

Psychometric Characteristics of a Public-Domain Self-Report Measure of Vocational Interests: The Oregon Vocational Interest Scales

JULIE A. POZZEBON,¹ BETH A. VISSER,¹ MICHAEL C. ASHTON,¹ KIBEOM LEE,² AND LEWIS R. GOLDBERG³

¹*Department of Psychology, Brock University, St. Catharines, Ontario, Canada*

²*Department of Psychology, University of Calgary, Calgary, Alberta, Canada*

³*Oregon Research Institute, Eugene, Oregon*

We investigated the psychometric properties of the Oregon Vocational Interest Scales (ORVIS), a brief public-domain alternative to commercial inventories, in a large community sample and in a college sample. In both samples, we examined the factor structure, scale intercorrelations, and personality correlates of the ORVIS, and in the community sample, we also examined the correlations of the ORVIS scales with cognitive abilities and with the scales of a longer, proprietary interest survey. In both samples, all 8 scales—Leadership, Organization, Altruism, Creativity, Analysis, Producing, Adventuring, and Erudition—showed wide variation in scores, high internal-consistency reliabilities, and a pattern of high convergent and low discriminant correlations with the scales of the proprietary interest survey. Overall, the results support the construct validity of the scales, which are recommended for use in research on vocational interests and other individual differences.

In this article, we introduce the Oregon Vocational Interest Scales. This new instrument measures eight important types of occupational interest similar to those identified by Holland (1973) and Campbell, Hyne, and Nilsen (1992) but has the additional advantages of being brief and available in the public domain.

ASSESSMENT OF VOCATIONAL INTERESTS

Vocational interests represent an important domain of individual differences, one that overlaps only partially with the ability or personality domains (e.g., Ackerman & Heggestad, 1997). Measures of the major areas of vocational interest can discriminate among persons of different occupational groups or academic majors, providing incremental validity beyond that provided by ability or personality variables (e.g., Logue, Lounsbury, Gupta, & Leong, 2007). Some research has even indicated that vocational interests can discriminate between persons of different sexual orientations much more strongly than can personality characteristics (Lippa, 1998). Given the importance of vocational interests as individual difference variables, a brief public-domain measure of the main areas of vocational interest would be useful for researchers.

Prior to developing a self-report measure of vocational interests, the researcher must choose a strategy for constructing scales and a format for presenting items. Some inventories are based on a criterion-oriented strategy whereby items are selected on the basis of their empirical ability to discriminate between occupational groups; other inventories are based on a construct-oriented strategy whereby items are selected on the basis of their conceptual relevance to a given domain of interests (see

Cronbach, 1990, p. 467). Some inventories involve a forced-choice item format whereby respondents must indicate which item is most or least endorsed; other inventories involve a single-stimulus item format whereby respondents must indicate their level of endorsement of each item in turn (see Cronbach, 1990, p. 470). We developed the scales of this article according to a construct-oriented strategy with a single-stimulus response format. These approaches have the advantage of producing scales whose scores are readily interpretable; the construct-oriented strategy increases the likelihood that empirical validity will generalize across respondent samples, and the single-stimulus item format avoids the difficulties of interpreting responses that represent contrasts between the respondent's levels of two or more different areas of interest.

DEVELOPMENT OF THE ORVIS

The ORVIS measures the following eight dimensions of vocational interest: Leadership, Organization, Altruism, Creativity, Analysis, Producing, Adventuring, and Erudition. The first five ORVIS variables of this list are similar in content to five of Holland's (1973) "RIASEC" interest types, namely, Enterprising, Conventional, Social, Artistic, and Investigative. The next two ORVIS scales, Producing and Adventuring, represent a division of Holland's Realistic interest type as operationalized in two Orientation scales from the Campbell Interest and Skill Survey (CISS; Campbell et al., 1992). Finally, the ORVIS Erudition scale measures interests in scholarly activities, which were found to be differentiated from the remaining CISS Orientations. In the following, we provide a brief history of the development of the ORVIS variables.

