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Short Communication

Less is not always more: The case of the 36-item short form of the Zimbardo Time Perspective Inventory

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ABSTRACT

Recently, a shortened version of the Zimbardo Time Perspective Inventory (ZPTI; Zimbardo & Boyd, 1999) was proposed as a "gold standard" (Sircova et al., 2014, p. 9). In this study, we examined the internal consistency and structural validity of this version of the ZPTI in samples of adolescents from the United Kingdom ($N = 913$) and the United States ($N = 815$), and adults from Australia ($N = 667$). Results provided support for the internal consistency of ZPTI scores, but structural validity analyses indicated poor fit and numerous problematic items. The findings call into question the use of scores on this shortened version of the ZTPI.

1. Introduction

Time perspective describes the influence that considerations of past, present and future have on a range of human behaviors; however, the conceptualization, study, and measurement of the construct have been problematic. One of the most commonly used assessment tools, the Zimbardo Time Perspective Inventory (ZTPI; Zimbardo & Boyd, 1999), has been widely adopted and translated into several languages (e.g., Sircova et al., 2014), but concerns remain about the psychometric properties of ZTPI scores (e.g., Shipp, Edwards, & Schurer-Lambert, 2009; Worrell & Mello, 2007). In view of these concerns a number of modified versions of the scale have been developed including a revised 36-item version (ZTPI-36; Sircova et al., 2014).

To date, structural tests of the ZTPI five-factor model have largely relied on confirmatory factor analyses (CFAs). One drawback to this approach is that non-significant cross-loadings can weaken model fit (Perry, Clough, Crust, Earle, & Nicholls, 2013). In a typical independent cluster model (CFA–ICM), each cross-loading, including non-significant or negligible ones, represents a misspecification. In longer scales, the accumulation of many non-significant cross-loadings leads to many small misspecifications and can therefore artificially reduce model fit. Exploratory structural equation modeling (ESEM; for more details see Asparouhov & Muthén, 2009) is a strategy predicated on the integration of confirmatory and exploratory factor analysis (Weisner & Schandling, 2013). ESEM differs from standard CFA in that all factor loadings are estimated while observing various constraints necessary for model identification, and factor loading matrices can be rotated. Marsh et al. (2009) argued that ESEM is a viable alternative to standard CFA for psychological scales composed of indicators with many nonzero cross-loadings.

The present study examined the psychometric properties of the ZTPI-36 in three diverse samples from different countries. The use of multiple and diverse samples is especially important given that the scale developers have claimed that the five-factor structure is "the gold-standard for further research on time perspective" (Sircova et al., 2014, p.9) in 24 countries. In order for the scale to be considered 'gold standard' it is important that the structure and reliability can be replicated in samples diverse in age and culture in on-going time perspective research.

2. Methods

2.1. Participants

Data from three independent samples were analysed. Participants in the United Kingdom sample were 913 pupils (aged

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12–16; 49.8% male) from 10 High schools in Northern Ireland. A total of 943 questionnaires were completed with 913 included in analyses. Thirty were excluded as a result of having been partially completed or spoiled.

Participants in the United States study were 816 academically talented adolescents (aged 11–18; 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. Participants were predominantly in the 7th to 11th grades.

Participants in the Australian sample were a general population sample of 667 (aged 17–70, $M = 29.45$; 67.8% female) recruited online through social media (e.g., Facebook, forums), via email snowballing, and through posts placed on university learning management systems (e.g., Moodle, Blackboard).

2.2. Measures

The ZTPI-36 is comprised of 36 items assigned to five factors: Past Negative (PN; 7 items, e.g., "*I often think of what I should have done differently in my life*"); Past Positive (PP; 6 items, e.g., "*On balance, there is much more good to recall than bad in my past*"); Present Hedonistic (PH; 10 items, e.g., "*I try to live my life as fully as possible, one day at a time*"); Present Fatalistic (PF; 6 items, e.g., "*My life is controlled by forces I cannot influence*"); and Future (F; 7 items), e.g., "*When I want to achieve something, I set goals and consider specific means for reaching those goals*"). Participants respond to questions using a 5-point Likert scale (1 = *very uncharacteristic of me*; 5 = *very characteristic of me*). Scale developers reported acceptable reliabilities across 26 samples from 24 countries, although there were some sub-optimal reliability estimates for PF scores. Moreover, the scale developers reported the following model fit information for the scale: $\chi^2(N = 10765,\ 584) = 20692.27$, $p < .001$; RMSEA = .057; SRMR = .062; CFI = .86.

