

- Joreskog, K. G., & Sorbom, D. (1993). *LISREL 8: Structural equation modeling with the SIMPLIS command language*. Chicago: Scientific Software International.
- Khan, S. B., Alvi, S. A., Shaukat, N., Hussain, M. A., & Baig, T. (1990). A study of the validity of Holland's theory in a non-Western culture. *Journal of Vocational Behavior*, *36*, 132-146.
- Leong, F. T. (1997). Cross-cultural career psychology: Comment on Fouad, Harmon, & Borgen (1997) and Tracey, Watanabe, & Schneider (1997). *Journal of Counseling Psychology*, *44*, 355-359.
- Leong, F. T. L., & Chou, E. L. (1994). The role of ethnic identity and acculturation in the vocational behavior of Asian Americans: An integrative review. *Journal of Vocational Behavior*, *44*, 155-172.
- Mathieu, J. E., & Farr, J. L. (1991). Further evidence for the discriminant validity of measures of organizational commitment, job involvement, and job satisfaction. *Journal of Applied Psychology*, *76*, 127-133.
- Mathieu, J. E., Hofmann, D. A., & Farr, J. L. (1993). Job perception-job satisfaction relations: An empirical comparison of three competing theories. *Organizational Behavior and Human Decision Processes*, *56*, 370-387.
- Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.
- Owens, W. A., & Schoenfeldt, L. F. (1979). Toward a classification of persons. *Journal of Applied Psychology Monograph*, *65*, 569-607.
- Redding, G. (1990). *The spirit of Chinese capitalism*. New York: de Gruyter.
- Rosenberg, M. (1957). *Occupations and values*. Glencoe, IL: Free Press.
- Rounds, J. (1995). Vocational interests: Evaluating structural hypotheses. In D. Lubinski & R. V. Dawis (Eds.), *Assessing individual differences in human behavior: New concepts, new methods, and findings*. (pp. 177-232). Palo Alto, CA: Consulting Psychologist Press.
- Rounds, J., & Tracey, T. J. (1996). Cross-cultural structural equivalence of RIASEC models and measures. *Journal of Counseling Psychology*, *43*, 310-329.
- Rounds, J., Tracey, T. J., & Hubert, L. (1992). Methods for evaluating vocational interest structural hypotheses. *Journal of Vocational Behavior*, *40*, 239-259.
- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research*, *25*, 173-180.
- Swaney, K. B. (1995). *Technical manual: Revised unisex edition of the ACT interest inventory (UNIACT)*. Iowa City, IA: American College Testing.
- Tracey, T. J., & Rounds, J. (1993). Evaluating Holland's and Gati's vocational-interest models: A structural meta analysis. *Psychological Bulletin*, *113*, 229-246.
- Tracey, T. J., Watanabe, N., & Schneider, P. L. (1997). Structural invariance of vocational interests across Japanese and American cultures. *Journal of Counseling Psychology*, *44*, 346-354.
- Van de Vijver, F., & Leung, K. (1997). Methods and data analysis of comparative research. In J. W. Berry, Y. H. Poortinga, & J. Pandey (Eds.), *Handbook of cross-cultural psychology, Vol. 1: Theory and method* (pp. 257-300). Boston: Allyn & Bacon.
- Yang, K. S., Yu, A. B., & Yeh, M. H. (1989). *Chinese individual modernity and traditionality: Construct definition and measurement*. Proceedings of the Interdisciplinary Conference on Chinese Psychology and Behavior, 287-354. (In Chinese)
- Yu, J., & Alvi, S. A. (1996). A study of Holland's typology in China. *Journal of Career Assessment*, *4*, 245-252.

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## An Evaluation of the Cross-Cultural Validity of Holland's Theory: Career Choices by Workers in India

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The current study evaluated the cross-cultural validity of Holland's (1985) theory through internal and external analyses based on the responses of 172 natives of India who completed the Vocational Preference Inventory (VPI) and measures of job and occupational satisfaction. Internal consistency estimates for Holland dimensions, intercorrelations among participants' vocational interest scales, and the results of a randomization test (Tracey, 1997) all provide evidence for the internal structure of the VPI with Indians. However, the VPI did not exhibit high external validity. Further, multiple regression results indicated that congruence, consistency, and differentiation did not predict job or occupational satisfaction, suggesting cross-cultural boundaries on Holland's theory itself. Finally, we assessed and found limited conceptual and linguistic equivalence of measurement of the VPI in India. The assumptions of Holland's theory in light of the current findings are discussed. © 1998 Academic Press

Holland's theory of career choice has proven to be a useful model in the United States and its value can be further enhanced by establishing its cross-cultural validity. This task has been attempted in other parts of the world (e.g., Fouad & Dancer, 1992; Melamed, 1976). The present study examines the validity of Holland's theory in India. Holland's theory is based on a person-environment (P-E) interaction model (Holland, 1985, 1996). Specifically, the P-E interaction is embedded in a classification system which categorizes vocational personality types into six groups: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. These occupational personality types are typically assessed via instruments such as the Vocational Preference Inventory (VPI; Holland, 1977), Strong Interest Inventory (SII; Hansen & Campbell, 1985), or the Self-Directed

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Search (SDS; Holland, 1994). With each of these instruments, an individual is assigned a three-point code based on the top three categories which describe his or her occupational personality. For example, a person scoring highest on the Artistic (A), Social (S), and Investigative (I) categories, respectively, would be assigned the three-point code ASI. Occupational environments may be categorized into these groupings in a similar manner according to the job tasks and work settings, using either the Dictionary of Holland Occupational Codes (Gottfredson & Holland, 1989) or the self-report Position Classification Inventory (Gottfredson & Holland, 1991).