In the summer of 1996, the CISS was administered by mail to participants in the Eugene-Springfield (Oregon) Community Sample (ESCS; Goldberg, 1999), and approximately 600 of

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Address correspondence to Julie A. Pozzebon, Department of Psychology, Brock University, St. Catharines, Ontario, L2S 3A1, Canada; Email: Julie.Pozzebon@brocku.ca

them completed the survey.¹ Over the years, Goldberg has carried out a number of analyses of CISS scales, the most important of which for our purposes were analyses of the seven CISS Orientation scales. To develop public-domain measures of each of the CISS Orientations, 2,035 items from the International Personality Item Pool (IPIP; Goldberg, 1999) were correlated with the seven scale scores, and IPIP items were classified by the CISS scale with which they were most highly associated. IPIP items falling within each category were then selected rationally based on the extent of their correlations with the CISS scale, the apparent relevance of their content to the construct, and their lack of redundancy with other items already selected for that IPIP scale. Finally, the reliability of preliminary versions of the new scales were analyzed, and any items that served to attenuate scale reliability were omitted and in some cases replaced with other IPIP items that functioned more adequately.

All IPIP items are short phrases, beginning with a verb (e.g., "Take risks," "Talk softly"). Those IPIP items that turned out to be most highly associated with the CISS scales typically included verbal phrases involving interest or preference (e.g., "Like," "Do not like," "Enjoy," "Do not enjoy," "Prefer," "Am [not] interested in"). To discover whether the self-reported relative frequencies of individuals' actual behavioral acts might turn out to be even better measures of interests, Goldberg used the 400 items in the Behavioral Report Inventory (BRI), which had been administered to the ESCS in 1997, to develop BRI scales associated with the seven CISS Orientation scales using the exact same procedures used to develop the IPIP scales. Both the IPIP and BRI scales were developed in parallel in 2004 and compared as predictors of the CISS constructs. Information about both sets of scales is available from L. R. Goldberg.

In factor analyses of the original CISS Orientation scales, separately for skills and interests, as well as for the new IPIP and BRI versions of those seven constructs, it was always necessary to extract eight factors for the seven scales to each load most highly on a separate factor. If less than eight factors were extracted, the scales measuring the Producing and Analyzing Orientations always loaded most highly on the same factor. In the eight-factor analyses of the original CISS scales, the additional factor included CISS scales measuring interests and skills related to such occupations as Translator/Interpreter, Writer/Editor, Librarian, Liberal Arts Professor, and Musician and to such basic interests as Writing and International Activities. Seemingly, then, the addition of an eighth dimension (which Goldberg called "Erudition") to the Holland (1973) six and the Campbell et al. (1992) seven might be warranted. Although such an additional dimension is unlikely to be completely independent of the other constructs, it might serve to capture important individual differences unavailable in previous vocational inventories.

The ORVIS were developed as direct measures of these eight constructs. Items for each of the eight new scales were generated by Goldberg to include both interests and activities that were conceptually associated with each dimension, based on the corresponding IPIP and BRI scales, and on the content of the CISS

scales most highly associated with the additional eighth factor. All items from the preliminary versions of these new ORVIS scales were administered to the ESCS as part of an Omnibus Personal Attributes Survey (OPAS) in 2006. This article is the first report of our analyses of these scales in this community sample along with a cross-validation of our findings in another quite different kind of sample: one consisting of college students. Thus, this article represents the first empirical validation of this construct-driven measure of vocational interests.

METHOD

Participants

Community sample. From Goldberg's (1999) ESCS, 665 participants completed the ORVIS, of whom 379 (57%) were women and 286 (43%) were men. In 2006, the participants' mean age was 62 years ($SD = 11.7$). Over 98% of respondents were White, and 85% had at least some college education.

College sample. Canadian college students in their 1st year of study participated in an ongoing longitudinal investigation of academic performance, college satisfaction, and choice of major. Of the 346 students, there were 245 women (71%) and 101 men (29%), with a mean age of 18.5 years ($SD = 1.7$).