2.3. Statistical Analyses

Model fit was assessed using CFA and ESEM in Mplus7 (Muthén & Muthén, 2012) and the MLM estimator. The MLM maximum likelihood parameter estimates with standard errors and a mean-adjusted chi-square (χ^2) test statistic that is robust to non-normality. The MLM χ^2 test statistic is also referred to as the Satorra–Bentler χ^2. A five-factor model for the ZTPI was assessed. An oblique geomin rotation, as recommended by Marsh et al. (2009) to enable latent factor correlations, with an epsilon value of 0.5 and ML estimation was used in all ESEM analyses as recommended when there are more than four response categories (e.g., Beauducel & Herzberg, 2006) and data may not be normally distributed (Bentler & Wu, 2002). The indices used to test model fit were χ^2, comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). Although Hu and Bentler's (1999) cut-offs (i.e., >.95 for CFI and TLI, <.06 for RMSEA, and <.08 for SRMR) are typically cited, Marsh, Hau, and Wen (2004) suggested that strict adherence to these cut-off values is likely to lead to erroneous results, as factor loadings in social sciences are typically lower (see, e.g., Heene, Hilbert, Draxler, Ziegler, & Bühner, 2011). We also interpreted standardized factor loadings for CFA using Comrey and Lee's (1992) recommendations (i.e., >.71 = excellent, >.63 = very good, >.55 = good, >.45 = fair and >.32 = poor).

3. Results

Results from the structural analyses of the ZTPI-36 are reported in Tables 1 and 2. As can be seen in Table 1, the fit indices across the three samples were well short of the acceptable range for CFI and TLI indices, and were acceptable for the RMSEA and SRMR indices. All of the ESEM fit indices for the data in the UK sample fell within the acceptable range. However, the CFI and TLI values for the ESEM analyses in the other two samples still fell short of .90. Cronbach's alpha reliability estimates were as follows for scores across the three samples (UK, US & Australia respectively): PH = .74, .69, .73; PP = .74, .63, .72; PN = .50, .58, .62; PF = .21, .43, .48; F = .72, .64, .64.

Table 2 displays the CFA and ESEM item loadings. Using Comrey and Lee's (1992) recommendation of >.55 as a good factor loading, only 6 of the 36 items (PH31, PH42, PP7, PN34, PN50 and F40) had good loadings across all samples and both methods. Moreover, there was variability in coefficient salience across the three samples and the two methods. No PF item had a loading of >.55 in any sample. Omega hierarchical reliability estimates were higher across the three samples for CFA coefficients (UK, US, & Australia, respectively)—PH = .74, .69, .73; PP = .76, .65, .72; PN = .73, .79, .83; PF = .48, .63, .64; F = .73, .65, .65 (*Mdn* = .72)—than for ESEM coefficients: PH = .54, .57, .72; PP = .74, .64, .72; PN = .73, .72, .70; PF = .24, .39, .54; *F* = .64, .60, .62 (*Mdn* = .64). There were 43 substantive (>.20) cross-loadings across 27 of the 36 items in the UK sample, 47 cross-loadings across 31 items in the US sample, and 37 across 26 of the items in the Australian sample. Overall, only two of the items did not present any statistically significant cross loadings in any sample. Table 3 displays the latent factor correlations for all three samples.

4. Discussion

The ZTPI has become a popular instrument in assessing time constructs (Sircova et al., 2014; Zimbardo & Boyd, 1999), and although validated primarily in college samples, the scale is used with both adolescents and adults, based on claims of rigorous psychometric properties for the instrument's scores (e.g., Laghi, Liga, Baumgartner, & Baiocco, 2012). The ZTPI-36 is an ambitious and potentially useful attempt to create a psychometrically robust and reliable short form of the ZTPI. The authors employed a data-driven methodology to the development of the scale, and four items (PF24, PF33, PH52 and PP25) loaded on different factors than in the original ZTPI. However, our investigation suggests that there are major concerns with the 36-item model. In particular, and in line with results reported by Sircova et al. (2014), there appears to be problems with the PF factor. In fact, only two of the 36 PD coefficients were greater than .55 ('good', Comrey & Lee, 1992).

