Concurrent Validity of the 2005 Strong Interest Inventory: An Examination of Gender and Major Field of Study

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This is the first article evaluating the concurrent validity of the 2005 Strong Interest Inventory (SII). The Basic Interest Scales (BISs) were substantially revised to reflect the changing workplace, so such an update is particularly important. Concurrent validity of the 41 content scales in the SII was examined for differentiating 31 college majors in a national college sample of 1,403 women and 469 men. Using discriminant analyses, three sets of content scales were used to predict major field of study. These were six General Occupational Scales, five Personal Style Scales, and 30 BISs. Each set of scales showed substantial concurrent validity in differentiating college major for women and men. The most specific scales, the BISs, were the most predictive of major, with hit rates 6 times greater than chance. Results clearly supported the concurrent validity and counseling utility of the content scales of the SII.

Keywords: Basic Interest Scales, concurrent validity, educational major, hit rates, 2005 Strong Interest Inventory

Vocational interests, measured for 80 years with the Strong Interest Inventories, are robust dimensions with stability over time and with potent implications for educational and career pursuits (Hansen, 2005; Harmon, Hansen, Borgen, & Hammer, 1994; Low, Yoon, Roberts, & Rounds, 2005). The 1994 Strong Interest Inventory (SII; Harmon et al., 1994; Strong, 1927) has recently been revised, and the newest version was released to the public in early 2005 (Donnay, Morris, Schaubhut, & Thompson, 2005). Differences between the 1994 and 2005 SII include new occupational scales, the expansion of the Basic Interest Scales (BISs) from 25 to 30 scales, and the addition of a Teamwork scale to the Personal Style Scales (PSSs). The current study focuses on the concurrent

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validity of the 41 content scales in the 2005 SII, and especially the new BISs, for differentiating college majors in a large national sample.

Vocational psychology researchers have used the SII to examine relations between interest and other constructs such as career choice (Toman & Savickas, 1997), personality (Larson & Borgen, 2002; Larson, Rottinghaus, & Borgen, 2002; Staggs, Larson, & Borgen, in press, 2004), ethnicity and culture (Davison Aviles & Spokane, 1999; Fouad, 2002; Fouad, Harmon, & Borgen, 1997; Lattimore & Borgen, 1999), self-efficacy (Brown, Lent, & Gore, 2000; Chartrand, Borgen, Betz, & Donnay, 2002; Donnay & Borgen, 1996; Luzzo & Day, 1999), educational aspirations (Gasser, Larson, & Borgen, 2004; Rottinghaus, Lindley, Green, & Borgen, 2002), teaching development (Larkin, Harvey, & Bechtel, 2002), satisfaction (Jackson, 2002; Zao, 2002;), academic or career progress (Barnes & Herr, 1998; Kahn, Nauta, Gailbreath, Tipps, & Chartrand, 2002), intelligence (Kaufman & McLean, 1998), and theoretical applications (Betz & Borgen, 2000; Borgen & Harmon, 1996; Harmon & Borgen, 1995).

The SII has also been used widely in practical applications such as career counseling (e.g., Buboltz, Thomas, & Johnson, 2001; Hansen & Campbell, 1985; Swanson & Fouad, 1999; Zytowski & Warman, 1982). In one study of career assessment practices, the SII was cited as the most frequently used interest measure by the sample of more than 600 counseling psychologists (Watkins, Campbell, & Nieberding, 1994). Furthermore, this measure has been utilized in numerous case studies of vocational behavior (e.g., Prince, 1998; Savickas, 1998; Swanson, 1992).

Prior studies have examined the validity of the 1994 SII BISs (Donnay & Borgen, 1996; Lattimore & Borgen, 1999; Olsen, 1996; Ralston, Borgen, Rottinghaus, & Donnay, 2004). However, this is the first article to examine in-depth the incremental validity of the new 2005 BISs.

Specifically, the purpose of the current study was to provide concurrent criterion validity for the new SII primarily investigating the scales' abilities to differentiate between different college majors. This is important to provide evidence that the revised SII is valid and to provide guidance for practitioners transitioning to the new SII during the next few years. The 2005 SII has been revised to encompass a wider variety of BISs to account for the development of new interests in today's ever-changing workforce. Currently, the 2005 SII is a 291-item measure of vocational interests based on Holland's RIASEC model (Holland, 1997). Differences between the 1994 and 2005 SII include the expansion of the BISs from 25 to 30 scales, the inclusion of another PSS (the Teamwork scale), and a format change from a 3-point to 5-point differentiation of interest preference. These changes allow for the expression of new career options that have become available in the workforce in the past decade.

As part of the revision of the 2005 SII, the publisher, CPP Incorporated, sampled students taking college courses over the Internet as part of their revision and validation efforts. The authors were allowed access to this rich data set. Using discriminant analyses, we provide in this article initial concurrent criterion validity estimates of the 2005 SII for identifying students in a diverse array of majors.

College major was the criterion variable, and the SII scales were the predictors. Three predictor sets of SII content scales were used for multivariate prediction of majors: 6 General Occupational Themes (GOTs), 30 BISs, and 5 PSSs.

We expected to find support for three hypotheses. First, although the PSSs and the PSSs and GOTs combined were expected to predict major field of study better than chance, it was expected that the inclusion of the BISs to the PSSs and GOTs would result in the highest level of prediction (cf. Donnay & Borgen, 1996; Ralston et al., 2004; Ralston, Miller, Zakalik, Rottinghaus, & Betz, 2003). Second, we expected that the strongest predictive set would be the 30 BISs alone because of their greater number and specificity (cf. Donnay & Borgen, 1996; Ralston et al., 2004; Ralston et al., 2003). Third, it was hypothesized that similar results would be found for men and women (Donnay & Borgen, 1996; Olsen, 1996).