Positive outcomes, for example vocational adjustment and job satisfaction, are hypothesized to flow from an optimal person-environment fit (e.g., an Investigative person working in an Investigative environment) (Holland, 1985). More specifically, there are three central theoretical constructs in Holland's model: congruence, consistency, and differentiation. Holland (1985) predicts that vocational satisfaction, stability, and achievement will depend on the congruence between an individual's three-point personality code and his or her occupational environment (also represented by a three-point code). Failure to establish a career in an occupation congruent with one's personality may result in maladaptive career development and low job satisfaction.

Consistency refers to the similarity of personality types present in an individual's three-point code. According to Holland, the relation between the six personality types may be represented by a hexagonal figure with the types in a fixed order: R, I, A, S, E, C. Hence, R is most closely related to I and C; S is most closely related to A and E; and so on. Consistency refers to how close (on the hexagon) the second and third types are to the first type in a person's three-point code. According to Holland, the more consistent a person's three-point code, the more predictable his or her vocational behavior will be. Similarly, the most predictable occupational environments are those with high-consistency three-point codes.

Differentiation is the difference between an individual's scores on his or her highest and lowest categories. It is an index of the extent to which a person has clearly defined or well-differentiated interests. A differentiation score may be assigned to the work environment in an analogous fashion. The predictability of the P-E interaction will be best when both the person and the work environment are highly differentiated.

Holland's theory has been used in several prominent career interest assessments, including those listed above. While these instruments have been most widely used in the United States, there have been efforts to use them internationally (for a review, see Hansen, 1987). English versions of the VPI, SDS, and SCII have been used with a variety of international participants, including Australians (Melamed, 1976; Taylor, 1983), Pakistanis (Shah, 1970), Taiwanese (Chu, 1975), Mexicans (Fouad & Dancer, 1992), and Canadians, New Zealanders, and South Africans (Lonner & Adams, 1972). Lonner (1968), using a German form of the SCII with German, Swiss, and Austrian psychologists and

accountants, found that their vocational interests were similar to those of their U.S. counterparts. Hansen and Fouad (1984) developed a Spanish translation of the SCII that elicits interests similar to the English version. Evidence of convergent and discriminant validity for the Spanish and English forms of the SCII has been reported (Fouad, Cudeck, & Hansen, 1984). Additional evidence of the predictive accuracy of the Spanish form for the occupations of engineering and law was reported by Fouad and Hansen (1987).

Most of the above studies provide support for the use of Holland's theory-based career assessments with persons outside of the U.S. culture. However, a theoretical justification for this usage is absent, as Holland did not incorporate cross-cultural factors into his theory (June & Pringle, 1977). Further, a valuable test of a theory is to evaluate its structure across cultures, as recently noted by Rounds and Tracey (1996). Similarly, Ryan, Tracey, and Rounds (1996) evaluated the structure of the VPI across ethnic, gender, and socioeconomic status. Other studies have tested the hexagonal structure of Holland's theory with non-U.S. samples. Bull (1975) found the SCII General Occupational Themes (which represent R, I, A, S, E, C occupational dimensions) to be similar in samples of students from the United States and New Zealand. Feldman and Meir (1976) found an I, R, A, S, E, C pattern using a Hebrew interest inventory based on Holland's theory. Fouad and Dancer (1992) found support for Holland's structure across Mexican and U.S. cultures in a study that held gender and occupation constant (i.e., male engineers were the participants). Given the limited number of studies and the heavy emphasis on structural or internal validity (see Leong, 1997), the cross-cultural validity of Holland's theory remains an open question. For example, many cross-cultural studies of Holland's theory have failed to focus on the dimensions of congruence, consistency, and differentiation as predictors of criteria (i.e., external validity). Moreover, few studies of Holland's theory (see Leong, 1997) have examined such measurement issues as functional, conceptual, linguistic, and metric equivalences. Thus, the cultural validity of Holland's theory is in need of further investigations.

According to Leong (1990), cultural validity is concerned with the accuracy and utility of a test or model when applied to a population which is culturally different from the one on which the test or model was developed. It is similar to the concept of population validity and population sensitivity as discussed by Laosa (1990). Cultural validity also can be evaluated by assessing potential biases in tests. Following Gottfredson's (1986) formulation, "... criteria used to assess test bias have been grouped under two general headings—internal and external validity. The former refers to the internal structure of a test and the latter to the relation of test scores to other performances that the test should theoretically predict" (p. 133). More and more cross-cultural research is using this distinction of internal (or structural) and external validity as a way of organizing and classifying studies (e.g., see Van de Vijver & Leung, 1996) and we also adopt this approach.