Measures

ORVIS. Participants in both samples completed the 92 ORVIS items (see the Appendix for items sorted by scale). For each item, participants rated their level of interest in each occupational description (e.g., "Care for sick people") on a 5-point scale ranging from 1 (*strongly dislike*) to 5 (*strongly like*).

CISS. Most participants of the community sample also completed the CISS (Campbell et al., 1992), which contains 320 self-report items, each using a 6-point response scale ranging from 1 (*strongly dislike*) to 6 (*strongly like*). We used participants' scores on the seven CISS Orientation scales: Influencing, Organizing, Helping, Creating, Analyzing, Producing, and Adventuring. These scales correspond conceptually to the first seven ORVIS scales listed previously. (There is no direct counterpart of the ORVIS Erudition scale in the CISS, but much of the content of ORVIS Erudition is represented within CISS Creating.)

Personality. Participants in the community sample completed various personality measures including the IPIP Big Five scales (Goldberg, 1999). Internal consistency reliabilities (alpha) of the IPIP Big Five scales ranged from .88 to .91 in this sample. Participants in both samples also provided self-reports on measures of the HEXACO personality factors. Specifically, community sample participants provided self-reports on the full-length (192-item) form of the HEXACO Personality Inventory (HEXACO-PI; Lee & Ashton, 2004), whereas college sample participants provided self-reports on the half-length (100-item) form of the same inventory (HEXACO-PI-R; e.g., Lee et al., 2009). Both versions of the HEXACO inventory assess six broad personality factors: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience. In the short version of the inventory, one of the four facet-level scales defining the Extraversion factor has been replaced. For consistency across samples, we computed scores on the Extraversion factor from the three common facet-level

¹Of the more than 30 questionnaires administered to the ESCS during the 1993 to 2006 period, the CISS was the only one for which no honorarium payment was provided; and doubtless because of this, participation was lower than for the other surveys

scales only, and we computed scale scores from the items of the half-length form. All items were administered using a response scale with options ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency reliabilities (alpha) of the six HEXACO scales ranged from .79 to .84 in the community sample and from .81 to .84 in the college sample.

Cognitive ability. In the community sample, we measured reasoning ability as measured by Factor B, a 15-item Reasoning scale, from the Sixteen Personality Factor Questionnaire (16PF; Conn & Rieke, 1994). Although the 16PF is a personality inventory, the items of its Reasoning scale are cognitive ability items, scored as correct or incorrect. The internal-consistency reliability of the Reasoning scale was .75 in this sample.

In the college sample, we administered two measures of ability. Verbal ability was measured with the 46 items of the Vocabulary scale from the Multidimensional Aptitude Battery (MAB; Jackson, 1984). Mathematical ability was measured with a test consisting of 20 items taken from the Gauss Mathematics Contest (Center for Education in Mathematics and Computing, 2007); the mathematics items assessed problem solving in arithmetic and in basic algebra and geometry. Internal-consistency reliabilities of the verbal and mathematical ability measures were .78 and .65, respectively.

RESULTS

Internal Consistency Reliabilities

Internal consistency reliabilities and descriptive statistics for the ORVIS scales are reported in Table 1 for both the community and college samples. The reliabilities were generally high in both samples, ranging from .79 and .75 for Erudition to .90 and .91 for Organization, respectively.

As shown in Table 1, the means for all scales in both samples were reasonably close to the theoretical midpoints (i.e., 3.00 for the 1–5 scales), and the standard deviations were reasonably wide, covering at least one fifth of the theoretical range. The mean scores for women and men indicated some sex differences in the scales. In both samples, the largest sex difference was in Adventure, with men's scores more than a standard deviation higher than women's scores. Men's Analysis scores were also substantially higher than were women's ($d > .5$), whereas women scored higher on Altruism than did men ($d > .5$).

