

The Reliability and Validity of Zimbardo Time Perspective Inventory Scores in Academically Talented Adolescents

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In this study, the authors examined the reliability, structural validity, and concurrent validity of Zimbardo Time Perspective Inventory (ZTPI) scores in a group of 815 academically talented adolescents. Reliability estimates of the purported factors' scores were in the low to moderate range. Exploratory factor analysis supported a five-factor structure similar to the one proposed by Zimbardo and Boyd but also provided support for a six-factor structure that included an additional factor reflecting negative feelings about the future. ZTPI subscale intercorrelations were generally low, and intercorrelations between ZTPI subscale scores and other constructs were low, but in the expected directions. Results are discussed in light of the ZTPI's application to an adolescent-aged population.

Keywords: *time perspective; adolescence; reliability; validity; ZPTI*

Time perspective (TP) is an important area of research for our understanding of adolescence (A. L. Greene, 1986; Lessing, 1972; Nurmi, 1991). Developmentally, adolescents are in the process of forming a coherent identity that requires the integration of past, present, and future selves (Erikson, 1963, 1968; Marcia, 1980). Through identity formation, adolescents make critical decisions about developmental tasks in educational, occupational, and familial domains that have considerable implications for adult life (Havighurst, 1972; McCabe & Barnett, 2000a), and these decisions are influenced by their TP (Nurmi, 1993; Nuttin, 1985).

There is a considerable research base in psychology on adolescents' TP (see Kauffman & Husman, 2004), with a substantial amount of the research focusing on future TP (e.g., Jessor, Donovan, & Costa, 1990; Lessing, 1972; Markus & Nurius, 1986; McInerney, 2004; Nuttin & Lens, 1985; Simons, Dewitte, & Lens, 2000; Simons, Vansteenkiste, Lens, & Lacante, 2004; Wyman, Cowen, Work, & Kerley, 1993). This research has revealed meaningful relationships between future TP and other important variables such as motivation (B. A. Greene & DeBacker, 2004;

Miller & Brickman, 2004; Phalet, Andriessen, & Lens, 2004; Simons et al., 2000; Simons et al., 2004), delay of gratification (Bembenutty & Karabenick, 2004; Shybut, 1970), delinquency (Oyserman & Markus, 1990a, 1990b), and academic achievement (e.g., Anderman, Anderman, & Griesinger, 1999; de Volder & Lens, 1982; Groth, 1973; Honora, 2002; Shell & Husman, 2001; Teahan, 1958). However, the emphasis on the future has resulted in a relative neglect of the potential importance of adolescents' past and present TPs.

The Zimbardo Time Perspective Inventory

Zimbardo, Keough, and Boyd (1997) argued that individuals partition their lives into temporal categories of past, present, and future. Zimbardo and Boyd (1999) contended further that individuals can develop "a cognitive temporal 'bias' toward being past, future, or present oriented" that can result in "a dispositional style . . . that is characteristic of how an individual will respond across a host of daily life choices" (p. 1272). In other words, it is important to study individuals' orientations toward the past and the present as well as their orientation toward the future. Moreover, Zimbardo and Boyd also indicated that the study of TP should be approached multidimensionally, as unidimensional approaches—that is, approaches focused solely on the past, present, or future—may lead to erroneous conclusions. For example, they indicated that "scoring low on a scale of future orientation is [not] equivalent to scoring high on a scale of present orientation" (Zimbardo & Boyd, 1999, p. 1273). Thus, these researchers developed the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999), an instrument intended to measure simultaneously individuals' orientations to the past, present, and future.

The 56-item ZTPI (Zimbardo & Boyd, 1999) was developed in a college-aged sample of students with mean ages ranging from 16.5 to 23.6. On the basis of several studies with these college-aged samples, the internal consistency and test-retest reliability as well as the structural, predictive, convergent, and discriminant validity of ZTPI scores were examined, and Zimbardo and Boyd concluded that "the ZTPI is a reliable and valid measure of TP" (p. 1284). They reported that ZTPI scores make up five factors: Past Negative (a negative or aversive sense of the past), Past Positive (a warm and sentimental view of the past), Present Hedonistic (a risk-taking attitude toward life), Present Fatalistic (an attitude of helplessness and hopelessness toward life), and Future (a goal-orientated view toward the future).

Studying TP Multidimensionally

As individuals mature from childhood to adolescence, they acquire cognitive skills that facilitate the consideration of multiple dimensions of time (Piaget, 1975). Young children do not have a developed understanding of time (Piaget, 1954, 1955),

whereas, in contrast, adolescents are capable of abstract thinking (Wessman & Gorman, 1977) and self-reflection (Keating, 1990), which enables thinking about multiple dimensions of time. The development of a nuanced sense of past, present, and future continues through adolescence and probably consolidates with the development of formal operational thinking (McInerney, 2004). Given the advanced cognitive abilities, adolescents are capable of thinking about the multiple dimensions of time and serving as an appropriate age group to examine TP.

