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Examining the structure of vocational interests in Turkey in the context of the personal globe model

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Abstract The structural validity of the Personal Globe Inventory-Short (PGI-S: Tracey in J Vocat Behavi 76:1–15, 2010) was examined in a Turkish sample of high school and university students. The PGI-S measures eight basic interest scales, Holland's (Making vocational choice, Prentice-Hall, Englewood Cliffs, 1997) six types, Prediger's (J Vocat Behav 21:259–287, 1981) people/things, data/ideas dimensions, and prestige. After adapting the original PGI-S items into Turkish (PGI-S-T), the inventory was administered to high school students ($N = 605$) and university students ($N = 359$). The fit of Holland's RIASEC and the PGI eight type model were examined separately using the randomization test of hypothesized order relations. Results indicated a strong fit for both the eight type and the RIASEC model. Expected significant differences were found between PGI-S-T subscales across gender and age. The results support the structural validity of the adapted PGI-S-T in a Turkish sample.

Résumé. L'examination de la structure des intérêts vocationnels en Turquie dans le contexte du personal globe model. La validité structurale du Personal Globe Inventory-Short (PGI-S: Tracey, 2010) a été examinée à partir d'un échantillon de lycéens et d'étudiants universitaires turcs. Après une adaptation des items

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originaux en turc (PSI-S-T), l'inventaire a été administré aux lycéens (N = 605) et aux universitaires (N = 359). La correspondance du RIASEC de Holland et du modèle à huit types du PGI ont été examinés séparément en utilisant un test de randomisation de l'ordre des relations supposées. Les résultats soutiennent la validité structurale de la version adaptée PGI-S-T dans un échantillon turc.

Zusammenfassung. Prüfung der Struktur der beruflichen Interessen in der Türkei im Kontext des personal Globe-Modells. Die strukturelle Validität der Kurzfassung der Personal Globe Skala (PGI-S: Tracey, 2010) wurde in einer türkischen Stichprobe von Gymnasiasten und Studenten untersucht. Nach der Anpassung der ursprünglichen PGI-S Elemente in die türkische (PGI-S-T) wurde das Inventar an Gymnasiasten (N = 605) und Universitätsstudenten (N = 359) getestet. Die Passung zwischen dem RIASEC nach Holland und dem PGI-8-Typ-Modell wurde separat mithilfe von Rang-Randomisierungstests untersucht. Die Ergebnisse unterstützen die strukturelle Validität des adaptierten PGI-S-T in einer türkischen Stichprobe.

Resumen. Examinando la estructura de los intereses vocacionales en Turquía en el contexto del modelo de globo personal. La validez estructural de el inventario del globo personal versión corta (PGI-S: Tracey, 2010) se examinó con un amuestra de estudiantes de educación secundaria y universidad. Tras adaptar los ítems originales al turco (PGI-S-T), el inventario se administró a estudiantes de secundaria (N = 650) y de universidad (N = 359). El encaje al RIASEC de Holland y el modelo ocho del PGI se examinaron separadamente utilizando el test aleatorio de relaciones hipotéticas. Los resultados confirman la validez estructural del test PGI-S-T adaptado a una muestra turca.

Keywords PGI · Vocational interests

Introduction

Vocational interests have long been shown to play an integral role in furthering individuals' academic and career advancement, decision making, and self-exploration (Dawis & Lofquist, 1984; Holland, 1997). Researchers have put forth a number of methods and models to account for the structure of vocational interests (Gati, 1991; Holland, 1973, 1985; Prediger, 1982; Tracey, 2002). However, many of these examinations have been carried out within the United States and often with college students. Given the many advantages of using established measures and models, there has been a significant increase in the use of U.S. based interests models in other countries (Tracey & Gupta, 2008). Despite the advantages, researchers have highlighted the need for examining the structural validity of interest assessments prior to their inclusion in cross-cultural research (Tracey & Rounds, 1995). This recommendation has spurred the examination of interests assessments in a number of countries (Caulum, Tracey, Gresham, & McCarty, 2011; Wilkins, Ramkissoon, & Tracey, 2013; Zhang, Kube, Wang, & Tracey, 2013). However, no study to date has examined the fit of vocational interests assessments

in a Turkish context. The current study investigated the structural applicability of the PGI-S to a sample of Turkish high school and college students.

