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Vocational Interests and Career Indecision in Switzerland and Burkina Faso: Cross-cultural Similarities and Differences

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Abstract

The Personal Globe Inventory (PGI) and the Career Decision-Making Difficulties Questionnaire (CDDQ) have been adapted to be used in various languages and cultural contexts. However, French versions of these instruments have never been used in Africa and only very few studies have formally studied their cross-cultural replicability. Moreover, no studies have analyzed if the relationship between career interests and decision-making difficulties might be stable across cultures. For this reason, 413 Swiss students and adult workers and 287 Burkinabe students completed both the PGI and the CDDQ. Randomization tests and a series of confirmatory factor analyses supported the structural validity and replicability across the two countries of both the PGI and the CDDQ. Although CDDQ's scales reached scalar invariance across cultures, this was not the case for the scales of the PGI, which reached only metric invariance, suggesting that country-specific norms should be used for this inventory. However, both instruments reached scalar invariance with regard to gender. Gender differences were larger for interests than for career decision-making difficulties within each country sample. Finally, the associations between vocational interests and the CDDQ were small and significant in some cases only in Switzerland. Overall, this study shows that the structure of vocational interests and career indecision seem to replicate well across very different cultures.

Keywords: Vocational interests, Career indecision, Career Decision-Making Difficulties Questionnaire, Personal Globe Inventory, Cross-cultural psychology

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Vocational Interest Models Across Cultures

Holland's (1959, 1973, 1985, 1997) RIASEC model of vocational interests has been considered the most influential model of vocational interests for the past five decades. According to Holland, a vocational choice should reflect congruence between an individual's personality (also in terms of interests) and the characteristics of an occupation (which can be described in terms of activities, among other things). To describe both vocational interests and occupations, Holland used six occupational or personality types: realistic, investigative, artistic, social, enterprising, and conventional (RIASEC). The six RIASEC types are organized in a hexagonal structure, in a two-dimensional space, which is hypothesized to fit a circular structure. Prediger (1982) named the two bipolar, orthogonal dimensions "People-Things" and "Data-Ideas." According to the circular ordering assumption, the most similar types are adjacent on the hexagon (e.g., R and I) whereas the most dissimilar are opposite (e.g., R and S). Although several techniques have been used to investigate the validity of the circular ordering of interests across cultures, the randomization test of hypothesized order relations (Hubert & Arabie, 1987) was the most influential during the three past decades. Moreover, several methodologists have suggested that reaching an invariant measurement pattern of latent constructs (e.g., the circular ordering or circumplex) is not sufficient in order to determine if scores can be compared (e.g., van de Vijver, 2011). Accordingly, metric invariance evaluating whether scales have the same units of measurement but a different origin, and scalar invariance evaluating if there is an identical interval or scale ratio in the compared groups should be inspected, the latter one determining if mean score comparison across different cultures (van de Vijver, 2011; Xu & Tracey, 2017).

Socio-economic context is known to have an impact on the availability of occupations in any given labor market. Career aspirations are influenced by both the socio-cultural and

cultural contexts (Metz, Fouad, & Ihle-Helledy, 2009), and culture could also have an impact on the structure underlying vocational interests (Hansen, Scullard, & Haviland, 2000). For this reason, several researchers have investigated the impact of culture on Holland's RIASEC model of vocational interests (e.g., Tracey, Watanabe, & Schneider, 1997). Amstrong, Hubert, and Rounds (2003) found the circular structure of the RIASEC model to fit better for Asian- and Caucasian-American samples, and to be less appropriate for African-and Hispanic-American samples. They suggested that the meaning of the RIASEC types is influenced by culture, explaining why the circumplex structure of vocational interests does not replicate well across samples. Du Toi and de Bruin (2002) examined the structural validity of Holland's RIASEC model among young black South African population groups. They observed a significant but poor fit of the hexagonal model to a North West sample, and no fit for an Eastern Cape one. Their examination of the spatial configuration of the six RIASEC types through multidimensional scaling analyses did not confirm the hypothesized R-I-A-S-E-C order for any of the four groups, and the graphic representation for each group appeared to mis-fit the shape of a regular hexagon, highlighting the inadequacy of this model in the South African context. Similar results were found in studies examining other cultural groups (e.g., Farth, Leong, & Law, 1998; Long & Tracey, 2006; Rounds & Tracey, 1996). These findings suggest that Holland's RIASEC model of vocational interests does not replicate very well across cultures, and seems to be more appropriate for North American or Western populations (e.g., Hansen et al., 2000).

Several alternatives to the hexagonal structure of the RIASEC model have been proposed in the literature. For example, Gati (1982, 1991) proposed an alternative hierarchical structure of the RIASEC model with three groups (i.e., R-I, A-S, E-C). Gati argued that this alternative structure had better predictive validity. More recently, and in order to acknowledge the importance of the prestige dimension to describe vocational interests (Gottfredson, 1980, 1996), Tracey and Rounds (1996) proposed a spherical model of interests that can be depicted

in a three-dimensional space defined by the following three orthogonal dimensions: People-Things, Data-Ideas, and Prestige. A first study conducted in the US and Japan suggested that "the inclusion of prestige in interest models has potential cross-culturally" (Tracey et al., 1997, p. 353), and that the spherical model could be more robust across cultures than Holland's RIASEC model. Based on the spherical model of interests, Tracey (1997b, 2002) developed the Personal Globe Inventory (PGI). The spherical model of interests and its operationalization, the PGI, was designed to be integrative. The three dimensions and 18 specific scales of this model include Holland's RIASEC types plus Prediger's two dimensions.

The PGI has been used increasingly for assessing the structure of vocational interests in many countries and has shown a strong stability across various socio-cultural contexts (e.g., Darcy, 2005; Etzel, Nagy, & Tracey, 2015; Šverko, 2008). For example, recently, Hedrih, Stošić, Simić, & Ilieva (2016) examined the fit of the hexagonal and the spherical models of the PGI to Serbian and Bulgarian data. According to their findings, the models fit the data of both countries well, supporting the internationalization of the PGI. However, a study conducted in a Caribbean sample (Wilkins, Ramkissoon, & Tracey, 2013) reported a poorer but significant fit of the PGI spherical model, and the authors argued that this may be due to the conceptualization of occupational prestige in the Caribbean context. Thus, further studies including samples from diverse regions of the world are certainly needed to evaluate the cross-cultural replicability of the spherical model of interests. Moreover, gender differences in vocational interests were assessed using the PGI in several countries. A common finding emerged from these studies. As reported by several researchers, women systematically scored higher on scales associated with the People dimension whereas men scored higher on scales associated with the Things dimension (e.g., Darcy, 2005; Etzel et al., 2015; Long, Watanabe, & Tracey, 2006; Tracey, 2002).

Interests' Differentiation and Consistency and Career Development Outcomes

According to Holland's theory of career choice (1985), career choices should be easier for people with differentiated and consistent vocational interests (Holland & Gottfredson, 1975). Therefore, individuals that have a differentiated or consistent profile should experience less career indecision or fewer career decision-making difficulties (Reardon & Lentz, 1999). Holland (1997) defined differentiation as the degree of contrast between a person's interests for some areas over others. According to Holland (1997), differentiation refers to the degree of distinctiveness of various interests and corresponds to the difference between the highest and the lowest dimension score. The greater the differentiation in interests, the more clearly a person's profile emerges. A person's differentiation score can be assessed by using the dispersion-index formula (Holland, 1997). Consistency refers to the degree to which one's ideal types are closely related or adjacent to one another on the hexagon. It refers to their homogeneity or closeness and corresponds to an integration of similar related interests and competencies. This is operationalized by considering the distance between the two highest RIASEC scores on the hexagon (Swanson & Hansen, 1986). An interest profile with the two highest scores on adjacent types is considered highly consistent, whereas an interest profile with the two highest scores on opposite types is considered inconsistent. Several authors have proposed formulas to assess differentiation and consistency (e.g., Iachan, 1984; Swanson & Hansen, 1986). Some formulas proposed were found to be complex, and this complexity has led to mitigated results (Bullock & Reardon, 2008; Holland, 1997; Nauta & Kahn, 2007). Recently, Tracey, Wille, Durr II, and De Fruyt (2014) proposed an alternative to Holland's computation of both differentiation and consistency for the hexagonal model, based on cosine fit function. According to theory, the hexagonal model can be represented in a bi-dimensional space and the cosine fit function was found to provide a better operationalization of both constructs across the RIASEC model compared to Holland's formulas as it takes into account the entire profile (for an example of the use of this approach, see Tracey et al., 2014). However, to our knowledge, none of the above-mentioned methods has been used to assess

either differentiation or consistency for the PGI spherical model, which according to theory should be represented in a three-dimensional space.