A primary goal of cross-cultural psychology is to evaluate the validity of

theories across different cultures and to assess the generalizability of a theory of human behavior developed in the United States. The current study seeks to evaluate the cross-cultural validity of Holland's theory by examining the internal and external validity of his theoretical model with a sample of workers in India. In addition, the current study also sought to examine the linguistic and conceptual equivalence of the Vocational Preference Inventory as an operationalization of Holland's theory. Existing literature on India also suggest that the caste system in that country may serve as a potential influencing factor in cross-cultural equivalence of vocational interest measures (e.g., see Pandey, 1988). Cross-cultural equivalence of measurement is a central part of the evaluation of cultural validity of any theory or model.

## METHOD

### *Participants*

Participants were 172 employed individuals from several occupational groups including teachers, bank managers, bank clerks and tellers, and engineers. Sixty percent ( $n = 103$ ) were men and 40% ( $n = 69$ ) were women. Participants' age ranges were as follows: 19% between 22–30 years, 35% between 31–40 years, 34% between 41–50 years, and 10% between 51–63 years. A majority of the participants had either a bachelor's degree (49%) or a masters degree (37%), while 4% had completed high school only. In terms of their marital status, 86% were married and 12% were single. Percentages do not add up to exactly 100 due to missing data. Most participants were from the metropolitan city of Madras, India ( $n = 141$ ), with a smaller subgroup coming from Bombay, India ( $n = 31$ ).

### *Measures*

*Job Satisfaction Index (Brayfield & Rothe, 1951).* The Job Satisfaction Index (JSI) is an 18-item paper and pencil measure of the degree of satisfaction employees feel toward their jobs. The JSI yields a global score for each respondent. The JSI split-half reliability of .87 was calculated on data from 231 female clerical employees, and the JSI correlates .92 with the Hoppock Job Satisfaction Blank, a well-established measure of job satisfaction. Additional validity evidence pertaining to the JSI is summarized by Cook, Hepworth, Wall, and Warr (1981).

*Vocational Preference Inventory (Holland, 1977).* The Vocational Preference Inventory is a widely used measure of occupational interests. It is described by Holland (1985, 1996). Shorter forms of the VPI exist, but the complete 160-item paper and pencil form was used in the current study. Subjects are asked whether they are interested in 160 specific occupations. The VPI provides six Holland code scores for each respondent. Additionally, scores for Control, Masculinity, Status, Infrequent Response, and Acquiescence are provided to assist in interpretation. Based on the advice of the third and fourth authors, who were born and raised in India, the options for responding to the VPI were modified from the

standard three alternatives (i.e., interesting/appeals to you, uninteresting/dislike it, and leave no mark if undecided) to five alternatives in order to assess the linguistic and conceptual equivalence of the VPI. The first two of the original alternatives were kept and three new alternatives were offered. The first of the new alternatives was "darken the number 3 if you do not understand what the occupation means." This addition provides a crude measure of potential problems with linguistic equivalence. The next alternative was "darken the number 4 if the occupation does not exist in India." The final new alternative was "darken the number 5 if the occupation is too low status for you to consider." These two response options were added to assess the conceptual equivalence of the VPI. For alternative 4, if the occupation is rated by a significant number as not existing in India, then there is evidence of a potential lack of conceptual equivalence of the VPI. For alternative 5, if the occupation is rated by a significant number of the subjects as too low status to consider, then there is some evidence of potential contamination due to conceptual nonequivalence.

### *Procedure*

Copies of the JSI and VPI were distributed to employees in a school and several banks in India by the third and fourth authors. In addition to the JSI and VPI, the study packets contained a personal data sheet on which respondents indicated their age, sex, education level, occupation, marital status, age(s) of their child(ren), and level of satisfaction with their occupation (single-item rating). The participants were instructed to complete the instruments and return the packet to a designated person within their organization, who then returned the completed questionnaires to the authors.

### *Calculation of Indices*

Measures of congruence, consistency, and differentiation were computed in order to evaluate the external validity or predictive capability of Holland's theory in India. In all cases higher scores represent higher levels of the construct. Recall that Holland posits congruence as a major determinant of occupational outcomes, including satisfaction, performance, and persistence. At least 13 ways to measure congruence have been proposed (Camp & Chartrand, 1992). In this study we calculated two indices, the first a traditional measure using the top codes of the person and of the reported occupation and the second an index due to Iachan (1984, 1990) that uses all three of the codes for person and occupation. Iachan's (1990) index is calculated as a weighted matrix which gives a congruence score based on the similarity of a person's three-point Holland code (using an interest inventory such as the VPI) to the three-point Holland code for their actual or proposed occupation. In the current study, the occupation that participants indicated they currently held was classified according to Holland codes using the second edition of the Dictionary of Holland Occupational Codes (Gottfredson & Holland, 1989). The coded occupations and participants' VPI scores were used to calculate congruence scores. Congruence between actual occupation and VPI

occupational interests was somewhat low with a mean score of 9.78 across the total sample (the theoretical range of scores is 0–28). In the Camp and Chartrand (1992) comparative evaluation, the M index performed well in terms of correlating with other indices, especially the theoretically justified Kwak–Pulvino and Hexagon Congruence Index (HCI). To evaluate the Iachan index of congruence, the congruence scores based on it were correlated with the traditionally used congruence comparison using only the two top occupation and interest inventory Holland codes. The Iachan index correlated positively and moderately with the two-point congruence index across the entire sample ( $r = .58, p < .01$ ).