METHOD

Participants

A sample of exactly 1,873 participants was used as part of the 2005 SII revision data gathered by CPP, Incorporated. There were 1,403 women and 469 men in this national college sample. In regards to the disparate numbers of women and men, it appears that more women were conducting Internet searches on career-related topics during the time of the study. Also, given that participants needed to fill out a lengthy questionnaire of more than 300 items, it seems that women were more willing to do so and persist with the task than men. We hypothesize that this reflects national trends of higher percentages of women engaging in career-seeking behaviors. In regards to this being a national sample, the authors ran analyses on the zip codes of the sample's respondents, and found that the zip codes were widely distributed across the United States (see Table 1).

The age range of the sample was 17 to 57 years with a mean age of 22.61 (SD = 5.86). The ethnicity of the sample was 73% White, 11% African American, 8% Hispanic, 5% Asian, 3% other or multiple ethnicities. Participants were students endorsing one of 31 different majors as shown in Table 2. All participants endorsed that they were full-time students. The goal of the current education for the sample was undergraduate coursework or degrees (64.6%), masters degrees (14.5%), associates degrees (10%), doctoral degrees (4.9%), professional degrees (such as JDs and MDs; 4.5%), and trade school degrees (1.4%).

Procedures

The sample was obtained through CPP, Incorporated. Participants were selected through a random sampling procedure as they clicked onto a certain Internet screen. Potential participants were those who entered *career* into the search engine. Every third person to enter that search word on the Google Web

Table 1
Geographical Representation of the Total National Sample (N = 1872, with 47 missing zip codes)

Area Defined by 1-Digit Zip		State	N
Northeast	0		153
	0	Connecticut	24
	0	Maine	6
	0	Massachusetts	49
	0	New Hampshire	8
	0	New Jersey	52
	0	Rhode Island	10
	0	Vermont	4
Greater New York	1		238
	1	Delaware	5
	1	New York	138
	1	Pennsylvania	95
Atlantic	2		176
	2	District of Columbia	2
	2	Maryland	48
	2	North Carolina	36
	2	South Carolina	23
	2	Virginia	54
	2	West Virginia	13
Southeast	3		268
	3	Alabama	40
	3	Florida	121
	3	Georgia	46
	3	Mississippi	20
	3	Tennessee	41
Eastern Plains	4		243
	4	Indiana	95
	4	Kentucky	26
	4	Michigan	67
	4	Ohio	55
Northern Plains	5		77
	5	Iowa	14
	5	Minnesota	29
	5	Montana	2
	5	North Dakota	6
	5	South Dakota	3
	5	Wisconsin	23
Western Plains	6		130
	6	Illinois	67
	6	Kansas	23
	6	Missouri	28
	6	Nebraska	12
Southern Plains	7		198
	7	Arkansas	12
	7	Louisiana	55

(continued)

Table 1 (continued)

Area Defined by 1-Digit Zip		State	*n*
	7	Oklahoma	20
	7	Texas	111
Rocky Mountains	8		101
	8	Arizona	37
	8	Colorado	24
	8	Idaho	6
	8	Nevada	13
	8	New Mexico	5
	8	Utah	13
	8	Wyoming	2
Pacific	9		242
	9	Alaska	6
	9	California	165
	9	Hawaii	11
	9	Oregon	21
	9	Washington	39
Total			1825

page (www.google.com) was invited to take the 2005 SII for no charge. Google is a widely used Internet search engine. Human participants considerations were consistent with American Psychological Association (APA; 2002) guidelines, and involved informing the participants of what was expected and what would be the result of participating. Specifically, participants were informed in advance the number of items to be filled out, the time commitment, and the career report that would be received at the end of participation. No risks of participating were anticipated; however, the participants were told that they could discontinue the study at any time. In exchange for completing the 2005 SII, participants were given a brief summary of their results that included their six GOTs, estimated from the 1994 SII scoring keys.

SII

The SII comprises 291 items and was designed to capture an individual's career interests (Donnay et al., 2005). The revision of the 1994 SII resulted in some items being deleted, some items being slightly revised, and some new items being added. In short, there were 20 items with minor word changes, and 78 new items added to the 2005 SII (Donnay et al., 2005). Similar to the 1994 SII, the 2005 SII includes two sets of content scales, the 6 GOTs and the 30 BISs, and one set of empirically keyed scales, the 211 Occupational Scales (OSs). The OSs are not included in the current study and are not discussed. The 2005 SII was normed on a new reference group titled the General Representative Sample (GRS) that included 2,250

Table 2
College Majors for the Female Sample (n = 1403) and for the Male Sample (n = 469)