To date, however, there has been relatively little research examining TP as a multidimensional construct. One obvious reason for this gap was the absence of an instrument that allowed for the multidimensional examination of TP prior to the development of the ZTPI. Although the Circles Test (Cottle, 1967) requires respondents to reflect on the past, present, and future, it does not yield separate scores for each time orientation; rather, it yields one score reflecting the temporal dominance (e.g., past dominance or present dominance) of the respondent. Another possible reason for the unidimensional focus of TP research is the field's focus on examining future TP (e.g., Nurmi, Seginer, & Poole, 1990). Indeed, the only other multidimensional instrument in the TP literature is the Future Orientation Interview (McCabe & Barnett, 2000b), another measure of future TP.

To date, eight studies have examined TP from a multidimensional perspective, and each has used either the ZTPI (Zimbardo & Boyd, 1999) or earlier versions of the instrument (Gonzalez & Zimbardo, 1985; Keough, Zimbardo, & Boyd, 1999; Zimbardo et al., 1997). Gonzalez and Zimbardo reported examining the structural validity of scores on 31 items but provided no coefficients or reliability estimates. The two more recent studies including adolescents (Keough et al., 1999; Zimbardo et al., 1997) used a 22-item version consisting of a single Present and a single Future subscale. They reported reliability information on the instrument's scores for the whole sample but not for the subgroups, and they did not report structural validity data.

The Present Study

The purpose of the present study was to validate ZTPI scores in an adolescent population. Goodwin and Goodwin (1999) reminded us that reliability and validity are properties of scores on instruments in particular samples. If TP is an important variable to study in adolescents, we must validate scores on instruments in that population. Thus, the current study examined ZTPI scores in a group of academically talented adolescents attending an academic summer program at a university. Although academically talented students attending university-based summer enrichment programs represent only a small subsample of all adolescents, they are a useful group in which to start examining scores on an instrument developed and validated with college-aged students.

We examined several questions in the study. First, we examined the internal consistency of ZTPI subscale scores as identified by Zimbardo and Boyd (1999) across grade-level groups by gender. Second, we examined convergent and discriminant validity of ZPTI subscale scores with a variety of other constructs, including measures of hope, perceived life chances, academic achievement, and academic cheating. The Past Positive and Future subscales were expected to have modest positive relationships—in the .25 to .45 range—with hope, perceived life chances, academic achievement, and the seriousness of academic cheating. Conversely, the Past Negative and Present Fatalistic subscales were expected to have negative relationships (–.45 to –.25) with hope and perceived life chances, and the Present Hedonistic subscale was expected to have a negative relationship with the seriousness of academic cheating. Third, we examined the structural validity of ZTPI scores in this sample using factor analytic procedures.

Method

Participants

Participants consisted of 815 academically talented adolescents (46.6% male) attending a summer program at a research university in a western state. Students were accepted into the summer program using several criteria, including school achievement, teacher recommendations, and an academic product. However, they did not have to be identified as gifted and talented at their home schools. Participants ranged in age from 11 to 18 years ($M = 14.4$, $SD = 1.4$) and had a mean grade point average (GPA) of 3.8 ($SD = .34$, skew = -1.8). The majority of the students had just completed 7th (21.5%), 8th (26.4%), 9th (21.1%), or 10th (20.1%) grade, with 85 (10.4%) students between 11th and 12th grade, and only 4 students in lower grades. The largest ethnic groups were Chinese American ($n = 291$; 35.7%), White ($n = 148$; 18.2%), and Other ($n = 138$; 16.9%). Other ethnic groups included Chicanos/Latinos ($n = 60$), African Americans ($n = 34$), Filipinos ($n = 34$), and other Asian American groups ($n = 81$), with each of these groups making up less than 10% of the sample.

Measures

The ZTPI. The ZTPI (Zimbardo & Boyd, 1999) is a 56-item measure consisting of five subscales, Past Negative, Past Positive, Present Hedonistic, Present Fatalistic, and Future. Participants respond to questions using a 5-point Likert scale (1 = *very uncharacteristic*; 5 = *very characteristic*). Zimbardo and Boyd have reported internal consistency estimates for subscale scores based on Cronbach's α ranging from .74 to .82 ($Mdn \alpha = .79$). The five-factor structure was supported using exploratory and confirmatory factor analyses (CFAs), and interscale correlations were generally low

($-.09 \leq r \leq .38$). Convergent and discriminant validity were established by meaningful correlations in the hypothesized directions with aggression, depression, self-esteem, and trait anxiety (Zimbardo & Boyd, 1999).