Consistency was calculated using Strahan's (1987) method, which uses the top three Holland codes. Again, this method is thought to be a more accurate way to calculate consistency than those that use only the top two Holland codes. Consistency scores using Strahan's index may range from 1 to 10. The average consistency score in the current study was 7.1. The Strahan three-point consistency index was correlated with consistency scores based on only the top two Holland codes for each participant. The Strahan index correlated highly with the traditional method of calculating consistency ( $r = .92, p < .01$ ). Last, differentiation was calculated by subtracting participants' lowest Holland code score from that of their highest Holland code.

## RESULTS

Results are presented first for internal analysis of the scale without regard for external correlates. A randomization test of order relationships was conducted as part of this analysis. The second section presents results pertaining to external correlates or the relationships of the scale scores with respect to various measures expected theoretically to correlate with them.

### Internal Structure Analyses

Six Holland codes were calculated for each participant based on their responses to the VPI. The internal consistency reliability estimates (Cronbach's alpha) of the six Holland types were also computed. Means, standard deviations, and Cronbach's alpha estimates for the six Holland scales, the JSI, and the single-item measure of occupational satisfaction are presented separately in Table 1 for males and females. The scale score intercorrelations provide another assessment of the internal structure of the VPI.

*Randomization test of vocational interest structure.* Another approach to internal structure is nonparametric and is based on work by Hubert and Arabie (1987). A computer program, RANDALL (Tracey, 1997), compares predictions made by a theory to random pairings of rows and columns in a matrix. The program yields an exact probability and a correspondence index. Because Holland's (1985) theory makes clear predictions about the magnitude of association between adjacent, intermediate, and opposite elements of the hexagonal structure, it is ideal for the randomization approach. We used Tracey's (1997) RANDALL program to evaluate the structure of Holland's theory in the present

TABLE 1  
Means, Standard Deviations, Internal Consistency Estimates, and Intercorrelations for VPI Holland Codes, Job Satisfaction Index, and Self-Reported Occupational Satisfaction by Gender (NM = 103, NF = 69)

	BRAY	OCCSAT	R	I	A	S	E	C
1	<b>.79/.75</b>	.5328	-.1223	-.0764	-.0582	.1081	-.1053	-.1122
2	.2591	—	-.0607	.0329	-.0664	.2519	.1151	-.0235
3	-.1580	.0546	<b>.88/.86</b>	.6733	.5232	.4280	.6256	.5958
4	-.0633	.0578	.5774	<b>.84/.90</b>	.4924	.4640	.5291	.4572
5	.0491	.1495	.4525	.4761	<b>.89/.86</b>	.6075	.4458	.2144
6	-.0117	.1123	.5622	.5270	.6017	<b>.80/.85</b>	.5585	.1627
7	.0303	.0463	.5792	.3265	.5812	.6140	<b>.81/.79</b>	.5598
8	.0622	.1483	.4474	.4708	.4196	.5849	.6731	<b>.79/.83</b>
M	M 66.66	4.06	2.74	4.71	5.22	4.54	4.61	4.44
	F 70.30	4.40	3.23	6.72	8.33	8.44	5.60	4.20
SD	M 8.32	1.15	3.41	3.68	4.30	3.38	3.37	3.23
	F 8.13	.911	3.29	4.55	3.94	3.85	3.32	3.53

Note. Male correlations are below the main diagonal, female correlations are above the main diagonal. Cronbach's alpha estimates are provided on the main diagonal in bold for males followed by females. All male  $n$ 's are 103 except for occupational satisfaction ( $n = 99$ ), all female  $n$ 's are 69.

\*  $p < .05$ .

\*\*  $p < .01$ .

sample. The results of the subgroup analyses, as indicated by the correspondence index (.5000 for males, .6111 for females) and the exact probability levels ( $p = .0167$  for both subgroups), revealed that Holland's theoretical model fits the data. Either 54 (male) or 58 (female) out of 72 predictions made by the theory were confirmed, with no ties. The complete table of these randomization results is available from the authors upon request.

### External Correlates Analyses

In order to assess the external correlates of the VPI, congruence, consistency, and differentiation scores were calculated for each participant from their Holland scale scores. Pearson correlations between participants' consistency, congruence, differentiation, and self-rated occupational and job satisfaction were generated and are shown in Table 2. Self-rated occupational satisfaction was correlated differentially with the job satisfaction composite by gender subgroup, with females showing a stronger relationship ( $r = .53, p < .001$ ) than males ( $r = .26, p < .01$ ). However, neither congruence, consistency, nor differentiation correlated strongly with either self-report measure of satisfaction. Thus for the current sample, scores representing differentiation, consistency, and congruence were unrelated to satisfaction, either for job or for occupation.