College Major	Female n's	% of Female Sample	Male n's	% of Male Sample
Accounting	47	3.3	12	2.6
Administration	38	2.7	17	3.6
Applied art & design	32	2.3	5	1.1
Architecture	14	1.0	10	2.1
Biological science	119	8.5	36	7.7
Chemistry	15	1.1	13	2.8
Communications	68	4.9	6	1.3
Computer & information sciences	45	3.2	42	9.0
Computer technology	25	1.8	29	6.2
Economics	15	1.1	13	2.8
Education	123	8.8	11	2.3
Engineering	29	2.1	51	10.9
Foreign languages	19	1.4	5	1.1
Health & medical science	120	8.6	21	4.5
History	26	1.9	9	1.9
International business	19	1.4	9	1.9
Journalism	24	1.7	5	1.1
Law	36	2.6	5	1.1
Law enforcement & protective services	21	1.5	4	0.9
Literature	34	2.4	5	1.1
Management	57	4.1	39	8.3
Marketing	44	3.1	23	4.9
Mathematics	23	1.6	10	2.1
Medical technology	26	1.9	4	0.9
Performance & fine arts	30	2.1	8	1.7
Political science	33	2.4	22	4.7
Psychology	149	10.6	28	6.0
Social work	25	1.8	0	0.0
Sociology	35	2.5	7	1.5
Other humanities & liberal arts	88	6.3	14	3.0
Other social sciences	24	1.7	6	1.3

employed adults, 50% women and 50% men who averaged age 35 years, a mean of 9 years of experience in their respective occupations, and reported working a mean of 41 hrs per week (Donnay et al., 2005). The GRS is reported to have 30% non-Whites in the sample and to represent more than 370 different occupations (Donnay et al., 2005).

The six 2005 GOTs were broadened to include new items but remain essentially the same (Donnay et al., 2005). They were constructed based on homogeneous

item content. The internal consistency initial estimates reveal alphas above .90 (Donnay et al., 2005).

The 2005 BISs include 30 homogenous content scales. Of these 30 scales, 10 of the scales are new and 20 scales were revised and updated (Donnay et al., 2005). (Note: Four of the 1994 BISs were dropped, and one scale, Nature, was combined with Agriculture.) In general, the number and range of items per scale was reduced from 5 to 21 items per BIS in 1994 to 6 to 12 items per BIS in the 2005 BISs (Donnay et al., 2005). The median Cronbach's alpha of the 2005 BISs was reported by Donnay et al. (2005) as .87.

The five PSSs are represented as bipolar continua on which each individual falls. The PSSs include Work Style, Learning Environment, Leadership Style, Risk Taking/Adventure, and Teamwork scales with internal consistency estimates reported between .82 and .87 (Donnay et al., 2005). The revised Risk Taking scale was broadened beyond physical risk taking to include financial risk taking and emotional risk taking (Donnay et al., 2005). The Teamwork scale is the new PSS, and it measures to what extent the individual likes to solve problems or tasks independently or as a member of a group.

Major differences between the 1994 and 2005 SII scales include the expansion of the BISs from 25 to 30 scales and the inclusion of another PSS (the Team Orientation scale). As mentioned previously, these changes allow for the expression of new career options that have become available in the workforce in the past decade. Another important change in the 2005 SII was the expansion of the 3-point item response (choice of like, neutral, dislike) to a 5-point item response (choice of strongly like, like, indifferent, dislike, and strongly dislike). This change permits the participant to express more extreme likes and dislikes. Also, preliminary data suggest that this wider range of response options increases the sensitivity of the SII, thus increasing the reliability of the instrument (Donnay et al., 2005). For more reliability and validity information on the 2005 SII, see Donnay et al. (2005).

RESULTS

Preliminary Analyses

For the discriminant analyses, the data set of 1,403 women was examined, and then the data set of 469 males was used for validity generalization purposes. Hence, the analyses were run on women, and the sample of men was used for cross-validation. This approach was followed because the sample size for women was substantially larger and thus could be expected to provide more stable discriminant function weights. This meant that multivariate models for the data were generated for the women, and then the fit of those models to the data on men was examined. In the female sample, there were 31 majors as shown by Table 2.

Descriptive statistics were computed for each of the college majors by gender to ensure that the groups were of substantial size for use in later analyses. Majors with *n*'s smaller than 16 were excluded from further analysis. Originally, there were 75 different majors. After eliminating 44 groups for women and men due to small sample sizes, there were 31 majors for analysis. See Table 2 for a list of the majors and sample sizes of those groups used in the current study. It was decided that excluding majors with small *n*'s was a better strategy in analyzing these data than grouping similar majors together. This decision was reached as a result of two lines of reasoning. First, the research question being addressed in the current study was "how well do these scales discriminate among college majors?" The research question addressed in cluster analysis would be "How well do these scales combine college majors?" which was different than the issue addressed in the current study. Second, the purpose of the current study was to look at how well the 41 content scales of the SII separate college majors, and that conceptually these 41 different scales should be able to do so with great specificity (Ralston et al., 2004). By clustering majors together, we would lose our ability to look at the instrument with greater precision.

Hypothesis 1: Adding the BISs Would Significantly Improve the Correct Classification of Majors for the Female Sample

The first hypothesis was the prediction that the addition of the BISs to the PSSs and the GOTs would yield a significantly higher percentage of correct classifications of the 31 majors for the women than either the PSSs alone or the PSSs and GOTs combined. To test this hypothesis, three discriminant analyses were performed using SPSS 10 for Windows. Three models identified in Table 3 were compared: Model 0 (the PSSs alone), Model 1 (the PSSs plus the GOTs), or Model 2 (the PSSs plus the GOTs plus the BISs). In the first discriminant analysis, the PSSs were entered; in the second analysis, the GOTs were added as predictors; and in the third analysis, the BISs were added as predictors. The criterion variable in each of the three discriminant analyses was major with 31 categories as shown by Table 2. Also, for each analysis, a priori expectations were set as all groups equal to balance out the effects of different numbers in each major. For 31 majors, assuming equal subgroup sizes, the chance hit rate was 1/31 or 3.2%.

