

**HOLLAND'S THEORY IN AN INTERNATIONAL CONTEXT:
APPLICABILITY OF RIASEC STRUCTURE AND ASSESSMENTS**

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Abstract

Holland's RIASEC theory was designed to meet the vocational needs of people in the U.S. in the mid-twentieth century. This article reviews literature relevant to the applicability of the RIASEC model's structure and Holland-based assessments in global cultures and contexts for which they were not originally intended. We examined literature produced after a 1996 meta-analysis of a similar topic, which proved to be mixed but somewhat more supportive of the international applicability of RIASEC structure and Holland-based assessments. The discussion includes a commentary on the applicability of Holland's theory in a post-modern world with its global economy and rapid change.

**HOLLAND'S THEORY IN AN INTERNATIONAL CONTEXT:
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John L. Holland's (1997) RIASEC theory was designed to address vocational issues of people living in the U.S. in the mid-twentieth century. However, U.S. values of individualism, independent decision making, and immediate-family structure (Stead & Watson, 1998) are not the norm in many places, and relentless global change seems to further challenge this matching theory. As a result, some have criticized the contribution of Holland's theory and doubt its applicability to non-majority U.S. citizens and the 21st century worker in a global economy (Brown, 2002). This criticism seems to have amplified as there has been increased discussion of the internationalization of career counseling and a rise in post-modern thought with regards to how careers and working are conceptualized (Collin & Young, 2000; Savickas et al, 2009). The present literature review seeks to determine the current, international applicability of RIASEC structure and Holland theory-based instruments in a time of change.

Post-modern thought arose when modern philosophies encountered difficulties. Post-modern thought has been influential in many fields (i.e., literature, art, psychology) due to how it addressed cultural influences as diverse cultures have gained increased international respect (Kahn & Lourenco, 1999). Vocational psychology and counseling have also seen the influence of post-modern thought, which at times has led to criticism. For example, Coutinho, Dam, and Blustein (2008) went so far as to suggest that "the notion of career is no longer a sufficiently inclusive conceptual framework, which successfully encapsulates the experiences of work in the lives of the majority of people in the world today" (p. 12). Moreover, Savickas (1995) questioned the degree to which modern theories can address the needs of a post-modern world. Others have called for the revision of old theory, the creation of post-modern oriented theories of vocational

guidance, or the convergence of multiple, modern theories (e.g., Osipow, 1990; Savickas, 2005; Schultheiss, 2007; Severy, 2008; Young & Valach, 2004). Blustein (2006) noted that trait-and-factor theorists, such as Holland, perpetuate a tendency to focus on the privileged, well-educated worker. Others have said that RIASEC theory focuses on the parts and not the whole career development experience (Miller-Tiedeman & Tiedeman, 1985).

While some career scholars and practitioners question the currency of Holland's theory, Brown (2002) concluded that "...most career development theorists and practitioners are unready to jettison one hundred years of thought and research because of criticism from post-modern thinkers" (p. 513). Moreover, Holland's contributions remain evident in the literature. Ruff, Reardon, and Bertoch (2008) reported finding over 1,600 citations to Holland's RIASEC theory and applications in the literature from 1953 to early 2007. These citations were categorized into multiple groups and their identification of diverse populations was very helpful in organizing this literature review.

Although this article cannot respond to all of the concerns regarding Holland's theory, literature will be reviewed that is relevant to both the applicability of the structure of the RIASEC model as well as the development of Holland-based assessments in contemporary cultures and contexts for which they were not originally intended. The structure of the RIASEC model and the assessment of individuals' Holland types have been discussed and researched extensively, making these issues two important areas to understand regarding the cross-cultural applicability of Holland's theory. Savickas and colleagues (2009) have begun to develop new approaches to career development to meet the needs of a today's global economy. They have begun this development to "avoid the difficulties of creating models and methods in one country and then trying to export them to other countries" (p. 2). Despite their criticism of Holland's

theory, they contend “we must not lose sight of those valuable contributions of 20th century theories and techniques” (p. 2). Perhaps this comprehensive review of the current international applicability of the RIASEC structure and Holland based instruments will help scholars to understand where these 20th century techniques may or may not fit into the 21st century.

We will examine the actual evidence of the usefulness of Holland's theory and applications such as the Self-Directed Search (SDS; Holland, Fritzsche, & Powell, 1994) for diverse groups worldwide. The evidence will also help to demonstrate that many cultures continue to adopt the RIASEC model. The discussion will include a commentary on the applicability of Holland's theory in the 21st century with its global economy and rapid change, as well as some possible directions for future research.

Holland's RIASEC Structural Model

Holland's theory rests on four basic assumptions that describe how occupational interests are developed. The first assumption states that individuals can be categorized into Realistic (R), Investigative (I), Artistic (A), Social (S), Enterprising (E), and Conventional (C) types. The second assumption asserts that environments (e.g., places of employment) are also categorized into these same six types. This third assumption is that individuals tend to choose environments that fit with their personality. The fourth assumption highlights the importance of one's personality being congruent with his or her environment. It states that behavior is determined by the fit between an individual's personality and the environment by which he or she is surrounded (Holland, 1997).

The six RIASEC types are optimally represented by a circular order, also commonly referred to as the hexagonal model, and cited throughout this review as the RIASEC model. Holland's structure of six types into a hexagon is one of the most well replicated findings in the

history of vocational psychology (Rounds, 1995). The six domains are arranged according to their relative similarity in a hexagonal formation of R-I-A-S-E-C. For example, according to Holland's theory the Social and Enterprising types, which appear adjacent on the hexagon, are more alike than the Social and Realistic types which appear opposite from one another on the hexagon.

The validity of the RIASEC structure has been extensively studied and critiqued. Holland's assessment tools are utilized throughout the world, and it is important to understand the hexagonal structure of the RIASEC model in all countries and cultures in which it is utilized. Although Holland's system has been subjected to more empirical tests than any other vocational theory it still remains in the early phases of cross-cultural research (Spokane & Cruza-Guet, 2005). In countries other than the U.S., circumstances exist that may change the way occupational choice or the development of occupational interests evolve, including high unemployment rates, socioeconomic factors, collectivist cultures, school-to-work transition, feudal system, agrarian economy, and utilitarian values (e.g., Leong, Austin, Sekaran, & Komarraju, 1998; Long, Adams, & Tracey, 2005; Stead & Watson, 1998). Therefore, in the global economy different occupations are available with different distributions of the six types (Leong et al., 1998).

In addition, educational systems in other countries can vary greatly from the structure in place in the United States which was the context for Holland's theoretical and practical work. For example in China, college entrants must declare a major upon entrance and even prior to that must narrow potential majors into one of two tracks, science/technology and humanity/social science (Tang, 2001). High school students are required to decide prior to entrance exams, as the

exams differentiate majors falling into the two tracks. Similar early decisions about career tracks are seen in other countries (e.g., Šverko & Babarovic, 2006; Tak, 2004).