The State Hope Scale (SHS). The second composite measure was the six-item SHS (Snyder et al., 1996). The SHS was developed to assess an individual's current goal-directed thinking. Three of the six items focus on agency (i.e., the capacity to begin and maintain goal-directed action), and three focus on pathways (i.e., the capacity to find ways to obtain the goal). Participants respond to the items using an 8-point Likert scale (1 = *definitely false*; 8 = *definitely true*), with higher numbers indicating greater hope. Snyder et al. reported that the pathways (.74–.93, *Mdn* = .91) and agency (.83–.95, *Mdn* = .91) component scores had acceptable internal consistency estimates (Cronbach's α) and were supported using factor analytic techniques. They also reported convergent and divergent validity evidence based on both correlations and experimental manipulations. In the current study, α estimates for SHS scores ranged from .76 to .83 across gender and grade subgroups (total sample α = .80).

The Measure of Perceived Life Chances (MPLC). The third composite measure was the MPLC (Jessor et al., 1990), a 10-item unidimensional measure of the subjective likelihood of a number of future events. Participants respond on a 5-point Likert scale with verbal anchors to questions (e.g., "What are the chances that you will have a job that pays well?"). The verbal anchors range from *Very Low* (1) through *About fifty-fifty* (3) to *Very High* (5). Jessor et al. reported α reliability estimates for MPLC scores ranging from .88 to .92 and that students with higher MPLC scores were less likely to engage in risky behaviors. Worrell, Latto, and Perlinski (1999) reported an α estimate of .89 for MPLC scores and indicated that academically talented students and resilient at-risk students obtained statistically significant higher MPLC scores than nonresilient at-risk students. The first two questions on the original measure ask about the chances of "graduating from high school" and "going on to college." For this academically talented (AT) sample, these two questions were changed to "graduating from college" and "going on to graduate school" to create the MPLC-AT. For these scores, α estimates were high across gender and grade subgroups, ranging from .85 to .88 (total sample α = .87).

Other measures. Other variables measured in the study included self-reported GPA, participants' expected grade in the summer program measured on a GPA-equivalent scale, and a single item on the acceptability of cheating. The acceptability of cheating item required participants to rate how serious a problem it would be if students cheated in the summer program. This item was rated on a 5-point Likert scale ranging from 1 (*Not at all serious*) to 5 (*Very serious*). Thus, higher scores on this item indicated disapproval of cheating.

Procedure

The data were collected in the 5th week of a 6-week summer program for academically talented students. Questions were included on an anonymous program evaluation questionnaire, which was completed on the students' own time and returned to a designated student in the classroom. A total of 900 students completed the questionnaires. However, 23 students (2.5%) were eliminated due to missing data on gender, age, grade level, or ethnicity, and an additional 62 participants (6.9%) were excluded because they failed to answer three or more questions on the ZTPI. Missing values for participants with one or two missing items were calculated using the linear interpolation function of the Statistical Package for the Social Sciences (SPSS, Inc., 2002). Missing data on individual ZPTI items ranged from 0 to 34 (Item 29) participants. The biggest change in the standard deviation when the missing values were replaced was .008 on Item 29. The final sample of 815 made up 91% of the total sample.

Results

Table 1 contains means and standard deviations for all of the major variables in the study. As can be seen in the table, participants' mean ratings on the hope and perceived life chances scales were near the upper end of the range, and the latter score also had a kurtosis value of 3.3. However, mean scores on the other subscales were all closer to the scale midpoint, and the distributions of the variables were generally normal with skew and kurtosis values of less than 0.5. Students expected to earn grades in the B⁺ to A⁻ range.

The internal consistency estimates for the ZTPI subscales are presented by gender and grade level in Table 2. With the exception of the Past Positive scores, which had α reliability estimates in the .50 to .60 range (*Mdn* α = .61), all of the other reliability estimates were in the .70 to .80 range (Past Negative *Mdn* α = .82; Present Hedonistic *Mdn* α = .73; Present Fatalistic *Mdn* α = .72; Future *Mdn* α = .75). Confidence intervals calculated using the SPSS syntax provided by Thompson (2003) indicated that the internal consistency estimates for some Past Positive scores may have been less than .50.