Few researchers have investigated the relationship between the two constructs and career development outcomes during the past decade. Nauta and Kahn (2007) found differentiation to be negatively associated with identity statuses such as foreclosure and moratorium. According to their findings, higher levels of identity based on little self-exploration (foreclosure) and higher levels of exploration without commitment (moratorium), were related to lower levels of interest differentiation. More recently, by testing Holland's interest secondary constructs with career development variables in a German college student sample, Jaensch, Hirschi, and Spurk (2016) reported that interest differentiation was positively related to career decidedness, as also reported by Hirschi (2009) with a Swiss adolescent sample, and to career engagement. The same study reported that differentiation was positively associated with congruence, and negatively with profile elevation. Other studies have shown the construct of interest differentiation to be related to gender and nationality (Hirschi, 2009), personality traits such as openness (Bullock & Reardon, 2008), extraversion, and self-exploration (Hirshi, 2009), career maturity (Babarović et al., 2015), decision-making, integration of self-information or career information (Gordon & Meyer, 2002). Consistency was found to be related to differentiation, profile elevation or congruence (Bullock & Reardon, 2008; Swanson & Hansen, 1986), stability of vocational choices (Villwock, Schnitzen, & Carbonari, 1976) or goals (Holland, 1968). It showed no relation to career decidedness (Hirschi & Läge, 2007), or career maturity (Babarović, Černja, & Šverko, 2015). In light of these associations, it can be posited that between the differentiation and consistency constructs, differentiation seems to have a stronger association with career development outcomes such as career indecision (Babarović et al., 2015; Hirschi & Läge, 2007; Villwock et al., 1976).

Career Indecision

There is a long tradition of research on career indecision. Career indecision is viewed as a state of not being able to make a decision related to one's career when confronted to the need to do so (Gati, Krausz, & Osipow, 1996; Osipow, 1999). Indecision is a normal aspect of career development, and should be distinguished from indecisiveness, a state of chronic indecision affecting multiple aspects of life (Gati & Asher, 2001; Osipow, 1999; Santos, Ferreira, & Gonçalves, 2014). According to Gati, Fassa, and Houminer (1995), career indecision can be conceptualized as resulting from difficulties making vocational choices. Gati et al. (1996) developed a taxonomy of career decision-making difficulties that can be assessed with the Career Decision-making Difficulties Questionnaire (CDDQ). The CDDQ includes ten specific difficulties grouped in three clusters: Lack of Readiness, Lack of Information, and Inconsistent Information. Although the original three-factor structure of the CDDQ has been supported in Israeli and US student samples (Gati et al., 1996) and across several cultures (e.g., Tien, 2005; Vahedi, Farrokhi, Mahdavi, & Moradi, 2012), the Lack of Readiness dimension and its sub-scales (i.e., Lack of Motivation, Indecisiveness, and Dysfunctional Beliefs) exhibited marginal internal reliability coefficients in most studies as reviewed by Sovet, Tak, and Jung (2015). According to these authors, the low internal reliability coefficient observed for this dimension may be due to the broad concepts covered by both the Lack of Motivation and Indecisiveness sub-scales. Moreover, career decision-making difficulties have been linked to several constructs. Researchers have shown that career decision difficulties are linked with career decision-making self-efficacy (e.g., Osipow & Gati, 1998; Sidiropoulou-Dimakakou et al., 2012; Sovet et al., 2015), personality traits (e.g., Marcionetti & Rossier, 2016; Martincin & Stead, 2015), and locus of control (e.g., Lease, 2004), as well as with contextual dimensions, such as parenting style (e.g., Sovet & Metz, 2014), and career related outcomes such as work knowledge (e.g., Lease, 2004), and career decidedness (e.g., Kleiman et al., 2004). Career decision-making difficulties were found to be antecedents of a lack of determination, decision-making confusion, and commitment

difficulty (e.g., Sidiropoulou-Dimakakou, Mylonas, Argyropoulou, & Tampouri, 2012). It has been demonstrated that participating in career transition workshops or career counseling sessions decreases career decision-making difficulties (Gati, Ryzhik, & Vertsberger, 2013; Masdonati, Massoudi, & Rossier, 2009).

According to some authors, interests and career decision could be linked (e.g., Tracey, 2008; Volodina & Nagy, 2016) in that a differentiated and consistent interest profile should facilitate making a career choice (e.g., Nauta & Kahn, 2007; Lent et al., 1994). Xu (2017) reported several studies conducted on high school and college students where interest congruence was determinant in the career decision-making process. Regarding career decision-making difficulties, gender differences were investigated in several cultures and researchers found no differences (e.g., Gati et al., 2000; Lancaster, Rudolph, Perkins, & Patten, 1999; Vertsberger & Gati, 2016) or few (e.g., Sovet et al., 2015). The CDDQ (Gati et al., 1996; Gati, Krausz, Osipow, & Saka, 2000) has been translated into more than 30 languages and has demonstrated strong validity in diverse contexts (e.g., Creed & Yin, 2006; Mau, 2001; Sovet et al., 2015) and across different linguistic groups of the same country (e.g., Sovet, DiMillo, & Samson, 2016). However, no research to date using the CDDQ has been conducted in Africa.

The Present Study

Previous cross-cultural studies conducted in other countries suggest that the spherical structure and the three-factor model should replicate for the PGI and the CDDQ, respectively. Moreover, several researchers report gender differences in vocational interests using the PGI across countries whereas very few gender differences have been found for the CDDQ. Finally, no operationalization of both differentiation and consistency of interests has been yet proposed for the PGI and consequently, their association with career decision-making difficulties has never been examined. Therefore, this study aimed to:

(1) test the cross-cultural replicability of the structure underlying both the PGI and the CDDQ in two French-speaking countries separated by a large cultural distance, Switzerland and Burkina Faso;

(2) test gender differences for both instruments in both countries;

(3) propose an operationalization of both differentiation and consistency for the PGI 18-type model, and evaluate its association with career decision-making difficulties.

Method

Participants

A total of 700 participants (Switzerland: *n* = 413*;* Burkina Faso: *n* = 287) participated in this study. The Swiss sample consisted of 190 men (46%) and 223 women aged 16 to 42 (*M* = 22.24, *SD* = 3.83). Most of them were university students enrolled in various majors such as social sciences (22.28%), science, technology, engineering or mathematics (18.89%), accounting, economics or business (11.86%), law (12.11%), biological or health sciences (9.44%), literature (5.81%), or professionals from various fields (11.38%). A small proportion of participants (8.23%) mentioned neither their major nor their profession. The Burkinabe sample consisted of 141 men (49.1%) and 146 women, all university students aged 16 to 41 (*M* = 24.83, *SD* = 3.76), enrolled in social sciences (28.90%), science, technology, engineering or mathematics (1.70%), accounting, economics or business (26.50%), biological or health sciences (16.00%), and literature (26.80%).

Instruments

Personal Globe Inventory (PGI). Vocational interests were assessed using the French version of the PGI (Tracey, 2002) translated by Eurotests Editions (B. Langelier, personal communication, July 1, 2013). The first part of the PGI consists of 108 occupational titles for which participants rate the extent to which they like these occupations using a 7-point Likert-type scale ranging from *strongly dislike* (1) to *strongly like* (7). The second part of the PGI consists of 113 occupational activities (108 tied to 18 spherical scales of 6 items

each, and 5 exploratory items) for each of which participants are asked to respond twice. Participants first use a 7-point Likert-type scale ranging from *strongly dislike* (1) to *strongly like* (7) to rate the extent to which they like these occupational activities. Second, they use a 7-point Likert-type scale ranging from *unable to do* (1) to *very competent* (7) to rate their competence beliefs regarding these occupational activities. Therefore, the 334 items of the PGI assessthree sets of 18 spherical scales. The three sets of 18 spherical scales are respectively related to activity preferences, activity competence beliefs, and occupational preferences. All together, these three sets of spherical scales allow for the computing of 18 composite spherical scales.

