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The validity and reliability of the Zimbardo time perspective inventory in a Turkish sample

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Abstract

The present study evaluated the validity and reliability of the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, *Journal of Personality and Social Psychology, 77*(6), 1271–1288, 1999) in a Turkish sample. A Turkish version of the ZTPI was administered to participants in Study 1 ($n = 554$) while another group of participants filled out the ZTPI as well as measures of personality, locus of control, self-esteem, and self-efficacy in Study 2 ($n = 234$). Test-retest reliability of the ZTPI scores was assessed on the Study 2's sample ($n = 88$) over a 2-week period. The Turkish ZTPI demonstrated adequate internal consistency and test-retest reliability with minor exceptions. Confirmatory factor analyses (CFA) supported the five-factor structure of the original scale suggesting that the ZTPI has cross-cultural validity. However, similar to prior adaptation studies, the model fit values ranged from poor to good, suggesting a need for additional research on the psychometric properties of the ZTPI. Finally, the applicability of the deviation from balanced perspective scores was examined and unique relationships were demonstrated: balanced time perspective was associated with high conscientiousness and internal locus of control. Findings are discussed in relation to the time perspective theory, and the recommendations to improve the ZTPI's structural validity are provided.

Keywords Time perspective theory · Balanced time perspective · Personality · Self-efficacy · Self-esteem · Locus of control · Confirmatory factor analysis

Responses to daily events necessitate thinking frequently about the past, present, and future. A focus on different temporal dimensions is needed because we make use of past events to make sense of the present (Bernstein and Benfield 2013). Past events and present considerations are utilized in generating expectations for the future (Lennings 2000), and future expectations influence both what we choose to pay attention to in the present and how we evaluate the past (Shipp et al. 2009). Such an integrated view was first reflected in Kurt Lewin's (1951) definition of time perspective as "the totality of an individual's views of his psychological future and psychological past existing at a given time" (p.75). A general understanding of subjective time orientations is crucial, because they are frequently employed in interacting with the world (Boniwell et al. 2010; Zimbardo and Boyd 1999).

The Zimbardo Time Perspective Inventory

A popular measure of an individual's time perspective is the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo and Boyd 1999). The ZTPI is a self-report questionnaire that consists of five dimensions, Past Positive (PP), Past Negative (PN), Future (F), Present Hedonistic (PH), and Present Fatalistic (PF). While PP is characterized by a nostalgic and warm evaluation of the past, PN is generally a pessimistic and regretful consideration of the past. Setting goals and delaying gratification are characteristics of the F component. PH is associated with life choices involving immediate pleasure, risk taking, and impulsivity. Finally, PF is marked with pessimistic expectations about the future and a feeling of lack of control over life events.

The ZTPI has been translated into Greek (Anagnostopoulos and Griva 2012), Lithuanian (Liniauskaite and Kairys 2009), Brazilian (Milfont et al. 2008), Spanish (Diaz-Morales 2006), French (Apostolidis and Fieulaine 2004), Chinese (Gao 2011), Portuguese (Ortuño and Gamboa 2009), and Swedish (Carelli et al. 2011). The properties of a Turkish translation of the ZTPI were examined by Kislali-Erginbilgic on a sample of university

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students in an unpublished study. This version of the scale has been employed in prior studies and yielded findings in line with the time perspective theory (Akirmak 2014; Sircova et al. 2014). Although a Turkish translation of the ZTPI exists (Kislali-Erginbilgic n.d.) an evaluation of its psychometric properties including its factor structure, convergent validity, and reliability has not been conducted yet.

The goal of the present study was to adapt the ZTPI to Turkish using a sample of university students. A robust adaptation of the ZTPI to Turkish is essential to reliably compare Turkish data with data from other cultures, contributing to the cross-cultural validity of the scale. For example, in previous adaptation studies, some ZTPI items were found to have weak to non-significant associations with the purported factors (Anagnostopoulos and Griva 2012; Liniauskaite and Kairys 2009; Milfont et al. 2008). Because there are cross-cultural differences in time orientations and correspondingly how participants respond to items in the ZTPI (Sircova et al. 2014), there is a need for scrutiny of the Turkish version of the ZTPI. In addition to the factor structure, the ZTPI subscales' associations with other constructs were examined to evaluate the convergent validity. The ZTPI factor scores have shown robust associations with personality traits (Kairys and Liniauskaite 2015), self-esteem (Anagnostopoulos and Griva 2012; Zimbardo and Boyd 1999), and self-efficacy (Boniwell et al. 2010; Worrell et al. 2015), and thus these constructs were chosen to evaluate the convergent validity of the Turkish ZTPI in the current study.

Personality Traits

Prior research has demonstrated meaningful relationships between the ZTPI and personality, particularly, the Big Five personality traits. A meta-analysis study[1] by Kairys and Liniauskaite (2015) found that across six studies, neuroticism is positively associated with PF and PN; extraversion is positively associated with PH and PP, and negatively associated with PN; openness is positively associated with PH, and negatively associated with PF; agreeableness is positively associated with F and PP, and negatively associated with PN; conscientiousness is positively associated with F and PP, and negatively associated with PF, PH, and PN. Among the big five traits, conscientiousness was found to be related to all of the ZTPI factors, and particularly in relation to F. Neuroticism has strong association with PN, but the rest of the associations between the big five traits and ZTPI factors are between medium to low effect size range (Kairys and Liniauskaite 2015).

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[1] Only the weighted averages of correlations above .10 are considered to represent a meaningful association between the variables.

Perceptions of Self

Self-esteem refers to an individual's judgments about self-worth and is related to psychological well-being and positive outcomes (Drake et al. 2008; Ryan and Deci 2000; Seema and Sircova 2013; Wood et al. 2003; Worrell et al. 2015). Self-esteem was positively associated with PP and F and negatively associated with the PN and PF, but no reliable association was found with PH (Seema et al. 2014; Zimbardo and Boyd 1999). In contrast to these findings, other studies found no reliable association with PP (Worrell et al. 2015) and F (Anagnostopoulos and Griva 2012), and a positive association with PH (Akirmak 2014), indicating the presence of cross-cultural variability.