The CFA analyses provided mixed results in all samples. Although the ESEM analyses yielded better CFI and TLI fit indices, these were within the acceptable range in only one sample. Some

Table 1
CFA and ESEM results for the ZTPI-36.

	χ^2_{s-b}	*df*	CFI	TLI	RMSEA (95% CI)	SRMR
CFA						
UK	1898.5*	584	.78	.76	.05 (.05–.05)	.07
US	1774.7*	584	.75	.73	.05 (.05–.05)	.07
Australia	2066.5*	584	.72	.70	.06 (.06–.07)	.08
ESEM						
UK	927.21*	460	.93	.91	.03 (.03–04)	.03
US	1066.2*	460	.89	.85	.04 (.04–.04)	.03
Australia	1170.4*	460	.88	.84	.05 (.05–.05)	.03

Note. CFA = confirmatory factor analysis; ESEM = exploratory structural equation modeling; s–b = Satorra–Bentler; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual.

* $p < .001$.

Table 2
Standardized estimates from CFA and ESEM.

	British sample (n = 913)				American sample (n = 815)				Australian sample (n = 653)			
	CFA	R^2	ESEM	R^2	CFA	R^2	ESEM	R^2	CFA	R^2	ESEM	R^2
Present hedonistic items												
8	.60	.36	.19	.47	.37	.13	.21	.23	.69	.48	.66	.50
12	.28	.08	.09	.12	.32	.11	.28	.13	.27	.07	.24	.13
17	.24	.06	.12	.21	.30	.09	.20	.27	.31	.10	.42	.29
19	.31	.10	.21	.19	.28	.08	.17	.15	.31	.10	.32	.15
23	.61	.38	.19	.50	.43	.18	.23	.36	.70	.49	.70	.56
31	**.76**	.58	**.80**	.67	**.77**	.59	**.87**	.72	**.61**	.38	**.59**	.36
42	**.75**	.57	**.89**	.77	**.80**	.65	**.77**	.63	**.68**	.46	**.64**	.43
44	.35	.12	.14	.17	.35	.13	.18	.21	.42	.17	.40	.20
52	.35	.12	.15	.16	.34	.12	.17	.20	.35	.12	.29	.17
55	.40	.16	.31	.22	.24	.06	.21	.09	.23	.05	.22	.16
Past positive items												
2	.74	.55	.70	.52	.54	.29	.55	.33	.55	.30	.59	.39
7	**.65**	.43	**.64**	.42	**.73**	.53	**.71**	.52	**.75**	.56	**.74**	.59
11	.58	.33	.57	.36	.55	.30	.51	.37	.76	.58	.60	.57
20	.67	.45	.63	.46	.58	.34	.52	.36	.59	.34	.52	.40
29	.57	.33	.56	.34	.16	.02	.24	.17	.33	.11	.49	.31
49	.28	.08	.26	.14	.29	.09	.28	.13	.24	.06	.32	.12
Past negative items												
4	.35	.13	.44	.20	.51	.26	.49	.27	.62	.38	.35	.42
25	.56	.32	.43	.39	.57	.32	.39	.41	.67	.45	.36	.62
27	.44	.19	.51	.27	.47	.22	.46	.25	.52	.27	.37	.29
34	**.73**	.53	**.64**	.50	**.72**	.53	**.59**	.50	**.68**	.46	**.67**	.53
36	.30	.09	.36	.14	.47	.22	.54	.32	.54	.29	.42	.37
50	**.74**	.55	**.68**	.52	**.78**	.60	**.65**	.56	**.77**	.59	**.84**	.73
54	.54	.30	.60	.36	.57	.33	.51	.36	.69	.47	.41	.51
Present fatalistic												
24	.44	.19	.49	.27	.33	.11	.42	.24	.34	.11	.11	.32
33	.31	.09	.07	.20	.52	.27	.30	.25	.63	.40	.41	.35
35	.51	.26	.34	.21	.51	.26	.38	.25	.52	.27	.38	.27
37	.43	.18	.28	.13	.53	.28	.32	.21	.59	.35	.52	.33
38	.32	.10	.25	.14	.44	.20	.31	.18	.45	.20	.53	.27
47	.15	.02	-.11	.09	.47	.17	.08	.21	.34	.12	.47	.23
Future												
9	.47	.22	.25	.25	.32	.10	.29	.18	.20	.04	.19	.07
10	.48	.23	.50	.28	.57	.32	.52	.34	.62	.38	.60	.40
21	.63	.40	.54	.38	.49	.24	.38	.22	.44	.19	.40	.20
30	.46	.21	.27	.27	.32	.10	.19	.17	.36	.13	.33	.18
40	**.59**	.35	**.57**	.37	**.56**	.31	**.55**	.31	**.64**	.41	**.64**	.43
45	.51	.26	.43	.26	.52	.27	.52	.28	.52	.27	.47	.24
51	.52	.27	.58	.34	.42	.18	.45	.23	.42	.18	.40	.19