The 18 spherical scales are named Social Facilitating, Managing, Business Details, Data processing, Mechanical, Nature/Outdoors, Artistic, Helping, Social sciences, Influence, Business Systems, Financial Analysis, Science, Quality Control, Manual Work, Personal Service, Construction/Repair, and Basic Services. Among these 18 spherical scales, the first eight scales constitute the 8-type model, the following five represent the higher prestige scales (Social Sciences to Quality Control) and the last five the lower prestige scales. The first eight spherical scales also allow for the computing of four general scales named People, Things, Data, and Ideas, derived from Prediger's bipolar model, the six Holland RIASEC types, and the three dimensional scales named People vs. Things, Data vs. Ideas, and Prestige.

Internal reliabilities of the 18 composite spherical scales of the original version of the PGI ranged from .88 to .95 (*Mdn* = .93). Internal reliabilities ranged from .83 to .96 for the Swiss sample (*Mdn* = .92) and from .86 to .93 for the Burkinabe sample (*Mdn* = .90). Note that this manuscript presents only the results for the composite scales, but results for each set of scales can be found in the Appendix and Supplemental Materials.

Career Decision-making Difficulties Questionnaire (CDDQ). Career indecision was assessed using a French-validated version of the CDDQ (Gati et al., 1996, 2000; Rossier, Rochat, Sovet, & Bernaud, in press). The CDDQ consists of 34 items evaluating individuals'

perceived difficulties in the career decision-making process. The participants indicate the extent to which each item describes a difficulty they encounter using a 9-point Likert-type scale ranging from *does not describe me* (1) to *describes me well* (9). The CDDQ items are organized in ten sub-scales: Lack of Motivation (Rm), Indecisiveness (Ri), Dysfunctional Beliefs (Rd), Lack of Information about the Process (Lp), Lack of Information about the Self (Ls), Lack of Information about Occupations (Lo), Lack of Information about Additional Sources (La), Unreliable Information (Iu), Internal Conflicts (Ii), and External Conflicts (Ie). The ten sub-scales are grouped into three main categories or dimensions: Lack of Readiness includes Rm, Ri, and Rd; Lack of Information includes Lp, Ls, Lo, La; and Inconsistent Information includes Iu, Ii, and Ie. A total score can be computed.

Scores for each of the three major categories were computed by taking the mean score of their sub-scales. Cronbach α coefficients of the French-validated version of the CDDQ were .93 for the 34-item total score, .62, .93, .89 for the three main categories, and ranged from .58 to .87 (*Mdn* = .78) for the 10 sub-scales. For the 10 sub-scale scores, Gati et al. (1996) reported median Cronbach's internal reliability of .78 for the Israeli sample, and of .77 for the American sample. Furthermore, Willner, Gati, and Guan (2015) found a median Cronbach's internal reliability of .82, .70, .90, and .87 for the US adult, Israeli, US student, and Chinese samples, respectively. In this study, median Cronbach's internal reliabilities were .70 and .63 for the 10 sub-scale scores in the Swiss and the Burkinabe samples, respectively.

Procedure

Swiss university students were recruited at the University of Lausanne and at the Swiss Federal Institute of Technology of Lausanne. Flyers explaining the objective of the study and calling for participation were distributed either during class courses or just after with the permission of teachers on these two campuses. Some large posters were also placed in heavily frequented areas of the campuses such as libraries and restaurants. Prior to completing the questionnaire, potential participants were asked to send an email to the first

author to get the questionnaire's online link and their participation ID, a personal code by which each of them could access the online questionnaires. All participants who completed the questionnaires within three weeks received a shopping gift card worth twenty Swiss francs as compensation. The recruitment process of professionals was similar except that they were contacted directly by email through a directory of potential participants of the Psychology Institute of the University of Lausanne. Items of the online questionnaire required responses, which led to no missing data for Swiss participants.

Burkinabe students at the University Norbert Zongo were invited to voluntarily complete a paper-pencil version of the PGI and CDDQ during a university course. An online questionnaire is not well suited to this context where access to the internet is difficult and not free of charge. No compensation was offered, as the questionnaire was administered during a regular class session. Questionnaire completing sessions were organized by the co-author working at the University Norbert Zongo with volunteers only. Cases with a high rate of missing responses (more than 10%) were not used in analyses. For this reason, eight Burkinabe cases were excluded.

Analyses

First, descriptive statistics were computed. Internal reliabilities were assessed using Cronbach's alpha. To assess scales' distribution, Skewness (*S*) and Kurtosis (*K*) were computed. Values lower than 1 in absolute value indicate a more or less normal distribution.

Randomization Tests of Hypothesized Order Relations. In order to analyze the spherical distribution of the PGI scales in each country, randomization tests of hypothesized order relations were conducted using the computer program RANDALL (Hubert & Arabie, 1987; Tracey, 1997a, 2000). Randomization tests were conducted for the 18 spherical scales, the 8-type model, and the RIASEC model. According to the circular order model assumption, two spatially close variables will be more correlated than two variables spatially away from one another (Tracey, 1997a, 2000). Correlation matrices for the RIASEC model, 8-type

model, and 18 spherical model are respectively associated with a total of 72, 288, and 9,472 predictions (e.g., Etzel et al., 2015). A correspondence index (CI) derived from the number of predictions that were met over the number of predictions allows to assess the fit of a circular model to data. The CI ranges from –1 (misfit, none of the total predictions were met) to 0 (50% of predictions were met) to +1 (perfect fit, 100% of predictions were met). A CI of .50 with a significant *p* value (<.05), indicating that 75% of predictions were met, is considered as an adequate fit. In order to assess an in-depth cross-cultural invariance, difference in fit statistics were computed for the RIASEC model, the 8-type model, and the 18 spherical scalesacross the two-country pairs of data sets, and by gender using the R version of RANDMF program (Tracey, 1997a). This analysis allows one-to-one comparisons of correlation matrices for example Swiss women compared to Burkinabe women, and yields for each comparison a CI that indicates whether model fit is better in one of the compared two groups. A non-significant CI ($p > .05$) indicates structural invariance across two groups which matrices are compared. A negative CI indicates a better fit in the second sample whereas a positive CI indicates a better fit in the first sample.

Confirmation Factor Analyses (CFA). To assess the measurement invariance level of the scales of both instruments, we computed CFA to assess the construct validity of both instruments. For the PGI, prior to CFA, a principal components factor analyses with varimax rotation was computed for each country and a three-factor solution was considered, taking into account the three-dimensional space of the spherical structure of the PGI. Rotation was applied to avoid generating a general factor and to assure repartition of variance among the three factors. The objective of such approach was to determine the model that will be specified in CFA. For the CDDQ, the original and theoretical three-factor structure was considered. Various goodness-of-fit indices were considered. For the χ^2 per degree of freedom (χ^2/df), a model is considered to be adequate if the value is equal or below 3. For the

comparative fit index (CFI) and the Tucker-Lewis index (TLI) values of .90 or above indicate an adequate model (Byrne, 2010). Finally, a root mean square error of approximation (RMSEA) of .08 or less indicates an adequate fit and a value of .05 or less indicates a good fit (Hu & Bentler, 1999). In order to further assess the configural, the metric, and the scalar invariance across both countries and their respective gender groups, multi-group confirmatory factor analyses (MGCFAs) were conducted for each instrument (for an example of the use of this approach, see Rossier et al., 2016). To assess the fit of each model, the changes in model fit statistics were inspected (Vandenberg & Lance, 2000) as well as the changes in CFI, that should be less than .01 (Cheung & Rensvold, 2002), or less than .002 according to Meade, Johnson, and Braddy (2008), and changes in RMSEA that should be lower than .05 (e.g., Savickas & Porfeli, 2012).