In order to explore further the external validity of Holland's theory, multiple regressions were performed with the JSI score as the criterion variable and

TABLE 2

Correlations between Self-Reported Job and Occupational Satisfaction and Differentiation, Consistency, and Congruence Indices by Gender (*N*M = 103, *N*F = 69)

	Job satisfaction		Occupational satisfaction	
	Male	Female	Male	Female
Differentiation	-.0315	-.0801	.0491	-.1862
Strahan consistency	-.0864	.0123	-.0878	-.0377
Iachan congruence	.1385	.0555	-.0771	.2029

*Note.* Job satisfaction was measured by the JSI; Occupational satisfaction by a single self-report item on the personal data sheet. Male correlations are followed by female correlations for each relationship.

congruence, consistency, and differentiation as predictors. Contrary to Holland's theoretical predictions, none of these derived scores served as a significant predictor of job satisfaction for the sample of Indian workers. Neither the overall  $R^2$  nor the specific beta weights were significant. This pattern of results held whether the regression analyses were conducted separately on gender subgroups or on the total group.

#### *Equivalence of Measurement*

The issue of equivalence of measurement has always been a central one in relation to cultural validity in career assessment (see e.g., Fouad, 1993; Leong & Brown, 1995; and Marsella & Leong, 1995). Cross-cultural psychologists have identified four types of equivalences which are important for researchers to examine when conducting research with cross-cultural populations (Lonner & Ibrahim, 1996). These include: (a) functional, (b) conceptual, (c) linguistic, and (d) metric equivalence. For our present purposes we will focus on linguistic and conceptual equivalence. Linguistic equivalence is considered to be absent if two cultures do not have the same words for an object, activity, or phenomena or if the words are used differently. For example, there is no linguistic equivalent for *posse* from the Strong Interest Inventory for many languages in developing countries. Conceptual equivalence is concerned with whether two cultures attach the same meaning to a similar concept or even have the same concepts. For example, the Chinese do not have a concept for psychotherapy and studies of attitudes towards psychotherapists in China would have major problems with conceptual equivalence (Leong, in press).

In terms of the new alternative response option where subjects were asked to darken the number 3 if they did not understand what the occupation means, 39 out of the 160 (24%) items had 5% or more of the subjects choosing this alternative. The items most commonly chosen as occupations the subjects did not understand were as follows (with the percentages in parentheses): masseur/masseuse (24.4%), power shovel operator (23.5%), photoengraver (22.1%),

bartender (21.5%), truck gardener (20.3%), tree surgeon (18%), and buyer (16.9%). As for the new alternative which included the option darken the number 4 if the occupation does not exist in India, 14 of the 160 occupational items in the VPI had 5% or more of the subjects indicating that the specific occupation did not exist in India. Of these 14 occupations, the highest number of responses were to these occupations (with the percentages in parenthesis following the item): masseur/masseuse (13%), truck gardener (13%), FBI agent (10%), funeral director (9%), prizefighter (9%), humorist (8%), and shipping and receiving clerk (8%). As for the last new alternative included, the option darken the number 5 if the occupation is too low status to be considered, 56 of the 160 occupational items in the VPI (35%) had 5% or more of the subjects indicating that the specific occupation was too low class for them to consider. Of these 56 occupations, a quarter of the sample (25% or more of the subjects) indicated that the following occupations were too low class for them to consider (with the percentages in parenthesis following the item): restaurant worker (45%), barber (43%), carpenter (38%), truck driver (37%), filling station worker (36%), post office clerk (34%), mail carrier (34%), ward attendant (34%), bartender (31%), truck gardener (27%), bill collector (29%), cook/chef (27%), and long distance bus driver (27%).

#### DISCUSSION

The present evaluation of the cross-cultural validity of Holland's theory of career choice as measured by the Vocational Preference Inventory produced some mixed results. When transported to India, the VPI exhibits evidence of support when considered by itself. For example, the internal consistency reliability estimates of the Holland scales indicate that the Realistic, Investigative, Artistic, Social, Enterprising, and Conventional scales are all homogenous representations of those interest clusters hypothesized by Holland. As another indication of the cross-cultural validity of the internal structure of Holland's theory, the intercorrelations of the Holland scales are quite comparable for the Indian sample when contrasted with the American normative sample reported in the VPI Manual. For example, for the American sample, the correlation between Investigative and Artistic is .43 whereas the same correlations for the Indian subsamples are .47 for males and .49 for females; the correlation between realistic and investigative is .40 in the American sample and .57 for males and .67 for females in the Indian sample. This parallel level of relationship in the intercorrelations of the six Holland types holds for all of the other correlations that we computed. Additionally, the randomization test of hypothesized order relationships (RANDALL) supported Holland's theoretical structure for the Indian subsample. Results of the present study suggest that Holland's theory of careers as measured by the Vocational Preference Inventory is internally valid when transported to an Indian sample.

With regard to external validity, the data from this study are less encouraging on several fronts. One method of approaching this issue is to use Holland's

(1996) constructs of congruence, consistency, and differentiation as predictors of job satisfaction. Holland's theory maintains that these three constructs should be positive predictors of job satisfaction among workers. Yet the present results indicate that none of the three constructs was a significant predictor of job satisfaction individually or in combination. The lack of predictive validity of the VPI suggest that there may be important cultural differences in vocational behavior among Indian workers. At the very least, the lack of external validity for the VPI suggests that there may be major limitations in the application of Holland's theory to other cultures such as India.