ZTPI Intercorrelations and Relationships With Other Constructs

Intercorrelations among ZTPI subscales were in expected directions: Past Negative scores were positively correlated with Present Hedonistic ($r = .24$) and Present Fatalistic ($r = .46$) scores, and Present Fatalistic scores were positively correlated with Present Hedonistic scores ($r = .35$) and negatively correlated with Future scores ($r = -.24$). Correlations between ZTPI subscale scores and the other variables were low but in the expected directions (see Table 3). Only five correlations achieved values of .25 or above. As predicted, scores on Past Positive and Future

Table 1
Means and Standard Deviations of Major Variables

Variable	<i>N</i>	<i>M</i>	<i>SD</i>
SHS score (6; 1–8)	815	6.26	1.03
MPLC-AT score (10; 1–5)	815	4.38	0.52
Past negative (10; 1–5)	815	3.19	0.71
Past positive (9; 1–5)	815	3.40	0.54
Present hedonistic (15; 1–5)	815	3.39	0.52
Present fatalistic (9; 1–5)	815	2.56	0.63
Future (13; 1–5)	815	3.35	0.56
Grade point average	722	3.81	0.34
Expected summer grade	798	3.54	0.66
Acceptability of cheating (1–5)	805	3.76	1.09

Note: Number of items making up composite variables and the range of scores are shown in parentheses. SHS = State Hope Scale; MPLC-AT = Measure of Perceived Life Chances–Academically Talented Revision.

Table 2
Internal Consistency Estimates for ZTPI Subscales by Subgroups

	<i>N</i>	Past Negative	Past Positive	Present Hedonistic	Present Fatalistic	Future
No. of items		10	9	15	9	13
Female	435	.80 (.78–.83)	.62 (.56–.67)	.76 (.72–.79)	.69 (.64–.73)	.73 (.69–.76)
Male	380	.82 (.79–.85)	.60 (.54–.66)	.79 (.75–.82)	.74 (.70–.78)	.77 (.73–.80)
Grade 7	175	.81 (.76–.85)	.60 (.50–.68)	.78 (.73–.82)	.74 (.68–.79)	.78 (.73–.82)
Grade 8	215	.83 (.80–.86)	.67 (.60–.73)	.77 (.72–.81)	.66 (.59–.73)	.77 (.72–.81)
Grade 9	172	.82 (.77–.85)	.55 (.44–.64)	.81 (.76–.85)	.76 (.70–.81)	.73 (.66–.78)
Grade 10	164	.83 (.78–.86)	.55 (.44–.64)	.73 (.67–.79)	.72 (.65–.78)	.75 (.68–.80)
Grade 11	85	.76 (.67–.83)	.68 (.57–.77)	.63 (.51–.74)	.72 (.62–.80)	.72 (.62–.80)
Total	815	.81 (.80–.83)	.61 (.57–.65)	.77 (.75–.79)	.72 (.69–.75)	.75 (.72–.78)

Note: ZPTI = Zimbardo Time Perspective Inventory. Confidence intervals of 95% appear in parentheses.

were positively correlated with hope (SHS) and perceived life chances, and Future scores were also positively correlated with the seriousness of academic cheating. Academic achievement was not related to any TP scores, and Past Negative, Present Hedonistic, and Present Fatalistic did not have correlations of at least $|.25|$ with any other variables.

To examine the combined contributions of ZTPI subscales, they were used as predictors in three multiple regressions. ZPTI scores were significant predictors of SHS scores, $F(5, 809) = 39.85$, $p < .001$, Adjusted $R^2 = .19$, with all five subscales making contributions at the .001 level—the *Bs* ranged from $|.20|$ to $|.50|$

Table 3
Correlations of ZPTI Scores and Other Variables

	<i>N</i>	Past Negative	Past Positive	Present Hedonistic	Present Fatalistic	Future
SHS	815	-.22	.26	.09	-.21	.32
MPLC-AT	815	-.16	.28	.15	-.17	.25
GPA	722	-.08	.09	-.02	-.15	.18
Summer GPA	798	-.11	.05	-.05	-.15	.11
Seriousness of academic cheating	805	-.08	.13	-.10	-.15	.30

Note: ZPTI = Zimbardo Time Perspective Inventory; SHS = State Hope Scale; MPLC-AT = Measure of Perceived Life Chances–Academically Talented Revision; GPA = grade point average.

and the β s ranged from $|.11|$ to $|.27|$. Additionally, three of the ZPTI scores had sizeable structure coefficients (r_s): Past Negative = $-.48$, Past Positive = $.58$, and Future = $.72$. The five ZPTI subscales also predicted MPLC scores, $F(5, 809) = 33.3$, $p < .001$, Adjusted $R^2 = .17$, with significant t -test results for all of the subscales ($|.09| < b < |.22|$; $|.12| < \beta < |.22|$). In this analysis, Past Negative ($r_s = -.39$), Past Positive ($r_s = .68$), and Future ($r_s = .61$) also had sizeable structure coefficients. Finally, the regression equation predicting the seriousness of cheating yielded significant results, $F(5, 799) = 18.2$, $p < .001$, Adjusted $R^2 = .10$. Although the Future score was the only significant contributor to the regression equation ($B = .51$, $\beta = .27$, $p < .001$), Past Positive ($r_s = .41$), Present Hedonistic ($r_s = -.55$), Present Fatalistic ($r_s = -.46$), and Future ($r_s = .95$) were useful predictors as indicated by structure coefficients greater than $.40$.