Interests' Differentiation and Consistency Indices. We first computed the RIASEC differentiation and consistency indices as proposed by Tracey et al. (2014). Considering that these indices are difficult to generalize to a three-dimensional space, we developed alternative RIASEC differentiation and consistency indices and generalized them to PGI's three-dimensional space. Following the suggestions of Tracey et al. (2014), we developed indices of elevation, amplitude, and consistency for both the RIASEC and the PGI. Elevation was assessed by computing the mean across all scores. Amplitude was assessed by computing the standard deviation of the profile scores, which thus represents a dispersion index. In terms of consistency, we have stated that scores with a consistent profile should be strictly the opposite of the order of distances that separate the strongest interest from other interests. This means that the further an interest is away from the greater interest, the lower the score should be. To assess this, we considered a regular distribution of interests in the plane (RIASEC) and in the space (PGI spherical model), and were able to define a theoretical order for consistent profiles. We therefore propose to express the consistency of a profile by the opposite of the value of the Spearman correlation coefficient calculated between the scores of the profile and

the distances that separate the position of the most marked interest (the exact position of these interest types in the plane or space, an example and a R syntax to calculate these indices are provided in Appendix 1).

Below are the formulas for the RIASEC model to calculate indices for an individual *i*, with the following RIASEC scores, $R = x_{i1}$, $I = x_{i2}$, $A = x_{i3}$, $S = x_{i4}$, $E = x_{i5}$ and $C = x_{i6}$. For the consistency $\vec{y}_{max}$ corresponds to the coordinates of the highest score and *d* was used for distance.

$$elevation_i = \bar{x}_i = \frac{\sum_{j=1}^{6} x_{ij}}{6}$$

$$amplitude_i = s_i = \sqrt{\frac{\sum_{j=1}^{6}(x_{ij} - \bar{x}_i)^2}{5}}$$

$$Consist. = C_i = -r(rank(x_{i1}, x_{i2}, \dots, x_{i6}), rank(d(\vec{y}_{max}, \vec{y}_R), d(\vec{y}_{max}, \vec{y}_I), \dots, d(\vec{y}_{max}, \vec{y}_C)))$$
$$= -r_S\big((x_{i1}, x_{i2}, \dots, x_{i6}), (d(\vec{y}_{max}, \vec{y}_R), d(\vec{y}_{max}, \vec{y}_I), \dots, d(\vec{y}_{max}, \vec{y}_C))\big)$$

For the PGI the indices were calculated the same way for an individual *i*, with the following PGI scores, $F1 = x_{i1}$, $F2 = x_{i2}$, $F3 = x_{i3}$, …, $F18 = x_{i18}$.

$$elevation_i = \bar{x}_i = \frac{\sum_{j=1}^{18} x_{ij}}{18}$$

$$amplitude_i = s_i = \sqrt{\frac{\sum_{j=1}^{18}(x_{ij} - \bar{x}_i)^2}{17}}$$

$$Consist. = C'_i = -r(rank(x_{i1}, x_{i2}, \dots, x_{i18}), rank(d(\vec{y}_{max}, \vec{y}_{F1}), d(\vec{y}_{max}, \vec{y}_{F2}), \dots, d(\vec{y}_{max}, \vec{y}_{F18})))$$
$$= -r_S((x_{i1}, x_{i2}, \dots, x_{i18}), (d(\vec{y}_{max}, \vec{y}_{F1}), d(\vec{y}_{max}, \vec{y}_{F2}), \dots, d(\vec{y}_{max}, \vec{y}_{F18})))$$

For the RIASEC, our elevation index is strictly the same as the one proposed by Tracey et al. (r = 1.00), and our amplitude index is very close to Tracey et al.'s (r = .94). Our consistency index is slightly different from the index suggested by Tracey et al. (r = .77).

Interestingly, if Tracey et al.'s amplitude and consistency are quite correlated (r = .67), this seems to be less the case with our indices (r = .34).

Results

Descriptive statistics (mean, standard deviation, skewness, kurtosis, and internal reliabilities) for both samples, for both instruments, and for all scales are reported in Table 1 (PGI's composite scores and CDDQ) and in the Appendix 2 (PGI's activity preferences, activity competence beliefs, and occupational preferences). Mean and standard deviation are indicated separately for men and women. For the PGI, Cronbach's α reliabilities ranged similarly across its dimensions for both countries and were close to those reported by Tracey (2002) in a US sample. With respect to the CDDQ, Cronbach's αs were slightly lower for the ten sub-scales, the three dimensions and the total score in the Burkinabe sample than in the Swiss sample but in both cases were similar to those reported in Israeli and US samples (Gati et al., 1996, 2000). Specifically, alpha was low for *dysfunctional beliefs* (.48) in the Swiss sample, and for *indecisiveness* (.46), *lack of motivation* (.46), and *dysfunctional beliefs* (.41) in the Burkinabe sample. The Lack of Motivation sub-scale and the Dysfunctional Beliefs sub-scale replicated the results in the American sample of Gati et al. (1996).

PGI's Spherical Structure in Switzerland and Burkina Faso

The randomization tests were conducted and difference in fit statistics were computed separately for each country and for each gender (see Table 2). For both countries, the data fit a circular structure for the RIASEC and 8-type models, and a spherical structure for the 18-type model. Considering gender, CIs ranged from .71 to .92 for the RIASEC model, from .68 to .86 for the 8-type model, and from .42 to .59 for the 18-type spherical model. Most CIs yielded for both countries were above .50, indicating that more than 75% of predictions were met in most of cases. More precisely, all CIs were above .50 for the Swiss data and only the three CIs yielded for the 18 spherical scales across the Burkinabe men (.42), women (.44), and overall sample (.46) were below .50. Overall, the CIs for men and women were slightly

higher in Switzerland where they ranged from .56 to .92 (*Mdn* = .83) compared to Burkina Faso were they ranged from .42 to .81 (*Mdn* = .70). Moreover, there were no statistically significant differences (all $p > .05$) in the fit of the circular order structure across the two countries, and their gender groups regarding each of the three interest models (i.e., RIASEC, 8-type, and 18-type). Overall, these results support the circular structure of the 6- and 8-type models and the spherical structure of the 18-type model of the PGI in both Switzerland and Burkina Faso.

Measurement Invariance Across Countries and Gender Groups

In order to assess the measurement invariance of the PGI and the CDDQ across the two countries, an overall model was first assessed for both instruments. These models were then used to conduct MGCFAs (see Rossier et al., 2016 for an example of this procedure).

To define the model for the PGI, all loadings above .40, observed in at least one country with the exploratory factor analyses, were considered. Fit indices of this initial model were lower than the values indicating an adequate fit: $\chi^2(118) = 3{,}092.16$, $p < .001$, $\chi^2/df = 26.21$, CFI = .788, TLI = .725, and RMSEA = .019. Adjusting this model by taking into account 7 covariances between error terms associated with modification indices equal or above 50, led to a model with improved fit indices: $\chi^2(111) = 1{,}482.89$, $p < .001$, $\chi^2/df = 13.36$, CFI = .902, TLI = .865, and RMSEA = .133. A MGCFA of this adjusted model (see Table 3) was computed across the two countries. CFI, TLI, and RMSEA had a modest fit, indicating that this model seems to reach configural invariance. The ΔCFI and ΔRMSEA suggest that the composite spherical scales of the PGI reach metric invariance but not scalar invariance across countries. Furthermore, MGCFAs were computed across gender groups, for each country. CFIs, TLIs, and RMSEAs indicated an almost adequate fit for Switzerland and a slightly lower fit for Burkina Faso. Moreover, ΔCFIs and ΔRMSEAs are all low suggesting that the composite spherical scales of the PGI reach metric and even scalar invariance across

countries' respective gender groups.

For the CDDQ, the initial overall three-factor model had adequate fit indices: $\chi^2(24) = 123.50$, $p < .001$, $\chi^2/df = 5.15$, CFI = .956, TLI = .934, and RMSEA = .077. A series of MGCFA were then conducted to assess measurement invariance across the two countries and their gender groups. As can be seen in Table 3, results indicated that the CDDQ reached configural invariance (CFI and TLI > .90 and RMSEA < .06), and metric and scalar invariance, (ΔCFIs $\leq$ .001 and ΔRMSEAs $\leq$ .01) across both countries and their respective gender groups.