In the following section, we explore literature as it pertains to the understanding of the hexagonal model outside the U.S. by first describing some of the conceptual models that use Holland's theory, examining the findings of a highly relevant meta-analysis (Rounds & Tracey, 1996), and reviewing relevant literature not included in the Rounds and Tracey meta-analysis.

Seven Holland-Related Models for the Structure of Vocational Interests

Holland's RIASEC model has been elaborated in terms of a circular order hypothesis and a circumplex hypothesis. This was further elaborated in a schema by Prediger (1982), followed by a spherical model of interests posed by Tracey & Rounds (1995). We will elaborate on the Holland, Prediger, Tracey and Rounds, and partition models in the following paragraphs with a comment on cross cultural implications for each.

Two major structural hypotheses of Holland's model identified in the literature are (a) the circular order hypothesis and (b) the circumplex hypothesis (Rounds, Tracey, & Hubert, 1992). The circular order hypothesis is based on the idea that the inter-point distances for the six types are "inversely proportional to the theoretical relationships between them" (Holland, 1973, 1985, p. 5). In other words, adjacent types (e.g., RI, IA, AS, SE) should have a larger correlation than other correlations, and correlations between opposite types (e.g., RS, IE, AC) will be smaller than all others. This circular order structure has been supported in various contexts and has formed the basis of some of the most widely used vocational interest assessments, many of which are mentioned in the assessment portion of this article (e.g., Strong Interest Inventory; Harmon, Hansen, Borgen, & Hammer, 1994; Self-Directed Search; Holland, Fritzsche, & Powell, 1994). Rounds et al. (1992) suggest that the underlying structure of the circular ordering

of types is a circumplex. Similar to the circular order hypothesis, the circumplex hypothesis holds the same predictions for the relationships between types but adds that the correlations between each of the adjacent types will be equal, the correlations between each of the alternate types will be equal, and the correlations between each of the opposite types will be equal.

There have been mixed results regarding support for the circular structure of the RIASEC model across cultures. Some have proposed alternative models to explain interests that are not aligned with Holland's theory (Prediger, 1982; Tracey & Rounds, 1995). Rounds and Tracey (1996) used a meta-analysis to examine the cross cultural applicability of Holland's hexagonal structure.

Another method for representing the circumplex model is Prediger's (1982) two-dimensional schema of vocational interests, which is an additional way to view Holland's RIASEC hexagon. Prediger asserted that the hexagon is a multidimensional model which can be better represented using two bipolar dimensions. The two dimensions are labeled people-things and ideas-data.

Finally, as an extension of this model, Tracey and Rounds (1995) proposed a third dimension of vocational interests which they labeled prestige. They suggested that vocational interests are better represented by a sphere rather than a circle and unlike the hexagonal model, types on the spherical model are not of equal distance from their neighboring types.

For example, Liu and Rounds (2003) found in mainland China that the distances between the Realistic and Conventional types and Investigative and Artistic types were greater than other distances and proposed an octant model. This implies that RIASEC types are located on a circle at points in an octant model but with two empty spaces on the model, between R and C and also between I and A, for unspecified types.

Two variations on Holland's RIASEC scheme for organizing interests involve partitioning groups of interests in alternative arrangements. Gati (1979, 1982, 1991) proposed a hierarchical model of interests as an alternative to Holland's model, and suggested a three-group model partitioning interest domains as follows: R-I, A-S, and E-C. Gati's model predicts that the correlations between RIASEC types within a single category (e.g., R and I) are greater than the correlations between pairs of RIASEC types outside of the category (e.g., R and A). Rounds and Tracey (1996) noted problems inherent in both Holland and Gati's model based on the magnitude of relation of the A and S types, so they formulated an alternative three-group partition model similar to Gati's model which put A in its own category and S was added to the E-C category.

These three models, Holland's (1985) circular order model, Gati's (1982) three-group partition, and the Rounds and Tracey (1996) alternative three-class partition model were included in Rounds and Tracey's 1996 meta-analysis. These models were examined for structural equivalence across cultures and were based on the literature from 1970 to 1992. Rounds and Tracey examined the fit of these models using 96 international matrices from 19 countries including Australia, Brazil, Canada, Columbia, France, Guyana, Iceland, Indonesia, Israel, Malaysia, Mexico, New Zealand, Pakistan, Papua New Guinea, Paraguay, Portugal, Taiwan, 20 United States ethnic matrices, and a benchmark sample of 73 United States matrices.

They found that researchers varied in their methods for evaluating RIASEC structure in non-U.S. samples but most used one of the following: U.S. RIASEC measures, adaptation of U.S. RIASEC inventories, theory-constructed RIASEC measures, and translated U.S. RIASEC measures. Using Hubert and Arabie's (1987) randomization, they found that regardless of the assessment method used when studying Holland's model in other countries, the cross-culture

structural equivalence of Holland's circular order model was not supported. Additionally, they found that Gati's model and their alternative model (Rounds & Tracey, 1996) fit the international data well and both fit significantly better than Holland's circular order model.

As the literature reveals, there have been numerous models posed to explain the structure of interest which are based on Holland's original RIASEC structure. As the review of the literature demonstrates, these various models have also been found to be of varying use in different cultures. The finding of the 1996 meta-analysis was not very encouraging regarding the use of Holland's traditional RIASEC model outside the U.S. Yet, research not included in the Rounds and Tracey (1996) study is mixed but somewhat more promising. We now examine the research not included in their 1996 meta-analysis that has sought to explain the structure of vocational interests globally.

The Structure of Vocational Interests in Non U.S. Samples

Since Rounds and Tracey's (1996) meta-analysis, many studies have explored the nature of the RIASEC model. Specific studies that evaluated the applicability of it in various cultures and settings from 1996 to March 2008 are examined in the following sections. The current status of the RIASEC model in Africa, Asia, Europe, and South America is presented. Table 1 provides a complete list of the applicability of each model by country as well as the characteristics of the sample and the measures used. The information in Table 1 is limited by practical space concerns, researchers' multiple approaches, and researchers' use of various Holland-based assessment tools. Because this is a literature review and the authors were not limited by the statistical constraints of a meta-analysis, we chose to present all of the information reviewed for a more comprehensive summary of the literature.

Insert Table 1: Source, Sample Characteristics, Inventory,
Inventory Language, and Fit of Model to Data by Country Here

Africa. We found one study that sampled participants in Africa. In 2002, du Toit and de Bruin tested the validity of Holland's circular order model for black South African students using the South African version of the Self-Directed Search. The results indicated that the structural validity of Holland's circular order model of personality types was not supported in this South African population. The authors argued that because black South Africans value collectivism, a value that is contradictory to that of many Western societies, it is possible that this value affects vocational interests. They also noted that the unemployment rate in this population was extremely high and that participants may have endorsed several interests on the SDS with the hope of increasing their odds for gaining employment. It is also important to note that the SDS was in English, a second language for many of them. Only minimal research is available on the RIASEC structure in Africa and more research is needed to understand its possible usefulness in this complex and diverse region.