All R^2 values >.05 are statistically significant at $p < .01$. Bold font indicates items loading >.55 in all samples and in both CFA and ESEM models.

Table 3
Latent factor correlations for all three samples.

	PP	PN	PH	PF
UK sample				
PP	–			
PN	−.32**	–		
PH	−.04	.16**	–	
PF	−.10*	.40**	.65**	–
F	.35**	−.01	−.48**	−.43**
US sample				
PP	–			
PN	−.17**	–		
PH	.15**	.21**	–	
PF	−.10	.72**	.37**	–
F	.45**	−.06	.00	−.27**
Aus sample				
PP	–			
PN	−.55**	–		
PH	.21**	.07	–	
PF	−.29**	.66**	.37**	–
F	.28**	−.22**	−.22**	−.43**

* $p < .05$.
** $p < .01$.

researchers have advised against the strict application of minimum threshold values for fit indices (Hopwood & Donnellan, 2010), but even by the most liberal cut-offs, the results were still unacceptable. It could be argued that the ESEM results for the ZTPI-36 are *close enough* to the .90 threshold to provide support for this version of the scale. However, these results do not suggest that the psychometric properties of ZTPI-36 scores reflect a gold standard as suggested by the developers.

The internal consistency results suggest that alpha is overestimating the internal consistency of the PN and PF scores, as omega estimates for these two factors are substantially lower. These results are at odds with the extant literature where, in general, most ZTPI internal consistency estimates have been acceptable, and are more in keeping with a few studies in which internal consistency estimates for ZTPI scores were low (e.g., Milfont, Andrade, Belo, & Pessoa, 2008). It is also worth noting that while alpha estimates were not particularly strong, omega estimates based on CFA coefficients were weaker, and omega estimates based on ESEM coefficients were weakest, despite these models yielding the best fit.

This study only used data from English-speaking, Westernized countries and two different data collection methods were used. Additionally, our examination of ZPTI scores is limited to internal consistency and structural validity; and participants in the NI sample came from 10 schools. Nonetheless, the results allow us to draw some conclusions. We contend that rather than the purely data-driven approach to modifying the ZPTI adopted by some researchers (e.g., Sircova et al., 2014; Zhang, Howell, & Bowerman, 2013), that more theoretically-driven adaptations are considered. A data-driven approach to the development of scales (e.g., choosing only high loading items, or using correlated error terms to improve fit) is not ideal as results are often sample-specific and difficult to replicate. We would like to call for a more theoretical approach to all future modifications of the ZPTI, for example by eliminating items which do not assess time perspective, as previously suggested (e.g., Crockett, Weinman, Hankins, & Marteau, 2009; Seijts, 1998; Shipp et al., 2009), and re-examining the structure and function of some factors, in particular the present fatalistic factor. It is our considered opinion that a more theoretically sound adaptation of the scale might yield a more reliable and culturally invariant measure of time perspective.

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