Gender Differences

Concerning gender differences for Switzerland, overall significant differences for the PGI's composite scales were observed for the 18 spherical scales ($F_{18,394} = 22.44$, $p < .001$, $\eta^2 = 0.51$), the 4 general scales of People, Things, Data and Idea ($F_{4,408} = 69.40$, $p < .001$, $\eta^2 = 0.41$), the RIASEC scales ($F_{6,406} = 50.26$, $p < .001$, $\eta^2 = 0.43$), and the 3 dimensional scales of People/Things, Idea/Data, and Prestige ($F_{3,409} = 86.89$, $p < .001$, $\eta^2 = 0.39$). On the PGI, men scored higher on Business Detail, Data Processing, Mechanical, Nature/Outdoors, Influence, Business Systems, Financial Analysis, Science, Quality Control, Manual Work, and Construction/Repair spherical scales; on the RIASEC higher on Realistic, Investigative, and Conventional scales; for the four general scales on Things and Data; and for the three dimensional scales on Ideas/Data. Women scored higher on Social Facilitating, Helping, Social Sciences, and Personal Service spherical scales; on the RIASEC Social scales, on the four general scales of People; on the three dimensional scales of People/Things and Prestige. Effect sizes were high with *d*s equal or above 0.80 for many scales (see Table 1). For the CDDQ, the overall difference was significant for the 10 sub-scales ($F_{10,402} = 4.30$, $p < .001$, $\eta^2 = 0.10$) but not for the three main dimensions ($F_{3,409} = 1.30$, $p = .28$, $\eta^2 = 0.01$). Men scored slightly higher on *lack of motivation* whereas women scored slightly higher on *indecisiveness*.

Concerning gender differences in Burkina Faso for the PGI, the overall main effects were significant for the 18 spherical scales ($F_{18,268} = 8.44$, $p < .001$, $\eta^2 = 0.36$), the 4 general scales People, Things, Data, and Idea ($F_{4,282} = 12.71$, $p < .001$, $\eta^2 = 0.15$), the RIASEC scales ($F_{6,280} = 9.09$, $p < .001$, $\eta^2 = 0.16$), and the 3 dimensional scales People/Things, Idea/Data, and Prestige ($F_{3,283} = 17.68$, $p < .001$, $\eta^2 = 0.16$). Men scored higher on the spherical scales of data processing and mechanical; on RIASEC realistic and conventional scales; on the 4 general scales of People, and the three dimensional scales of Prestige. Women scored higher on the spherical scales of social facilitating, artistic, helping, personal service and basic services; on the RIASEC artistic and social scales; on the four general scales of People; and on the three dimensional scales of People/Things. Effect size coefficients were low with only one large effect size for the People/Things dimensional scales. Regarding the CDDQ, the overall gender difference was non-significant across the ten sub-scales ($F_{10,276} = 1.36$, $p = .20$, $\eta^2 = 0.05$) but significant across the three main dimensions ($F_{3,283} = 3.25$, $p = .02$, $\eta^2 = 0.03$). More specifically, Burkinabe women scored higher on the total score, Lack of Readiness and Inconsistent Information main dimensions, and on Lack of Motivation, Indecisiveness, Lack of Information about the Self, and Unreliable Information sub-scales. Within each country, overall gender differences were larger for interests compared to career decision-making difficulties.

PGI's Differentiation and Consistency Indices and the CDDQ

The correlations between PGI differentiation and consistency indices are reported in Table 4. The correlations show that the newly developed indices are identical or very similar to the indices proposed by Tracey et al. (2014). Low but significant correlations between PGI differentiation and consistency indices and career decision-making difficulties were observed for Switzerland but not for Burkina Faso. No such significant correlations were observed across the RIASEC model within both country samples.

Regarding the PGI spherical model, within Switzerland, interests differentiation indices ranged from 2.54 to 15.43 (M = 7.78, SD = 2.38) and consistency indices ranged from –.47 to .86 (M = .32, SD = .29). Correlations between interests differentiation and the ten CDDQ sub-scales were very low and significant only for lack of information about the self (r = –.10, p < .05). Moreover, correlations between consistency and CDDQ sub-scales were low and significant only for *lack of motivation* (r = –.12, p = .01). Within Burkina Faso, interests differentiation indices ranged from 2.37 to 13.80 (M = 6.61, SD = 1.97) and consistency indices ranged from –.38 to .89 (M = .33, SD = .27). Correlations between differentiation and consistency indices and the CDDQ ten sub-scales were all very low and non-significant. Interestingly, elevation did correlate significantly with *inconsistent information* in either country.

Discussion

The findings of this study provide strong support for the structural validity and cross-cultural replicability of both the PGI and the CDDQ in Switzerland and Burkina Faso. We assessed the validity and the cross-cultural replicability of the PGI spherical structure by means of two approaches in order to overcome the limitation of conducting only randomization tests (Etzel et al., 2015). In addition to randomization tests for gauging the spherical structure of the PGI, MGCFAs were used to assess not only the configural but also the metric and scalar invariance of the PGI composite scales. Results indicated that the PGI reached configural and metric but not scalar invariance across the two cultures, suggesting that country-specific norms should be considered (Duarte & Rossier, 2008). Moreover, the PGI reached scalar invariance across gender in both countries. For the CDDQ, MGCFAs suggested that this instrument reached configural, metric, and even scalar invariance across countries and gender. Finally, interests differentiation and consistency were weakly related with career decision-making difficulties, suggesting that the development of interests and the specific difficulties one may have at a specific moment are two quite unrelated aspects, one

developing over a long period of time, the other occurring at a specific moment.

Descriptives

Cronbach's internal reliabilities showed a similar range for the PGI in Switzerland and Burkina Faso considering the composite scales, and were close to those observed in the original US sample (Tracey, 2002). Similar results have been reported in other cultures, including China (e.g., Long, Adams, & Tracey, 2005) and Ireland (e.g., Darcy, 2005). With respect to the CDDQ, as in previous studies, the internal reliability of Dysfunctional Beliefs sub-scale was the lowest, in the unacceptable range for the Swiss (α = .48) and the Burkinabe (α = .41) samples. Similary, Gati and colleagues (1996) reported α = .40 and Lancaster and colleagues (1999) α = .34 for this sub-scale while Sovet and colleagues (2015) suggested the cancellation of the Dysfunctional Beliefs sub-scale in validating the CDDQ in the Korean context. Likewise, internal reliabilities for indecisiveness and lack of motivation in the Burkinabe sample were in the unacceptable range while they ranged from questionable to acceptable in the Swiss sample. Reliability was poor for the Lack of Readiness dimension in both countries, a finding that has been attributed in a previous study to the broad concepts covered by this dimension (Sovet et al., 2015). Overall, internal reliabilities of the CDDQ sub-scales and dimensions were quite similar to those reported in the original Israeli and US samples and furthermore in several cultures (see Sovet et al., 2015). Moreover, the ranges of skewness and kurtosis values computed for the PGI and CDDQ sub-scales indicate that distributions for both samples in this study are generally close to normal. Differentiation and consistency indices that were developed for the spherical model of interests are very similar to those developed by Tracey et al. (2014) for the RIASEC model.

Spherical Distribution of PGI's Scales Across Both Countries

Randomization tests were calculated to assess the circular structure of the PGI composite 6- and 8-type scales, and the spherical structure of the PGI composite 18-type scales. Overall, these tests yielded similar CI values for both countries and genders. The CI

values found in Switzerland for the 6-type, 8-type, and 18-type structures, and those found in Burkina Faso for the 6- and 8-type structures were similar to those found in several other countries and cultures including the US (Tracey, 2002), China (Long et al., 2005), Japan (Long et al., 2006), Serbia (Hedrih, 2008), Croatia (Šverko, 2008), and Germany (Etzel et al., 2015). However, the CIs found for the 18-type structure across both Burkinabe gender and overall sample were low compared to those found in the above-mentioned cultures. This suggests that although the Burkinabe data fit a circular structure significantly for the 6-, 8-, and 18-type models, the fit was lower for the latter. This cross-cultural difference might be further studied. Moreover, the randomization test of difference in fit revealed no statistically significant differences across the two countries or across gender. Overall, these two sets of analyses confirmed that the structure underlying the PGI seems to replicate well in the two countries.