Asia. Outside of mainland China, researchers have examined Holland's model with various groups. Using a sample of 1,813 Hong Kong college students, Farh, Leong, and Law (1998) investigated the validity of Holland's hexagon model using the unisex edition of the ACT Interest Inventory (UNIACT). They found that the Hong Kong data did not support the circumplex model of vocational interests but did support the circular order relationship. Holland's circular order model fit the sample well, although not as well as it is typically found with a U.S. sample. They found that individuals who have more traditional Chinese values are

less likely to pursue careers that are in line with Holland's theory than individuals who have less traditional Chinese values.

Similarly, Soh and Leong (2001) studied the structural validity of the RIASEC model in Eastern Asia by comparing a sample of 184 students in Singapore to 180 students in the United States using the revised unisex edition of the ACT Interest Inventory (UNIACT-R). Results indicated adequate stability of the circular order model in Singapore with results similar to those found in the U.S. sample.

Using the Korean version of the Strong Interest Inventory, Tak (2004) sampled 829 Korean college students and found that Holland's circular order model fit well for both men and women. In a sample of Japanese and American college students, Tracey, Watanabe, and Schneider (1997) compared the structure of Tracey and Rounds's eight-type circular model, Holland's six-type model, and Tracey and Rounds's spherical model. Results indicated that Tracey and Rounds's eight-type circular model fit the Japanese sample better than Holland's six-type model. Researchers suggest caution when using Holland's six-type circular model with a Japanese population because the greater specification of categories provided by the eight-type model may lend itself better to Japanese populations (Tracey et al., 1997).

An adapted English version of the Vocational Preference Inventory was used to examine the validity of Holland's theory in India (Leong et al., 1998). Findings indicated the data were consistent with Holland's predictions about the magnitude of association between adjacent, intermediate, and opposite elements of the hexagonal structure. These findings support the idea that for this sample in India practical implications can still be drawn about the structure of a person's RIASEC code.

Moving to the more extensive research conducted in China, Long and Tracey (2006) conducted a meta-analysis with a sample of 29 RIASEC matrices. They compared Holland's circular order model, Gati's model, Rounds and Tracey's model, and Liu and Rounds's octant model and found similar results in this sample to those found by Rounds and Tracy (1996) with an international sample. Specifically, Gati's and Rounds and Tracey's models fit the best, while Holland's model had the worst fit and Liu and Rounds's model fell in between. The authors make a case that the lack of fit of Holland's model and the superior representation of interests measured by Gati's and Rounds and Tracey's models in China may be related to the complexity of the model. Holland's six-type model attempts to explain multiple relationships among types, while Gati's and Rounds and Tracey's models require that individuals fit into fewer categories. Perhaps the complexity of Holland's model shows a lower fit due to its requirements that people fit into six types with a certain relationship among these types. The authors' suggest that certain issues such as prestige and differences in a couple of occupational categories in China may create an environment in which it is difficult to fit the traditional RIASEC hexagon.

Long and Tracey (2006) further contend that Holland's model predicts many different relations between each of the scales, whereas the other models are more simplistic in that they ignore many of the relations predicted by Holland (1997). Thus a two-factor model may be a more accurate fit when applying Holland's hexagonal model to Chinese societies (Wong & Wong, 2006). The revised two-factor model shows the largest correlation existing between E and S with the smallest correlation occurring between A and C. This model has been theorized to be applicable due to the separation of students into either scientific or artistic pursuits early on in their academic careers, the emphasis on business pursuits in Chinese societies, and the strong influence of Chinese traditions.

Additional Chinese studies include utilizing the SII Chinese with a sample of college students (Tang, 2001). Results indicated that RIASEC ordering for both men and women college students was not congruent with the ordering proposed in Holland's theory. Men's types were arranged RISAEC with no resemblance to a hexagon, while women's were ordered RSAECI and did resemble a hexagon. This study contributed to the literature by providing additional support for the close proximity of the Realistic and Investigative types and the immense distance of their location from the other types.

Another study examining the structural relationship of Holland's model in China used the Personal Globe Inventory (PGI) on a sample of Chinese high school and college students (Long et al., 2005). They examined the fit of the data to the PGI spherical model, Holland's circular order, and Tracy and Rounds's eight-type model. Similar to results in the United States, researchers found that the spherical model and the eight-type model fit the Chinese data well. The authors assert that this model is well suited for this particular culture as it is typical for them to make occupational decisions based on the reputation it will give to their family. Unlike the results in Japan (Tracey et al., 1997), in this study Holland's six-type model fit the data as well as the eight-type model providing support for the use of the PGI with a Chinese population.

Although considerable RIASEC research has been conducted with various instruments in Asia, especially in China, there is still much to be done. The findings are complex and mixed with regards to the "fit" the RIASEC structure has with the people of this diverse region. Yet, most of the results appear to be supportive of the use of some version of Holland's RIASEC model with the people of Asia. This may suggest that as China's economy becomes more urban and market-driven the RIASEC scheme for classifying occupations and identifying vocational personalities will become more useful.

Europe. The RIASEC studies conducted in Europe are scattered among many nations. In Iceland, Einarsdottir, Rounds, Ægisdottir, and Gerstein (2002) evaluated Holland's circular order model and Gati's model using the Strong Interest Inventory (SII) and the Self-Directed Search (SDS). Einarsdottir et al. (2002) concluded that the RIASEC structure in Iceland is consistent with the U.S. structure. However, they found Gati's model to show a better fit than Holland's circular order model in the Icelandic samples.

Hedrih (2008) explored the structure of vocational interests in Serbia. This study examined the fit of models by Holland, Gati, Rounds, and Tracey, and Liu and Rounds to the structure of correlations between RIASEC scales. Additionally, the fit of the spherical and octagonal models to the structure of correlations between Tracey's eight- and 18-type scales was evaluated. The results showed high levels of fit to Holland's hexagonal model. Liu and Rounds's model was also found to significantly fit the data, although to a lesser degree than Holland's model. The models of Gati and Rounds and Tracey were found to be nonsignificant in this Serbian sample. The octagonal model fit the data very well and with a significance level much higher than Holland's hexagonal model. The author attributed these findings to more combinations resulting from the eight-type model. The spherical model was found to fit the data equal to that of U.S. samples.

A significant contribution to this research in Europe explored the fit of Holland's model in Germany, a country that had not been included in previous investigations (Nagy, Trautwein, & Lüdtke, 2007). Researchers administered the Revised General Interest Structure Test, a RIASEC based German assessment, and concluded that German high school and college populations typically structure their profiles of interests in accordance with Holland's hexagonal representation.

In Croatia, Šverko (2008) studied the validity of the spherical, octagonal, and hexagonal models of interests in a sample ranging from school age to college students. The results indicate a good fit of all three models verifying this structure for all age and gender sub-samples as well.

The application of the RIASEC structure to the vocational interests of the European samples appears to be appropriate with the samples included in the studies reviewed. Continued exploration with additional samples representing a greater portion of the population of Europe is needed.

