI-TA scores) and internal consistency estimates for each sample. As is typical in previous research (Worrell et al., 2013), the subscale means mostly fell between 2.0 and 4.0 and participants reported higher mean scores on the positive scales than on the negative scales.

2.3. Statistical analyses

We used confirmatory factor analysis (CFA) to examine the model fit and robustness of the hypothesized six-factor structure by comparing it to a two-factor valence model (positive vs. negative subscales) as well as a three-factor temporal model (past, present, and future subscales). All CFAs were conducted using the maximum likelihood extraction and robust chi squares (Satorra & Bentler, 1994) in Mplus 7 (Muthén & Muthén, 1998-2012), as some ATI-TA items are skewed. Missing data were handled using multiple imputation, and no outliers were removed. We determined the fit of each CFA by examining various goodness-of fit indices (Hu & Bentler, 1999). Although we reported the significance of the chi-square statistic, as noted by several scholars (Bentler & Bonett, 1980; McDonald & Marsh, 1990; Marsh, Balla, & McDonald, 1988), this value is highly sensitive to sample size. Thus, consistent with past recommendations (Byrne, 2001; Hu & Bentler, 1999; Thompson, 2004), we examined the chi-square likelihood ratio (χ^2/df), which demonstrates good fit if the value is below 3.0.

We also considered the comparative fit index (CFI) as well as the Tucker Lewis index (TLI), which both suggest acceptable model fit when their values are at or above 0.90 (Byrne, 2008) and excellent fit when values are at or above 0.95 (Hu & Bentler, 1999). Finally, we examined the root mean square error of approximation (RMSEA; Steiger, 1990) as well as the 90% confidence interval around the RMSEA values, and the standardized root mean square residual (SRMR). For the RMSEA and SRMR, acceptable fit is demonstrated when the value is below or near 0.08 (Brown & Cudeck, 1993), with good fit indicated by values below 0.05 (Marsh, Hau, & Wen, 2004).

After establishing acceptable fit for the individual samples, invariance analyses were conducted. Configural invariance, which tests for the same pattern of factors and items loading on factors, was assessed first. When configural invariance was met, metric invariance, which constrains factor loadings to be equal across groups, was assessed. Finally, if metric invariance was attained, scalar invariance, which constrains intercepts to be equal across the samples, was assessed. When

Table 1
Means, standard deviations, and internal consistency estimates for time attitude scores in young, middle, and older adults for the six-factor model.

	Mean	*SD*	α	95% CI	ω_h
Younger adults					
Past Positive	3.45	0.81	0.89	0.87, 0.91	0.90
Past Negative	2.66	0.93	0.90	0.87, 0.91	0.90
Present Positive	3.57	0.73	0.91	0.88, 0.92	0.91
Present Negative	2.60	0.82	0.88	0.86, 0.91	0.88
Future Positive	4.01	0.74	0.92	0.90, 0.93	0.92
Future Negative	2.00	0.72	0.81	0.77, 0.84	0.81
Middle adults					
Past Positive	3.18	0.85	0.89	0.87, 0.91	0.89
Past Negative	2.93	0.98	0.90	0.87, 0.92	0.89
Present Positive	3.45	0.86	0.93	0.92, 0.95	0.93
Present Negative	2.89	0.98	0.90	0.87, 0.92	0.90
Future Positive	3.85	0.81	0.92	0.90, 0.94	0.92
Future Negative	2.09	0.84	0.89	0.85, 0.91	0.89
Older adults					
Past Positive	3.48	0.88	0.89	0.86, 0.91	0.90
Past Negative	2.27	0.91	0.88	0.85, 0.90	0.89
Present Positive	3.90	0.82	0.94	0.92, 0.95	0.95
Present Negative	2.16	0.91	0.91	0.88, 0.92	0.91
Future Positive	3.66	0.77	0.93	0.91, 0.95	0.93
Future Negative	1.95	0.72	0.81	0.76, 0.85	0.84

Note. The omega values were based on the coefficients from the six-factor models in Table 3.

invariance was not met, post-hoc analyses were conducted to identify the subscales that were not invariant. We used two methods to see if the fit deteriorated with greater constraints: (a) the ΔCFI test proposed by Meade, Johnson, and Braddy (2008), who argue that the CFI value for the more restrictive should not decrease by more than .002, and (b) the chi-square test for the Satorra-Bentler chi-square, which assesses if the difference from the less restrictive to the more restrictive model is statistically significant, indicating a lack of invariance.