Cross-cultural Replicability of the PGI and the CDDQ

Several methodologists have suggested that construct or configural invariance is not sufficient to determine that scores can be compared (van de Vijver, 2011). For this reason, we also assessed the measurement invariance of the PGI 18 spherical scales by conducting a MGCFA (Byrne, 2010; Hu & Bentler, 1999; Vandenberg & Lance, 2000). The fit indices showed that the PGI reached configural and metric invariance across Switzerland and Burkina Faso but not scalar invariance, as expected. This suggests that the structure and the metric of the scale are similar in the two countries but that the origin of the scales might be slightly different. For this reason, specific norms have to be developed for each country. However, scalar equivalence was reached across gender groups in both countries, indicating that gender differences can be interpreted.

To our knowledge, although the CDDQ have been translated and validated in several countries, there is no cross-cultural research to date that evaluates its replicability simultaneously across different contexts. Indeed, several studies conducted in a single country

have replicated the original three-factor structure (e.g., Lozano, 2007; Mau, 2001; Osipow & Gati, 1998). Our findings indicate configural, metric, and scalar invariance across countries and gender groups for the CDDQ, suggesting that country and gender scores can be compared. Knowing that these career decision-making difficulties may be influenced by the availability of contextual resources such as availability of information about occupations or trainings, it is surprising that the psychometric properties of the CDDQ were not affected by the cultural context.

The PGI and CDDQ's cross-cultural level of invariance is surprising. Indeed, several previous findings concerning Holland's RIASEC model seemed to indicate that its hexagonal structure varies across cultures, suggesting that the structure underlying vocational interest might be culture-specific (e.g., du Toit & de Bruin, 2000; Farth, Leong & Law, 1998; Long & Tracey, 2006). Interestingly, the structure underlying the PGI has replicated well in some Asian countries (e.g., Long et al., 2005; Long et al., 2006; Zhang, Kube, Wang, & Tracey, 2013), as it did in our two countries, which are economically and culturally very different. Like most developed countries, Switzerland has a high standard of living, an effective educational system, good working conditions, and a very low unemployment rate compared to Burkina Faso, which is classified as a developing economy and offers less training and work opportunities. Furthermore, Switzerland is considered an individualistic country while Burkina Faso is viewed as collectivist. Culturally-related beliefs, values, and behaviors could have an impact on the structure of both interests and career decision-making difficulties (Hofstede, 1980, 1991). However, this seemed not to be case in our study, suggesting that the underlying structure of both interests and career decision-making difficulties are less impacted by cultural context. Contrary to what might be expected, both the PGI and the CDDQ appear to have strong replicability across these contexts. Although our findings suggest that both the PGI and CDDQ can be used to assess vocational interests and career indecision in the two culturally different countries, context-specific norms should be

considered for the PGI, which did not reach scalar invariance.

Gender Differences in the PGI and the Career Decision-making Difficulties

Overall gender differences were significant for the PGI scales in Switzerland. Men scored higher on Ideas and Data scales whereas women scored higher on People, Things, and Prestige scales. These results reflect the reality in Switzerland where men dominate science, technology, engineering, and mathematics fields while women outnumber men in social science fields. Based on this, it can be expected that men score higher on prestige than women but the results were contrary to that expectation. One interpretation of these findings is that female college students' career behaviors might be more influenced by expectations than by real work experience. Gender differences were also significant for PGI scales in Burkina Faso. Men scored higher on Ideas, Data and Prestige scales whereas women scored higher on People and Things scales. These results reflect the reality in almost all West Africa countries. In these countries, men largely dominate science fields (e.g. health sciences), which are seen as more prestigious than literature and social science fields largely where women outnumber men (Moumoula, 2013). Gender differences observed in Switzerland and in Burkina Faso were in line with those reported by several researchers in other cultures, women scoring higher on scales related with the People dimension whereas men score higher on scales related with the Things dimension (e.g., Darcy, 2005; Etzel et al., 2015; Long et al., 2006).

Consistent with previous studies, no overall gender difference was observed in Switzerland regarding career decision-making difficulties (e.g., Gati et al., 2000; Kleiman et al., 2004; Vertsberger & Gati, 2016). However, in Burkina Faso, women scored higher than men, which could mean that men are encouraged to make a career choice more quickly. Indeed, in African societies, men are traditionally in charge of the family and, therefore, this responsibility results in a social pressure that impels them to decide on their career path earlier compared to women. This strong social pressure on men leads them to make career decisions much sooner and to express less doubt than women, who often express more

indecision. Even if most studies reported no gender differences in career indecision, our results are consistent with other studies conducted in Western adolescents (e.g., Sovet & Metz, 2014; Vignoli, 2009). Authors of these studies explained the lower career indecision reported by men as being due to gender role socialization, encouragement by parents that leads men to engage earlier in career exploration, to be more confidence when making a career decision, and therefore to express higher levels of self-esteem. Further research about the determinants of the observed difference across women and men in Burkina Faso is certainly needed.

Interests' Differentiation and Consistency and Career Indecision

To our knowledge, this study is the first that has tried to compute differentiation and consistency indices for PGI's spherical model. The developed indices showed moderate to high correlations with Tracey et al.'s previous indices that derived from an enhanced approach, suggesting validity. We posited that high levels of interest differentiation and consistency should be associated with lower career decision-making difficulties. However, the development of vocational interests and the difficulties that occur during a choice might be two quite different realities, occurring in very different temporalities. Overall, correlations between differentiation/consistency of interests and career decision-making difficulties had negligible effect sizes, suggesting a lack of apparent associations between these constructs in both countries. In Switzerland, interest differentiation was associated significantly and negatively only with a *lack of information about the self* as observed by Gordon and Meyer (2002) in South African university students. Moreover, interest consistency was associated significantly and negatively only with *lack of motivation*. In Burkina Faso, interest differentiation and consistency were not associated with career decision-making difficulties. Although this was unexpected, these results are consistent with those of Nauta and Kahn (2007), who reported no association between career decision self-efficacy and interest differentiation and consistency in American young adults.

The little difference in results between Switzerland, where interest differentiation is negatively associated with *lack of information about the self*, and Burkina Faso, where this relationship was not significant, might be attributed to contextual factors such as their respective educational systems. In fact, the Swiss educational system offers more career exploration opportunities through activities at school and career development lessons. Swiss students have to decide whether they want to pursue education or vocational training after the ninth grade. In contrast, Burkinabe students do not benefit from career planning or exploration programs. As reported by Hirschi (2009), career exploration is a significant predictor of interest differentiation, which in turn relates to career-choice readiness. Furthermore, results suggest that individuals with a consistent profile would have fewer difficulties related to motivation in making a career decision in Switzerland but not in Burkina Faso. This can be explained by the fact that career decision-making might be importantly influenced in Burkina Faso by significant contextual factors such as job accessibility that could prevent individuals from choosing careers related to their preferred domains or fields (Moumoula, 2013).

Limitations

The findings of the present study should be considered in light of certain limitations. If the temporality of the occurrence of both the development of vocational interests (gradual long-term evolution) and the difficulties during a choice (occurring specifically during the process of choice) is one possible explanation for the lack/small association of interest differentiation/consistency with career decision-making difficulties, the level of education and the age of the participants could be another one. Of course, our two samples consisted of participants that were not confronted with a serious need to make a career decision as they had already made their choice of major. Conducting such a study across younger populations or populations confronted to a career choice such as high school students preparing for the school-to-university transition would have brought insight into this issue.

Tracey and colleagues (2014) highlighted some limitations in earlier operationalization of interests differentiation and consistency, explaining the lack of empirical evidence of their predictive value. In fact, there seems to be no consensus about the formulae that would better reflect these two constructs. we have developed an operationalization of both indices for the RIASEC and the PGI and interestingly, our indices positively correlated with Tracey et al.'s based on the cosine fit function. Though we were able to compare our indices with Tracey et al.'s RIASEC indices, such a comparison was not possible for the PGI 18-type model given the fact that there was no available operationalization of both construct for this latest model. Further methodical investigations are needed to provide insight into this issue (Černja, Babarović, & Šverko, 2016).