Factor Structure of the ORVIS Items

We also conducted item-level factor analyses of the 92 ORVIS items in each of the two samples. In both samples, we extracted eight principal components and rotated them to an orthogonal Procrustes solution based on a target matrix in which each item was assigned a target loading of 1 for its designated scale and 0 for all other scales (see the Appendix for the loading of each item on its targeted factor). In both samples, factor scores on the resulting factors correlated strongly with the corresponding scale scores: Correlations ranged from .69 (Erudition) to .94 (Altruism) in the college sample and from .77 (Erudition) to .94 (Organization and Altruism) in the community sample. Thus, the factor analysis results generally supported the division of the ORVIS items into the eight specified scales.²

²A confirmatory factor analysis of the ORVIS items is unsuitable for the following reasons. First, the ORVIS scales will not be strictly unidimensional,

TABLE 1.—Means, standard deviations, and sex differences in the Oregon Vocational Interest Scales.

Scale	Total		Women		Men		<i>d</i> (Women–Men)
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
Community sample							
Leadership (.87)	2.78	.76	2.66	.75	2.94	.75	–.37
Organization (.90)	2.52	.79	2.48	.80	2.58	.77	–.12*
Altruism (.86)	3.15	.70	3.32	.65	2.93	.70	.60
Creativity (.88)	3.22	.80	3.39	.81	2.99	.73	.53
Analysis (.88)	2.60	.87	2.38	.82	2.90	.84	–.62
Production (.81)	3.17	.72	3.05	.71	3.34	.71	–.40
Adventure (.82)	2.50	.77	2.20	.66	2.89	.73	–1.03
Erudition (.79)	3.58	.69	3.40	.70	3.12	.65	.41
College sample							
Leadership (.85)	2.90	.74	2.82	.74	3.10	.70	–.36
Organization (.91)	2.38	.81	2.29	.77	2.58	.87	–.45
Altruism (.84)	3.24	.70	3.40	.64	2.87	.69	.73
Creativity (.89)	2.96	.86	3.01	.86	2.84	.86	.18*
Analysis (.84)	2.08	.73	1.94	.64	2.42	.81	–.86
Production (.82)	2.33	.73	2.22	.68	2.60	.76	–.49
Adventure (.83)	2.78	.82	2.52	.69	3.40	.78	–1.11
Erudition (.75)	2.84	.68	2.91	.68	2.69	.66	.29

Note. Community $N = 379$ women, 286 men; college $N = 245$ women, 101 men. Internal-consistency reliabilities are in parentheses.
*ns; for all other d values, $p < .01$.

Correlations Among the ORVIS Scales

Table 2 provides the correlations among the eight ORVIS scales. These correlations were generally positive, with substantial correlations (approximately .50) between the Production and Adventure scales, the Leadership and Organization scales, and the Creativity and Erudition scales. When sex was partialled out of the correlations, the largest decrease in value was only .03, suggesting that the overlap cannot be attributed to sex differences in these vocational interest scales.

Correlations Between the ORVIS and CISS Scales

Table 3 shows the correlations of the ORVIS scales with the Orientation scales from the CISS. For the seven ORVIS scales that have counterparts in the CISS (i.e., all except ORVIS Erudition), the convergent correlations were all very high, ranging from .67 to .76, with a mean of .72. The discriminant correlations were substantially weaker (mean of .16), ranging from –.13 to .58, with the highest being .44 (ORVIS Leadership with CISS Adventuring) and .43 (ORVIS Adventure with CISS Producing). The remaining ORVIS variable, Erudition, correlated .58 with CISS Creating, the scale that subsumes some Erudition-related content.

because each scale would likely contain several implicit (i.e., not explicitly hypothesized) “facets” or lower order factors representing various subdomains. Second, most ORVIS items would be expected to show appreciable associations with one or more scales other than the intended scale, because some activities and occupations will involve two or more areas of interest. Our aim in conducting the factor analyses was simply to evaluate how closely the eight ORVIS scales correspond to the eight largest factors underlying the ORVIS items, and not to find a model that would provide close fit to the data.