Although interest assessments have demonstrated longstanding importance, researchers have posited that vocational interests are no longer a key career variable. This is particularly the case when compared to variables such as satisfaction and productivity (Savickas, 2005). Some have used this as a justification for the merits of a constructionistic approach to career intervention (Krieshok, 2003; Krieshok, Black, & McKay, 2009; Savickas, 2005). While there are many merits to a career constructionist approach, the premise that interest assessments have not demonstrated their validity is inaccurate. In a recent meta-analysis of the validity of interest-occupation fit and occupational outcomes, Rounds and Su (2014) demonstrated that interest occupation fit was highly related to satisfaction, tenure, and performance. Indeed, there are few constructs that have a demonstrated relation with career variables. For example, results have demonstrated the salience of interests in predicting academic success, persistence, and graduation in college (Tracey & Robins, 2006; Tracey, Allen, & Robins, 2012) as well as long term employment patterns (Wille, Tracey, Feys, & De Fruyt 2014).

A number of models have been proposed to represent the structure of vocational interests: Gati's (1991) hierarchical cluster, Prediger's (1982, Prediger & Vansickle, 1992) two-dimensional people/things and data/ideas model, and Holland's interest model (1973, 1985, 1997). The latter, Holland's RIASEC hexagon model, has been the leading interest assessment framework for the last 30 years. This is largely due to the commensurate assessment of classifying the relative fit between individuals and occupations. Holland's model is comprised of six interest types (i.e., realistic, investigative, artistic, social, enterprising, and conventional, hereafter collectively referred to as RIASEC) that are arranged in a circular pattern with similarity among the types represented by relative distance apart (e.g., R and I are close and similar while R and S are opposite and dissimilar). The RIASEC model has received widespread support in the literature, primarily with U.S. samples (Holland, 1985, 1997; Tracey & Rounds, 1992, 1993).

Despite the support, cross-cultural examinations of the Holland's RIASEC hexagonal ordering of types have been found to be equivocal, at best (Farth, Leong, & Law, 1998; Haverkamp, Collins, & Hanson, 1994; Leong, Austin, Secaran, & Komarraju, 1998; Yu & Alvi, 1996). A meta-analysis conducted by Tracey and Rounds (1995) demonstrated that the circular structure did not fit the data well for both non-US samples and US ethnic minorities and this lack of fit was not related to issues of economic development. While these assessments occurred a while ago, there is no subsequent examinations of data outside the U.S. that would demonstrate that this poor showing of Holland's model has improved. Indeed, a relatively recent meta-analysis of Holland's model in China (Long, Watanabe, & Tracey, 2006) also demonstrated that it does not fit as well as it does in the U.S. These results highlight the need for further examination of the validity of interests measures for use in non-U.S. contexts.

The Personal Globe Inventory (PGI; Tracey, 2002) is an expansion on Holland's model and one that has been found to fit the theoretical circular model well in U.S.

samples and even better than other Holland based measures. The PGI is designed to measure interests and competence as well as occupational preferences. The PGI was developed, in part, due to the early research by Tracey and Rounds (1995) who found the six-type structure of the RIASEC model to be arbitrary. They concluded that interests could be represented using any number of types. So in an attempt to offer a more simplified and complete representation of interests, the PGI uses an octant model rather than the sextant model. The greater number of types allows for more homogeneity and thus can be more easily understood by the user. In fact, few understand what realistic and conventional mean until it is well explained. The PGI's eight types are social facilitating, managing, business detail, mechanical, nature/outdoors, artistic, and helping. The PGI is framed by a three-dimensional spherical structure that can be interpreted on a number of levels: Prediger's two dimensions (i.e., people/things and data/ideas), Holland's six RIASEC types, eight octant types, and 18 basic scales. The three-dimensional structure has received empirical support across different item types (responses to activity liking, competence, and occupational titles), gender, U.S. ethnic groups, and age (Tracey, 2002).