Conclusion

Overall, the findings of this study strongly support the structural validity and the cross-cultural replicability of both the PGI and the CDDQ in Switzerland and Burkina Faso. The circular structure of the RIASEC model, the 8-type model, the spherical structure of the 18-type model of the PGI, and the three-factor structure of the CDDQ were validated across college students in both countries. Results indicated that the PGI exhibited configural and metric invariance whereas the CDDQ exhibited scalar equivalence across countries. For this reason, mean scores across cultures could be compared for the CDDQ but not for the PGI for which country-specific norms should be considered. Moreover, scalar equivalence was reached across gender in both countries. In both countries and consistent with the literature, women expressed more interests for domains associated with the People dimension whereas men expressed more interests for domains associated with the Things dimension. For the CDDQ, no gender difference was observed in Switzerland, whereas men scored lower than women in Burkina Faso. Interest differentiation and consistency were not associated with career decision-making difficulties in Burkina Faso. However, we observed a weak negative correlation between differentiation and consistency, and the CDDQ's Lack of Information

about the Self and Lack of Motivation sub-scales in Switzerland. Results imply that career decision-making difficulties are not related to differentiation and consistency of vocational interests in Burkina Faso, but they are partially, weakly related in Switzerland.

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Table 1

Descriptive Statistics for the Composite Scores of the PGI and the CDDQ by Gender for Both Countries

	Switzerland (n = 413)								Burkina Faso (n = 287)							
	Men		Women						Men		Women					
	M	*SD*	*M*	*SD*	*d*	*S*	*K*	α	*M*	*SD*	*M*	*SD*	*d*	*S*	*K*	α
Personal Globe Inventory: Composite scores																
Spherical scales																
Social Facilitating	47.39	9.83	52.23	9.62	0.50***	0.15	-0.66	.86	48.10	9.80	51.84	9.88	0.38*	0.09	-0.26	.86
Managing	50.17	9.58	49.85	10.36	-0.03	0.12	-0.51	.89	49.57	10.35	50.42	9.67	0.09	-0.32	-0.36	.89
Business Detail	52.59	9.88	47.79	9.58	-0.49***	0.71	-0.43	.95	50.38	10.82	49.64	9.16	-0.07	-0.06	-0.60	.92
Data Processing	56.17	9.82	44.74	6.57	-1.39***	0.83	-0.08	.93	51.90	10.33	48.17	9.34	-0.38**	0.30	-0.36	.91
Mechanical	55.29	10.61	45.50	6.75	-1.12***	1.02	0.36	.93	51.50	10.63	48.55	9.16	-0.30*	0.50	0.27	.91
Nature/Outdoors	51.48	9.92	48.74	9.92	-0.28**	0.41	-0.58	.91	50.29	10.24	49.72	9.79	-0.06	0.25	-0.40	.89
Artistic	49.34	10.10	50.57	9.90	0.12	0.46	-0.67	.93	48.63	10.44	51.32	9.40	0.27*	0.15	-0.42	.90
Helping	45.22	8.63	54.07	9.28	0.98***	-0.07	-0.90	.92	47.12	9.76	52.78	9.45	0.59***	-0.30	-0.22	.87
Social Sciences	46.20	9.32	53.24	9.42	0.75***	0.01	-0.96	.94	49.82	10.08	50.18	9.95	0.04	-0.25	-0.40	.92
Influence	51.17	10.83	49.00	9.14	-0.22**	0.12	-0.17	.83	50.89	10.47	49.14	9.48	-0.18	-0.04	0.20	.87
Business Systems	54.56	9.85	46.12	8.37	-0.93***	0.56	-0.62	.94	50.72	10.91	49.30	9.02	-0.14	-0.14	-0.37	.92
Financial Analysis	53.37	10.14	47.13	8.95	-0.65***	0.63	-0.72	.96	50.56	10.39	49.46	9.62	-0.11	-0.08	-0.60	.93
Science	51.91	10.15	48.37	9.60	-0.36***	0.15	-0.87	.92	51.00	10.45	49.03	9.48	-0.20	0.12	-0.64	.91
Quality Control	54.65	10.98	46.04	6.97	-0.95***	0.80	0.29	.87	50.64	10.76	49.38	9.20	-0.13	0.35	0.29	.89
Manual Work	53.82	10.82	46.74	7.92	-0.76***	1.01	0.85	.88	51.04	10.48	49.00	9.44	-0.21	0.94	1.52	.90
Personal Service	47.65	9.17	52.00	10.26	0.44***	0.64	-0.13	.84	47.16	9.86	52.74	9.38	0.58***	0.54	0.69	.87
Construction/Repair	55.08	11.03	45.67	6.41	-1.06***	1.35	1.39	.93	50.52	10.44	49.50	9.57	-0.10	0.74	1.35	.90
Basic Services	49.12	10.17	50.75	9.82	0.16	0.43	-0.10	.83	48.34	10.44	51.60	9.31	0.33**	0.26	-0.03	.86
Six types																
Realistic	55.29	10.61	45.50	6.75	-1.12***	1.02	0.36		51.50	10.63	48.56	9.16	-0.30*	0.50	0.27	
Investigative	51.48	9.92	48.74	9.92	-0.28**	0.41	-0.58		50.29	10.24	49.72	9.79	-0.06	0.25	-0.40	
Artistic	49.34	10.10	50.57	9.90	0.12	0.46	-0.67		48.63	10.44	51.32	9.40	0.27*	0.15	-0.42	
Social	45.52	9.03	53.82	9.18	0.91***	-0.08	-0.83		47.24	9.77	52.66	9.52	0.56***	-0.17	-0.28	
Enterprising	49.25	9.66	50.64	10.26	0.14	0.18	-0.42		49.05	10.19	50.92	9.76	0.19	-0.20	-0.33	
Conventional	55.64	9.62	45.19	7.50	-1.06***	0.52	-		51.49	10.43	48.56	9.38	-0.14*	0.14	-	

					1.22		0.57					0.30		0.30
Four types														
People	46.56	9.66	52.93	9.35	0.67***	0.01	-0.56	47.68	10.06	52.24	9.45	0.47***	-0.03	-0.31
Things	55.63	9.97	45.20	7.12	-1.22***	0.70	-0.12	51.46	10.48	48.59	9.34	-0.29**	0.36	0.08
Data	52.05	9.88	48.25	9.79	-0.39***	0.26	-0.67	50.02	10.58	49.97	9.44	-0.01	-0.18	-0.15
Ideas	50.29	10.29	49.76	9.76	-0.05	0.26	-0.40	49.27	10.64	50.71	9.32	0.14	0.03	0.09
Dimensional														
People/Things	43.26	8.79	55.75	6.90	1.59***	-0.40	-0.53	46.12	9.02	53.75	9.48	0.83***	0.32	0.34
Ideas/Data	51.33	9.63	48.87	10.18	-0.25**	-0.07	-0.31	50.71	10.48	49.32	9.50	-0.14	-0.44	-0.19
Prestige	49.34	10.80	50.56	9.25	0.12*	-0.20	-0.37	51.21	9.86	48.83	10.02	-0.24**	0.06	-0.04
Career Decision-making Difficulties Questionnaire														
Lack of Readiness	4.26	1.10	4.21	1.17	-0.05	0.18	-0.47	.57	4.55	1.26	4.98	1.23	0.34**	0.11	-0.03	.52
Lack of Motivation	3.77	1.76	3.12	1.67	-0.38***	0.53	-0.47	.61	2.74	1.78	3.22	2.00	0.25*	0.77	-0.25	.46
Indecisiveness	5.11	1.99	5.79	1.98	0.34**	-0.23	-0.80	.72	5.52	2.21	6.06	1.90	0.26*	-0.29	-0.52	.46
Dysfunctional Beliefs	3.91	1.48	3.71	1.45	-0.13	0.41	-0.07	.48	5.39	1.72	5.66	1.71	0.16	0.78	-0.19	.41
Lack of Information	3.90	1.66	3.95	1.80	0.03	0.10	-0.92	.92	3.81	1.87	3.98	1.95	0.10	0.34	-0.50	.87
About Process	4.11	1.99	4.12	2.17	<0.01	0.15	-1.01	.84	4.14	2.43	4.36	2.42	0.09	0.30	-0.98	.76
About the Self	3.75	1.84	3.76	2.04	<0.01	0.42	-0.71	.81	3.37	2.03	3.62	2.25	0.12**	0.61	-0.55	.74
About Occupations	4.20	1.99	4.38	2.12	0.09	0.13	-1.03	.78	4.02	2.36	4.17	2.36	0.07	0.37	-0.89	.70
About Additional Sources	3.53	1.90	3.53	2.01	<0.01	0.49	-0.65	.61	3.72	2.47	3.79	2.53	0.03	0.55	-0.76	.61
Inconsistent Information	3.19	1.35	3.01	1.37	-0.12	0.42	-0.31	.79	3.31	1.74	3.69	1.70	0.24*	0.49	-0.18	.78
Unreliable Information	3.41	1.75	3.23	1.75	-0.10	0.62	-0.63	.68	3.36	2.05	4.02	2.19	0.31**	0.47	-0.68	.57
Internal Conflicts	3.65	1.56	3.52	1.58	-0.08	0.26	1.73	.64	3.39	1.91	3.73	1.83	0.18	0.58	-0.22	.65
External Conflicts	2.51	1.79	2.27	1.81	-0.13	1.53	-0.47	.73	3.17	2.57	3.32	2.59	0.06	0.95	-0.35	.80
CDDQ total score	3.79	1.19	3.74	1.24	-0.05	0.11	-0.80	.90	3.88	1.34	4.19	1.32	0.25*	0.23	-0.11	.87