In essence, the primary analyses were designed to compare which model (Model 0 [PSSs alone] vs. Model 1 [PSSs plus GOTs] vs. Model 2 [PSSs plus GOTs plus BISs]) would be more accurate in classifying the 31 majors. Table 3 presents the original hit rates for all three models and the hit rates when the jackknife procedure is used.[1] The jackknife procedure generates a new hit rate by rerunning the analyses multiple times by removing a case and then replacing it. This procedure provides a cross-validated estimate of the model parameters; it is an attempt to correct for inflated hit rates due to overweighting sample-specific error (Efron, 1983; Lachenbruch, 1967).

Table 3
Results of Hit Rates and Improvement Evaluations of Classification Among Models

Type of Model	Hit Rate % (Females)	Jackknife % (Females)	Validity (Males) Generalization %	Squared Canonical Correlation[a]	Wilks's Lambda	*F* Value for Test of Nested Model
Model 0 (PSSs[b])	12.9	10.2	9.8	.2304	.54**	
Model 1 (PSSs + GOTs[c])	20.3	16.1	14	.3481	.23**	Model 1 vs. Model 0: F (330,14,133.22) = 3.67*
Model 2 (PSSs + GOTs + BISs[d])	38.3	22.3	21.5	.3969	.05**	Model 2 vs. Model 0 : F (1230, 32,490.05) = 2.21* Model 2 vs. Model 1 : F (1230, 32,490.05) = 1.72*
Model 3 (GOTs)	15.3	12.1	11.7	.3249	.34**	NA[e]
Model 4 (BISs)	33.7	21.1	19.8	.3844	.08**	NA

Note. PSSs = Personal Style Scales; GOTs = General Occupational Themes; BISs = Basic Interest Scales.
The sample size is 1,403.

a. The squared canonical correlation is the proportion of variance of the unstandardized first discriminant function scores that is explained by the differences in groups (31 majors).

b. The 2005 PSS predictors were the Work Style, Learning Environment, Leadership Style, Risk Taking/Adventure, and Teamwork scales.

c. The 2005 GOT predictors were the Realistic, Investigative, Artistic, Social, Enterprising, and Conventional GOTs.

d. The 2005 BIS predictors were the 30 BISs.

e. The *F* test can only be performed comparing the Wilks's lambdas of models in which one model is nested in another.

*$p < .01$. **$p < .001$.

To gain an estimate of effect sizes across the models, Table 3 also presents the squared canonical correlations for the first function in each of the models. The squared canonical correlation for the first function is the proportion of variance of the unstandardized first discriminant function scores that is explained by the differences in groups (31 majors).[2] It is analogous to the η^2 in a one-way ANOVA (see Cohen, Cohen, West, & Aiken, 2003, p. 319). As shown in Table 3, the effect sizes ranged from 23% in Model 0 to 40% in Model 2.

Also shown in Table 3 are the Wilks's lambdas and the *F* values for the comparison of the three models in terms of the significant reduction in the Wilks's lambda. This *F* test (developed by Frane, personal communication, 1977) is presented in Tabachnick and Fidell (2001) to evaluate the significance of the decrease in the Wilks's lambda for sequential discriminant analyses. This *F* test compares nested models (e.g., PSSs alone compared to PSSs plus GOTs). Of interest in this article is the comparison of Models 0 (PSSs), 1 (PSSs plus GOTs), and 2 (PSSs plus GOTs plus BISs).

The first hypothesis was supported. As shown by Table 3, the addition of the GOTs increased the hit rate from 12.9% with the PSSs alone (Model 0) to 20.3% when the GOTs were added (Model 1) resulting in a significant increase as shown by the *F* test ($p < .01$). Likewise, adding the BIS increased the hit rate from 20.3% (Model 1) to 38.3% (Model 2) resulting in a significant increase as shown by the *F* test ($p < .01$).

The conservative jackknife procedure yielded lower hit rates as expected; however, the same pattern of results emerged; that is, when the GOTs were added to the PSSs, the hit rate jumped from 10.2% to 16.1%. Likewise, when the BISs were added, the hit rate jumped from 16.1 % to 22.3%.

Hypothesis 2: BISs Alone Would Correctly Classify Significantly More College Majors for the Female Sample

For the second hypotheses, we expected the BISs alone as a predictor set would yield the highest correct classification among the 31 majors for the women than either the PSSs alone as a predictor set or the GOTs as a predictor set. Moreover, we expected the GOTs alone would be better at differentiating majors than the PSSs alone. Finally, we expected that all three predictor sets alone would discriminate among the college majors better than chance (3.2%). Two additional discriminant analyses were run to compare Model 0 (PSSs alone) with two other models, namely the GOTs alone (Model 3) and the BISs alone (Model 4). In both discriminant analyses, the criterion variable was major with 31 categories (see Table 2). The predictors were either the six GOTs or the 30 BISs. The original hit rate for these two additional models, the hit rate when implementing the jackknife procedure, the squared canonical correlations, and the Wilks's lambdas are presented in Table 3. Given that Models 3 and 4 are not nested, the *F* test could not be conducted on these models.