3. Results

Internal consistency estimates (α) for the raw scores as well as 95% confidence intervals are shown in Table 1. Cronbach's alphas (Cronbach & Shavelson, 2004) ranged from 0.81–0.94 across the age groups, with 16 of the 18 estimates ≥0.88; only Future Negative scores had lower estimates in two samples. Hierarchical omega internal consistency estimates (ω_h) are also shown in Table 1. For a single homogeneous factor, omega (McDonald, 1999) is the ratio of true-score variance to the total variance, and is calculated using the item's coefficients on the factor. Values ranged from 0.81–0.95 across the age groups. Table 2 includes the intercorrelations among the six subscales. Correlations between positive and negative subscales were negative and correlations within valence groupings were positive across the three age groups. A similar pattern for young, middle, and older adults was also observed within time periods with the strongest associations between scores from the *same* time period (e.g., Present Positive and Present Negative) than between scores across time periods (e.g., Past/Present, Present/Future).

The goodness-of fit indices from each of the nine CFAs are reported in Table 3. In all three samples, the two-factor valence model fell well short of acceptable fit, with the chi-square likelihood ratios >3, CFI and TLI values <0.90, and RMSEA and SRMR values >0.08. Although the goodness-of-fit indices for the three-factor time period models showed marked improvements over the two-factor model, most of the fit indices were also not in the acceptable range (CFIs ≤0.90, TLI ≤0.90, RMSEA and SRMR >0.08), except for the CFI and RMSEA values for the young adult sample. Thus, the three-factor model was also rejected. As in previous studies, the six-factor model demonstrated the best fit, with all but one of the fit indices (i.e., the TLI for older adults) in the acceptable or close range, and therefore this model was chosen.

The results of the invariance analyses are reported in Table 4. Configural variance was obtained for the six-factor model across the age groups. Metric invariance did not meet the ΔCFI criterion, and the difference was also statistically significant, indicating a lack of metric invariance. We examined invariance in the six subscales separately and found across all three groups scalar invariance for Present Negative scores (Factor 4: CFI = 0.980, TLI = 0.981, RMSEA = 0.067 [0.044, 0.090], SRMR = 0.045, $\chi^2[8] = 15.23$, $p > 0.05$) and metric invariance for Future Positive scores (Factor 5: CFI = 0.987, TLI = 0.983, RMSEA = 0.067 [0.040, 0.093], SRMR = 0.046, $\chi^2[8] = 15.19$, $p > 0.05$). Finally, we examined invariance across sets of two groups (young and middle adults, young and late adults, and middle and late adults). We obtained scalar invariance for five factors—excluding Future Negative scores—across young and middle adults (see Table 4).

4. Discussion

Developmental theory suggests that time perspective differs across the life-span (Carstensen, 2006; Erikson, 1968; Lewin, 1939; Mello & Worrell, 2015; Piaget, 1955). Some empirical evidence supports this notion. Studies have shown how an orientation toward the future increases through adolescence (Steinberg et al., 2009) and decreases between younger and older adulthood (Cate & John, 2007; Lang & Carstensen, 2002; Rakowski, 1979). However, this research is limited because different conceptualizations and measures of time perspective have been employed. To provide the field with a measure that may be used across the life-span, we examined the psychometric properties of the ATI-TA in independent samples of young, middle, and older adults. Overall, internal consistency estimates, structural analyses, and tests of invariance showed that the ATI-TA yielded reliable scores and a theoretically-expected structure in all of these age groups.

Reliability estimates indicated good to excellent internal consistency for each of the six subscales (i.e., Past Positive, Past Negative, Present Positive, Future Positive, & Future Negative) across young, middle, and older adult samples. Both alpha and omega estimates indicated internal consistency. These reliabilities are similar to prior research with adolescent participants (Alansari et al., 2013; McKay, Cole, et al., 2015; Worrell et al., 2013). Patterns of correlations were also similar with this prior research, where correlations between positive and negative subscales were negative and correlations within valence groupings were positive.