South America. The only study representing South America utilized the methods proposed by Hubert and Arabie (1987) and Glidden-Tracey and Parraga (1996). Researchers examined the structure of the SDS in a sample of Bolivian college students and tested Holland's circumplex model, Gati's hierarchical model of vocational interests, and Rounds and Tracey's (1996) alternative partition model. All of the models demonstrated a poor fit and the authors indicated two possible explanations, the small sample size and the lack of demonstrated validity for the Spanish translation of the SDS-Form E as a measure of vocational interests in this non-Anglo-American sample.

Summary on the cultural applicability of the RIASEC structure. The literature provides empirical evidence to support the use of Holland's theory in various countries and cultural contexts. Various models based on Holland's theory have demonstrated structural utility in a number of countries in Asia and Europe. Specifically, both the circular order and the circumplex model were found to fit the data well in Eastern China (Long et al., 2005), in Iceland (Einarsdottir et al., 2002), and in Germany (Nagy et al., 2007). Further, the circular order model was supported in Hong Kong (Farh et al., 1998), Singapore (Soh & Leong, 2001), Korea (Tak, 2004), India (Leong et al., 1998), and Croatia (Šverko, 2008).

In addition to the circular order and circumplex models, five other models based on Holland's theory demonstrated good fit across cultures. Prediger's two-dimensional model was supported in Iceland (Einarsdottir et al., 2002) and China (Wong & Wong, 2006). Liu and Rounds's octant model (2003) fit the data well in Serbia (Hedrih, 2008) and Croatia (Šverko, 2008). Gati's hierarchical model (1979, 1982, 1991) and Rounds and Tracey's alternative hierarchical model (1996) were supported in Germany (Nagy et al., 2007) and China (Long & Tracey, 2006). Tracey and Rounds's spherical model (1995) was supported in Croatia (Šverko, 2008), China (Long & Tracey, 2006), and Japan (Tracey et al., 1997).

While there is a great deal of support for these models in numerous cultural contexts, there is also evidence to warrant cautious use of Holland's theory in some places. Holland's circumplex model, Gati's hierarchical model of vocational interests, and Rounds and Tracey's (1996) alternative partition model all demonstrated a poor fit in Africa (du Toit & de Bruin, 2002; Glidden-Tracey & Parraga, 1996). There are some cultures where one model is supported but another is not. For example, although the circular order model was supported in Hong Kong, Holland's circumplex model was not (Farh et al., 1998). Additionally, in China where other models were supported, Long and Tracey (2006) and Tang (2001) found that Holland's circular order model did not fit the data. Similarly, Holland's circular order model was not supported in Japan (Tracey et al., 1997). In Serbia Gati and Rounds, Tracey's models, and the two hierarchical models were not supported while other models were found to fit the data well (Hedrih, 2008).

As with cultural subgroups in the United States, it is apparent that global groups with a sufficiently common social and educational experience may confidently apply RIASEC theory and the SDS to almost everyone (Day & Rounds, 1998). After examining data from a sample of

49,450 comprised of five ethnic groups in relation to gender, Day and Rounds found a markedly similar underlying interest structure. They concluded that the structure of minority vocational interests seems to be well represented by Holland's RIASEC model, and instruments based on such theories have validity for diverse groups in the United States. "Furthermore, the common structure of vocational interests is theoretically related to McCrae and Costa's (1997) claim of personality structure as a universal. If vocational preferences are indeed manifestations of personality, then the two claims are one" (Day & Rounds, 1998, p. 735). Of course, persons who differ greatly from average in any characteristic, i.e., very poor or very rich, very slow or very smart, a special talent or genetic characteristic, may be outside the range of what the typology seeks to help us understand or explain (Holland, 1997).

Holland-Based Assessments

Stead and Watson (1998) posited that translations of theories and instruments originating in the U.S. for the use in other cultural settings often do not account for the context in which they will be used. Not only must findings from research with diverse populations be incorporated, but also issues pertinent to living in those places must be addressed. Although Holland's theory and associated measures have been translated into numerous languages and have shown to be reliable translations (e.g., du Toit & de Bruin, 2002; Tracey et al., 1997), some hold they have not accounted for the culture context in which these measures will be used (e.g., Tang, 2001). We examined existing evidence for the applicability of Holland's measures worldwide, concentrating on what has been found since the meta-analytic study by Rounds and Tracey (1996).

In the United States, multicultural research has focused on the applicability of Holland's theory with different ethnic minorities living within the U.S. The results have been relatively positive with most studies confirming that Holland's RIASEC types fit well with individuals of

different minority groups (Goh, Lee, & Yu, 2004). Additionally, many of the studies applying Holland-based assessments with individuals outside of U.S. culture have shown support for the cross-cultural measurement of Holland's theory (Leong et al., 1998).

Measures

Several measures utilizing Holland's theory have been translated into different languages for varied cultural groups, namely the Self-Directed Search (SDS; Holland et al., 1994) and the Strong Interest Inventory (SII; Harmon et al., 1994). Other measures of the RIASEC types have also been utilized or developed with non-U.S. samples (e.g., Career Key, Inventory of Occupational Preference, Personal Globe Inventory). Many of the assessments when considered by themselves, demonstrate high internal validity (Leong et al., 1998) as well as high internal consistency (e.g., Ting & Jones, 2005; du Toit & de Bruin, 2002) when utilized with high school and college samples.

Leong et al. (1998) specified four types of equivalences that cross-cultural psychologists (e.g., Lonner & Ibrahim, 1996) have recommended for examination when evaluating cross-cultural measures: functional, conceptual, linguistic, and metric equivalence. Functional equivalence relates to the function that behavior plays across two cultures while conceptual equivalence involves two cultures attaching the same or similar meaning to behavior or concepts. Linguistic equivalence refers to the presence of the same word for an activity, object, or phenomena across two cultures. Metric equivalencies involve the similarities of the psychometric properties across cultures including that the scale measures the same construct in each culture. Several authors have found that translations of assessments based on Holland's theory demonstrated these equivalencies (e.g., Glidden-Tracey & Greenwood, 1997; Goh & Yu, 2001). In the following pages, some of the cross-cultural studies using The Career Key, The Inventory

of Occupational Preferences, The Self-Directed Search, The Personal Globe Inventory, The Strong Interest Inventory, and the Vocational Preference Inventory will be reviewed.

The Career Key (CK; Jones, 1987), originally developed for use in the United States, assesses an individual's resemblance to the six RIASEC types by using personal statements and occupation items. The CK integrates features of the six Holland types with 12 interest and 66 work trait groups of the U.S. Employment Security System (www.CareerKey.org). The U.S. version has shown internal consistency ranging from .64 to .92 with a mean of .79. The CK has been translated into Korean, Chinese, Romanian, and Spanish in addition to a Caribbean version and a Canadian version.