Factor Analyses

CFAs. CFA procedures are generally more appropriate when the underlying factor structure is supported by theory, empirical data, or both (Byrne, 2001; Thompson, 2004) and is particularly useful in comparing multiple models (MacCallum, Wegener, Uchino, & Fabrigar, 1993). Zimbardo and Boyd (1999) indicated that both exploratory and confirmatory factor analytic procedures provided support for the ZPTI's five-factor structure, although they did not provide fit indices for the scores in the CFA. Moreover, the presence of multiple dimensions of time (e.g., past, present, and future) suggested alternative models that could be tested with this new age group. Thus, CFAs were first conducted to examine the structure of ZPTI scores.

Three models were compared—a one-factor model; a three-factor model consisting of past (Past Negative), present (Present Hedonistic and Present Fatalistic), and future items; and the five-factor model reported by Zimbardo and Boyd (1999).

Table 4
Fit Indices for the ZPTI Derived From Confirmatory
Factor Analyses (Maximum Likelihood Robust)

Model	χ^2 s-b	df	χ^2/df	CFI		RMSEA
				Robust	SRMR	(90% CI)
One-factor	7732.44*	1484	5.21	.319	.078	.076, .079
Three-factor (past, present, future)	5775.55*	1481	3.90	.532	.064	.063, .066
Five-factor (Zimbardo & Boyd)	4819.72*	1474	3.27	.636	.057	.055, .059

Note: $N = 710$. ZPTI = Zimbardo Time Perspective Inventory; s-b = Satorra–Bentler; CFI = comparative fit index; SRMR = standardized root mean square residual; RMSEA = root mean square error of approximation; CI = confidence interval.

* $p < .001$.

As Thompson (2004) recommended, goodness of fit was assessed using several criteria, including the Satorra–Bentler scaled χ^2 (Satorra & Bentler, 1994), which corrects for nonnormality in the data, the χ^2 to degrees of freedom ratio, the comparative fit index (CFI), the standardized root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) values, based on a 90% confidence interval. Acceptable fit is indicated by a χ^2 to degrees of freedom ratio between 1 and 2 (Hair, Anderson, Tatham, & Black, 1995), a CFI value of .95 or higher (Hu & Bentler, 1998), and SRMR and RMSEA values less than .05 (Byrne, 2001; MacCallum, Browne, & Sugawara, 1996).

The results of the CFA are presented in Table 4. As can be seen, although the three-factor model was significantly better than the one-factor model, and the five-factor model was significantly better than the three-factor model, none of the three models resulted in an acceptable fit for the data. Although the SRMR and RMSEA for the five-factor model suggested a fair fit (MacCallum et al., 1996), both the CFI and the χ^2 /degrees of freedom ratio indicated poor fit, with the CFI of .64 being well below .95.

Exploratory factor analyses (EFAs). Given the poor results from the CFA and the desire to identify the best fit of ZPTI scores in this sample (Spector, 1992), we conducted post hoc EFA with principal axis extraction. The Kaiser–Meyer–Olkin measure of sampling adequacy's value was .84, and Bartlett's test of sphericity was significant, $\chi^2 (1540, N = 815) = 11577, p < .001$. Low communality estimates (i.e., .19 to .58, $Mdn = .31$) and a 28:3 variable–factor ratio suggested a sample size of at least 200 would result in admissible solutions (MacCallum, Widaman, Zhang, & Hong, 1999). The number of factors to extract was determined using multiple methods. The eigenvalue rule suggested 16 factors, whereas the scree test and parallel analysis (Thompson & Daniel, 1996; Watkins, 2000) suggested six

factors. Moreover, the ZTPI is based on a five-factor model (Zimbardo & Boyd, 1999). Given the fact that the eigenvalue rule is generally the least accurate indicator of the number of factors to extract (Bernstein & Teng, 1989; Comrey, 1978; Gorsuch, 1997; Snook & Gorsuch, 1989), we examined both five- and six-factor orthogonal (varimax) and oblique (oblimin; $\delta = 0$) solutions (Tabachnick & Fidell, 1996). A coefficient of .40 was used for item salience.

Five-factor solution. The oblimin rotation indicated that the factors were not substantially correlated ($|.05| \leq r \leq |.28|$, $Mdn = .16$) and the pattern of salient coefficients was similar across rotation methods. Thus, results from the varimax rotation are presented in Table 5. The five factors were similar to the ones reported by Zimbardo and Boyd (1999) and were given the same names as originally proposed. Factor I (Past Negative) consisted of 9 items, 8 of the 10 items that make up this subscale and 1 Past Positive item, loading inversely. Factor II, labeled Present Hedonistic, consisted of 7 of the 15 items assigned to this subscale, but the pattern/structure coefficients plummeted after the 2nd and 3rd items (from .70 to .51, and .51 to .41, respectively). Factor III (Future) consisted of 6 of the 13 Future items. Five of the 9 Present Fatalistic items made up Factor IV, and 4 of the 9 Present Positive items made up Factor V.