The findings in regard to the relationship between self-efficacy and time perspective are diverse. Generalized self-efficacy has shown a negative association with PN and PF and a positive association with PH, but has not been reliably associated with PP and F (Boniwell et al. 2010). Worrell et al. (2015) examined the association of the ZTPI factors with emotional, academic, and social self-efficacy, and found that all self-efficacy measures were negatively associated with PN, and none of them were associated with PP. Additionally, F was associated with high academic and social self-efficacy, PF was negatively associated with academic self-efficacy, and PH was positively associated with emotional self-efficacy and negatively associated with academic and social self-efficacy (Worrell et al. 2015).

Locus of Control

According to Rotter (1966), individuals with an internal locus of control perceive reinforcers and events as dependent on their actions whereas individuals with an external locus of control perceive them as dependent on outside factors such as luck, fate, or actions of others. Shipp et al. (2009) demonstrated that internal locus of control was positively related to PP and F while external locus of control was positively related to PN and PF, and, to a weaker extent, to PH. In contrast to Shipp et al.'s (2009) findings, Haghighatgoo et al. (2011) reported that PF was connected to inner action control style. However, such a finding is directly in contrast with the time perspective theory, which suggests that PF is associated with an external locus of control. Nevertheless, both studies found that the PP and F factors are related to having a sense of self-control over life events rather than attributing their causes to external sources.

Balanced Time Perspective

In addition to the standard ZTPI factors, there exists a growing body of research on the balanced time perspective (BTP;

Boniwell and Zimbardo 2004; Stolarski et al. 2014; Worrell et al. 2015). BTP can be construed as the flexibility in switching among the five dimensions of the ZTPI according to task and situational demands (Zimbardo and Boyd 1999). According to the time perspective theory (Boniwell and Zimbardo 2004; Zimbardo and Boyd 1999), BTP is an adaptive temporal frame that promotes optimal functioning. BTP was positively associated with various indexes of subjective well-being, physical health, happiness, self-esteem, and positive affect, but negatively associated with romantic anxiety, negative affect, and neuroticism (Akirmak 2014; Drake et al. 2008; Güell et al. 2015; Oyanadel and Buela-Casal 2014; Webster 2011; Zhang et al. 2013). Furthermore, BTP was related to higher fluid intelligence and better executive control (Zajenkowski et al. 2016b; Zajenkowski et al. 2016a), and lower levels of posttraumatic stress disorder (Stolarski and Cyniak-Cieciura 2016). There is also recent evidence linking BTP to gray matter volume and specific brain regions (Guo et al. 2017).

There have been various methods to operationalize BTP in the time perspective literature (Zhang et al. 2013). The most common methods include the cut-off scores approach (Boniwell 2005; Drake et al. 2008), cluster analysis (Boniwell et al. 2010), and deviation from balanced time (DBTP, Stolarski et al. 2011; also see Wiberg et al. 2012 for a similar operationalization). The first two approaches are criticized mainly because the identification of individuals with BTP is highly dependent on the sample characteristics, and thus, affected by sampling variability (Stolarski et al. 2015; Wiberg et al. 2012). DBTP approach involves calculation of a derived difference score based on the obtained ZTPI subscale scores and theorized optimum ZTPI scores, and is indicative of how much an individual deviates from the balanced time perspective (Stolarski et al. 2011). DBTP has shown to have higher predictive validity compared to the other operationalizations of BTP (Zhang et al. 2013) and the current study utilized this individual-based approach.

The Current Study

The present research evaluated the validity and reliability of ZTPI scores in a Turkish sample, contributing to our understanding of the variability in subjective time orientations across cultures. Study 1 evaluated the factor structure of the ZTPI scores. Study 2 evaluated the convergent validity, internal reliability, and test-retest reliability of the ZTPI scores.

Study 1

The purpose of Study 1 was to examine the factor structure of the Turkish ZTPI with a confirmatory factor analysis (CFA).

A CFA was conducted rather than an exploratory factor analysis (EFA) primarily because there is strong empirical and theoretical foundation on the ZTPI's factor structure (Brown 2006; Thompson 2004). The empirical support for the five-factor structure of the Turkish ZTPI mainly derives from previous findings that utilized Kislali-Erginbilgic's version of the scale (Akirmak 2014; Sircova et al. 2014). However, these studies did not specifically evaluate the factor structure of the ZTPI scores. Study 1 evaluated the support for the five-factor model in comparison to one and three-factor models, and examined the factor structure in detail for sources of ill-fit.

Method

Participants and Procedure[2]

Participants consisted of 554 undergraduates (80.1% females and 19.1% males) recruited through convenience and snowball sampling by means of an anonymous survey link distributed in university e-mail groups and announced in undergraduate classes. Participant age ranged from 18 to 51 ($M = 21.56$, $SD = 3.94$ for women and $M = 21.67$, $SD = 2.61$ for men). The majority of the participants were university students ($n = 544$) from Istanbul Bilgi University (98.2%) and various other universities in Turkey. They completed only a single scale, the Turkish ZTPI, in order to increase the response rate, and obtain responses from a sufficiently large sample to match the number of parameters estimated in the CFA. Responses were collected online through an anonymous survey link. Informed consent was obtained from all participants included in the study. Participants from Istanbul Bilgi University received course credit for completion of the survey, however other participants did not receive any compensation. All research was conducted according to the ethical rules monitored by the Human Subjects Ethics Committee of the Istanbul Bilgi University.

Measures

Time Perspective Time perspective was assessed by a Turkish version of the Zimbardo Time Perspective Inventory. A standard translation and back-translation procedure was employed in the adaptation of the original ZTPI to Turkish. For this purpose, the original scale was first translated into Turkish independently by three graduate students, who were fluent in English and had experience in English-Turkish translations. A final version of the scale was agreed upon after comparison and elimination of the discrepancies among the translations.

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[2] All data generated or analyzed during this study are included in this published article and can also be accessed from here: https://osf.io/sbeuz/?view_only=411dd63c9ef144cc8aa1483b4a587d58

An interpreter translated this version of the scale back to the source language. The translation was compared to the source version and the author evaluated its accuracy.[3] Like the original scale, the Turkish translation of the ZTPI includes 56 items scored on a 5-point Likert scale (1 = *very untrue*, 5 = *very true*). The original ZTPI consists of five dimensions: Past Positive (PP), Past Negative (PN), Present Hedonistic (PH), Present Fatalistic (PF), and Future (F). Cronbach alpha estimates in this study were as follows, .84, .74, .75, .78, .68 for PN, PP, F, PH, and PF, respectively.

