Article

Journal of Career Assessment
21(3) 452-468

DOI: 10.1177/1069072712475180
jca.sagepub.com
SAGE

Assessing Scientist and Practitioner Orientations in Industrial/Organizational Psychology

Frederick T. L. Leong[1], Marina Pearce[1], and Jason L. Huang[2]

Abstract

This research develops and provides initial evidence of internal validity for a measure of scientist and practitioner orientations in industrial/organizational psychology (the SPI-IO). The application of this measure has various potential benefits, including the ability to measure students' needs, guide their development, and understand the influence of training on their career interests over time. We used the O*Net database to draw information regarding what critical work tasks are performed by industrial/organizational (I/O) psychologists –these work tasks were used to build items for the practitioner scale of the SPI-IO. Leong and Zachar developed a scientist scale for an earlier version of the SPI used to assess career orientations in counseling and clinical psychology. The scientist scale is composed of items that are also relevant for I/O psychology. Together, Leong and Zachar's scientist scale and our newly developed practitioner scale comprise the SPI-IO. In Study 1, we used the SPI-IO to measure career orientations in undergraduates and found support for the measure's construct validity. In Study 2, we assessed career orientations in I/O psychology graduate students. With the graduate sample, we sought to again support the SPI-IO's validity and also to determine whether the SPI-IO could account for more variance in career specialty choice (i.e., science vs. practice) than more general measures of career interests (i.e., RIASEC). In all cases, the validity and unique predictive utility of the SPI-IO was confirmed. In addition to reviewing these results in detail, we provide a copy of the SPI-IO and discuss its implications for use.

Keywords

career choice, career interests, specialty choice, organizational psychology

Much research regarding career counseling and development has focused on an individual's initial choice of an occupational field and whether a match exists between the individual and this choice

[1] Department of Psychology, Michigan State University, East Lansing, MI, USA
[2] Department of Psychology, Wayne State University, Detroit, MI, USA

Corresponding Author:
Frederick T. L. Leong, Department of Psychology, Michigan State University, 316 Physics, Suite 136, East Lansing, MI 48824, USA.
Email: fleong@msu.edu

(e.g., Holland, 1985; Super, 1953). However, many people who choose a career path must make multiple decisions, ranging from the initial, general choice of an occupational field to more specific choices like which specialty to enter (Hartung, Borges, & Jones, 2005; Leong, Hardin, & Gaylor, 2005). Although relatively unstudied until the 1990s, the latter issue has since become popular. Consider the following examples as illustrations of *career specialty choices*. After deciding to pursue a career in medicine, one must determine a particular domain of practice, such as surgery, internal medicine, dermatology, psychiatry, and so on. A person who has chosen to study law must also choose whether to work in dispute resolution, real estate issues, environmental law, taxes, and so on. Someone interested in becoming an engineer will also need to decide whether to focus on mechanics, hardware, software, materials, and so on. As these examples reveal, many if not all career paths require one to make not only a broad determination regarding which field to enter but also more specific choices about which area to specialize in. Thus, the choice of career specialty adds an additional level of complexity to the phenomena of career exploration, development, and decision making.

Today's workforce is confronted with an increasing number of career specialty options (Zachar & Leong, 1997), creating a need to better understand how people choose among them—as well as how to use them to aid development. As will be discussed later, studies have begun to shed light on the critical influences of career specialty choice; such evidence suggests that an individual's personality and career interests can predict his specialty choice within a field. With regard to specialty choice in medicine, person-oriented and technique-oriented physicians were found to differ in personality patterns and values (Borges & Gibson, 2005; Taber, Hartung, & Borges, 2011). Also, the degree of matching between medical students' personality profiles with members of a criteria group was found to predict medical specialty choice 43–60% of the time (Hartung et al., 2005). As a result of findings like these, a career intervention program has been designed to effectively promote medical student specialty choices (Leong et al., 2005). The importance of career specialty choice research is not limited to the medical arena; studies in other professions have also evidenced its value. For example, the congruence between career interests and specialty choice in a sample of computer software professionals was shown to predict their levels of satisfaction (Meir & Melamed, 2005). For business professionals, both generalist and specialist methods of graduate training were found to enhance managerial career success (Baruch, Bell, & Gray, 2005).