A total of 25 items did not achieve a salient coefficient on any factor, and only 18 of the 56 items (32%) had pattern/structure coefficients of at least .50: 6 on Factor I and 4 or fewer on the other factors. This solution accounted for only 27.6% of the variance in the scores, and construct reliability estimates based on salient coefficients ranged from .57 to .82. Coefficients of congruence with the five-factor structure reported by Zimbardo and Boyd were mixed: Past Positive ($r_c = .82$), Present Fatalistic ($r_c = .80$), and Future ($r_c = .87$) were in the poor to borderline range, and Past Negative ($r_c = .95$) and Present Hedonistic ($r_c = .94$) were in the good range (MacCallum et al., 1999).

Six-factor structure. The six-factor structure, which accounted for 29.4% of the variance in scores, also yielded interpretable factors. As with the five-factor structure, the oblique extraction (oblimin) indicated that the factors were not highly correlated ($|.01| \leq r \leq |.28|$, $Mdn = .13$) and was quite similar to the orthogonal extraction. The first five factors were almost identical to their counterparts in the five-factor solution: Past Negative (I; 9 items), Present Hedonistic (II; 7 items), Future (III; 6 items), Present Fatalistic (IV; 5 items), and Past Positive (V; 5 items). Three Future items about planning formed a sixth factor, which was labeled Future Planning. Two of the items (Item 43: pattern/structure coefficient = .54; Item 24: pattern/structure coefficient = .50) did not have salient coefficients in the five-factor structure, and 1 item migrated from the Future factor (Item 6: pattern/structure coefficient = .49). Construct reliability estimates based on salient coefficients ranged from .51 (for the Future Planning factor) to .82; 21 items did not have

Table 5
Pattern/Structure Coefficients From the Five-Factor Varimax Rotation^a

Item No.	Item	I PN	II PH	III FU	IV PF	V PP	<i>h</i> ²
PN50	Thinks about bad things in past	.72	.04	.01	.18	-.04	.58
PN16	Replays painful past events	.70	.06	.00	.11	-.01	.53
PN34	Hard to forget unpleasant past	.69	.06	.03	.13	-.04	.54
PN54	Thinks about good things missed	.55	.07	-.11	.21	.15	.43
PN4	Thinks about past choices	.54	.03	.01	.03	.05	.37
PP25	Past has unpleasant memories	-.53	.03	.00	-.30	.18	.43
PN27	Made mistakes in past	.49	.19	.06	-.05	-.02	.34
PN22	Abused and rejected in past	.47	.13	.07	.02	-.06	.30
PN36	Drawn back to past experiences	.47	.10	.10	.07	.21	.33
PH31	Taking risks alleviates boredom	.09	.71	.00	.03	-.14	.54
PH42	I take risks for excitement	.06	.70	-.01	.10	-.14	.55
PH26	Excitement is important	.01	.51	.06	-.13	.06	.31
PH1	Partying is important	.00	.41	-.03	.11	.06	.27
PH23	I make spur of the moment decisions	.07	.41	-.23	.25	-.06	.38
PH48	I prefer spontaneous friends	.07	.41	-.00	.07	.06	.22
PH17	I live life as fully as possible	-.16	.41	.27	.08	.05	.36
FU40	I complete projects on time	-.10	.04	.59	.10	.06	.38
FU10	I set goals and ways to reach them	-.10	.11	.54	-.07	.12	.34
FU45	I resist temptation when there is work	-.07	.00	.51	.05	.10	.28
FU13	Deadline more important than play	-.10	.02	.50	.02	.06	.31
FU6	Days should be planned each morning	.08	.16	.46	.02	.23	.42
FU51	I work on things to get ahead	.14	.03	.40	-.04	.04	.23
PF39	You cannot change the future	.10	.01	-.04	.66	-.07	.42
PF38	My life path is controlled	.24	-.01	.06	.57	.04	.43
PF14	Whatever will be will be	.15	.10	-.19	.52	.03	.36
PF53	Luck pays off better than work	.11	.13	-.20	.44	.10	.32
PF3	Fate determines my life	.12	.10	.11	.41	.11	.28
PP7	Pleasurable to think about my past	-.18	.15	.15	-.01	.58	.41
PP2	Childhood has wonderful memories	-.01	.16	.17	.03	.51	.32
PP20	Happy memories come to mind	-.10	.30	.21	-.07	.47	.36
PP15	I like stories of the "good old times"	.15	.01	.12	.10	.42	.26
PN5	Decisions influenced by others	.32	.06	-.10	.00	.10	.22
PH8	I do things impulsively	-.01	.35	-.18	.16	-.00	.27
FU9	I worry when things are late ^b	.03	-.15	.38	-.28	-.09	.27
PP11	More good than bad in my past	-.37	.17	.14	-.09	.37	.36
PH12	I get caught up and lose track of time	.10	.33	-.11	-.02	.10	.19
FU18	It upsets me to be late	.08	-.03	.39	-.16	.11	.24
PH19	Live each day as if it were the last	.09	.29	.14	.03	.19	.26
FU21	I meet my obligations	-.09	.16	.39	-.16	.10	.30
FU24	Take each day as is rather than plan ^b	-.07	-.29	.32	.23	.09	.43
PH28	Enjoy the moment; work can wait	.09	.26	.35	.33	.12	.33
PP29	I get nostalgic about my childhood	.24	.04	-.02	.14	.30	.23
FU30	Weigh costs and benefits of decisions	.15	.03	.28	-.10	.17	.21
PH32	Journey more important than end	.05	.39	-.01	.07	.09	.27