Balanced time perspective (BTP) was operationalized as the deviation from the optimal ZTPI dimension scores, i.e., deviation from balanced time perspective (DBTP; Stolarski et al. 2011). In the present calculations, optimal scores suggested by Stolarski et al. (2011) were used. DBTP scores were calculated for each participant in the following way: optimal scores were subtracted from participants' observed scores for a given ZTPI dimension; the obtained values were squared and then summed across all dimensions; and finally the square root of the final sum was taken. As DBTP score approaches to zero, it is indicative of more balanced time perspective, i.e., less deviation from the balanced time perspective.

Statistical Analyses

Participants were dropped from the analyses if they failed to answer at least four of the ZTPI items. Overall there were very few missing data with 59 missing observations amounting to less than .002 of the total responses. A linear interpolation algorithm was employed to replace missing data using the 'imputeTS' (Moritz and Bartz-Beielstein 2017) package in R (R Core Team 2017).

A confirmatory factor analysis (CFA) was conducted to examine the Turkish ZTPI's factor structure. For this purpose, multiple structural models were compared. First, a single factor model was specified with all 56 items loaded onto this latent variable. Next, a three-factor model (Past, Present, and Future) was examined with the following specifications. The items loading onto the PP and PN dimensions in the original ZTPI were pooled together and specified to load onto the Past latent variable. Similarly, the items loading onto the PH and PF dimensions in the original ZTPI were pooled together and specified to load onto the Present latent variable. The Future latent variable was specified with the same indicators as in the original ZTPI. Finally, a five-factor model was specified based on the original factor structure of the ZTPI (Zimbardo and Boyd 1999). One indicator variable was chosen as a marker variable in each of these models. Additionally, all indicators were loading only onto a single latent variable and the correlations among the latent variables were estimated.

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[3] The Turkish ZTPI is available upon request from the author.

A robust maximum likelihood estimation, specifically maximum-likelihood estimation with robust standard errors and a Satorra-Bentler scaled test statistic (MLM estimation in 'lavaan'; Rosseel 2012) was used, because the ZTPI is rated on an ordinal scale, and the univariate and multivariate normality assumptions were not met (see the previous studies that also utilized robust maximum likelihood estimation: Anagnostopoulos and Griva 2012; Carelli et al. 2011; Milfont et al. 2008; Worrell and Mello 2007). Multiple goodness of fit statistics were evaluated and compared across the models (Brown 2006; Kline 2005). The following fit indices were used in the model comparisons: Chi-square, the model chi-square to model *df* ratio (χ^2/df), comparative fit index (CFI), the Tucker-Lewis index (TLI), the standardized root mean square residual (SRMR), and root-mean square error of approximation (RMSEA) and its 90% confidence interval (90% CI).

Results and Discussion

The means, standard deviations, other descriptive information of the Turkish ZTPI are presented in Table 1. The results of the CFA analyses are presented in Table 2. As can be seen from Table 2, the one-factor and three-factor models exhibited poor fit with the data. Each of the overall goodness of fit indices suggested that the five-factor model fits the data better though it does not satisfy the frequently used criteria (Hu and Bentler 1999) for good model fit: CFI (≥ .95), TLI (≥ .95), SRMR (≤ .08), RMSEA (≤ .06, and 90% CI ≤ .06). The relative chi square (χ^2/df) and RMSEA indicated acceptable model fit, but the SRMR, CFI and TLI indices were not in the range of recommended values for acceptable model fit. When the item-factor loadings were examined, it was assessed that item 56 ("*there will always be time to catch up on my work*") had a non-significant factor loading. Conducting the CFA again with the removal of item 56 did not result in a significant improvement in the model fit, and thus it was decided to keep this item in the scale for the rest of the statistical analyses.

Table 1 Descriptive statistics for the ZTPI

ZTPI scores	Mean	SD	Mdn.	Min.	Max.	Kurtosis	Skewness
PN	3.17	.73	3.20	1.00	5.00	−.28	−.18
PP	3.50	.63	3.56	1.22	5.00	.35	−.53
PF	2.61	.59	2.56	1.11	4.67	.00	.33
PH	3.41	.50	3.40	1.80	5.00	.22	.03
F	3.59	.51	3.62	2.08	4.85	−.25	−.10
DBTP	2.37	.72	2.37	.87	4.59	−.13	.25

N 554, *ZTPI* Zimbardo Time Perspective Inventory; *DBTP* deviation from balanced time perspective; *PN* past negative; *PP* past positive, *PF* present fatalistic; *PH* present hedonistic; *F* future; *Mdn* median; *Min* minimum; *Max* maximum

Table 2 Fit indices for alternative models of CFA for the ZTPI

Model	$\chi^{2(S-B)}$	df	χ^2/df	CFI	TLI	RMSEA	90% CI	SRMR
One factor	6508.77	1484	4.39	0.310	0.284	0.082	0.080–0.084	0.112
Three factors	4772.71	1481	3.22	0.545	0.526	0.067	0.065–0.069	0.097
Five factors	3974.69	1474	2.69	0.654	0.639	0.059	0.056–0.061	0.086
Five factors – item parcels	203.98	80	2.55	0.953	0.939	0.056	0.046–0.065	0.049

N 554; *CFA* Confirmatory Factor Analysis; *S-B* Satorra – Bentler test statistic; *ZTPI* Zimbardo Time Perspective Inventory; *CFI* comparative fit index; *TLI* Tucker-Lewis index; *RMSEA* root mean square error of approximation; *CI* confidence interval; *SRMR* standardized root mean residual. The reported statistics are the robust estimates