TABLE 2.—Intercorrelations of the Oregon Vocational Interest Scales in the Community and College Samples.

ORVIS Scale	1	2	3	4	5	6	7	8
1. Leadership		.44 (.44)	.31 (.38)	.23 (.29)	.31 (.27)	.10 (.07)	.39 (.35)	.33 (.38)
2. Organization	.60 (.59)		.16 (.18)	-.04 (-.03)	.41 (.41)	.15 (.14)	.20 (.20)	.13 (.15)
3. Altruism	.10 (.17)	-.09 (-.03)		.36 (.32)	.14 (.24)	.17 (.24)	.08 (.23)	.44 (.41)
4. Creativity	.32 (.34)	.02 (.04)	.34 (.33)		.15 (.24)	.22 (.28)	.05 (.18)	.54 (.52)
5. Analysis	.15 (.10)	.23 (.19)	.05 (.17)	.09 (.13)		.38 (.34)	.34 (.24)	.28 (.36)
6. Production	.20 (.16)	.08 (.04)	.16 (.26)	.36 (.40)	.42 (.37)		.50 (.47)	.18 (.22)
7. Adventure	.27 (.21)	.08 (.00)	.07 (.29)	.17 (.25)	.32 (.21)	.58 (.55)		.04 (.14)
8. Erudition	.36 (.39)	.16 (.19)	.31 (.28)	.57 (.57)	.08 (.13)	.35 (.40)	.07 (.16)	

Note. Above the diagonal are intercorrelations in the community sample ($N = 665$); below the diagonal are intercorrelations in the college sample ($N = 346$). Partial correlations with sex controlled are in parentheses. Correlations with absolute values of .40 or greater are in bold.

Correlations of Vocational Interests With Personality and Cognitive Ability

Table 4 provides the correlations of the ORVIS scales with the personality scales and the cognitive ability variables. With regard to the IPIP Big Five scales (administered in the community sample only), the largest correlations ($r_s \geq .25$) were observed between IPIP Extraversion and ORVIS Leadership; IPIP Agreeableness and ORVIS Altruism; and IPIP Intellect and ORVIS Leadership, Creativity, and Erudition. With regard to the HEXACO-PI scales (administered in both samples), the strongest relations ($r \geq .45$) were those of HEXACO-PI Openness with ORVIS Creativity and Erudition. The HEXACO-PI Extraversion scale showed moderate positive correlations with ORVIS Leadership (particularly in the community sample) and with ORVIS Altruism (particularly in the college sample). There were also moderately strong negative relations between HEXACO-PI Emotionality and ORVIS Adventuring in both samples, although these correlations were partly attributable to sex differences on both variables (when participant sex was controlled, r_s decreased from $-.36$ to $-.19$ in the community sample and from $-.49$ to $-.27$ in the college sample). Many other correlations between ORVIS and HEXACO-PI scales exceeded .20 in absolute value, and these generally were consistent with the content of the respective scales.

Most of the correlations between ORVIS scales and cognitive ability tests were rather weak, but the strongest relations involved the ORVIS Analysis and Erudition scales. In the community sample, 16PF Reasoning correlated strongly with Erudition and with Analysis. In the college sample, verbal

ability (MAB Vocabulary) correlated strongly with Erudition, and mathematical ability was correlated with Analysis.³

DISCUSSION

In this investigation, we examined the psychometric properties of the ORVIS, a new public-domain measure of several broad types of vocational interests. The brevity of the ORVIS instrument and the simplicity of its IPIP-based item format make it well suited for use in vocational interests research and as a supplement to the variables examined in other individual differences research. As we discuss below, the results suggest that this instrument will be a useful tool for assessing this important area of individual differences.

Within both the community and the college samples, there was wide variation in participants' scores and high internal consistency reliabilities for the eight ORVIS scales. The ORVIS scales showed appropriate patterns of convergent and discriminant correlations with the scales of the CISS, a published interest inventory.