(continued)

Table 5 (continued)

Item No.	Item	I PN	II PH	III FU	IV PF	V PP	h^2
PN33	Things rarely worked out	.39	.04	-.06	.27	.02	.30
PF35	Reduces joy to think about goals	.30	.18	-.18	.25	.03	.28
PF37	You can't plan for the future	.24	.23	-.09	.31	-.04	.35
PP41	I tune out talk about the past ^b	-.21	-.15	.03	-.23	.09	.22
FU43	I make lists of things to do	.04	-.05	.26	.02	.21	.28
PH44	I follow heart more than head	.10	.35	.06	.19	.17	.24
PH46	I get caught up in the moment	.12	.39	-.01	.00	.26	.28
PF47	Past life was simpler	.37	-.05	-.08	.19	.22	.27
PP49	I like family rituals and traditions	.07	.01	.16	.07	.34	.19
PF52	Spending is better than saving	.12	.32	-.17	.27	.03	.28
PH55	I like my relationships passionate	.11	.29	.06	-.02	.14	.21
FU56	There is always time to catch up ^b	-.08	-.24	.39	-.27	-.09	.34
Eigenvalue (postrotation)		4.25	3.57	3.07	2.61	1.99	
Percentage of variance (postrotation)		7.59	6.37	5.48	4.65	3.56	
Construct reliability ^c		.82	.71	.67	.65	.57	

Note: ZPTI = Zimbardo Time Perspective Inventory; PN = past negative; FU = future; PH = present hedonistic; PF = present fatalistic; PP = past positive.

a. Correlation matrix available from author.

b. Reversed-scored items.

c. Based on items with coefficients of at least .35.

salient coefficients on any factor. The pattern/structure coefficients for the six-factor structure are available from the first author.

In sum, both the five- and six-factor structures indicated that the majority of the items on the ZPTI are not salient with the factors, and, with the exception of Past Negative, there are less than five items contributing meaningfully to each factor, suggesting the need for more scale development work with the instrument, at least in this age group.

Discussion

In this study, we examined the psychometric properties of ZPTI (Zimbardo & Boyd, 1999) scores in a sample of academically talented adolescents. Internal consistency estimates for scores on four of the subscales (Past Negative, Present Hedonistic, Present Fatalistic, and Future) suggest that these scores may be reliable in adolescent populations. However, the reliability estimates for Past Positive scores in this sample were considerably lower than the estimate reported by Zimbardo and Boyd in their college sample. Although correlations with other constructs were in the hypothesized directions, only Future scores had correlations greater than .30 with any construct. TP scores in combination did predict measures of hope, perceived life

chances, and attitudes toward academic dishonesty. Finally, CFAs did not support the purported structure of the scale, and EFAs provided only qualified support for the five-factor structure reported by Zimbardo and Boyd but also suggested the possibility of a six-factor structure, which included an additional factor reflecting planning for the future.

Reliability Results

Several measurement researchers have cautioned against an ideal level of internal consistency (e.g., Goodwin & Goodwin, 1999; Schmitt, 1996; Thompson, 2003). Moreover, reliability estimates should be calculated for scores on each sample in which one collects data (Henson, 2001; Vacha-Haase, Henson, & Caruso, 2002). Low reliability estimates of scores affect the validity of the constructs being examined and the effect sizes that the scores yield (Thompson, 2003; Vacha-Haase et al., 2002). Thus, studies of the internal consistency of scores in populations in which an instrument has not been used before provide important information for researchers. The results of this study suggest that TP constructs can be measured with some reliability in adolescent populations using ZTPI scores. However, this finding needs to be qualified on the basis of the factor analytic results found in the study. Although the internal consistency estimates suggest that the subscales have relatively homogeneous items, the factor analytic results raise questions about the integrity of the factors formed by these items, suggesting the need for further research on the ZPTI with an adolescent population.