As can be seen by Table 3, the hypothesis was supported. The GOTs alone correctly classified 15.5%, which was slightly higher than the 12.9% hit rate of

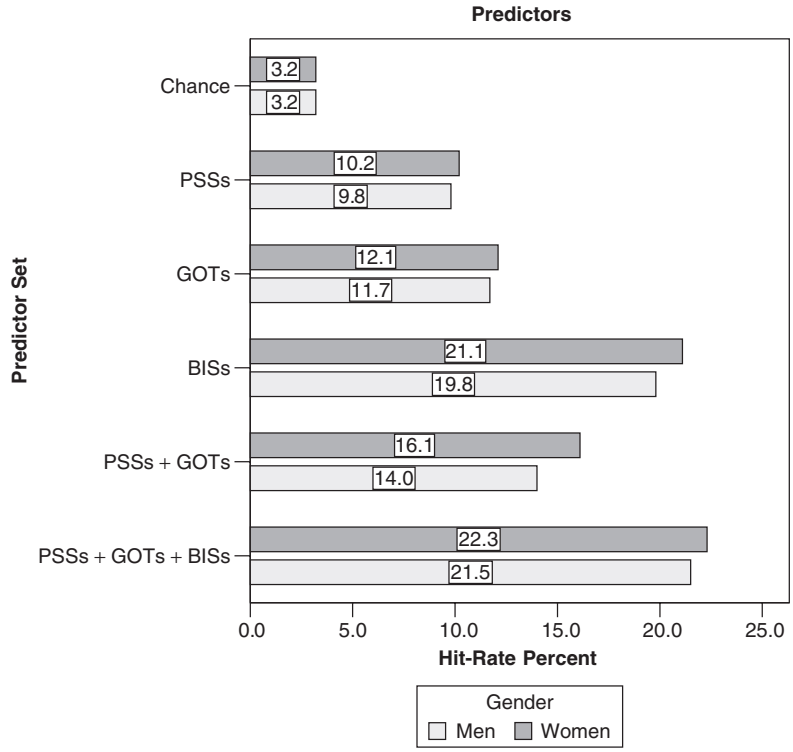

Figure 1. Summary of Discriminant Analyses Hit Rates for Women and Men for the Sets of Predictors.
Note. PSSs = Personal Style Scales; GOTs = General Occupation Scales; BISs = Basic Interest Scales.

the PSSs alone. Also, the BISs alone accurately classified 33.7% of the 31 majors compared to either the PSSs alone or the GOTs alone.

The jackknife procedure for each model yielded lower, but similar, rankings among the three models with the BISs alone showing a 21.1% correct classification followed by the GOTs with 12.1% correct classification followed by the PSSs with 10.2% correct classification. As expected, the BISs in this sample of women were the most useful in differentiating among college majors.

Hypothesis 3: Validity Generalization to the Male Sample

To validate the results obtained for women, the discriminant analyses models generated for the female data set were examined as to how they generalized to the sample of men. The hit rates for Models 0 through 4 for the male sample are produced as part of the output for the discriminant analyses already presented and are shown in Table 3.

The same pattern of findings for the women emerged for the men as shown by Table 3 and illustrated in Figure 1. First, as expected, the addition of the GOTs

increased the accurate classification from 10.2% with the PSSs alone to 14% with the PSSs plus the GOTs. The incremental addition of the BISs boosted the hit rate to 21.5%. Second, the GOTs alone yielded a higher hit rate than the PSSs alone (11.7% vs. 9.8%), and the BISs alone yielded the highest hit rate (19.8%). All three predictor sets were significantly better than the 3% chance rate—ranging from 3 times better (the PSSs) to more than 6 times better (the BISs).

Additional Univariate Analyses

To provide individual information about the predictive utility of the 30 BISs in differentiating among the 31 majors, 30 univariate ANOVAs were conducted. College major was the independent variable, and each BIS was the dependent variable. The 31 groups of college majors were treated as the independent variable with 31 levels. The *F* values and Wilks's lambdas provided the ratio of within-groups sum of squares to the total sum of squares. Wilks's lambda is subtracted from 1 as an indicator of the proportion of variance in college-major group membership that is explained by the particular BIS. For example, the Science BIS explained 21% of the variance in college major. Thus, smaller Wilks's values here occurred as a result of predictor sets contributing more to group separation.

As can be seen in Table 4, 27 of the BIS ANOVAs were statistically significant at the $p < .001$ level. The only three exceptions to this were for the Athletics BIS, the Religion and Spirituality BIS, and the Culinary Arts BIS. The BIS Athletics was significant at the $p = .01$ level, whereas the BIS Religion and Spirituality and the BIS Culinary Arts were significant at $p = .12$. Wilks's lambdas across the BISs ranged from .78 (BIS Medical Science) to .97 (BIS Culinary Arts and BIS Religion and Spirituality), which means that the scales individually accounted for 3% to 22% of the variance explained by college major separation.

DISCUSSION

Figure 1 summarizes the discriminant results, which were very similar for men and women. All sets of scales substantially improved on chance in their predictive ability. The hypotheses about which set of scales would add most to prediction of college major were confirmed. The PSSs showed hit rates 3 times greater than chance; the GOTs had hit rates 4 times greater than chance; and the BISs had hit rates more than 6 times chance. When the specific BISs were added to the PSSs and GOTs, they increased the hit rates by about 6 to 8 percentage points.