The relations of the ORVIS scales with the personality and cognitive ability variables were theoretically meaningful. For example, the personality dimension of Openness appears to be heavily implicated in occupational interests involving Creativity

³The ORVIS items that correlated most strongly with mathematical ability were "Be a mathematician" and "Solve complex puzzles," with correlations of .25 and .27, respectively.

TABLE 3.—Correlations of the Oregon Vocational Interest Scales with the Campbell Interest and Skill Survey scales.

Scale	ORVIS							
	Leadership	Organization	Altruism	Creativity	Analysis	Production	Adventure	Erudition
CISS								
Influencing	.75	.25	.16	.09	.15	.02	.32	.16
Organizing	.37	.67	.09	-.11	.27	.05	.20	-.01
Helping	.20	.11	.69	.21	.01	.09	.05	.27
Creating	.14	-.07	.36	.67	-.01	.06	-.13	.58
Analyzing	.21	.30	-.04	-.07	.75	.27	.29	.11
Producing	.03	.17	.04	.03	.38	.75	.44	.03
Adventuring	.43	.20	-.05	-.12	.31	.29	.76	-.09

Note. $N = 449$. ORVIS = Oregon Vocational Interest Scales; CISS = Campbell Interest and Skill Survey. Convergent correlations are in bold. $p < .05$ for $|r| \geq .10$.

TABLE 4.—Correlations of the Oregon Vocational Interest Scales (ORVIS) with personality and cognitive ability variables.

Personality and Ability Scale	ORVIS																
	Leadership		Organization		Altruism		Creativity		Analysis		Production		Adventure		Erudition		
	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	
HEXACO-PI(-R) Scales																	
Honesty-Humility	-.30	-.27	-.14	-.22	.08	.25	-.10	-.01	-.19	-.02	.00	.03	-.25	-.13	-.02	.08	
Emotionality	-.15	-.15	-.05	-.06	.20	.29	.19	.11	-.25	-.22	-.20	-.22	-.36	-.46	.09	.03	
Extraversion	.40	.25	.03	-.02	.20	.39	.11	.14	-.06	-.04	-.09	.07	.05	.19	.12	.06	
Agreeableness	-.08	-.15	-.06	-.12	.21	.11	.05	.06	-.07	.11	-.03	.12	-.15	.19	.06	-.02	
Conscientiousness	.06	-.05	.15	.07	-.05	.22	-.05	-.13	.06	.00	-.04	-.18	-.04	-.26	-.02	.02	
Openness	.24	.25	-.14	-.02	.20	.04	.46	.57	.27	.14	.22	.33	.08	.07	.45	.49	
IPIP Big Five																	
Extraversion	.38	-.01	.16	.14	-.07	-.15	.01	.10									
Agreeableness	.06	-.05	.42	.21	-.11	-.02	-.15	.18									
Conscientiousness	.10	.20	-.04	-.12	.01	-.08	-.04	-.08									
Emotional Stability	.07	-.04	.01	-.05	.09	.00	.04	-.02									
Intellect	.29	-.06	.10	.30	.23	.07	.02	.34									
Cognitive Abilities																	
Reasoning	.11		-.03		.05		.14		.27		.07		.07		.31		
Math		.05		.09		-.15		-.04		.21		.05		.16		.03	
Verbal		.11		-.07		-.10		.21		.06		.16		.03		.40	

Note. Community (C): N = 408; N = 646 (HEXACO Personality Inventory-Revised); N = 541 (reasoning ability). $p \leq .05$ for $|r| \geq .09$, $p \leq .01$ for $|r| \geq .11$. College Student (S): N = 346. Correlations with absolute values of .40 or greater are in bold. $p \leq .05$ for $|r| \geq .11$, $p \leq .01$ for $|r| \geq .15$.