Findings indicated that the theorized six-factor structure fit the data for all adult groups better than alternate models. Confirmatory factor analyses were used to compare models including valence (two factor), time periods (three factors), and the theorized model (six factor). We

Table 2
Inter-correlations between the six-factors across younger, middle, and older adults.

	Past Positive	Past Negative	Present Positive	Present Negative	Future Positive	Future Negative
Younger adults						
Past Positive	–					
Past Negative	−0.73*	–				
Present Positive	0.34*	−0.37*	–			
Present Negative	−0.32*	0.49*	−0.81*	–		
Future Positive	0.11*	−0.19*	0.46*	−0.42*	–	
Future Negative	−0.13*	0.29*	−0.39*	0.47*	−0.75*	–
Middle adults						
Past Positive	–					
Past Negative	−0.68*	–				
Present Positive	0.31*	−0.40*	–			
Present Negative	−0.28*	0.45*	−0.85*	–		
Future Positive	0.22*	−0.28*	0.54*	−0.47*	–	
Future Negative	−0.22*	0.40*	−0.50*	0.51*	−0.76*	–
Older adults						
Past Positive	–					
Past Negative	−0.70*	–				
Present Positive	0.23*	−0.35*	–			
Present Negative	−0.23*	0.39*	−0.88*	–		
Future Positive	0.16*	−0.18*	0.53*	−0.48*	–	
Future Negative	−0.21*	0.39*	−0.58*	0.62*	−0.73*	–

* $p < 0.05$.

Table 3
Fit indices (maximum-likelihood robust) for time attitude scores in young, middle, and older adults.

Model	$\chi^2_{s\text{-}b}$	*df*	χ^2/df	CFI	TLI	RMSEA	90% CI	SRMR
Younger adults								
Baseline	6526.79*	435						
2-Factor (valence)	3265.90*	404	8.08	0.530	0.494	0.142	0.138, 0.147	0.163
3-Factor (temporal)	1009.12*	402	2.51	0.900	0.892	0.066	0.061, 0.071	0.062
6-Factor	630.23	390	1.62	0.961	0.956	0.042	0.036, 0.048	0.044
Middle adults								
Baseline	4226.08*	435						
2-Factor (valence)	2110.17*	404	5.22	0.550	0.515	0.157	0.151, 0.164	0.156
3-Factor (temporal)	866.01*	402	2.15	0.878	0.868	0.082	0.075, 0.090	0.072
6-Factor	626.14*	390	1.61	0.938	0.931	0.060	0.051, 0.068	0.057
Older adults								
Baseline	4247.23*	435						
2-Factor (valence)	2132.62*	404	5.28	0.547	0.512	0.166	0.159, 0.173	0.163
3-Factor (temporal)	931.94	402	2.32	0.861	0.850	0.092	0.084, 0.100	0.087
6-Factor	733.54*	390	1.88	0.910	0.899	0.075	0.067, 0.083	0.060

Note. Younger adults are 18–24, middle adults 25–59, and older adults 60–85. MLM = maximum-likelihood robust; s-b = Satorra-Bentler; CFI = comparative fit index; TLI = Tucker Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.
* $p < 0.001$.

examined CFI, TLI, and RMSEA fit indices for each age group. Based on recommendations outlined by Byrne (2008); Hu and Bentler (1999), and Marsh et al. (2004), acceptable fit was demonstrated for the six-factor structure in young, middle, and older adult samples. These findings are consistent with research in adolescent samples (Alansari et al., 2013; McKay, Cole, et al., 2015; Worrell et al., 2013).

We conducted invariance analyses to determine if ATI-TA subscales and items could be interpreted similarly across the three age groups. Results provided support for configural invariance for the six-factor model showing that scores were consistent across young, middle, and older adult age groups Further analyses with scalar and metric invariance suggested that although time attitudes can be measured with integrity across young, middle, and late adulthood, the meaning of time attitudes in young and middle adults may differ from the meaning of time attitudes for older adults, a finding that should be examined in future research. Moreover, Future Negative attitudes may also differ in meaning across all three groups, as these attitudes were the least likely to be invariant across groups, an issue of interest given that these scores have also yielded some of the lowest internal consistency estimates in some previous studies (McKay, Cole, et al., 2015).