When translating the Career Key into Chinese, structural changes were made to the occupational items but not the personal statements to better fit Chinese culture. The Chinese Career Key (CCK; Jones & Ting, 1999) consists of items assessing individuals' interests, skills, and values as well as occupations representing Holland's (1997) six environmental types (RIASEC). When creating the CCK, 15 of the 42 occupations on the U.S. version were altered to occupations in Hong Kong that were the best examples for each Holland type. These adaptations were made because the occupations did not exist or were not familiar in Hong Kong (e.g., farmer was replaced with police officer for the Realistic types). High internal consistency was found in samples of 101 public high school (33.7% men and 66.3% women; mean age of 17.2) and 80 college students (43.75% men and 56.25% women; mean age of 19.7) in Hong Kong ranging from .71-.88 (Ting & Jones, 2005). Results of an additional study of the CCK in Hong Kong found that in a sample of 130 female public high school students (mean age 17.4), internal consistency estimates ranged from .78 to .89 (Ting, 2007). The results of the CCK produced similar internal consistency to the original CK.

The Inventory of Occupational Preferences (IOP; Tracey & Rounds, 1996) uses 141 occupational titles arranged into 18 interest scales covering people/things, data/ideas, and prestige. The IOP is an expansion of Prediger's (1982) model that adds prestige to the already established People/Things and Data/Ideas dimensions. The structure is similar to Holland's hexagon; however, as the types were viewed as arbitrary by the developers, there are eight types arranged in circular order depicting similarity (Tracey et al., 1997). Internal consistency estimates for the IOP range from .85 to .95. Tracey et al. (1997) used the original form of the IOP and a Japanese translated version to compare cross-cultural invariance between Japanese and American samples. The Japanese sample consisted of 373 undergraduate college students (36.7% men and 62.5% women; average age 20.2 years) was compared to a sample of 401 U.S. college undergraduates (38.4% men and 61.6% women; average age 20.4) on fit of Holland interests using the two versions of the IOP. Japanese and American interests were found to be similar especially at the individual item level when using the versions of the IOP (Japanese sample alphas .76-.91; American alphas .79-.93). In addition, the fit of the IOP was more similar across the two cultures than a measure using the six dimensions (i.e., Vocational Preference Inventory).

The Personal Globe Inventory (PGI; Tracey, 2002) is a measure of career interests that was intended for use in the United States. The PGI measures Holland's RIASEC types as well as four interest types: Things, Data, People, and Ideas. The 218-item inventory consists of 108 items assessing liking of activities and perceived competence in performing activities in addition to 108 items assessing preference for occupational titles (additionally two repeated items are included). The PGI includes 31 scale scores for each of the three types of items in addition to 31 composite scales. The PGI represents interests as falling into three dimensions: People/Things,

Data/Ideas, and Prestige. Additionally, octants are used to represent interests as opposed to the six types identified by Holland. Internal consistency estimates for U.S. samples are greater than .80 for each scale (Tracey, 2002). The Personal Globe Inventory has been translated into Japanese (Tracey et al., 1997), Chinese (Long et al., 2005), and Croatian (Šverko, 2008). Long et al. (2005) stated that when comparing equivalencies of measures, structural validity is often the problem. Structural validity was supported in a Chinese sample of 721 high school students (44.4% men and 55.6% women; mean age of 16.69) and 943 college students (55.1% men and 44.9% women; mean age of 20.1) with the PGI – Chinese Version (Long et al., 2005). To create the Chinese version, the PGI was translated into Mandarin. Internal consistency estimates were found to be mostly over .80, with composite scales ranging from .84 to .94. The PGI was found to fit similarly in the Chinese and American samples.

The Self-Directed Search (SDS; Holland et al., 1994) is a 228-item, self-administered, scored, and interpreted measure designed to classify an individual's interests in terms of Holland's RIASEC theory. It was originally developed in the U.S. in 1970 and most recently revised in 1994. Activities, competencies, preferences, occupations, and self-estimates are assessed.

The SDS is available in more than 30 languages (Holland et al., 1994), many of which are sold by the U.S.-based publisher, Psychological Assessment Resources, and others that are sold by publishers in their respective countries. A more complete list of countries where the original SDS is utilized in a psychometrically sound way, SDS adaptations, and SDS translated versions are found in Table 2. The contents of the SDS information in this table was derived and verified from the records of the official publisher, Psychological Assessment Resources, Inc. Anecdotally, the authors are aware of other non-official translations throughout the world.

Translations of the SDS into other languages show adequate reliability with alphas ranging from .77-.95 (e.g., du Toit & de Bruin, 2002; Glidden-Tracey & Parraga, 1996).

Insert Table 2: Translations and Adapted Versions Here

As a specific example of one translation of the SDS, The SDS-S, a Spanish translation of a version of the SDS with a lower reading level (i.e., SDS-E), was created based on the assumption that vocational interests generalize from culture to culture (Glidden-Tracey & Parrage, 1996). In a sample of 98 Bolivian university students (43.0% men and 53.1% women; mean age of 21), Glidden-Tracy and Parraga found that the theoretical structure of vocational interests was not replicated in this sample. The authors stated the further need for assessing the linguistic equivalence of the two measures. Further assessment concluded that the SDS-S demonstrated adequate linguistic characteristics through back-translation procedures (Glidden-Tracey & Greenwood, 1997).

The Strong Interest Inventory (SII; Harmon et al., 1994) assesses interests of individuals in terms of occupations, school subjects, activities, leisure activities, people, and environments. It was originally developed in the U.S. and published in 1927; the most recent revision was published in 2005. SII results are presented for general occupational themes (GOT), basic interest skills, occupational scales, and personal styles scales. The SII has been translated into more than 17 languages. A list of many of these translations or adaptations, along with their references, can be found in Table 2. Many of these translated versions are sold by U.S.-based CPP, Inc. Goh and Yu (2001) found a Chinese translation of the SII, the SII-Chinese (Goh & Yu,

1995), to demonstrate both linguistic and metric equivalence to the SII. Additionally, Goh and Yu (2001) stated that the same inferences could be drawn from the SII-Chinese as from the SII.

The Vocational Preference Inventory (VPI; Holland, 1985) was originally developed for use in the United States. The VPI consists of 291 items, including 160 occupations representing each of the six Holland's themes in addition to five other scales (i.e., Self-Control, Masculinity-Femininity, Status, Infrequency, and Acquiescence). The VPI has been shown to have an internal consistency score ranging from .81 to .91 with an average of .88. The VPI has been translated into more than 20 languages, and many of these are listed in Table 2.

Leong et al. (1998) used an adapted version of the VPI to examine the validity of Holland's theory in a sample of 172 workers in India (60% men and 40% women; age range 22 to 63). Three new response types were added to determine linguistic and conceptual equivalence in India. In addition to "interesting/appeals to you" and "uninteresting/dislike it," "do not understand what it means," "does not exist in India," and "too low status to consider" were added. Utilizing the edited response choices with the English version of the VPI, Leong et al. found the internal consistency and the relation between RIASEC types to be adequate and similar to a US sample. The applicability of the VPI in India was complicated by findings with regards to the secondary constructs. Congruence, consistency, and differentiation were not found to be correlated with job satisfaction in this sample as is theorized by Holland (1997). The researchers emphasize the need for further research on the applicability of career assessments with this sample and the importance of continuing to account for more culture-based variables such as the absence of some occupations in certain environments.