or Erudition. However, these two areas of interest can be distinguished by their relations with verbal ability, which is associated rather strongly with ORVIS Erudition but only modestly with ORVIS Creativity. Similarly, the ORVIS Production and ORVIS Adventure variables are differentiated by their patterns of personality correlations: Openness to Experience was more strongly associated with Production than with Adventure, whereas Emotionality was more strongly (negatively) associated with Adventure than with Production. Finally, other relations are also of some interest, such as the modest link between mathematical ability and ORVIS Analysis and the moderate links between the Extraversion factor of personality and the ORVIS Leadership and ORVIS Altruism scales. Taken together, these results support the construct validity of the ORVIS scales insofar as the empirical relations were consistent with the apparent conceptual overlap between the ORVIS scales and the other individual difference variables. Moreover, the generally modest size of the observed correlations indicates that the ORVIS scales are not redundant with the measures of personality and cognitive ability.

In summary, the results of this investigation support the construct validity of the ORVIS and suggest that these scales are suitable for research on vocational interests and related individual differences. The ORVIS thus stands as the most thoroughly validated measure of vocational interests available in the public domain.

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REFERENCES

Ackerman, P. L., & Heggstad, E. D. (1997). Intelligence, personality, and interests: Evidence for overlapping traits. *Psychological Bulletin, 121*, 219–245.

Campbell, D. P., Hyne, S. A., & Nilsen, D. L. (1992). *Manual for the Campbell Interest and Skill Survey (CISS)*. Minneapolis, MN: National Computer Systems.

Center for Education in Mathematics and Computing. (2007). *Gauss contest*. Waterloo, Ontario, Canada: University of Waterloo.

Conn, S. R., & Rieke, M. L. (1994). *The 16PF fifth edition technical manual*. Champaign, IL: Institute for Personality and Ability Testing.

Cronbach, L. J. (1990). *Essentials of psychological testing* (5th ed.). New York, NY: Harper & Row.

Goldberg, L. R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, and F. Ostendorf (Eds.), *Personality psychology in Europe* (Vol. 7; pp. 7–28). Tilburg, The Netherlands: Tilburg University Press.

Holland, J. L. (1973). *Making vocational choices: A theory of careers*. Englewood Cliffs, NJ: Prentice-Hall.

Jackson, D. N. (1984). *Multidimensional Aptitude Battery*. Port Huron, MI: Research Psychologists Press.

Lee, K., & Ashton, M. C. (2004). Psychometric properties of the HEXACO personality inventory. *Multivariate Behavioral Research, 39*, 329–358.

Lee, K., Ashton, M. C., Pozzebon, J. A., Visser, B. A., Bourdage, J. S., & Ogunfowora, B. (2009). Similarity and assumed similarity in personality reports of well-acquainted persons. *Journal of Personality and Social Psychology, 96*, 460–472.

Lippa, R. (1998). Gender-related individual differences and the structure of vocational interests: The importance of the people-things dimension. *Journal of Personality and Social Psychology, 74*, 996–1009.

Logue, C. T., Lounsbury, J. W., Gupta, A., & Leong, F. T. L. (2007). Vocational interest themes and personality traits in relation to college major satisfaction of business students. *Journal of Career Development, 33*, 269–295.

APPENDIX: ITEMS OF THE OREGON VOCATIONAL INTEREST SCALES, SORTED BY SCALE

Leadership (CISS: Influencing; Holland: Enterprising)

1. Make important things happen	.54	.37
9. Lead other people	.71	.43
17. Be a sales or marketing director	.42	.45
25. Be the chief executive of a large company	.63	.52
33. Organize a political campaign	.43	.65
41. Be the master of ceremonies at a meeting	.59	.37
49. Plan an advertising campaign	.43	.54
57. Debate topics in a public meeting	.55	.59
65. Persuade others to change their views	.56	.46
73. Be a state governor or senator	.57	.73
81. Run for political office	.48	.76
86. Make decisions that affect a lot of people	.72	.54

Organization (CISS: Organizing; Holland: Conventional)