Although there are no agreed upon criteria for the sample size of a CFA analysis, a common rule of thumb is to use between 5 and 10 participants per each estimated parameter or a minimum of 300 cases although different criteria would apply depending on the model complexity (Field 2005; Tabachnick and Fidell 2007). The CFA models that were tested in the present study had 4.86, 4.73, 4.46 participants per estimated parameter for one, three, and five-factor models, respectively, and the total sample size for these analyses was higher than the suggested minimum of 300. However, because the reliability of the parameter estimates improves with more participants per parameter estimates, it was found useful to report a separate CFA model that employs item parcels so that potential effects of sample size on the reliability of parameter estimates is eliminated. A CFA with item parcels is advantageous because item parcels are more likely to be normally distributed even though individual items may not be normally distributed, and this method allows for better examination of relations among latent variables (Little et al. 2002) and the structural aspect of the factor solution (Marsh et al. 1998). A five-factor model with three indicators for each latent variable was specified. The indicators of each latent variable were item parcels that were created by combining the corresponding ZTPI items. Accordingly, 9 items of the PP, 10 items of the PN, 13 items of the F, 15 items of the PH, and 9 items of the PF were randomly combined, and assigned to three parcels for each of the latent variables. The ratio of participants to estimated parameters was 13.6 in this model. As shown in Table 2, the fit indices were in the range of acceptable to good model fit.

Study 1 shows that five-factor structure applies to the Turkish ZTPI. One of the ZTPI items (#56) had nonsignificant factor loading, but removing this item did not yield a significantly better model fit, and thus, it was decided to keep this item in the Turkish ZTPI to be consistent with cross-cultural studies utilizing ZTPI. The goodness-of-fit indices of the five-factor model ranged between poor to acceptable. As shown in Table 3, the fit indices pertaining to the Turkish ZTPI are consistent with the fit indices reported in other adaptation studies, albeit all findings showing poor to acceptable goodness-of-fit statistics for the five factor model

of the ZTPI. Finally, conducting a CFA with item-parcels resulted in significant improvement in the goodness-of-fit statistics that ranged between acceptable to good, and supported the structural validity of the Turkish ZTPI.

Study 2

The purpose of Study 2 was to evaluate the convergent validity of the Turkish ZTPI as well as the internal consistency and test-retest reliability of the ZTPI scores on a separate sample. The convergent validity of the scale was evaluated by examining the associations of the ZTPI subscales with the aforementioned constructs, including personality traits (conscientiousness and openness), perceptions of self (self-esteem and self-efficacy), and locus of control. The pattern of correlations that has been established in previous studies was expected to be replicated in the present study.

In addition to the ZTPI factor scores, BTP was also examined in Study 2. Although BTP is not a subscale of the ZTPI, it nevertheless provides an additional test of construct validity, because it demonstrates robust associations with many of the psychological constructs that are associated with the factors of the ZTPI (Zhang et al. 2013). Predictions for BTP were as follows. BTP was expected to show positive correlations with self-esteem (Akirmak 2014) and self-efficacy (Worrell et al. 2015), based on prior findings. There was not much research on BTP's associations with openness, conscientiousness, and locus of control, and the present study's predictions involving these variables were not based on empirical findings, but on time perspective theory. Given the positive associations of BTP with self-efficacy, self-esteem, PP, and F and negative associations of BTP with neuroticism, PN, and PF (Akirmak 2014), BTP was expected to be associated with higher internal locus of control and higher conscientiousness. As perceiving control over rewards is critical for healthy functioning (Rotter 1966), such a positive association between BTP and internal locus of control is naturally expected, but has not been examined in previous research. F has shown to be positively associated with both BTP (Akirmak 2014) and conscientiousness (Kairys and Liniauskaite 2015) in previous studies. Based on

Table 3 Goodness-of-fit statistics of CFA of the ZTPI across five adaptation studies

Study	χ^2	df	χ^2/df	CFI	TLI	RMSEA	90% CI	SRMR
Carelli et al. (2011)	3783	1479	2.56	.63	–	.06	–	.09
Liniauskaite and Kairys (2009)	3417	1474	2.32	.64	.62	.05	–	–
Milfont et al. (2008)	1630	655	2.49	.70	.74	.08	–	.09
Worrell and Mello (2007)	4819	1474	3.27	.64	–	–	.055–.059	.06
Present study	3974	1474	2.69	.65	.64	.06	.056–.061	.09

CFA Confirmatory Factor Analysis; *ZTPI* Zimbardo Time Perspective Inventory; *CFI* comparative fit index; *TLI* Tucker-Lewis index; *RMSEA* root mean square error of approximation; *CI* confidence interval; *SRMR* standardized root mean residual

these associations, a positive association between BTP and conscientiousness was predicted. There were no findings on openness and BTP relationship to my knowledge, however based on existing weak associations between ZTPI factors and openness (Kairys and Liniauskaite 2015), a weak association, if any, between BTP and openness was expected.

Method

Participants and Procedure

Participants consisted of 234 young adults (79.9% females and 17.1% males) recruited through convenience sampling from the university participant pool, similar to Study 1. Participant age ranged from 19 to 59 ($M = 23.80$, $SD = 5.77$ for women and $M = 25.15$, $SD = 7.57$ for men). Data from seven participants were excluded from the analyses due to inconsistent and/or incomplete responding, reducing the sample size to 227. The majority of the participants were university students ($n = 181$) from Istanbul Bilgi University (82%) and various other universities in Turkey. All participants filled out the survey materials including the Turkish ZTPI, and measures of locus of control, self-efficacy, self-esteem, and personality that are described in the next section. The order of the measures was randomized for each participant. Responses were collected online through an anonymous survey link. Similar to Study 1, all participants were informed about the nature of the study, and participants from Istanbul Bilgi University received course credit for completion of the survey, however other participants did not receive any compensation. Test-retest reliability was evaluated on a sample of 88 participants who took the survey twice within two to three weeks.

Measures

Time Perspective Time perspective was assessed by the Turkish version of the ZTPI (see Study 1).

Locus of Control Rotter's (1966) Internal-External Locus of Control Scale was used to measure the individual differences in perceived control over life events. The scale measures whether participants attribute the source of reinforcements to external (e.g., chance, fate, etc.) or internal (e.g., own behavior) factors. It consists of 29 items, and participants were asked to choose one of two statements, which they agree most. Higher scale scores indicate an external locus of control while lower scale scores indicate an internal locus of control. Cronbach's alpha for the Turkish version of the scale was .70 (Dağ 1991).