4.1. Limitations and future directions

The limitations of this study concern gender and criterion validity. The small number of males in each sample (<100) did not allow for invariance testing by gender. However, Andretta, Worrell, Mello, Dixson, and Baik (2013) found no meaningful differences in observed ATI-TA scores, nor did they find differences in gender representation across ATI-TA profiles; however, these authors did not examine differences in latent means. Although there is no reason to anticipate that ATI-TA scores would not be invariant by gender, this question should be examined in future studies of ATI-TA scores. The field would also benefit from examining the criterion validity of the ATI-TA across age groups. Studies that investigate relationships between time attitudes and psychological outcomes across the life-span will strengthen the psychometric and substantive contributions to the literature.

Several additional directions for research are apparent. First, creating a measure that enables the valid and reliable assessment of time perspective in childhood will be particularly useful for understanding the construct even farther across the life-span. Such a measure would enable comparisons of time perspectives between critical periods of development. Second, generating time attitude profiles with ATI-TA scores in adult samples may prove useful in understanding relationships between this construct and educational and psychological outcomes. Indeed, profiles with ATI-TA scores in adolescent samples have been observed and meaningful relationships with developmental outcomes have been shown (Alansari et al., 2013; Andretta, Worrell, & Mello, 2014).

Lastly, given the broad nature of the time perspective construct (Carstensen, 2006; Mello & Worrell, 2015; Stolarski et al., 2015), it will be important for additional measures to be developed that assess other dimensions of time perspective across the life-span. As scholars have highlighted (Carstensen, 2006; Mello & Worrell, 2015; Stolarski et al., 2015; Zimbardo & Boyd, 1999), individual differences in time perspective have implications for our ability to self-regulate (Bandura, 1997) and for our cognitions, emotions, and motivation (Carstensen,

Table 4
Invariance analyses (maximum-likelihood robust) for time attitude scores.

Model	$\chi^2_{s\text{-}b}$	*df*	CFI	TLI	RMSEA	(90% C.I.)	SRMR	Model Comparison	ΔCFI
Six factors[a]									
1. Configural	1986.90*	1170	0.941	0.934	0.056	0.051, 0.060	0.051		
2. Metric	2088.76*	1218	0.937	0.933	0.056	0.052, 0.060	0.063	2–1	−0.004
3. Scalar	2295.46*	1266	0.926	0.924	0.060	0.056, 0.064	0.065		
Five factors[b]									
4. Configural	836.43*	530	0.964	0.960	0.046	0.040, 0.052	0.045		
5. Metric	857.35*	550	0.964	0.961	0.046	0.040, 0.051	0.050	5–4	0.000
6. Scalar	888.20*	570	0.963	0.961	0.046	0.040, 0.051	0.051	6–5	0.001

Note. s-b = Satorra-Bentler. Younger adults are 18–24, middle adults 25–59, and older adults 60–85.
* $p < 0.001$.
[a] Configural invariance was supported using both the ΔCFI comparison and the chi-square test.
[b] This analysis included only young and middle adults and excluded the Future Negative subscale. Configural, metric, and scalar invariance supported using both the ΔCFI comparison and the chi-square test.

Isaacowitz, & Charles, 1999). Thus, it is crucial that well-constructed instruments assessing temporal constructs are developed to permit examination of time perspective across the life-span.

5. Conclusion

Overall, this study provides strong psychometric evidence that the ATI-TA (Mello & Worrell, 2007) may be employed effectively with young, middle, and older adults (Alansari et al., 2013; McKay, Cole, et al., 2015; Worrell et al., 2013). We included independent samples and conducted internal consistency, factor structure, and age-invariance analyses. Findings indicated that the ATI-TA yields a theorized six-factor structure and reliable scores with adults in varying stages of adulthood. Based on this evidence, the ATI-TA can be considered the Adolescent and Adult Time Inventory-Time Attitude scale. Now, researchers can clarify age-related patterns of time attitudes—positive and negative feelings about the past, the present, and the future from adolescence to late adulthood. This type of research will allow us to see if patterns of relationships with other constructs differ across the life-span. For example, studies can determine how time attitudes predict educational attainment, psychological well-being, and physical health among participants of various age groups.