2. Be the financial officer for a company	.56	.63
10. Be an office manager	.61	.66
18. Plan budgets	.67	.77
26. Prepare financial contracts	.68	.72
34. Develop an office filing system	.65	.63
42. Supervise the work of others	.37	.37
50. Plan investment strategies	.52	.68
58. Establish time schedules	.67	.63
66. Monitor business expenses	.80	.72
74. Be a purchasing agent	.66	.50
82. Keep track of a company's inventory	.78	.75
87. Manage a computer data base	.52	.62
90. Keep detailed records	.69	.54

Altruism (CISS: Helping; Holland: Social)

3. Help others learn new ideas	.33	.37
11. Care for sick people	.66	.62
19. Be an elementary-school teacher	.52	.51
27. Be a social worker	.72	.67
35. Be a minister, priest, rabbi or other religious teacher	.43	.19
43. Counsel persons who need help	.69	.71
51. Instruct parents on child care	.65	.71
59. Be a doctor or nurse	.57	.45
67. Be a physical therapist	.57	.42
75. Provide comfort and support to others	.68	.69
83. Participate in charity events	.48	.51
88. Help people make career decisions	.44	.55
91. Be a counselor or therapist	.69	.74

Creativity (CISS: Creating; Holland: Artistic)

4. Create works of art	.68	.71
12. Create new fashion designs	.64	.54
20. Be a professional dancer	.59	.42
28. Write short stories or novels	.43	.56
36. Play an instrument in a symphony	.43	.53
44. Redecorate one's house	.50	.41
52. Select art works for a museum	.64	.66
60. Sing professionally	.63	.60
68. Be an actor or actress	.60	.57
76. Be an artist or architect	.71	.71
84. Act in a play	.57	.64
85. Design Internet web pages	.30	.41
89. Write songs	.65	.75
92. Paint or draw	.70	.76

Analysis (CISS: Analyzing; Holland: Investigative)

5. Be a chemist	.73	.77
13. Design a laboratory experiment	.78	.75
21. Be a mathematician	.62	.54
29. Explain scientific concepts to others	.76	.76
37. Be a physicist	.80	.61
45. Carry out medical research	.67	.68
53. Be a scientific reporter	.73	.74
61. Solve complex puzzles	.38	.42
69. Develop a computer program	.52	.32
77. Be a statistician	.44	.26

Production (CISS: Producing; Holland: Realistic)

6. Care for cattle or horses	.40	.54
14. Be a farmer	.52	.66
22. Construct new buildings	.44	.30
30. Be a forest ranger	.58	.50
38. Cultivate plants	.57	.40
46. Go on nature walks	.48	.16
54. Do woodworking	.55	.51
62. Raise flowers	.48	.23
70. Repair cars or trucks	.37	.53
78. Work with tools and machinery	.51	.56

Adventure (CISS: Adventuring; Holland: Realistic)

7. Be a professional athlete	.57	.70
15. Engage in exciting adventures	.27	.47
23. Survive in the wilderness	.41	.49
31. Be a racing car driver	.54	.48
39. Face physical danger	.47	.46
47. Be a military officer	.46	.41
55. Compete in athletic events	.58	.71
63. Be a bounty hunter	.57	.40
71. Be a long-distance bicycle rider	.44	.54
79. Be a police officer	.58	.46

Erudition (No Direct Counterpart in CISS or Holland Models)

8. Be a translator or interpreter	.35	.51
16. Be a librarian	.54	.18
24. Be a professor of English	.59	.24
32. Make up word puzzles	.48	.21
40. Edit a newspaper	.62	.21
48. Know many languages	.32	.58
56. Be a foreign correspondent	.40	.48
64. Speak fluently on any subject	.23	.56
72. Read many books	.54	.55
80. Keep a diary or journal	.48	.33

Note. Numbers to the right of each item are factor loadings on the item's targeted factor in the college (left) and community (right) samples. See text for description of the factor analysis.