Our interpretation that the present findings reflect important cultural differences in vocational behavior between the United States and India is based on several conjectures. First, problems in the external validity of Holland's model in the current case may be a function of the unique characteristics of the occupational structure within India, namely the differential opportunity and availability of different types of occupations (e.g., there are fewer Investigative and Artistic type occupations available within India). A country with a skewed distribution of occupations as classified by Holland's model could account for the failure of congruence, consistency and differentiation in predicting individuals' occupational choices. Alternatively, the problem may not lie within the Indian occupational structure, but instead within Holland's model and/or the ability of the specific measure (i.e., the VPI) to predict occupational choices of Indian workers.

Indeed, the present study illustrates an underlying assumption within various models and theories of vocational choice, namely that occupational interest is a major determinant of occupational choice among individual members of a society. This assumption may not be supported in other countries. In the United States, vocational interests may account for a significant percentage of the variance in individuals' occupational choice. For example, research on the Strong Interest Inventories has found some evidence of predictive validity (Campbell & Hansen, 1981). On the other hand, meta-analytic studies of Holland's model have found equivocal support for congruence of vocational interests as a significant predictor of job satisfaction (Assouline & Meir, 1987; Tranberg, Slane, & Ekeberg, 1993). Nevertheless, much of the career counseling provided in the United States is predicated on this assumed relationship between vocational interests and job choice. However, in India vocational interests may account for only a small percentage of the variance in occupational choice, whereas socio-economic status or other variables may account for a greater portion of the variance. There is support for the hypothesis that vocational interests may not be a primary determinant of occupational choice even within the United States. For example, the study by McArthur (1954) of Harvard undergraduates illustrates that individuals from higher social economic status families had other variables, such as family pressure and family tradition, as more significant predictors of occupational choice than those who were from lower social economic status families which did not have similar constraints.

More recently, Slaney (1980) and Slaney and Brown (1983) found that

cross-cultural occupational differences seem to be a function of both socioeconomic and cultural differences. Therefore, it is quite possible that in India there are a series of other factors which may serve as more important determinants of occupational choice than individual vocational interests. In fact, Sekaran (1986) has pointed out that even those with doctoral degrees in the physical sciences often take up clerical jobs in Indian banks because there are not enough job opportunities available to them. An examination of the frequency data for participants with highest VPI score on the Investigative type supports this explanation. Only 2.2% of those with Investigative high scores were in Investigative careers whereas 11% of those with Investigative high scores were in Conventional careers in the current sample. Thus, the limitations of the available jobs in the preferred occupational interest areas for Indian workers may constrict the external validity of Holland's theory.

Despite being a commonly recommended strategy for cross-cultural vocational psychology research (see, e.g., Fouad, 1993; Leong & Brown, 1995; Marsella & Leong, 1995), the current study is one of a few that has actually attempted to assess the cross-cultural equivalence of measurement. Our modifications of the VPI instructions based on culture-specific information revealed that there was some problem with linguistic equivalence. Using 5% of the sample as a cutoff, we found that 39 out of the 160 items (24%) in the VPI had subjects indicating that they did not understand what the occupation meant. In terms of conceptual equivalence, we found no support for the hypothesis of a lack of conceptual equivalence. We assessed the lack of conceptual equivalence by asking subjects to darken the number 4 if the occupation does not exist in India. Using this alternative and a 5% cutoff criterion, we found that only 14 of the 160 occupational items in the VPI (8.7%) had 5% or more of the subjects indicating that the specific occupation did not exist in India. Had we found that over 20–25% of the 160 items had 5% or more the subjects indicating that the specific occupation did not exist in India, then we would have been more concerned about the lack of conceptual equivalence.

Our finding of potential problems with the linguistic and conceptual equivalence of the VPI for subjects in India provides one possible explanation of the mixed results in the current study. It is quite possible that the problems with the linguistic and conceptual equivalence of the VPI may be one contributor to the negative results with regards to the external validity of Holland's model in India. When a significant number of the items in a psychological instrument is not clearly understood by a sample (i.e., linguistic equivalence problem) or confounded by a cultural variable such as a caste system as in India (i.e., conceptual equivalence problem), then theoretically we should expect some problems with the cultural validity of the model being evaluated. Hence we tested and found a culture-specific (i.e., emic) explanation for potential problems in career assessment in India, namely the confounding of the assessment of occupational interests with a highly salient social class variable due to the caste system in India. Leong (in press) has argued for the importance of considering the cultural

context in cross-cultural career psychology research. With regards to India, Sharma (1981, cited by Pandey, 1988) emphasized the importance of generalizing culture sensitive data in social psychological research: he suggested that Indian culture differs from other cultures on several dimensions such as caste, socioeconomic hierarchy, theory of Karma, and the feudal system (Pandey, 1988, pp. 341–342). Hence future vocational psychology research in India should include these cultural dimensions.

At the very least these results suggest that we need to assess directly the cross-cultural equivalence of measurement in our career assessment tools when attempting to transport them to other cultures. At the same time, as illustrated in the present study, the assessment of cross-cultural equivalence needs to be informed by an emic or culture-specific approach that takes into account the local cultural conditions. In addition, having identified potential problems in cross-cultural equivalence, the next step would be to assess the impact of these problems in the primary research questions. In terms of the current findings, future studies should directly examine how much problems in linguistic and conceptual equivalence contributed to the external validity problems in Holland's model.

