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
Sarah J Barber
Georgia State University
31 PUBLICATIONS 533 CITATIONS
Ryan Howell
San Francisco State University
52 PUBLICATIONS 2,162 CITATIONS

Some of the authors of this publication are also working on these related projects:

A brief money management scale and its associations with personality, financial health, and hypothetical debt repayment View project
Sadness, identity, and plastic in over-shopping: The interplay of materialism, poor credit management and emotional buying motives in predicting compulsive buying View project
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

A R T I C L E   I N F O

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
Young adults
Middle adults
Older adults

A B S T R A C T

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, 1976). 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, 2013), New Zealand (Alansari, Worrell, Rubie-Davies, & Webber, 2013).
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 (Mage = 20.50, SDage = 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 (Mage = 36.60, SDage = 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, Pfiff, Iyer, Koleva, & Keltner, 2014).

The older adult sample included 189 individuals aged 60 to 85 (Mage = 70, SDage = 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).

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 (χ2/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.

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.

### Table 1

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>α</th>
<th>95% CI</th>
<th>ωh</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Younger adults</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Positive</td>
<td>3.45</td>
<td>0.81</td>
<td>0.89</td>
<td>0.87, 0.91</td>
<td>0.90</td>
</tr>
<tr>
<td>Past Negative</td>
<td>2.66</td>
<td>0.93</td>
<td>0.90</td>
<td>0.87, 0.91</td>
<td>0.90</td>
</tr>
<tr>
<td>Present Positive</td>
<td>3.57</td>
<td>0.73</td>
<td>0.91</td>
<td>0.88, 0.92</td>
<td>0.91</td>
</tr>
<tr>
<td>Present Negative</td>
<td>2.60</td>
<td>0.82</td>
<td>0.88</td>
<td>0.86, 0.91</td>
<td>0.88</td>
</tr>
<tr>
<td>Future Positive</td>
<td>4.01</td>
<td>0.74</td>
<td>0.92</td>
<td>0.90, 0.93</td>
<td>0.92</td>
</tr>
<tr>
<td>Future Negative</td>
<td>2.00</td>
<td>0.72</td>
<td>0.81</td>
<td>0.77, 0.84</td>
<td>0.81</td>
</tr>
<tr>
<td><strong>Middle adults</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Positive</td>
<td>3.18</td>
<td>0.85</td>
<td>0.89</td>
<td>0.87, 0.91</td>
<td>0.89</td>
</tr>
<tr>
<td>Past Negative</td>
<td>2.93</td>
<td>0.98</td>
<td>0.90</td>
<td>0.87, 0.92</td>
<td>0.89</td>
</tr>
<tr>
<td>Present Positive</td>
<td>3.45</td>
<td>0.86</td>
<td>0.93</td>
<td>0.92, 0.95</td>
<td>0.93</td>
</tr>
<tr>
<td>Present Negative</td>
<td>2.89</td>
<td>0.96</td>
<td>0.90</td>
<td>0.87, 0.92</td>
<td>0.90</td>
</tr>
<tr>
<td>Future Positive</td>
<td>3.85</td>
<td>0.81</td>
<td>0.92</td>
<td>0.90, 0.94</td>
<td>0.92</td>
</tr>
<tr>
<td>Future Negative</td>
<td>2.09</td>
<td>0.84</td>
<td>0.89</td>
<td>0.85, 0.91</td>
<td>0.89</td>
</tr>
<tr>
<td><strong>Older adults</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past Positive</td>
<td>3.48</td>
<td>0.88</td>
<td>0.89</td>
<td>0.86, 0.91</td>
<td>0.90</td>
</tr>
<tr>
<td>Past Negative</td>
<td>2.27</td>
<td>0.91</td>
<td>0.88</td>
<td>0.85, 0.90</td>
<td>0.89</td>
</tr>
<tr>
<td>Present Positive</td>
<td>3.90</td>
<td>0.82</td>
<td>0.94</td>
<td>0.92, 0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>Present Negative</td>
<td>2.16</td>
<td>0.91</td>
<td>0.91</td>
<td>0.88, 0.92</td>
<td>0.91</td>
</tr>
<tr>
<td>Future Positive</td>
<td>3.66</td>
<td>0.77</td>
<td>0.93</td>
<td>0.91, 0.95</td>
<td>0.93</td>
</tr>
<tr>
<td>Future Negative</td>
<td>1.95</td>
<td>0.72</td>
<td>0.81</td>
<td>0.76, 0.85</td>
<td>0.84</td>
</tr>
</tbody>
</table>

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) 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, χ²[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, χ²[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 4

<table>
<thead>
<tr>
<th></th>
<th>Younger adults</th>
<th>Middle adults</th>
<th>Older adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Past Positive</td>
<td>0.50</td>
<td>0.54</td>
<td>0.65</td>
</tr>
<tr>
<td>Past Negative</td>
<td>-0.68</td>
<td>-0.70</td>
<td>-0.70</td>
</tr>
<tr>
<td>Present Positive</td>
<td>0.31</td>
<td>0.40</td>
<td>0.35</td>
</tr>
<tr>
<td>Present Negative</td>
<td>-0.28</td>
<td>-0.35</td>
<td>-0.35</td>
</tr>
<tr>
<td>Future Positive</td>
<td>0.23</td>
<td>0.41</td>
<td>0.53</td>
</tr>
<tr>
<td>Future Negative</td>
<td>-0.21</td>
<td>-0.39</td>
<td>-0.58</td>
</tr>
</tbody>
</table>

*p < 0.05.
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 been shown (Alansari et al., 2013; Andretta, Worrell, & Mello, 2013; McKay, Cole, et al., 2015; Worrell et al., 2013).

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, 2006; Mello & Worrell, 2015; Stolarski et al., 2015).
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 (Alanis 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


Carstensen, L. L. (2006). The in...