Overall, we found that measures varied in the degree to which they were translated (i.e., degree to which they took into account cultural relevance). Several studies found that alterations

in language or content still measured similar constructs as the original U.S. versions (e.g., CCK, IOP, PGI). Other measures did not hold up as well after alterations were made. Glidden-Tracey and Parraga (1996) found the Spanish SDS demonstrated adequate linguistic characteristics but in the Bolivian sample only four types were found as opposed to Holland's six. Leong et al. (1998) found that the secondary constructs assessed through the VPI in India did not predict job satisfaction; nevertheless, the internal consistency and RIASEC structure was adequate and comparable to a US sample. Gender differences varied inconsistently across samples (e.g., Tak, 2004; Tang, 2001). Clearly, there have been some findings that suggest research and adaptation must continue to assure that Holland-based assessments are developed in a way that is reliable and valid for a population of interest. Overall, however, the degree to which these instruments have been adapted and translated for cultures all over the world is noteworthy.

Discussion

Holland's theory has been considered to be revolutionary to the field of vocational psychology and career counseling worldwide (Gottfredson, 1999), the most influential in the field of vocational theory (Brown & Brooks, 1996), and user-friendly for counselors and clients (Reardon & Lenz, 1998). Borgen (1991) summarized 20 years of Holland's work as seen through the *Journal of Vocational Behavior* with the following thoughts: "By any standard, the eruption of Holland's influence is unmistakable in the last two decades of vocational psychology. Research on his theory is voluminous and unabating. His theoretical insights are now at the center of any comprehensive review The widespread use of his inventories is huge. . . ." (p. 275-276). The theory attempts to explain the people and environments involved in work, the quality of career-related decisions, satisfaction and stability in work, and effective methods for providing assistance to people with career problems.

This review has focused on the applicability of the RIASEC structure and the appropriateness of Holland-based assessments outside of the U.S. where these constructs and tools were originally created. It examined the literature published since the Rounds and Tracey (1996) meta-analysis in order to update information about the cross-cultural applicability of Holland's RIASEC structure and assessments. This discussion will summarize the overall "fit" of these Holland-based constructs from a global perspective, discuss its applicability to the 21st century, and review limitations and implications for future research.

To provide an overall evaluation of the "fit" of Holland's theory throughout the world, we use the method cited by Leong et al. (1998). This method held that the functional, conceptual, linguistic, and metric equivalence should be evaluated when determining fit of a measure across cultures. Studies of Holland's measures set out to establish cross-cultural equivalence in several ways. Many of the assessments, even when used in English-speaking cultures, were altered in content to be consistent with the prestige and commonness of occupations in that setting. Research demonstrated that many of the instruments retained conceptual, linguistic, and metric equivalence as evidenced by similar internal consistency. Functional equivalence was not as well demonstrated with the circular order model not fitting well across several of the cross-cultural samples.

21st Century Applicability

One purpose of this article was to explore the applicability of Holland's theory throughout the world; however, some scholars argue that the post-modern world renders most established vocational theories irrelevant in a world marked by rapid change (e.g., Savickas et al., 2009). We suggest that established vocational theories, such as Holland's, remain applicable

even in the face of 21st century changes. Therefore, continued research into the cross-cultural applicability of Holland's theory remains important.

One of the influences that led to our current work environments receiving the label post-modern is the globalization and lack of job security in today's economy. Blustein (2006, 2008) and Coutinho et al. (2008) addressed these issues extensively. They emphasized the importance of career practitioners working with clients to address the changing ways of working. They also identified three needs that work meets in clients' lives, which include work as a means for 1) survival and power, 2) social connection, and 3) self-determination. We believe that Holland's theory can aid people in meeting all three of these needs. First, individuals in congruent environments are more likely to persist and be successful in their career pursuits. Second, people of similar Holland types tend to comprise an environment. If persons are looking for social connectedness in their environment, they are more likely to find that if they work in an environment composed of individuals with shared interests. Therefore, helping clients understand their Holland code can give them the information they need to find environments and individuals with whom they have more in common. Third, the self-determination need includes the idea that individuals seek to find their work rewarding and interesting. Holland's theory and associated assessment tools directly aid individuals in the process of finding those environments, skills, and work tasks in which they are most interested and likely to value. Among many of Coutinho et al. (2008) and Blustein's (2008) practical suggestions were uses of Holland's theory and assessment tools. Specific suggestions included helping clients to fully explore their three-letter Holland code and occupations generated by Holland-based assessment tools to assure a more complete knowledge of their skills, interests, values, and job options. It is apparent that these authors, who regularly tout the work-related implications of 21st century changes, continue

to see Holland's work as applicable in the contemporary world. Obviously, this literature review highlights the need for appropriate Holland-based measures for all people that wish to use them. This will best assure the benefits of Holland's theory can be realized.

As we have suggested, there is a need to understand the applicability of Holland-based assessments and the RIASEC structure in a variety of cultures and countries. Assuring that Holland's theory is appropriately used will allow for increased dissemination of the ideas on how to address the evolving needs of our clients.

Limitations and Implications for Research and Practice

Several of the previous studies assessing the use of Holland's theory with other cultures have used the English version of the measures abroad (e.g., Leong et al., 1998; Long et al., 2005; du Toit & de Bruin, 2002). This may have affected the findings of these studies, and it is suggested that future studies attempt to further validate and understand the versions of Holland-based instruments that have been translated or adapted for the culture studied. We have identified many of the translations of the Self-Directed Search and Strong Interest Inventory in Table 2 that could be used in such research.

We verified information about the various versions, adaptations, and translations of Holland-based assessments with the official publishers and copyright holders of these materials (i.e., Psychological Assessment Resources, Inc. and CPP, Inc.). The authors realize that other versions and information may exist but it was decided that official publisher verification would be the standard by which we would include information in this article.

An additional shortcoming of current culturally diverse Holland-based assessments is that the secondary constructs (e.g., congruence, consistency, differentiation) have not been widely explored as predictors of career choice (Leong et al., 1998; Spokane, Meir, & Catalano, 2000).

Because these secondary constructs are important in Holland's theory, more focus should be placed on the relation of these constructs to occupational choice in diverse settings. Additionally, culturally diverse populations have shown unique gender differences in scoring from sample to sample (Glidden-Tracey & Parraga, 1996).

With regard to RIASEC structure, the research is growing in nations of Europe and Asia, but this is not the case in many emerging nations. Additionally, more research with Holland's theory is needed to examine the influence of socioeconomic conditions, religion, family systems, school-to-work transition, and work values on career decisions.

Only one study (Rounds & Tracey, 1996) has examined the global relevance of this theory by conducting a meta-analysis that explored the international applicability of three Holland-based models of interest structure. These authors included 96 samples representing 19 countries found in the literature from 1970 to 1992, and found a better fit for models derived from Holland's circular order model (e.g., Gati, 1982) than for the circular order model itself. This is an important area for study given the increasing use of Holland's theory throughout the world with inconsistent empirical support. If it can be shown that a RIASEC structure is invariant across diverse cultures and economic conditions, then the plausibility that Holland's types represent universal entities is strengthened, such as the international validation work that has been done with the Big Five factors of personality (McCrae & Costa, 1997).