It was expected that the models generated for the women would probably not fit as well for the men. However, it was interesting that the hit rates for the male validity generalization sample were as high as they were. This finding suggests that the models generated for the women were fitting well for the smaller sample of men. Thus, the results are clear for women and men in showing the incremental validity of the BISs in these multivariate models. This suggested that, as

Table 4
Univariate Analyses of Variances Results for the Basic Interest Scales (BIS) for the Women (N = 1403)

Dependent Variable	Wilks's Lambda	*F*
Mechanics & construction	.90	5.24
Computer hardware & electronics	.85	8.23
Military	.93	3.42
Protective services	.91	4.52
Nature & agriculture	.95	2.56
Athletics	.96	1.69
Science	.79	12.44
Research	.90	4.86
Medical science	.78	12.82
Mathematics	.84	8.65
Visual arts & design	.90	5.20
Performing arts	.93	3.66
Writing & mass communication	.84	8.60
Culinary arts	.97	1.31
Counseling & helping	.88	6.09
Teaching & education	.88	6.09
Human resources & training	.91	4.28
Social sciences	.90	4.92
Religion & spirituality	.97	1.31
Healthcare services	.82	9.95
Marketing & advertising	.84	8.91
Sales	.88	6.48
Management	.89	5.44
Entrepreneurship	.88	6.23
Politics & public speaking	.87	6.94
Law	.90	5.13
Office management	.88	6.38
Taxes & accounting	.82	10.33
Programming & information services	.84	8.78
Finance & investing	.84	9.07

Note. All values were significant at $p < .001$ with the following exceptions: BIS Athletics ($p = .01$); BIS Religion and spirituality ($p = .12$); BIS Culinary arts ($p = .12$).

the scales' specificity to unique career interests increased, so did their ability to differentiate among college majors.

It is interesting to note that when the results for each of the sets of scales alone were compared to the results for the sets of scales combined, the hit rates for the analyses where the BISs were included were similar. In other words, the hit rate for the 30 BISs alone was 33.7%, whereas the hit rate for the BISs with the PSSs and GOTs was 38.3%. The PSSs alone had a hit rate of 12.9%, and the GOTs had a hit rate of 15.5%. Clearly, it appears that the BISs contributed almost as much as the three sets of scales combined. The same cannot be said for the PSSs or the GOTs.

Because this is the first article to provide concurrent criterion validity on the 2005 SII, the closest comparable findings are validity studies using the 1994 SII to predict occupational membership (Donnay & Borgen, 1996; Olsen, 1996). They used the 1994 SII GRS; Donnay and Borgen examined the total sample while Olsen examined men and women separately. In women and men separately and the total sample, our findings corroborate these findings; that is, the PSSs, GOTs, and BISs combined yielded the strongest hit rate of 25% for the total sample and for the female and male samples separately (Donnay & Borgen, 1996; Olsen, 1996). Moreover, in both studies, the BISs alone yielded a higher hit rate than either the PSSs alone or the GOTs alone.

Gender comparisons. In the current study, we found support for the ability of the 2005 SII scales to correctly classify college majors for women and men when using models generated for women. Our findings replicate Olsen's (1996) findings with the 1994 GRS. Olsen (1996) found that there were minimal differences between men and women. Olsen concluded that the SII scales predict occupational group membership equally well for women and men. These finding imply that the interests of college majors between genders are probably more similar than different from one another.

Univariate Results

For the 2005 SII, 27 of the 30 BISs were able to separate college majors at the $p < .001$ level. The only three scales that were not as useful in differentiating between college majors were the Athletics BIS, the Religion and Spirituality BIS, and the Culinary Arts BIS. Our results are consistent with Olsen (1996) and Donnay and Borgen (1996) who found that all 25 of the 1994 BISs separated occupational groups ($p < .001$). One small difference between the current study and the other two studies was the findings for the three nonsignificant BISs in the 2005 sample. One probable reason for the lack of significant findings was that there were no religion or culinary arts majors in the current study's sample.

An illustrative example. The utility of the BISs predictive capability lies in differentiating within a Holland code (A Holland code is a three-letter code describing an individual's most salient vocational interests in terms of the RIASEC. For example, an individual with the code *ASR* has endorsed more interest and greater person–environment fit with the Artistic [A], Social [S], and Realistic [R] domains). To illustrate, two majors (Social Work and Education) that are high on the Social GOT but differentiated on the relevant BIS are displayed graphically. Figures 2 and 3 present the GOT means for Social Work majors and Education majors. For these women, the Social GOT was dominant. A counselor examining only the GOTs would not find much distinction between these two majors as shown by Figures 2 and 3.

However, when the counselor includes the BIS profiles for these two majors, differentiation is immediately apparent as visually displayed in Figures 4 and 5. The two highest BIS means were reversed for these majors. For the Social Work

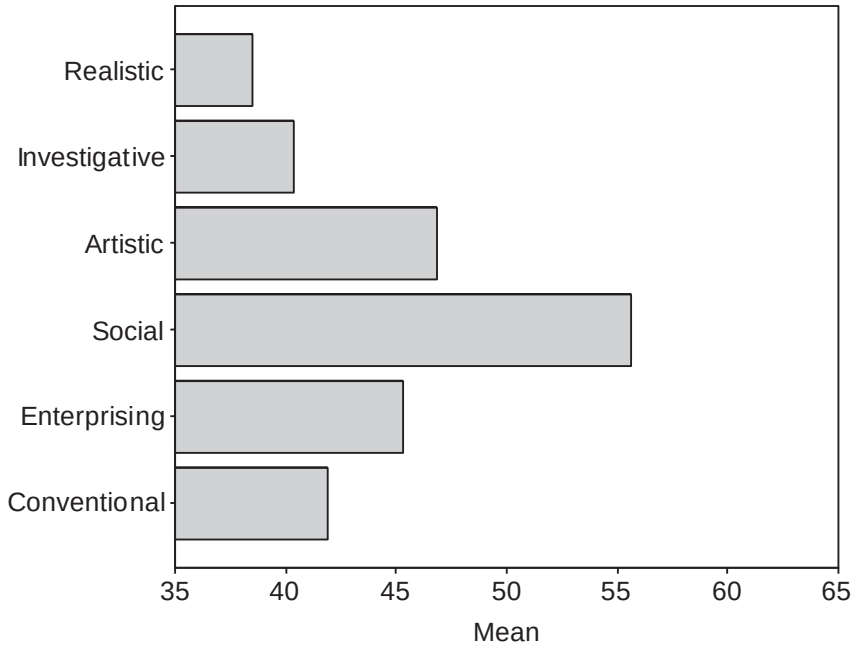

Figure 2. General Occupational Themes of the Social Work Majors.