Note. Cohen's *d*s are positive when women scored higher than men; *S* = skewness; *K* = kurtosis; α = Cronbach's alpha coefficient.

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

Table 2

Results of the Randomization Tests of Hypothesized Order Relations and Difference in Fit for Composite Scales in Both Countries

	Switzerland			Burkina Faso			Difference in fit*						
	All (a)	Women (b)	Men (c)	All (d)	Women (e)	Men (f)	b vs. c	e vs. f	b vs. e	c vs. f	b vs. f	c vs. e	a vs. d
	n = 413	*n* = 223	*n* = 190	*n* = 287	*n* = 146	*n* = 141							
RIASEC model													
Predictions made	72	72	72	72	72	72	72	72	72	72	72	72	72
Predictions met	69	69	66	66	64	61	65	58	63	60	61	64	65
CI	.92	.92	.83	.83	.78	.71	-.04	-.04	-.07	-.07	-.10	-.03	-.04
p	.02	.02	.02	.02	.02	.02	ns	ns	ns	ns	ns	ns	ns
8-Type model													
Predictions made	288	288	288	288	288	288	288	288	288	288	288	288	288
Predictions met	274	261	268	257	259	240	253	234	246	236	231	254	254
CI	.91	.82	.86	.79	.81	.68	.02	-.05	-.01	-.09	-.07	-.03	-.06
p	< .001	< .001	< .001	< .001	< .001	< .001	ns	ns	ns	ns	ns	ns	ns
18 spherical scales model													
Predictions made	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472	9,472
Predictions met	7,400	7,463	7,348	6,864	6,753	6,666	6,836	5,955	6,324	6,176	6,274	6,103	6,440
CI	.57	.59	.56	.46	.44	.42	-.01	-.01	.07	-.07	-.08	-.06	-.05
p	.001	.001	.001	.001	.001	.001	ns	ns	ns	ns	ns	ns	ns

Note. * Prediction met = number of predictions that are met in both groups and a negative CI indicates a better fit in the second sample whereas a positive CI indicates a better fit in the first sample; b vs. c = Swiss women are compared to Burkinabe women; e vs. f = Burkinabe women are compared to Burkinabe men; b vs. e = Swiss women are compared to Burkinabe women; c vs f = Swiss men are compared to Burkinabe men; b vs. f = Swiss women are compared to Burkinabe men; c vs. e = Swiss men are compared to Burkinabe Women; a vs. d = The Swiss overall sample is compared to the Burkinabe overall sample.

Table 3

Measurement Invariance for the PGI Composite Spherical Scales and the CDDQ Three-Factor Structure Across Countries and Gender

	χ^2	*df*	χ^2/df	*p*	CFI	TLI	RMSEA	$\Delta\chi^2$	Δdf	*p*	ΔCFI	ΔTLI	ΔRMSEA
PGI spherical model (adjusted) across countries													
Configural Invariance	1,795.84	222	8.09	< .001	.886	.843	.101						
Metric Invariance	1,900.13	251	7.57	< .001	.881	.855	.097	104.29	29	< .001	.005	<.001	.004
Scalar Invariance	2,279.66	269	8.48	< .001	.855	.835	.103	379.53	18	< .001	.026	.020	<.001
PGI spherical model (adjusted) across gender in Switzerland													
Configural Invariance	1278.40	222	5.76	< .001	.860	.807	.108						
Metric Invariance	1379.14	251	5.50	< .001	.851	.818	.105	100.74	29	< .001	.009	.011	.003
Scalar Invariance	1430.00	257	5.56	< .001	.845	.815	.105	50.86	6	< .001	.006	.003	<.001
PGI spherical model (adjusted) across gender in Burkina Faso													
Configural Invariance	780.19	222	3.51	< .001	.904	.868	.094						
Metric Invariance	826.62	251	3.29	< .001	.901	.880	.090	46.42	29	.021	.003	.012	.004
Scalar Invariance	839.86	257	3.27	< .001	.900	.881	.089	13.25	6	.039	.001	.001	.001
CDDQ across countries													
Configural Invariance	183.87	64	2.87	< .001	.950	.930	.052						
Metric Invariance	191.14	71	2.69	< .001	.950	.937	.049	7.27	07	.40	<.001	.007	.003
Scalar Invariance	195.11	73	2.67	< .001	.949	.938	.049	3.97	02	.13	.001	.001	.001
CDDQ across gender in Switzerland													
Configural Invariance	139.65	64	2.18	< .001	.953	.934	.054						
Metric Invariance	143.32	71	2.02	< .001	.955	.943	.050	3.68	07	.82	.002	.009	.004
Scalar Invariance	143.46	73	1.97	< .001	.956	.946	.048	0.14	02	.93	.001	.003	.002
CDDQ across gender in Burkina Faso													
Configural Invariance	115.93	64	1.81	< .001	.935	.908	.053						
Metric Invariance	119.15	71	1.68	< .001	.939	.923	.049	3.22	07	.86	.004	.015	.004
Scalar Invariance	121.47	73	1.66	< .001	.939	.925	.048	2.32	02	.31	<.001	.002	.001

Table 4

Correlation between the Differentiation and Consistency Indices of Interests in Switzerland and Burkina Faso

		1	2	3	4	5	6	7	8
Indices based on the cosine fit function method (Tracey et al., 2014)									
1.	RIASEC elevation	−							
2.	RIASEC amplitude	.08*	−						
3.	RIASEC consistency	.04	.67**	−					
Indices developed for this study									
4.	RIASEC elevation	1.00***	.08*	.04	−				
5.	RIASEC amplitude	.08*	.94***	.41***	.08*	−			
6.	RIASEC consistency	.02	.53***	.77***	.02	.34***	−		
7.	PGI elevation	.96***	.06	.04	.96***	.06	.02	−	
8.	PGI amplitude	.13**	.76***	.30***	.13**	.81***	.22***	.15***	−
9.	PGI consistency	−.07	.36***	.31***	−.07	.30***	.30***	−.10**	.14***

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

Highlights

- Strong support for the theoretical structures of both the PGI and CDDQ in Switzerland and Burkina Faso
- The PGI exhibited metric invariance, and the CDDQ scalar invariance across countries
- Both tools exhibited scalar invariance across gender in both countries
- There were larger gender differences in interests than in decision-making difficulties
- Differentiation and consistency of interests were associated with CDDQ in Switzerland only