Self-Efficacy The General-Self Efficacy Scale (Sherer and Adams 1983) was utilized to examine how participants differ in their beliefs on successfully accomplishing various actions. It has 17 items rated on a 5-point Likert scale. Cronbach's alpha for the Turkish version of the scale was .80 (Yildirim and İlhan 2010). As per recommendations of Yildirim and İlhan (2010), a single scale score was calculated and employed in the statistical analyses. Higher scale scores indicate higher levels of perceived self-efficacy.

Self-Esteem Rosenberg Self-Esteem Scale (Rosenberg 1965; Turkish adaptation by Cuhadaroglu 1986) was used to measure individual differences in self-esteem. The scale contains 10 items on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) with higher scores indicating higher self-esteem. Cronbach's alpha for the Turkish version of the scale was .71 (Cuhadaroglu 1986).

Personality NEO Five-Factor Inventory (NEO-FFI; Costa Jr. and McCrae 1989; Turkish adaptation by Sunar 1996) is a 60-item scale based on the Big Five personality traits. It has five sub-scales: extraversion, agreeableness, neuroticism, openness and conscientiousness. For the purposes of the present study, openness to experience and conscientiousness subscales were used. Each subscale includes 12 items on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores indicate higher tendency to show the given trait. Cronbach's alphas for the Turkish version of the subscales, openness, and conscientiousness were .65 and .80 respectively (Cemalcilar et al. 2003).

Statistical Analyses

Participant data were removed from the analyses if they failed to answer at least four of the items in any of the measured constructs. Data was also screened for multivariate outliers by examining the Mahalanobis distances of each participant. An outlier was identified with examining the χ^2 distributions of the Mahalanobis distances with a critical alpha value .001 corresponding to the *df* of 10 (Tabachnick and Fidell 1996). Two observations were above the critical value of $\chi^2 = 29.59$, and were removed from the statistical analysis. The analyses were performed on the remaining 225 participants. Overall, there were very few missing data with 76 missing observations amounting to less than .001 of the total responses. The missing data was imputed by the median values of the items using the 'psych' (Revelle 2018) package in R.

Convergent validity of the ZTPI was assessed by the correlations of the ZTPI subscales and DBTP scores with the other constructs. Reliability of the ZTPI was evaluated by examining internal consistency of the ZTPI subscale scores and consistency of them over two separate measurements, i.e., test-retest reliability. Internal consistency was examined by calculating Cronbach's alpha estimates and average inter-item correlations, and test-retest reliability was examined by calculating the intra-class correlation coefficients (ICC) of the subscale scores (Shrout and Fleiss 1979). ICC estimates and their 95% confidence intervals were calculated using SPSS 24 based on a single measures, consistency, one-way mixed-effects model.

Results and Discussion

The intercorrelations among the ZTPI subscales are presented in Table 4. PN scores were negatively correlated with PP scores and positively correlated with PF scores. PP scores were positively correlated with F and PH scores. F scores were negatively correlated with PH and PF scores. Finally, PF scores were positively correlated with PH scores. Contrary to the findings from the original ZTPI (Worrell and Mello 2007; Zimbardo and Boyd 1999), there was no reliable association between PN and PH scores in the present study. Table 4 also displays intercorrelations among the ZTPI scores obtained from Study 1. Overall, the ZTPI subscale intercorrelations showed high consistency, as indicated by similarity in the direction and magnitude of correlations between Study 1 and Study 2.

Reliability

The reliability indices are presented in Table 5. Cronbach's alpha coefficients ranged between .69 and .84, with PF having the lowest and PN having the highest reliability estimate. These values were all close to or above the recommended value of 0.70 indicating adequate internal consistency. The mean inter-item correlations of the ZTPI scales ranged between .17 and .34. Although these values are below the recommended range of .20 to .40 (Briggs and Cheek 1986), some authors argue that if a broad construct is measured mean-inter-item correlation of .15 is acceptable as a measure of internal consistency (Clark and Watson 1995). The results of test-retest reliability analysis indicated high reliability for PN (.84), PP (.82), and F (.79), moderate reliability for PF (.72), and low reliability for PH (.63).

Correlations between the ZTPI Subscales and Other Constructs

Table 6 presents the Pearson's correlations between the ZTPI subscale scores and scores on measures of locus of control, personality, self-efficacy, and self-esteem. Most of the correlation coefficients were fairly large and in the expected direction. The associations of ZTPI subscale scores with self-efficacy and self-esteem scores were similar. Both measures showed moderate to high correlations with PN, PP, PF, and F, but were not reliably associated with PH. In addition, the correlation between self-efficacy scores and F scores was stronger than the correlation between self-esteem scores and F scores. PN and PF scores were positively correlated with locus of control scores indicating that greater pessimism about the past and present is associated with higher external locus of control. In contrast, F scores were negatively associated with scores on locus of control indicating that future orientation was associated with internal locus of control. Conscientiousness scores were negatively correlated with PN and PF scores and positively correlated with PP and F scores. There was a weak negative association between PP and openness scores, but no other associations between the ZTPI subscale and openness scores were reliable. PH scores were not reliably correlated with any of the constructs. There was a trend towards weak positive associations between PH and locus of control ($p = .09$), and PH and openness ($p = .08$).

Correlations between the DBTP scores and Other Constructs

First, the optimal ZTPI subscale scores that were utilized to calculate the DBTP scores were evaluated. The deviation from balanced time perspective (DBTP; Stolarski et al. 2011) scores were computed for each participant, and Pearson correlations were calculated among the DBTP scores, ZTPI subscales, and other variables in the study. To explore whether choosing optimal scores that are more specific to the present sample would alter the results, a different deviation score was calculated by taking into account the current study's sample statistics. Specifically, the following optimal scores were determined and entered into the same equation as an alternate DBTP (aDBTP)

based on the quartiles of the subscales: for PH and F, optimal scores of 3.80 and 3.92 corresponding to the 3rd quartile (moderately high); for PN and PF, optimal scores of 2.60 and 2.22 corresponding to the 1st quartile (low); and for PP optimal score of 4.45 corresponding to mid value between the maximum score and 3rd quartile (high). The correlation between DBTP and aDBTP was very strong, .93. In addition, when the correlations between aDBTP and the other constructs were compared to the correlations calculated by using the original optimal scores, it was observed that they were all in the same direction except for the small variations in the size of the correlation coefficients. To be consistent with the existing literature and other cross-cultural studies, correlations based on the original DBTP optimal scores were reported in the current study.