Our interpretation of the present findings needs to be balanced with several limitations of the current study. First, the sample size of the current study, 172 participants, is small. In addition, we further reduced the sample size by conducting separate analyses by gender subgroups. This limitation is particularly true for the female subsample ( $n = 69$ ). Cross-validation of the current findings with larger and more representative samples is certainly needed. Second, only the English version of the VPI was used in the current study. However, as the vast majority of Indians speak English fluently, we do not believe that this is a significant limitation. We left unanswered the question of differential external validity with a Indian language version of the VPI. Of course, such an undertaking is extremely difficult given that there are so many different languages and dialects used in India. Third, whereas we were able to assess linguistic and conceptual equivalence of the VPI, we were not able to correct for the equivalence problems found in the current study because we were testing an established model (i.e., Holland's). Fourth, the study is also limited in that the majority of the sample came from only three to four occupational groups, namely teachers, bank managers, bank clerks, and engineering instructors. Finally, the current study used older versions of both the VPI (Holland, 1977) and the Dictionary of Holland Occupational Codes (Gottfredson & Holland, 1989). Future research with more recent versions of these assessment tools as well as different operationalizations of Holland's model seems indicated.

Whereas the current study found some evidence of the lack of external validity of Holland's theory of careers for workers in India, more research with different cultural samples is needed before conclusions can be reached concerning the overall cultural validity of Holland's theory. As mentioned above, similar research with a larger and more representative sample of workers from India is

needed. The current findings also suggest that it may be fruitful to examine culture specific determinants of occupational choice as alternatives to the Western assumption of vocational interests being the primary determinant. Comparative studies which examine the relative roles and contributions of vocational interests and other factors would add significantly to our understanding of vocational behavior in the cross-cultural context. Finally, future studies should continue to assess the potential problems with cross-cultural equivalence of measurement in career assessment tools.

## REFERENCES

- Assouline, M., & Meir, E. I. (1987). Meta-analysis of the relationship between congruence and well-being measures. *Journal of Vocational Behavior*, *31*, 319–332.
- Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. *Journal of Applied Psychology*, *35*, 307–311.
- Bull, P. E. (1975). Structure of occupational interests in New Zealand and America on Holland's typology. *Journal of Counseling Psychology*, *22*, 554–556.
- Camp, C. C., & Chartrand, J. M. (1992). A comparison and evaluation of interest congruence indices. *Journal of Vocational Behavior*, *41*, 162–182.
- Campbell, D. P., & Hansen, J. C. (1981). *Manual for the SVIB-SCII* (3rd ed.). Stanford: Stanford University Press.
- Chu, M. P. (1975). *Cross-cultural study of vocational interests measured by the SCII*. Unpublished doctoral dissertation, University of Wisconsin, Madison.
- Cook, J. D., Hepworth, S. T., Wall, T. D., & Warr, P. B. (1981). *The experience of work*. New York: Academic Press.
- Feldman, S., & Meir, E. I. (1976). Measuring women's interests using Holland's vocational classification. *Journal of Vocational Behavior*, *9*, 345–353.
- Fouad, N. A. (1993). Cross-cultural vocational assessment. *Career Development Quarterly*, *42*, 4–13.
- Fouad, N. A., Cudeck, R., & Hansen, J. C. (1984). Convergent validity of the Spanish and English forms of the Strong–Campbell Interest Inventory for bilingual Hispanic high school students. *Journal of Counseling Psychology*, *31*, 339–348.
- Fouad, N. A., & Dancer, L. S. (1992). Cross-cultural structure of interests: Mexico and the United States. *Journal of Vocational Behavior*, *40*, 129–143.
- Fouad, N. A., & Hansen, J. C. (1987). Cross-cultural predictive accuracy of the Strong–Campbell Interest Inventory. *Measurement and Evaluation in Counseling and Development*, *4*, 1–8.
- Gottfredson, G. D., & Holland, J. L. (1989). *Dictionary of Holland Occupational Codes* (2nd ed.). Odessa, FL: Psychological Assessment Resources, Inc.
- Gottfredson, G. D., & Holland, J. L. (1991). *Position Classification Inventory professional manual*. Odessa, FL: Psychological Assessment Resources.
- Gottfredson, L. S. (1986). Special groups and the beneficial use of vocational interest inventories. In W. B. Walsh & S. H. Osipow (Eds.), *Advances in vocational psychology, Vol. 1. The assessment of interests* (pp. 127–198). Hillsdale, NJ: Erlbaum.
- Hansen, J. C. (1987). Cross-cultural research in vocational research. *Measurement and Evaluation in Counseling and Development*, *19*, 163–176.
- Hansen, J. C., & Campbell, D. P. (1985). *Manual for the Strong Interest Inventory* (4th ed.). Palo Alto, CA: Consulting Psychologists Press.
- Hansen, J. C., & Fouad, N. A. (1984). Translation and validation of the Spanish form of the Strong–Campbell Interest Inventory. *Measurement and Evaluation in Guidance*, *16*, 192–197.
- Holland, J. L. (1977a). *The Vocational Preference Inventory*. Palo Alto, CA: Consulting Psychologists Press.
- Holland, J. L. (1985). *Making vocational choices: A theory of vocational personalities and work environments* (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.