The structure of Holland's RIASEC types has implications not only for vocational theory but also for career counseling practices. Measures of Holland's types are commonly used to help individuals learn about their vocational interests and to assist them in matching their interests with occupations. More research suggesting that interpretations of the RIASEC scales developed in the United States are applicable to other countries can provide greater confidence for using

U.S. based RIASEC inventories in counseling practice elsewhere. Currently, test developers and counselors are somewhat restricted in their ability to rely on interpretations developed on U.S. populations because they may not have demonstrated applicability across cultures. With respect to international standards for the development and use of psychological inventories, such as Holland-based assessments reported in this review, it should be noted that some instruments have been developed as research tools only. It would be improper to use them such instruments in practice with clients. Other instruments have been subjected to an extensive standardization and validation procedure in the U.S. or elsewhere.

In our examination of Holland-based assessments and the RIASEC structure around the world, it is evident that not all countries, provinces, and cultures have been studied or reviewed. Nevertheless, this article provides a comprehensive and current review of this topic and highlighted gaps that can be pursued by those seeking to further understand Holland's theory with diverse people.

Overall, researchers and practitioners have recognized the usefulness and prominent position that Holland's theory has in the field of career development. Perhaps because of the successful use this theory has found in the U.S., important steps have been made to utilize Holland's theory and associated instruments in many places around the globe. Holland has provided the world's career counselors and vocational psychologists with a great starting point to find a way to best serve clients and increase the knowledge in this area of science.

Even in this time of globalization and rapid change, we conclude that structured matching models, especially Holland's RIASEC typological theory, will continue to hold promise for scholars and practitioners in vocational psychology and guidance. Ruff et al. (2008) noted that Holland's work has appeared in 197 different journals published in countries around the world

and in widely varied professional fields and disciplines. An impact such as this can be appreciated by career counselors and vocational psychologists everywhere.

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Table 1 Source, sample characteristics, inventory, inventory language, model, and fit of model to data by country

| Source | Sex | N | Mean Age | Inventory | Inventory Language | Model | Fit of model to data |
|---------------------------------|-----|-----------------|----------|---------------|--------------------|---------------------|----------------------|
| Bolivia | | | | | | | |
| Glidden-Tracey & Parraga (1996) | M/F | 98 | 21 | SDS-S | Spanish | Circumplex | poor |
| Glidden-Tracey & Parraga (1996) | M/F | 98 | 21 | SDS-S | Spanish | Gati | poor |
| Glidden-Tracey & Parraga (1996) | M/F | 98 | 21 | SDS-S | Spanish | Alternative | poor |
| China | | | | | | | |
| Long, Adams, & Tracey (2005) | M/F | 717 | 16.69 | PGI | Chinese | Eight-type circular | good |
| Long, Adams, & Tracey (2005) | M/F | 943 | 20.51 | PGI | Chinese | Eight-type circular | good |
| Long, Adams, & Tracey (2005) | M/F | 717 | 16.69 | PGI | Chinese | Holland | good |
| Long, Adams, & Tracey (2005) | M/F | 943 | 20.51 | PGI | Chinese | Holland | good |
| Long, Adams, & Tracey (2005) | M/F | 711 | 16.69 | PGI | Chinese | Spherical | good |
| Long, Adams, & Tracey (2005) | M/F | 939 | 20.51 | PGI | Chinese | Spherical | good |
| Tang (2001) | M/F | 166 | 21.59 | SII - Chinese | Chinese | Holland | poor |
| China, Hong Kong, & Taiwan | | | | | | | |
| Leong & Tracey (2006) | M/F | 29 (studies) | | Meta analysis | | Holland | poor |
| Leong & Tracey (2006) | M/F | 29 (studies) | | Meta analysis | | Gati | good |

Table 1 (continued).

| Source | Sex | N | Mean Age | Inventory | Inventory Language | Model | Fit of model to data |
|----------------------------------|-----|-----------------|----------|---------------|--------------------|---------------------|----------------------|
| Leong & Tracey (2006) | M/F | 29 (studies) | | Meta analysis | | Octant | adequate |
| Croatia | | | | | | | |
| Šverko (2007) | M/F | 437 | 14.8 | PGI-Croatian | Croatian | Spherical | good |
| Šverko (2007) | M/F | 540 | 17.7 | PGI-Croatian | Croatian | Eight-type circular | good |
| Šverko (2007) | M/F | 630 | 23.6 | PGI-Croatian | Croatian | Holland | good |
| Šverko (2007) | M/F | 437 | 14.8 | PGI-Croatian | Croatian | Spherical | good |
| Šverko (2007) | M/F | 540 | 17.7 | PGI-Croatian | Croatian | Eight-type circular | good |
| Šverko (2007) | M/F | 630 | 23.6 | PGI-Croatian | Croatian | Holland | good |
| Šverko (2007) | M/F | 437 | 14.8 | PGI-Croatian | Croatian | Spherical | good |
| Šverko (2007) | M/F | 540 | 17.7 | PGI-Croatian | Croatian | Eight-type circular | good |
| Šverko (2007) | M/F | 630 | 23.6 | PGI-Croatian | Croatian | Holland | good |
| Germany | | | | | | | |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 3831 | 19.57 | Revised GIST | German | Holland | good |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 3831 | 19.57 | Revised GIST | German | Gati | good |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 3831 | 19.57 | Revised GIST | German | Alternative | good |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 353 | 23.37 | Revised GIST | German | Holland | good |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 353 | 23.37 | Revised GIST | German | Gati | good |
| Nagy, Trautwein, & Lüdtke (2007) | M/F | 353 | 23.37 | Revised GIST | German | Alternative | good |

Table 1 (continued).

| Source | Sex | N | Mean Age | Inventory | Inventory Language | Model | Fit of model to data |
|---|-----|------|----------|--------------------|--------------------|------------|----------------------|
| Hong Kong Farh, Leong, & Law (1998) | M/F | 1813 | 19.37 | UNIACT- Chinese | English/Chinese | Holland | good |
| Farh, Leong, & Law (1998) | M/F | 1813 | 19.37 | UNIACT- Chinese | English/Chinese | Circumplex | poor |
| Iceland Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | M | 128 | 23.5 | SII-Icelandic | Icelandic | Holland | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | F | 321 | 23.5 | SII-Icelandic | Icelandic | Holland | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | M | 128 | 23.5 | SII-Icelandic | Icelandic | Gati | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | F | 321 | 23.5 | SII-Icelandic | Icelandic | Gati | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | M | 127 | 24 | SDS | Icelandic | Holland | good |

Table 1 (continued).