More important for the purposes of this study, the PGI, unlike other Holland measures, has been found to generalize well across a host of countries. These include Singapore (Caulum et al., 2011), Ireland (Darcy, 2005), China (Long, Adams, & Tracey, 2005), Japan (Tracey, Watanebe, & Schneider, 1997), Croatia (Sverko, 2007), the Caribbean (Wilkins et al., 2013), and Serbia (Hedrih, 2008). One possible reason for these different results is that the PGI expands on the RIASEC model in several ways, but the most important here is the separation of prestige from the other types, and a finer differentiation of types.

In 2010, Tracey employed the item response theory to create the PGI-Short (PGI-S), an abbreviated 40 item version of the PGI. Despite the item reduction, the structural framework of the PGI was unaltered. So, it still includes the eight basic interest scales, the high prestige and low prestige scales, and the six-type RIASEC scale. To date, the only study that has examined the cross-cultural validity of the PGI-S is Zhang et al. (2013). These researchers adapted and implemented the PGI-S to a Chinese sample and found strong support for the reliability and structure. However, further research is needed to demonstrate the structural validity of the PGI-S to other non-U.S. samples. Such examination is important because applying models and measures generated on one population to another may render any mean comparisons irrelevant given the different underlying meanings and structures (Tracey & Gupta, 2008).

To date few studies have investigated career related constructs in a Turkish sample. Moreover, no study has examined the structure of interest in this sample. In keeping with Tracey and Gupta's (2008) main point of continual assessment of measures and to contribute to the vocational literature about Turkey, the current study examines the structural validity of the PGI-S as applied to a Turkish sample. More specifically, we are interested in examining the fit of the sextant and octant models and whether the structural validity differs across gender and educational level. Although examinations of the PGI-S in U.S. samples (Tracey, 2010) have not found gender differences in the structure, it is not clear if these results would be

consistent in a Turkish sample. Given that research (Hofstede, 1980, 1991) has noted differing cultural constructions of gender, as well as differential access to educational and occupational opportunities, an examination of differential fit is warranted. We also examined invariance across education level (high school versus college) because older students tend to have a more differentiated profile (Tracey, Robbins, & Hofsess, 2005) and this could be related to structural and mean differences.

Method

Participants

The sample comprised a total of 964 high school and university students from western Turkey. The high school sample ($N = 605$) consisted of 369 females and 236 males. Their ages ranged from 14 to 19 ($M = 16.22$ years, $SD = 0.92$). The high school sample was recruited from six different types of high schools. These included vocational trade high schools ($N = 136$), vocational industrial high school ($N = 94$), vocational girls high schools ($N = 100$), vocational religious high schools ($N = 54$), and academic high schools ($N = 221$). The university sample ($N = 359$) comprised 243 females and 116 males whose ages ranged from 18 to 34 ($M = 21.45$ years, $SD = 1.83$). The breakdown of high school students based on their occupational profile included: realistic (14%), investigative (37%), artistic (17%), social, (10%), and conventional (23%). While the occupational profiles of university students included: realistic (3%), investigative (24%), social (63%), and enterprising (12%).

Instruments

The Personal Globe Inventory-Short Turkish (PGI-S-T) is an adapted version of the PGI-S (Tracey, 2010). The PGI-S is comprised of two sets of 40 items respectively designed to measure a respondent's interest and competence. Interest and activity performance were rated with respect to both the degree of liking ranging from 1 (*strongly dislike very much*) to 7 (*strongly like very much*) and the degree of competence ranging from 1 (*unable to do*) to 7 (*able to do very much*). The responses were averaged to yield the eight basic interest scale scores, the RIASEC scale scores, and high and low prestige.

The PGI-S (Tracey, 2010) was translated into Turkish by five Turkish academicians. After translation into Turkish, a back-translation was done into English. This back-translated English version was compared to the original version of PGI-S to ensure that the two versions were identical. Several adaptations to the items were made to make the scale more appropriate for a Turkish context. For example, item 31 "Escort people through a television studio" was changed to "Guiding people visiting a TV studio."