- Holland, J. L. (1994). *Self Directed Search (SDS) Form R* (4th ed.). Odessa, FL: Psychological Assessment Resources.
- Holland, J. L. (1996). Exploring careers with a typology: What we have learned and some new directions. *American Psychologist*, *51*, 397-406.
- Hubert, L., & Arabie, P. (1987). Evaluating order hypotheses within proximity matrices. *Psychological Bulletin*, *102*, 172-178.
- Iachan, R. (1984). A measure of agreement for the Holland classification system. *Journal of Vocational Behavior*, *24*, 133-141.
- Iachan, R. (1990). Some extensions of the Iachan congruence index. *Journal of Vocational Behavior*, *36*, 176-180.
- June, L. N., & Pringle, G. D. (1977). The concept of race in the career development theories of Roe, Super, and Holland. *Journal of Non-White Concerns*, *6*, 17-24.
- Laosa, L. M. (1990). Population generalizability, cultural sensitivity, and ethical dilemmas. In C. B. Fisher & W. W. Tryon (Eds.), *Ethics in applied developmental psychology: Emerging issues in an emerging field* (pp. 227-251). Norwood, NJ: Ablex.
- Leong, F. T. (1990, December 12). *Threats to cultural validity in clinical diagnosis and assessment: The case of Asian Americans*. Paper presented at the Department of Psychology colloquium, University of Massachusetts, Boston-Harbor Campus.
- Leong, F. T. (1997). Cross-Cultural Career Psychology: Comment on Fouad, Harmon, & Borgen (1997) and Tracey, Watanabe, & Schneider (1997). *Journal of Counseling Psychology*, *44*, 355-359.
- Leong, F. T. L., & Brown, M. (1995). Theoretical issues in cross-cultural career development: Cultural validity and cultural specificity. In W. B. Walsh & S. H. Osipow (Eds.), *Handbook of vocational psychology* (2nd ed., pp. 143-180). Hillsdale, NJ: Erlbaum.
- Lonner, W. J. (1968). The SVIB visits German, Austrian, and Swiss psychologists. *American Psychologist*, *23*, 164-179.
- Lonner, W. J., & Adams, H. L. (1972). Interest patterns of psychologists in nine Western nations. *Journal of Applied Psychology*, *56*, 146-151.
- Lonner, W. J., & Ibrahim, F. A. (1996). Appraisal and assessment in cross-cultural counseling. In P. B. Pedersen, J. G. Draguns, W. J. Lonner, & J. E. Trimble (Eds.), *Counseling across cultures* (4th ed., pp. 293-322). Thousand Oaks, CA: Sage.
- Marsella, A.J. & Leong, F.T.L. (1995). Cross-cultural issues in personality and career assessment. *Journal of Career Assessment*, *3*, 202-218.
- McArthur, C. (1954). Long-term validity of the Strong Vocational Interest Blank in two subcultures. *Journal of Applied Psychology*, *38*, 346-354.
- Melamed, S. (1976). *Vocational and avocational choices and satisfaction: A test of Holland's theory*. Unpublished doctoral dissertation, University of Sydney, Australia.
- Pandey, J. (1988). Psychology in India: Trends emerging in the eighties. In J. Pandey (Ed.), *Psychology in India: The state of the art, volume 3, Organizational behavior and mental health* (pp. 339-361). New Delhi: Sage.
- Rounds, J., & Tracey, T. J. (1996). Cross-cultural structural equivalence of RIASEC models and measures. *Journal of Counseling Psychology*, *43*, 316-329.
- Ryan, J. M., Tracey, T. J., & Rounds, J. (1996). Generalizability of Holland's structure of vocational interests across ethnicity, gender, and socioeconomic status. *Journal of Counseling Psychology*, *43*, 330-337.
- Sekaran, U. (1986). Mapping of bank employee perceptions of organizational stimuli in two countries. *Journal of Management*, *12*, 19-30.
- Shah, I. (1970). *A cross-cultural study of vocational interests*. Unpublished doctoral dissertation, University of Minnesota, Minneapolis.
- Slaney, R. B. (1980). An investigation of racial differences on vocational variables among college women. *Journal of Vocational Behavior*, *16*, 197-207.
- Slaney, R. B., & Brown, M. T. (1983). Effects of race and socioeconomic status on career choice variables among college men. *Journal of Vocational Behavior*, *23*, 257-269.
- Strahan, R. F. (1987). Measures of consistency for Holland-type codes. *Journal of Vocational Behavior*, *31*, 37-44.
- Taylor, N. (1983). *Decidedness, vocational identity, and brief career counseling*. Unpublished master's thesis, Macquarie University, North Ryde, New South Wales, Australia.
- Tracey, T. J. G. (1997). RANDALL: A Microsoft Fortran program for a randomization test of hypothesized order relations. *Educational and Psychological Measurement*, *57*, 164-168.
- Tranberg, M., Slane, S., & Ekeberg, E. (1993). The relation between interest congruence and satisfaction: A meta-analysis. *Journal of Vocational Behavior*, *42*, 253-264.
- Van de Vijver, F., & Leung, K. (1996). Cross-cultural research methodology. In F. T. L. Leong & J. T. Austin (Eds.), *The psychology research handbook: A guide for graduate students and research assistants*. Newbury Park, CA: Sage.

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