Higher DBTP scores are indicative of higher imbalance in time perspective. DBTP was negatively correlated with self-esteem ($r = -.55$, $p < .001$), self-efficacy ($r = -.59$, $p < .001$), and conscientiousness ($r = -.46$, $p < .001$), but positively correlated with locus of control ($r = .36$, $p < .001$), indicating that balanced time perspective is associated with internal locus of control. There was no reliable association between openness and DBTP ($r = .06$, $p = .35$).

Discussion

Study 2 provided evidence on the convergent validity and reliability of the Turkish ZTPI. Reliability results suggest acceptable internal consistency and test-retest reliability for the ZTPI scores. Even though PF had the lowest coefficient alpha estimate, the average inter-item correlation is within the recommended range of .15 to .50 (Clark and Watson 1995). Correlational results were in the predicted direction. Finally, DBTP showed reliable associations with all of the measured constructs ranging between moderate to high, except for the openness, where the association was statistically non-significant.

Table 4 Intercorrelations among the ZTPI subscales and DBTP scores for Study 1 and Study 2

	PN	PP	PF	PH	F	DBTP
PN	–	−.29**	.41**	.07	−.01	.76**
PP	−.33**	–	.02	.18**	.09*	−.60**
PF	.37**	−.08	–	.27**	−.26**	.60**
PH	.09	.12	.28**	–	−.31**	−.04
F	−.12	.25*	−.27**	−.27**	–	−.21**
DBTP	.78**	−.66**	.58**	.03	−.37**	–

ZTPI Zimbardo Time Perspective Inventory; *DBTP* deviation from balanced time perspective; *PN* past negative; *PP* past positive, *PF* present fatalistic; *PH* present hedonistic; *F* future. Correlations are shown below the diagonal for Study 2 ($n = 225$) and above the diagonal for Study 1 ($n = 554$)

* indicates $p < .05$; ** indicates $p < .01$

Table 5 Internal consistency estimates and test-retest reliability of the ZTPI subscales

ZTPI subscales	α	ICC	95% CI	
			Lower	Higher
Past Negative	.84 (.34)	.84	.76	.89
Past Positive	.75 (.25)	.82	.73	.87
Future	.76 (.20)	.79	.70	.86
Present Hedonistic	.75 (.17)	.63	.48	.74
Present Fatalistic	.69 (.20)	.72	.61	.81

α Cronbach's alpha estimates and average inter-item correlations in parenthesis for n ranging between 222 and 226; *ICC* intra-class correlation coefficient; *CI* confidence interval. One-way random effects model was utilized for ICC on a sample of $n = 88$

General Discussion

A detailed examination of the factor structure, convergent validity, and reliability of the ZTPI scores in a Turkish sample has been lacking. Current findings provided support for the previous findings on the structural and convergent validity of the ZTPI scores. In addition, ZTPI subscales demonstrated good internal consistency and test-retest reliability.

Most adaptations of the ZTPI have been conducted on the Western and East Asian countries, which are more clock time sensitive (Brislin and Kim 2003). For this reason, it is informative to obtain data in a Turkish sample, as Turkey is markedly different than the Western and East Asian countries on the perception of time. Turkey is a Mediterranean country, and event rather than clock time is more important for Mediterranean countries (Brislin and Kim 2003). In everyday affairs, the priority is on people, and events are let to run their course until they are completed, regardless of other events that are planned for that day. Such a difference in the relative importance of clock and event times is likely to impact subjective time orientations. The possibility of limited applicability of the ZTPI in non-Western cultures were suggested based on the results of a cross-cultural study involving 24 countries (Sircova et al. 2015). Present research contributes to the cross-cultural aspects of the psychometric properties of the ZTPI. Findings indicated adequate reliability but limited validity of the ZTPI as a tool for the assessment of time orientations.

CFA Results

Although the ZTPI has been translated into various languages, the original five-factor structure does not uniformly apply to all of them (see Carelli et al. 2011; Worrell and Mello 2007). Using a CFA approach, five-factor structure of the Turkish ZTPI was evaluated. The goodness-of-fit indices of the five-factor model ranged between poor to acceptable, but are comparable to the fit values reported in other adaptation studies

Table 6 Correlations of the ZTPI with other variables

	Past negative	Past positive	Present fatalistic	Present hedonistic	Future
Locus of control	.29***	−.10	.50***	.11+	−.18**
Openness	.10	−.16*	−.09	.12+	.05
Conscientiousness	−.29***	.39***	−.29***	−.09	.66***
Self-efficacy	−.40***	.43***	−.42***	.03	.47***
Self-esteem	−.46***	.36***	−.36***	.07	.24***

n 225; *ZTPI* Zimbardo Time Perspective Inventory

+ indicates $p < .10$; * indicates $p < .05$; ** indicates $p < .01$; *** indicates $p < .001$

(Carelli et al. 2011; Liniauskaite and Kairys 2009; Milfont et al. 2008; Worrell and Mello 2007). Additionally, a five-factor model with item parcels was assessed, and the results showed acceptable to good model fit. Using item parcels enabled more reliable parameter estimates due to an increase in the number of participants to estimated parameters ratio. Zimbardo and Boyd (1999) reported only a single CFA fit index, relative chi-square value ($\chi^2/df = 2.30$, $n = 361$), as evidence for the structural validity of the five-factor model of the ZTPI. Present findings yielded comparable relative chi-square values to the original ZTPI when either item-indicators or item-parcels were employed. The results of the item and item-parcels CFA analyses imply that the ZTPI constructs have a similar meaning in the Turkish context, supporting the overall factorial structure. However, caution is advised, as the CFA with item indicators yielded goodness-of-fit statistics that ranged between poor to acceptable suggesting possible issues involving item bias or item-loadings. Such issues are likely to derive from different cultural perception of the ZTPI items by Turkish people compared to Western cultures. Alternatively, poor model fit can be due to items not sufficiently tapping into the construct of interest or tapping into multiple domains (Brown 2006; Thompson 2004), implying potential problems in the ZTPI's item composition.