| Source | Sex | N | Mean Age | Inventory | Inventory Language | Model | Fit of model to data |
|---|-----|---------|----------|--------------|--------------------|---------------------|----------------------|
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | F | 311 | 24 | SDS | Icelandic | Holland | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | M | 127 | 24 | SDS | Icelandic | Gati | good |
| Einarsdottir, Rounds, Ægisdottir, & Gerstein (2002) | F | 311 | 24 | SDS | Icelandic | Gati | good |
| India Leong, Austin, Sekaran, & Komarraju (1998) | M/F | 103/69 | 31-40 | VPI | English | Holland | good |
| Japan Tracey, Watanabe, & Schneider (1997) | M/F | 154/247 | 20.2 | IOP-Japanese | Japanese | Eight-type circular | good |
| Tracey, Watanabe, & Schneider (1997) | M/F | 154/247 | 20.2 | IOP-Japanese | Japanese | Holland | good |
| Tracey, Watanabe, & Schneider (1997) | M/F | 154/247 | 20.2 | IOP-Japanese | Japanese | Spherical | poor |
| Korea Tak (2004) | M/F | 829 | college | K-SII | Korean | Holland | good |
| Serbia Hedrih (2008) | M/F | 476/587 | 33.5 | PGI | Serbian | Holland | good |
| Hedrih (2008) | M/F | 476/588 | 33.5 | PGI | Serbian | Gati | poor |

Table 1 (continued).

| Source | Sex | N | Mean Age | Inventory | Inventory Language | Model | Fit of model to data |
|---------------------------|-----|---------|----------|-------------------|--------------------|---------------------|----------------------|
| Hedrih (2008) | M/F | 476/589 | 33.5 | PGI | Serbian | Alternative | poor |
| Hedrih (2008) | M/F | 476/590 | 33.5 | PGI | Serbian | Octant | adequate |
| Hedrih (2008) | M/F | 476/591 | 33.5 | PGI | Serbian | Spherical | good |
| Hedrih (2008) | M/F | 476/592 | 33.5 | PGI | Serbian | Eight-type circular | good |
| Singapore | | | | | | | |
| Soh & Leong (2001) | M/F | 48/136 | 17-19 | UNIACT-Chinese | English | Holland | good |
| South Africa (Eastern) | | | | | | | |
| du Toit & de Bruin (2002) | M/F | 144 | 19 | SDS-South African | English | Holland | poor |
| du Toit & de Bruin (2002) | F | 242 | 20 | SDS-South African | English | Holland | poor |
| South Africa (North West) | | | | | | | |
| du Toit & de Bruin (2002) | M | 459 | 20 | SDS-South African | English | Holland | poor |
| du Toit & de Bruin (2002) | F | 573 | 19 | SDS-South African | English | Holland | poor |

Note: F=Female; M=Male; Alternative=Rounds and Tracey's alternative three-group partition model; Circumplex=Holland's circumplex model; Eight-Type Circular=Tracey and Rounds's eight-type circular model; Gati=Gati's three-group partition; Holland=Holland's circular order model; Octant=Liu and Rounds's octant model; Spherical=Tracey and Rounds's spherical model; Revised GIST=Revised General Interest Structure Test; IOP-Japanese=Inventory of Occupational Preferences - Japanese Adaptation; K-SII=Korean Strong Interest Inventory; Meta analysis studies utilized: Self-Directed Search - Chinese Adaptation, Vocational Preference Inventory (VPI), ACT Interest Inventory (ACT II), Strong Interest Inventory (SII), rational constructions of RIASEC measures in China, and English versions of the SDS and UNIACT interest inventory; PGI=Personal Globe Inventory; PGI-Croatian=Personal Globe Inventory-Croatian; SDS=Self Directed Search; SDS-S=Self-Directed Search-Spanish; SDS-South African=Self-Directed Search South African; SII-Chinese=Strong Interest Inventory-Chinese; SII-Icelandic=Strong Interest Inventory-Icelandic; UNIACT= Unisex edition of the ACT Interest Inventory; VPI=Vocational Preference Inventory.

Table 2 *Translated and adapted versions of Holland-based inventories*

| Self-Directed Search | Strong Interest Inventory | Vocational Preference Inventory |
|--|--|---|
| Australia (Shears, 2000) | Australia (Naylor & Thorneycroft, 1986) | Australia (Athanasou, O'Gorman, & Meyer, 1986) |
| Arabic (PAR, 2008) | Chinese (Goh & Yu, 1995) | Canada (Trapnell, 1989) |
| Brazilian Portuguese (Primi et al., 2001) | France (Harmon et al., 1994) | Guyana (Mercurius-Fraser, 1980) |
| Canada (Holland, 1986) | French Canadian ("CPP Catalog", 2008) | India (Leong et al., 1998) |
| China (Yang, Stokes, & Hui, 2005) | Guyana (Harmon et al., 1994) | Japan (Koyo Shokugyo Sogo Kenkyujo, 1985) |
| Croatia (Sverko & Bararovic, 2006) | Iceland (Einarsdottir et al., 2002) | |
| Czech (Drexler, 2007*) | Italian (Sprini & Pace, 2005) | |
| Danish (Drexler, 2007*) | Korea (Tak, 2004) | |
| Dutch (Hogerheijde, 1981) | New Zealand (Bull, 1975) | |
| Estonian (PAR, 2008) | Portuguese ("CPP Catalog", 2008) | |
| Finland (Holland et al., 1994) | Spanish (Hansen & Fouad, 1984) | |
| France (Holland et al., 1994) | | |
| Galician (PAR, 2008) | | |
| Germany (Schmitt-Rodermund, 2004) | | |
| Greek (Holland et al., 1994) | | |
| Guyana (Mercurius-Fraser, 1980) | | |
| Hebrew (Meir, Hadas, & Noyfeld, 1997) | | |
| Hong Kong (Yang, Lance, & Hui, 2006) | | |
| Hungary (Holland et al., 1994) | | |
| Iceland (Einarsdottir et al., 2002) | | |
| Indonesia (Erlianto, 1982) | | |
| Italy (Holland et al., 1994) | | |
| Japan (Holland et al., 1994) | | |
| Korean (PAR, 2008) | | |
| Lithuanian (PAR, 2008) | | |
| Malaysia (Salleh, 1985) | | |
| New Zealand (Tuck & Keeling, 1980) | | |
| Nigeria (Holland et al., 1994) | | |
| Norway (Holland et al., 1994) | | |
| Pakistan (Alvi, Khan, & Kirkwood, 1990) | | |
| Poland (Holland et al., 1994) | | |
| Portugal (Holland et al., 1994) | | |
| Romanian (PAR, 2008) | | |
| Russia (Holland et al., 1994) | | |
| Table 2 (continued) | | |

| | | |
|--|--|--|
| Saudi Arabia (Holland et al., 1994) | | |
| Slovenia (Holland et al., 1994) | | |
| South Africa (du Toit & de Bruin, 2002) | | |
| South America (Holland et al., 1994) | | |
| Spanish (Holland, 1979) | | |
| Switzerland (Holland et al., 1994) | | |
| Taiwan (Jin, 1987) | | |
| Turkish (PAR, 2008) | | |
| Vietnamese (PAR, 2008) | | |

* P. Drexler, personal communication September 28, 2007