A demographic questionnaire was also administered to gather participants' background information.

Procedure

Participants were recruited from six public high schools and two universities located in the city of İzmir where there are over 150 public high schools and three state universities. A high school representative from each of the major types of high schools (i.e., vocational trade, vocational industrial, vocational girls, vocational religious, and academic) were approached to participate. Also two of the three universities were approached to participate. Classes were randomly selected from each school and the researchers administered the instruments in these classes. Of all the classes solicited, all agreed to participate with almost all students in every class participating in the study. Students participated voluntarily and no incentive was provided.

There was relatively little missing data as only 5% of all items missing and no individual having more than 2 items missing. Given the low number of missing data, we adopted listwise deletion as this results in unbiased estimates in cases where there is not much missing data (Schlomer, Bauman, & Card, 2010).

Analysis

The fit of the PGI-S-T's circular structure was examined using the randomization test of hypothesized order relations (Hubert & Arabie, 1987) as implemented by the RANDALL program (Tracey, 1997a). Seventy-two order predictions of the magnitude of correlations among interest types was posited by the RIASEC sextant scale and 288 unique order predictions among the octant interest scales. The number of predictions met in the data was then compared against the distribution of all random permutations of the rows and columns of the correlation matrix to provide an inferential probability value.

The Correspondence Index (CI) was used as an additional interpretative aid to assess model fit. The CI is a correlation that reflects the difference between the predictions met and the number of predictions violated, divided by the total number of predictions. The CI values range from −1 (*every prediction violated*), to 0 (*an equal number of predictions met and violated*), to +1 (*perfect model fit*). For example, a CI value of .50 indicated that 75% of the predictions were supported and 25% were not supported. The other index that was used to assess model fit was the randomization p value that measures the consistency between the model and the data whether or not it was obtained by chance. RANDALL software program (Tracey, 1997a) was used to calculate the CI and p-value. The program or a copy of the R code can be obtained at http://tracey.faculty.asu.edu/index.html. In order to test the criterion-related validity, the mean differences of the scores across gender and education level for all the scales were examined using a two-way multivariate analysis of variance (MANOVA).

Results

The correlations among the PGI-S-T subscales ranged between −.01 and .61 ($r = .22$, $SD = .19$) and the Cronbach alpha values ranged between .58 and .80 ($\alpha = .71$, $SD = .09$).[1] Randomization tests of hypothesized order relations (Hubert & Arabie, 1987) were conducted on the correlation matrices of the RIASEC and the PGI octant scales for activity interest, competence, and the composite score for each gender and education level (High School and University). The results of the randomization tests for the RIASEC and the octant scales are displayed in Tables 1 and 2, respectively. The results indicated a significant fit of the RIASEC model to the sample of all participants for interest, competence, and the activity interest-competence composite. The CI values ranged from .72 to .89 ($p < .02$). The fit of the sextant model to the data was also significant for the activity interest, competence, and the composite scores for gender and age. The CI values ranged from .61 to .89 ($p < .02$). Randomization tests of differences in fit on the liking, competence, and the composite scores across gender were conducted. Results demonstrated that there were no significant differences in the composite scores across gender ($p = .80$) and education level ($p = .90$).

As illustrated in Table 2, the data also fit the octant model well. Results of the randomization test indicated a significant fit to the total sample for interest, competence, and the activity interest-competence composite. The CI values ranged from .71 to .81 ($p < .001$). The fit of the PGI eight-type model to the data was also significant for the activity interest, competence, and the composite scores for both gender and age. The CI values ranged from .64 to .83 ($p < .02$). Similar to the sextant model, randomization tests of differences found no significant differences in the composite scores across gender ($p = .95$) and education level ($p = .82$).

These results indicate that the fit of the circular structure of the PGI-S on a Turkish sample was comparable to the results found in an American college sample where the CI values of the activity interest-competence composite were .92 and .88 for the octant and sextant models respectively (Tracey, 2010). The results were also similar to the findings from Zhang et al. in their use of the PGI-S in China with CI values ranging from .72 to .86 for the octant scales and .53 to .83 for the sextant scales. These values are also similar to those obtained with the larger PGI (Ireland: Darcy, 2005; and China: Long et al., 2005).