The present study underscores that even though five-factor structure applies to the Turkish ZTPI, it suffers from similar weaknesses that the original scale and its adaptations suffer. Additional research on the item composition and psychometric properties of the ZTPI is recommended in order to clarify these issues. For example, although F is modeled as a unidimensional construct (Zimbardo and Boyd 1999), some researchers have explored the possibility of the multiple dimensions of future, specifically, positive and negative future (Carelli et al. 2011). Lower fit indices of the original five-factor model of the ZTPI may derive from assuming future as a unidimensional construct, where, in fact, it may be a multidimensional construct.

Overall, findings in the time perspective literature are in agreement that even though the five-factor model of the ZTPI has best fit to the data, the fit indices are in the range of poor to good (see Table 3 for examples). A likely reason for poor model fit is the lack of precise definition of time

perspective construct that translates into its precise measurement. Thus, a robust conceptual specification of time perspective, leading to a more refined scale, is needed. When the ZTPI items are examined, it can be noticed that each ZTPI subscale appears to differentially tap into various psychological constructs. PP and PN are defined by general affective attitudes towards the past (Zimbardo and Boyd 1999), but such strong affective components are not reflected in the remaining ZTPI items. Items of the F dimension appear to tap less into affect but more into conscientiousness (e.g., "*Meeting tomorrow's deadline and doing other necessary work comes before tonight's play*"), goal setting (e.g., "*When I want to achieve something, I set goals and consider specific means for reaching those goals*"), and delay of gratification (e.g., "*I am able to resist temptations when I know that there is work to be done*"). PF has items that tap into hopelessness (e.g., "*Since whatever will be will be, it doesn't really matter what I do*"), locus of control (e.g., "*My life path is controlled by forces I cannot influence*"), and future (e.g., "*You can't really plan for the future because things change so much*") whereas PH has items that tap into impulsivity (e.g., "*I do things impulsively*"), hedonism (e.g., "*I believe that getting together with one's friends to party is one of life's important pleasures*"), and risk-taking (e.g., "*I take risks to put excitement in my life*") (Zimbardo and Boyd 1999). Such diversity in the nature of items across the subscales lead to a scale that lacks strong structural validity, as it confounds time perspective with other psychological phenomena. To remedy this issue, the items that are not tapping strongly into perceptions of time, but tapping strongly into other psychological constructs can be identified and removed from the scale, and replaced by items that are more focused on perceptions of time. For this reason, modifying the ZTPI scale just based on item-factor loadings should not improve the model fit. Evidence supports this position. Some researchers aimed to reduce the length of the ZTPI by removing the items with low construct loadings and cross-loadings, and rewording some of the items (ZTPI-25; Laghi et al. 2013), however, this attempt was demonstrated to be not successful in improving the factorial validity of the scale over and above the original version (Perry et al. 2015). Moreover, a large cross-cultural study, which included samples from 24 countries, examined the factor structure of

the ZTPI and identified 36 core items that showed similar factor structure between the samples (Sircova et al. 2014), but the obtained fit indices fell short of reaching a good model fit (Worrell et al. 2015). One likely reason for the poor model fit is that the aforementioned confound was not taken into account as a guide for item selection. These samples differed not only in time perspective, but also in the other psychological constructs ZTPI taps into, e.g., personality (McCrae et al. 2005), enlarging the discrepancies in the ZTPI's factor structure even more across samples. Future research on the psychometric properties of the ZTPI is needed to disentangle attitudes pertaining to time orientations and attitudes pertaining to other psychological constructs in an attempt to minimize the imbalanced inclusion of psychological constructs across the subscales.

Alternatively, time perspective can be conceptualized as being caused by these very traits. Accordingly, time perspective can be modeled as a higher order construct that is an aggregate of various lower level constructs. In other words, as an aggregate construct, time perspective does not cause the specified traits, but is comprised of them (for more information on causal indicators, see MacCallum and Browne 1993) with the assumption that each temporal dimension (e.g., past, present, and future) is differentially caused by the relevant psychological traits. The suggestion is to measure these traits at the construct level and examine their combined relations with regard to time perspective rather than measuring them at the item level and aggregating them within a single scale. A similar proposal was made for core self-evaluations (CSE) as being determined by lower level indicators such as self-esteem, generalized self-efficacy, locus of control, avoidance motivation, and approach motivation (Johnson et al. 2008). This approach explicitly models the proposed traits underlying time orientations as suggested by the time perspective theory and potentially has the benefit of improving structural validity, because it results in fewer biased estimates due to construct misspecification, i.e., specifying causal indicators as effects indicators (Law and Wong 1999). Future research can evaluate the causal indicators model of time perspective by first determining the psychological constructs that are relevant to time orientations, then building the appropriate structural model that is in accordance with the time perspective theory, and finally assessing the model fit.

Reliability Results

The Turkish ZTPI displayed acceptable internal consistency and test-retest reliability with minor exceptions. The coefficient alpha estimates for the ZTPI factors were all above the recommended value of .70 except for the PF, which had lower internal consistency estimates (.68 and .69 respectively for Study 1 and Study 2) compared to the other factors, but within an acceptable margin. PF also had the lowest internal

consistency estimate in some other studies (.65 in Carelli et al. 2011; .46 in Milfont et al. 2008; .68 in Seema and Sircova 2013). Although a coefficient alpha level of .70 is regarded as an indicator of adequate reliability, lower levels of coefficient alpha are acceptable and not problematic if "a measure has other desirable qualities such as meaningful content coverage, and reasonable unidimensionality" (Schmitt 1996; p. 352). The ZTPI factors are made up of items tapping into various aspects of time orientations indicating their broad and multifaceted nature (Zimbardo and Boyd 1999). For example, "*my life path is controlled by forces I cannot influence*" is about locus of control; "*life today is too complicated; I would prefer the simpler life of the past*" is about a longing for the past; and "*spending what I earn of pleasures today is better than saving for tomorrow's security*" is about focusing on short-term/immediate benefits; but, yet, they are all part of the same dimension, PF. This diversity in the item composition of the ZTPI factors is likely to be one of the main reasons for slightly lower coefficient alpha estimates, because responses to this heterogeneous set of items are less likely to be highly correlated (Schmitt 1996). Because coefficient alpha is influenced by the mean intercorrelation among the items as well as the test length (Clark and Watson 1995), it is regarded as an imperfect index of internal consistency. Furthermore, coefficient alpha is reduced when a small number of heterogeneous items or distinct item clusters are present in the data (Osburn 2000). A rather more straightforward index of internal consistency is the average interitem correlation and correlations in the range of .15–.50 are recommended depending on the nature (i.e., generality or specificity) of the measured construct (Briggs and Cheek 1986; Clark and Watson 1995). The average inter-item correlation of the ZTPI scores were in the recommended ranges in the current study, indicating satisfactory internal consistency of the ZTPI scores.