References

Alansari, M., Worrell, F. C., Rubie-Davies, C., & Webber, M. (2013). Adolescent Time Attitude Scale (ATAS) scores and academic outcomes in secondary school females in New Zealand. *International Journal of Quantitative Research in Education*, *1*, 251–274. http://dx.doi.org/10.1504/IJQRE.2013.057687.

Andretta, J. R., Worrell, F. C., & Mello, Z. R. (2014). Predicting educational outcomes and psychological wellbeing in adolescents using time attitude profiles. *Psychology in the Schools*, *51*, 434–451. http://dx.doi.org/10.1002/pits.21762.

Andretta, J. R., Worrell, F. C., Mello, Z. R., Dixson, D. D., & Baik, S. H. (2013). Demographic group differences in adolescents' time attitudes. *Journal of Adolescence*, *36*, 289–301. http://dx.doi.org/10.1016/j.adolescence.2012.11.005.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: Freeman.

Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*, 588–606. http://dx.doi.org/10.1037/0033-2909.88.3.588.

Brown, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park: CA: Sage.

Byrne, B. M. (2001). Structural equation modeling with AMOS, EQS, and LISREL: Comparative approaches to testing for the factorial validity of a measuring instrument. *International Journal of Testing*, *1*, 55–86. http://dx.doi.org/10.1207/S15327574IJT0101_4.

Byrne, B. M. (2008). Testing for multigroup equivalence of a measuring instrument: A walk through the process. *Psicothema*, *20*, 872–882.

Carstensen, L. L. (2006). The influence of a sense of time on human development. *Science*, *312*, 1913–1915. http://dx.doi.org/10.1126/science.1127488.

Carstensen, L. L., & Lang, F. R. (1996). Future orientation scale. Unpublished manuscript. Stanford University.

Carstensen, L. L., Isaacowitz, D. M., & Charles, S. T. (1999). Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*, *54*, 165–181. http://dx.doi.org/10.1037/0003-066X.54.3.165.

Cate, R. A., & John, O. P. (2007). Testing models of the structure and development of future time perspective: Maintaining a focus on opportunities in middle age. *Psychology and Aging*, *22*, 186–201. http://dx.doi.org/10.1037/0882-7974.22.1.186.

Cronbach, L. J., & Shavelson, R. J. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and Psychological Measurement*, *64*, 391–418. http://dx.doi.org/10.1177/0013164404266386.

Erikson, E. (1968). *Identity: Youth and crisis* (1st ed.). New York, NY: Norton.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternative. *Structural Equation Modeling*, *6*, 1–55. http://dx.doi.org/10.1080/10705519909540118.

Hubley, A. M., & Zumbo, B. D. (2011). Validity and the consequences of test interpretation and use. *Social Indicators Research*, *103*, 219–230. http://dx.doi.org/10.1007/s11205-011-9843-4.

Lang, F. R., & Carstensen, L. L. (2002). Time counts: Future time perspective, goals, and social relationships. *Psychology and Aging*, *17*, 125–139. http://dx.doi.org/10.1037/0882-7974.17.1.125.

Lewin, K. (1939). Field theory and experiment in social psychology: Concepts and methods. *American Journal of Sociology*, *44*, 868–896. http://dx.doi.org/10.1086/218177.

Marsh, H. W., Balla, J. R., & McDonald, R. P. (1988). Goodness-of-fit indexes in confirmatory factor analysis: The effect of sample size. *Psychological Bulletin*, *103*, 391–410. http://dx.doi.org/10.1037/0033-2909.103.3.391.

Marsh, H., Hau, K. -T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11*, 320–341. http://dx.doi.org/10.1207/s15328007sem1103_2.

McDonald, R. P. (1999). *Test theory: A unified treatment.* Mahwah, NJ: Erlbaum.

McDonald, R. P., & Marsh, H. W. (1990). Choosing a multivariate model: Noncentrality and goodness of fit. *Psychological Bulletin*, *107*, 247–255. http://dx.doi.org/10.1037/0033-2909.107.2.247.

McKay, M. T., Cole, J. C., Percy, A., Worrell, F. C., & Mello, Z. R. (2015b). Reliability and factorial validity of the Adolescent Time Inventory-Time Attitude Scores (ATI-TA) in Scottish and Northern Irish adolescents. *Personality and Individual Differences*, *86*, 412–416. http://dx.doi.org/10.1016/j.paid.2015.06.040.