Given the support for the circumplex structure of the PGI-S-T's octant and sextant models, mean differences in the scores across gender and education level were tested. Specifically, the scores on each of the 10 PGI-S-T scales across gender and high school were compared to the college sample by using a two-way MANOVA to control for Type I error. Results indicated that the MANOVA yielded statistically significant differences in gender $F(10, 945) = 47.07$, $p < .001$, education level $F(10, 945) = 12.89$, $p < .001$ and the interaction of the Gender × Education level effect, $F(10, 945) = 2.44$, $p = .007$. The results of the post hoc comparisons are summarized in Table 3. Regarding the significant differences

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[1] Given the many different groups and correlation matrices examined (54 different matrices), it is prohibitive to present all these data here. We do offer to send them to anyone upon request.

Table 1 Summary of the results of the randomization tests of hypothesized order relations of the sextant model

Sextant scales	All	High school	University	Female	Male
Liking					
N	964	605	359	612	352
Predictions made	72	72	72	72	72
Predictions met	68	66	67	68	58
p	.017	.017	.017	.017	.017
CI	.89	.83	.86	.89	.61
Competence					
N	964	605	359	612	352
Predictions made	72	72	72	72	72
Predictions met	62	66	64	66	67
p	.017	.017	.017	.017	.017
CI	.72	.83	.78	.83	.86
Liking-competence composite					
N	964	605	359	612	352
Predictions made	72	72	72	72	72
Predictions met	65	61	67	62	65
p	.017	.017	.017	.017	.017
CI	.81	.69	.86	.72	.81

Table 2 Summary of the results of the randomization tests of hypothesized order relations

Octant scales	All	High school	University	Female	Male
Liking					
N	964	605	359	612	352
Predictions made	288	288	288	288	288
Predictions met	261	263	249	250	236
p	.001	.001	.000	.001	.002
CI	.81	.83	.73	.74	.64
Competence					
N	964	605	359	612	352
Predictions made	288	288	288	288	288
Predictions met	246	252	253	259	249
p	.001	.000	.001	.000	.002
CI	.71	.75	.76	.80	.73
Liking-competence composite					
N	964	605	359	612	352
Predictions made	288	288	288	288	288
Predictions met	256	243	254	239	260
p	.000	.001	.002	.003	.000
CI	.78	.69	.76	.66	.81

Table 3 Summary of post hoc ANOVA results for the PGI-S-T across gender and sample and the interaction

Scale	Gender[a]		Sample[b]		Gender × Sample[c]	
	t-value	Difference	t-value	Difference	Scheffe (mean difference)	Difference
Social facilitating	4.53***	F > M	0.54		2.35***	FHS > MHS
Managing	−0.34		2.77**	HS > Col	1.81**	FHS > FCol
Business detail	−2.58**	F < M	−0.89		−1.98*	FHS < MCol
					−2.16**	FCol < MCol
Data processing	−10.75***	F < M	1.95			
Mechanical	−11.83***	F < M	5.98***	HS > Col		
Nature outdoors	−4.48***	F < M	3.27**	HS > Col		
Artistic	1.39		3.73***	HS > Col		
Helping	12.59***	F > M	−4.64***	HS < Col		
High prestige	3.13**	F > M	−2.07*	HS < Col	−1.78*,d	MHS < FHS
					−1.83*,d	MHS < FCol
					−1.87*,d	MHS < MCol
Low prestige	−10.67***	F < M	−1.12			

Direction of the group difference is noted for statistically significant differences only

* $p < .05$, ** $p < .01$, *** $p < .001$

[a] $df = 956$, N (female) = 610; N (male) = 348

[b] $df = 956$, N (HS) = 601; N (Col) = 357

[c] $df = 3, 954$, N (FemaleHS) = 367; N (MaleHS) = 243; N (FemaleCol) = 234; N (MaleCol) = 114

[d] Dunnet C was used for comparisons seeing that the assumption of homogeneity of variances was not supported

in gender, female students demonstrated higher scores across the following scales: social facilitating, helping, and high prestige. Men demonstrated higher scores on business detail, data processing, mechanical, nature outdoors, and low prestige. There was also a statistically significant difference between the education levels in the samples. The high school sample demonstrated significantly higher scores on managing, mechanical, nature outdoors, and artistic. While the college sample demonstrated significantly higher scores on helping, and high prestige.