The test-retest reliability estimates ranged between poor to good. Based on the ICC confidence intervals (Koo and Li 2016), PN, PP, PF, and F had moderate to good reliability, and PH had poor to moderate reliability. PH had the lowest test-retest consistency in the current study. The instability of PH scores relative to the other ZTPI subscale scores can be attributed partly to psychometric properties of the items and cross-cultural variability, and also partly due to state of political unrest and economic problems that had been prevailing in Turkey over the past years (Goodman 2018), which may have greatly fluctuated hedonistic tendencies. Overall, these reliability estimates are adequate and within the acceptable ranges.

ZTPI Intercorrelations

ZTPI intercorrelations were in the expected directions and further supported the five-factor structure in the Turkish sample. Importantly, intercorrelations displayed high consistency

between Study 1 and Study 2, implying that these associations remained stable over time and across different participants. The only difference was the weaker association between PP and F scores in Study 1 compared to Study 2. Also, in contrast to Zimbardo and Boyd's (1999) findings, a significant association between PP and F, and a non-significant association between PN and PH were obtained. Previous findings from non-US samples yielded positive correlations between PP and F (Carelli et al. 2011), and non-significant correlations between PN and PH (Boniwell et al. 2010) indicating the presence of cross-cultural variability in ZTPI subscale intercorrelations.

Correlational Results

Correlations of the ZTPI subscales with the other constructs were in the expected directions and consistent with the previous findings, supporting the convergent validity of the Turkish ZTPI. Most of the correlation coefficients were higher than .25 except for the associations involving PH, which failed to show reliable associations with the other variables. PN and PF scores were associated with higher external locus of control, but lower conscientiousness, self-efficacy, and self-esteem. PP scores were associated with higher conscientiousness, self-efficacy, and self-esteem. In contrast to the findings reported for the ZTPI (Worrell et al. 2015; Zimbardo and Boyd 1999), PP showed reliable associations with the psychosocial variables suggesting the importance of PP at least for the cultures that display both collectivistic and individualistic tendencies (Göregenli 1995). F scores were associated with higher internal locus of control, conscientiousness, self-efficacy, and self-esteem. A notable association that was replicated in the present study is the strong positive correlation between F and conscientiousness (Kairys 2010; Zhang and Howell 2011; Zimbardo and Boyd 1999). In previous studies, openness showed weak to non-significant associations with the ZTPI subscales (Dunkel and Weber 2010; Kairys and Liniauskaite 2015), and was not reliably associated with any of the ZTPI subscales in the present study. Finally, the associations between the ZTPI subscales and locus of control are similar to Shipp et al.'s (2009) findings, but are in contrast to Haghighatgoo et al. (2011)'s findings, where a positive association between inner behavior control and PF was reported. The discrepancy is likely due to the different assessment methods employed, as Haghighatgoo et al. (2011) categorized the behavior attribution style into four different categories. As a result, inner direction controlling is likely to be conceptually different than internal locus of control.

A comparison between recommended and sample-specific optimal DBTP scores showed that they are highly correlated with each other and had similar pattern of correlations with other variables, supporting the cross-cultural validity of the DBTP optimal scores (Stolarski et al. 2011). Although it was not essential to the validity of the Turkish ZTPI, correlations of the DBTP scores with other constructs were also examined and provided further evidence to the scale's convergent validity. Balanced time perspective was associated with higher self-esteem and generalized self-efficacy, replicating prior findings. As for the unique findings, BTP was related to higher conscientiousness and internal locus of control. Results on the positive association between BTP and conscientiousness are not surprising given the other constructs these variables are commonly associated with, though the present study provided the first empirical evidence. Findings on locus of control suggest that imbalanced time perspective is related to perceiving events and outcomes as dependent on external sources such as luck, fate, and others. Given the substantial findings on the relationship between BTP and subjective well-being, locus of control is possibly one of the mediatory mechanisms linking BTP to subjective well-being measures.

Limitations and Future Directions

A limitation of the present study was its sample composition. Specifically, gender distribution was not balanced. Although previous studies haven't found significant gender differences in the ZTPI's factor structure (Sircova et al. 2015), future studies should focus on this potential issue. As a major limitation, various indices of subjective well-being have shown to be related to BTP, however a direct assessment of well-being was not conducted in the present study. Nevertheless, the relationship between BTP and subjective well-being can be inferred from the BTP's association with self-esteem, as self-esteem is an important predictor of subjective well-being (Diener and Diener 1995; Lucas et al. 1996). In addition, ZTPI's association with only two of the Big Five personality traits, conscientiousness and openness, were examined. Future studies need to investigate correlations with agreeableness, extraversion, and neuroticism. Finally, there is evidence supporting the six-factor solution of the ZTPI with the addition of Future Negative (FN) items (Carelli et al. 2011), but such a conceptualization was not evaluated in the current study. Future studies should examine the impact of adding FN items on the factor structure of the Turkish ZTPI.

Time perspective has practical applications such as time perspective therapy (Sword et al. 2014; Zimbardo and Boyd 2008), time perspective coaching (Boniwell et al. 2014), and time management in organizations (Boniwell 2005; Boniwell and Osin 2014). The present study concentrated on the adaptation of the ZTPI to Turkish in an academic setting, however did not focus on these practical benefits in non-academic settings. Exploring the role of time perspective in clinical and organizational settings would be interesting from both theoretical and practical reasons, as it would add to the overall validity of the scale, enable cross-cultural comparisons of

these practices, and also help evaluate the utility of time perspective in these settings as an alternate approach.

Compliance with Ethical Standards

Conflict of Interest The author declares that he has no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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