McKay, M. T., Worrell, F. C., Temple, E. C., Perry, J., Cole, J. C., & Mello, Z. R. (2015a). Less is not always more: The case of the 36-item short form of the Zimbardo Time Perspective Inventory. *Personality and Individual Differences*, *72*, 68–71. http://dx.doi.org/10.1016/j.paid.2014.08.018.

Meade, A. W., Johnson, E. C., & Braddy, P. W. (2008). Power and sensitivity of alternate fit indices in tests of measurement invariance. *Journal of Applied Psychology*, *93*, 568–592. http://dx.doi.org/10.1037/0021-9010.93.3.568.

Mello, Z. R., & Worrell, F. C. (2007). *The Adolescent Time Inventory-English.* Berkeley: The 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 (Eds.), *Time perspective theory: Review, research, and application. Essays in honor of Phillip G. Zimbardo* (pp. 115–129). Zug, Switzerland: Springer.

Muthén, B. O., & Muthén, L. K. (1998-2012). *Mplus user's guide* (7th ed.). Los Angeles, CA: Authors.

Piaget, J. (1955). The development of time concepts in the child. In P. H. Hoch, & J. Zubin (Eds.), *Psychopathology of childhood* (pp. 34–44). New York, NY: Grube and Stratton.

Rakowski, W. (1979). Future time perspective in later adulthood: Review and research directions. *Experimental Aging Research*, *5*, 43–88. http://dx.doi.org/10.1080/03610737908257187.

Reed, A. E., & Carstensen, L. L. (2012). The theory behind the age-related positivity effect. *Frontiers in Psychology*, *3*, 1–9. http://dx.doi.org/10.3389/fpsyg.2012.00339.

Satorra, A., & Bentler, P. M. (1994). Corrections to test statistics and standard errors on covariance structure analysis. In A. von Eye, & C. C. Clogg (Eds.), *Latent variables analysis* (pp. 399–419). Thousand Oaks, CA: Sage.

Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*, 173–180. http://dx.doi.org/10.1207/s15327906mbr2502_4.

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. http://dx.doi.org/10.1111/j.1467-8624.2008.01244.x.

Stolarski, M., Fieulaine, N., & Beek, W. V. (2015). *Time perspective theory; review, research and application: Essays in honor of Philip G. Zimbardo.* Cham, Switzerland: Springer International Publishing. http://dx.doi.org/10.1007/978-3-319-07368-2_7.

Thompson, B. (2004). *Exploratory and confirmatory factor analysis: Understanding concepts and applications.* Washington, DC: American Psychological Association.

Worrell, F. C., & Mello, Z. R. (2007). Reliability and validity of Zimbardo Time Perspective Inventory scores in academically talented adolescents. *Educational and Psychological Measurement*, *67*, 487–504. http://dx.doi.org/10.1177/0013164406296985.

Worrell, F. C., Mello, Z. R., & Buhl, M. (2013). Introducing English and German versions of the Adolescent Time Attitude Scale (ATAS). *Assessment*, *20*, 496–510. http://dx.doi.org/10.1177/1073191110396202.

Zhang, J. W., Howell, R. T., & Iyer, R. (2014c). Engagement with natural beauty moderates the positive relation between connectedness with nature and psychological well-being. *Journal of Environmental Psychology*, *38*, 55–63. http://dx.doi.org/10.1016/j.jenvp.2013.12.013.

Zhang, J. W., Howell, R. T., Caprariello, P. A., & Guevarra, D. A. (2014a). Damned if they do, damned if they don't: Material buyers are not happier from material or experiential consumption. *Journal of Research in Personality*, *50*, 71–83. http://dx.doi.org/10.1016/j.jrp.2014.03.007.

Zhang, J. W., Piff, P. K., Iyer, R., Koleva, S., & Keltner, D. (2014b). An occasion for unselfing: Beautiful nature leads to prosociality. *Journal of Environmental Psychology*, *37*, 61–72. http://dx.doi.org/10.1016/j.jenvp.2013.11.008.

Zimbardo, P. G., & Boyd, J. N. (1999). Putting time in perspective: A valid, reliable individual-differences metric. *Journal of Personality and Social Psychology*, *77*, 1271–1288. http://dx.doi.org/10.1037/0022-3514.77.6.1271.