Factor-Analytic Results

We examined ZTPI scores using both CFAs and EFAs. The CFA results indicated that the five-factor structure proposed by Zimbardo and Boyd (1999) for ZPTI scores had the best fit to the data, but even that fit was quite poor. The EFAs provided stronger support for the five-factor structure but also raised several concerns about the instrument. Community estimates were low for the majority of the items, and about 40% of the items did not have salient coefficients on any factor. These results suggest that the domains are not well represented by ZPTI items. Nonetheless, the emergence of a recognizable factor structure in this sample, with two or more core items (i.e., coefficients in the .5 or higher range) on each factor, suggests that TP constructs are potentially measurable in this age group.

The results also provide guidance in developing scales and items that are more appropriate for adolescents. The Past Negative factor, consisting of nine items assessing negative past events with coefficients greater than .45, is the most coherent subscale in the measure. Three items measuring risk form the core of the Present Hedonistic factor, and this finding raises some questions about the construct underlying this factor. The Future factor seems to be tapping self-regulation and goal

setting, with the five items related to those topics yielding the highest coefficients. The Present Fatalistic factor had three core items related to low agency for changing the future, suggesting that it may be more future than present oriented, and the Past Positive factor had two core items about pleasant memories about the past.

The six-factor structure seemed related to previous work in this area. In 1985, Gonzalez and Zimbardo reported on the Stanford Time Perspective Inventory, a precursor to the ZPTI. They presented data on a large sample ($N = 11,892$), including participants from all 50 states as well as Canada, Mexico, Puerto Rico, and the Virgin Islands. Twelve percent of the participants were aged 19 years or younger and included junior and senior high school students. Factor analysis of these data yielded seven factors: “four future-oriented [factors], two present-oriented [factors,] and one that [was] a measure of time sensitivity or emotional reaction to the pressure of time” (Gonzalez & Zimbardo, 1985, p. 24). Two of the four future-oriented factors reported by Gonzalez and Zimbardo—Future, Work Motivation/Perseverance and Future, Specific Daily Planning—mirrored factors found in the six-factor extraction, the Future Oriented and Future Planning factors, respectively. Other researchers have also suggested that there are multiple aspects of future TP (see McCabe & Barnett, 2000b). One way to examine this issue is to increase the number of ZPTI items related to different aspects of future TP to allow for meaningful factors to emerge.

Although there were a limited number of salient items on the factors that emerged in the EFAs, the results provided some support for studying TP in an adolescent population. Findings indicate that adolescents may be capable of discerning between multiple dimensions of time in ways that are similar to a college-aged sample. Development of an age-appropriate instrument of TP for adolescents has important implications for psychological and educational research, given prior studies linking adolescents’ orientation to the present and future with outcomes such as academic achievement (Honora, 2002), delinquency (Oyserman & Markus, 1990a, 1990b), academic resilience (Worrell et al., 1999; Worrell & Hale, 2001), risky driving (Zimbardo et al., 1997), and the use of alcohol, tobacco, and drugs (Keough et al., 1999).

Limitations and Conclusion

This study had several limitations. First, the participant pool consisted of academically talented students attending a selective summer program. Although there were reasons for this choice, adolescents selected on the basis of high achievement may have reported TP scores with restricted ranges. Thus, the results may have been affected by the nature of the sample. Similarly, the low correlations between ZPTI subscales and achievement scores may be related to ceiling effects in the GPAs of participants in this study combined with the modest reliability estimates for the scores and may not accurately reflect the true relationships among these variables. Third, Chinese Americans made up a substantial portion of the sample,

and results from this group may not generalize either to the general adolescent population or to the population of college students, although it is representative of gifted and talented summer programs. Finally, the scale was developed with college students in mind, and the low coefficients may be due to items that are meaningful to college students but not to adolescents.

In conclusion, the study's results suggest that TP dimensions are potentially measurable in an adolescent population but also clearly suggest the need for developing a scale targeted at this age group. The items with the highest pattern/structure coefficients provide a starting place for developing questions that may better tap TP dimensions in adolescence. Additionally, we also recommend further examinations of ZPTI scores in other college samples to see if the ZPTI provides reliable and valid data in this population as well. The single validation study of ZPTI scores in the literature (Zimbardo & Boyd, 1999) is a far cry from the preponderance of evidence needed to support using an instrument (Benson, 1998), especially when the structural validity evidence accumulated is not strong.

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