According to MANOVA results, Gender × Education level interaction was significantly different in social facilitation, management, business detail and high prestige scales. Post hoc Scheffe t-tests indicated that with regard to the social facilitation scale, the scores of female high school students were significantly higher than the scores of male high school students. In terms of the managing scale, the scores of female high school students were higher than male high school students. In terms of the business detail scale, the scores of female high school and female college students were significantly lower than the scores of male college students. In

terms of the high prestige scale, the scores of male high school students were significantly lower.

Discussion

Given the common practice of importing measures and models developed in one country and applied to another country, examination of the cross-cultural applicability of measures has become paramount. Such an examination facilitates meaningful interpretation of the results and an increased understanding of observed score differences between countries. The results of the current study supported the structural validity of PGI-S in a sample of Turkish high school and college students. In addition, the values of the calculated internal consistency for the PGI-S-T were found to be satisfactory.

Both the sextant and octant scales demonstrated uniformly high fit to the data. The CI values obtained for the six-type RIASEC scales were comparable to the values obtained in the US samples (CI = .83; Tracey, 2010). Rounds and Tracey (1996) established a benchmark CI value of .70 in their structural meta-analysis of 73 US RIASEC matrices. The CI values in the current sample are higher than this benchmark indicating that the RIASEC scales fit the data as well as the PGI and RIASEC scales in U.S. samples. The PGI octant model exhibited comparable fit to the data as well. Similar to the six-type scale, the fit of the octant model was comparable to the fit obtained with U.S. samples (CI = .89; Tracey, 2010). These results were also consistent with other cross-cultural findings of the PGI (e.g., Darcy, 2005; Hedrih, 2008; Long, et al., 2005; Tracey, 1997b; Sverko, 2007; Wilkins, et al., 2013; Zhang et al., 2013).

Given the similarity in structure across the different groups, we examined mean differences across gender and education level (college versus high school) for the PGI-S-T octant scales. Results indicated both main effects across education level and gender as well as a significant interaction between education level and gender. Similar to Zhang et al. (2013), women scored significantly higher than men on two out of the four people scales (social facilitating and helping). Men scored significantly higher than women on the things scales (business detail, data processing, mechanical, and nature outdoors). Past research has consistently demonstrated gender differences between the People and Things scales using the PGI and other scales, with men typically scoring higher on Things and women scoring higher on People (Su et al., 2009; Tracey, 2002; Tracey & Hopkins, 2001; Tracey & Robbins, 2005).

An interesting gender by education level interaction effect was also noted on the prestige scales. Both male and female college students evidenced significantly higher scores than male high school students on high prestige. Given the selectiveness of college, higher scores on high prestige are expected for both males and females. However, male high school students scored significantly lower than female high school students on high prestige scales. One explanation for such findings is that within the Turkish school system, there are vocational high schools designated for learning trade and application to jobs such as a car mechanic or a

welder. These high schools tend to be predominantly male dominated and the preparation is geared towards jobs that are typically lower in prestige. Further investigation is warranted to examine the nuanced gender and school differences in specific prestige scales (e.g. business systems, social science, financial analysis, and influence).

Overall, these results support the usage of the PGI-S in a Turkish context. This structural similarity was evident in both the six-type and eight-type model as well as across gender and education level (high school and college). It is important to note that these findings are limited to the samples used. Both college and high school students were recruited from İzmir, one of many cities in Turkey. Further research examining a more diverse group of individuals, including those from multiple cities as well as rural and urban towns would be beneficial. Nonetheless, these results further substantiate the cross-cultural applicability of the PGI-S.

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