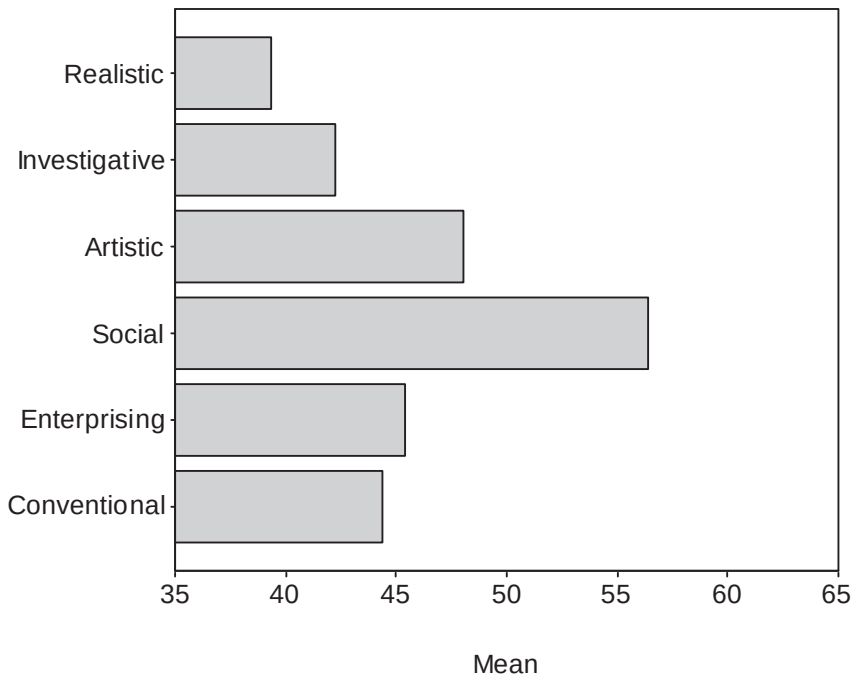

Figure 3. General Occupational Themes of the Education Majors.

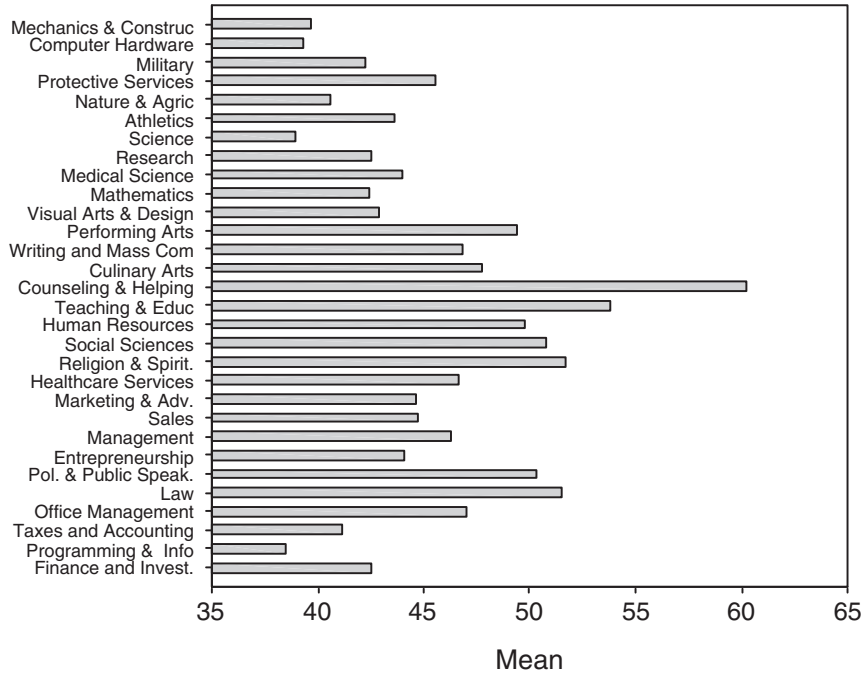

Figure 4. Basic Interest Scales of the Social Work Majors.

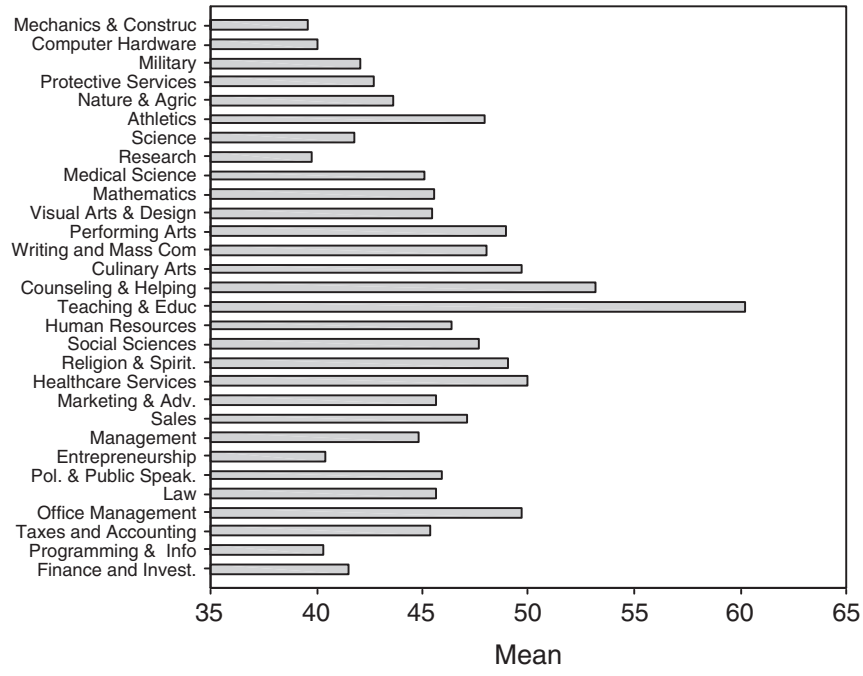

Figure 5. Basic Interest Scales of the Education Majors.

majors, the Counseling and Helping BIS mean was most dominant (followed by the Teaching and Education BIS). In contrast, for the Education majors, the highest mean was for the Teaching and Education BIS (followed by the next highest mean for the Counseling and Helping BIS).

Limitations

There were several limitations of the current study. The current study could have benefited from a greater breadth of majors themselves. In our sample, there were many Social majors, Artistic majors, and Investigative majors. However, there were fewer Conventional and Enterprising majors. In particular, there were very few Realistic majors. Therefore, the findings were limited in describing the separation of Realistic majors. In addition, even though we had a sample of 469 men, it would have been ideal to have an even larger sample.

Future Directions

The current study was one of the first to examine the 2005 SII. Although the current study has begun the process of establishing the concurrent validity of the 2005 SII scales in differentiating between college majors, more work on the validity of the revised instrument is needed. Other work is needed to replicate these findings and further explore the utility of this instrument. Furthermore, the lack of gender differences in hit rates (major classification) should also be verified. Finally, the current study showed that college majors could be differentiated from one another using the SII scales. This finding should be examined in regards to other college samples and to other populations, such as working adults.

Implications

Theoretical and practical implications of the current study's results were considered. Regarding theoretical implications, the ability of the BISs to draw out specific related majors showed that the BISs were performing in line with conceptual expectations. Overall, the 2005 SII scales appeared to form a valid measure of vocational interests of college students. Consequently, these scales were reflecting the structure of interests and majors that were postulated. Evidence for this was represented in that all three of the current study's hypotheses were generally supported.

Another implication of the current study was that the 2005 SII's use with the college population should be encouraged. The current study's major finding was that there was support for the valid use of this instrument with a collegiate population. Furthermore, the 2005 SII was able to separate the interests of female college majors, and this finding was generalizable to male college majors. Specifically, the PSSs, GOTs, and BISs had utility in correctly classifying the interests of college majors, and the BISs were especially powerful in this regard. Although replication of these findings is necessary, the current study laid the groundwork for future validity work and provided evidence of the utility of the 2005 SII. Therefore, because

this instrument appeared to be valid, it has much utility in helping individuals to gain valuable information and insight regarding vocational interests.

Along this line of reasoning, there were other practical implications. Based on the current study's findings regarding the ability of the sets of SII scales to classify college majors, the following clinical recommendations are suggested. If a client is struggling to find an appropriate career, these findings provide support for the use of the 2005 SII in helping the client narrow down the list of potential majors. In career counseling, the GOTs should be used by the counselor to create a general framework of the client's career interests, and the PSSs should add to fleshing out that general framework. However, the career counselor should pay most attention to a client's scores on the BISs to guide the client toward potential major choices. For example, a client may have strong artistic interests as shown by a high score on the Artistic GOT. However, there are many different career directions within this general interest group. The client could have a high score on the Writing and Mass Communication BIS and a lower score on the Culinary Arts BIS, which would have implications for pursuing different artistic careers. Assuming that the client finds this profile to be accurate, in this case, the career counselor could help guide the client toward exploring careers that involve writing rather than those that focus on working with food. Hence, the specificity of the BISs can add to how a career counselor conceptualizes an individual's career interests, as well as informing the client about specific interest areas to pursue or avoid in exploring major and career choices. The special utility of the BISs for guiding the selection of college major was also demonstrated by the Ralston et al. (2004) study of the 1994 SII.

CONCLUSION

The current study showed that the 2005 SII PSSs, GOTs, and BISs were useful overall in separating college majors for women and men. Furthermore, the greater specificity of the BISs in interest measurement suggested that the BISs be utilized in providing a client with more specific feedback in career counseling. In conclusion, the 2005 SII appeared to have concurrent validity in differentiating between the interests of college majors.

NOTES

1. Detailed discriminant analyses results are available from the first author.

2. Counseling psychologists may be used to seeing 1 –Wilks's lambda as the reported effect size in discriminant analyses that is accurate when the number of groups being classified is two. This is because when there are only two groups, the canonical correlation in a discriminant analysis is equal to the square-root of 1 – lambda. However, when the number of groups being classified is greater than two, then the interpretation of 1 – Wilks's lambda is unclear; rather the squared canonical correlation is the appropriate effect size and is the proportion of variance of the discriminant function scores that is explained by the differences in groups (six major families in the current study; D. Bonett, personal communication, May 30, 2005).

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