As for psychologists, the choice of a career specialty often means deciding whether to work in science or practice (Gottfredson, 1987; Kimble, 1984). While some psychologists are employed in academia or other research-focused institutions, others work directly with clients to apply their field's knowledge and methods. Because a person's scientist and practitioner orientations are critical determinants of career path—for example, the types of training sought out in school and the jobs pursued after graduating—Leong and Zachar (1991) developed the Scientist–Practitioner Inventory (SPI) to measure and study the career specialty choices made by psychology students. Although these authors developed the SPI for use in counseling and clinical psychology domains, scientist and practitioner interests permeate other areas within psychology that might also benefit from its use. With the number of industrial/organizational (I/O) psychologists continuing to rise (O*Net Online, Retrieved December 27, 2011), measuring scientist and practitioner orientations in I/O students—and understanding their influences and impacts on career development—seems particularly important.

Because the practitioner items from Leong and Zachar's (1991) SPI were originally developed to measure orientations in clinical and counseling psychology students (e.g., "Planning a behavior modification program for a client," "Designing a new treatment method for a mental health agency," etc.), they are not transferable to the domain of I/O psychology. Nonetheless, given the SPI's value for understanding career orientations in clinical and counseling psychology students (cf. Leong & Zachar, 1991; Zachar & Leong, 1997, 2000), it seems reasonable to believe that an

I/O psychology version would also be useful. Along these lines, the purpose of the current research is to develop a version of the SPI relevant for measuring career specialty interests of I/O psychology students (the scientist and practitioner orientations in industrial/organizational psychology [SPI-IO]), to empirically assess the factor structure and internal consistency of this new measure, and to examine its unique value for understanding career specialty choice.

A Review of the Scientist-Practitioner Inventory

Based on research evidence and common knowledge of the scientist versus practitioner split in psychology, Leong and Zachar (1991) noted the following observations regarding the training of psychologists: (a) Scientist training differs in nature from practitioner training; (b) Each individual is unique in terms of his orientation for science versus practice; and (c) These inclinations often do not coincide. They designed the SPI in order to measure these two underlying orientations among psychologists in training. The original SPI consisted of 42 items broken into seven subscales: four scientist subscales (research activities; teaching, guiding, and editing; academic ideas; and statistics and design) and three practitioner subscales (therapy activities, clinical consulting expertise, and testing and interpreting). Leong and Zachar validated the SPI in two samples of graduate students from counseling, clinical, and experimental psychology programs. Evidence was found for the inventory's internal consistency, test–retest reliability, and freedom from response set bias. In order to test whether the SPI was related to other established measures of career interests (i.e., to establish construct validity), the authors also collected data regarding participants' standing on each of Holland's (1985) Vocational Preference Inventory (VPI) variables: realistic, investigative, artistic, social, enterprising, and conventional. As expected, they discovered that the SPI's scientist variable correlated positively with the VPI's investigative variable and negatively with the VPI's social variable, whereas the SPI's practitioner scale correlated positively with the VPI's social variable and negatively with the VPI's investigative variable. The authors also supported their prediction that scientist orientation would be negatively related to practitioner orientation, indicating that individuals oriented toward one are oriented away from the other. Further, the SPI variables were related to participants' self-reported work-setting preferences, providing support for the inventory's ability to predict career specialty choices (i.e., demonstrating criterion-related validity).

Leong and Zachar (1991) also administered the SPI to two samples of undergraduate students in an introductory psychology course, one consisting of individuals majoring in psychology and the other of individuals with nonpsychology majors. In the psychology major sample, the SPI's structure consisted of two factors (science and practice), whereas in the nonpsychology major sample, only one overall factor was verified. The positive relationships between the SPI's scientist scale and the VPI's investigative variable and between the SPI's practitioner scale and the VPI's social variable were replicated in both samples, but the negative scientist–social and practitioner–investigative relationships were not found in either sample. Moreover, in the nonpsychology major sample, the SPI's scientist and practitioner scales correlated significantly with several VPI (RIASEC) variables. The dissimilarity of factor structure and correlations across all (graduate and undergraduate) samples, as the authors point out, suggests a developmental perspective of career specialty interests: The SPI's two-factor structure may have become clearer as a result of participants' domain knowledge (i.e., from undergraduate nonpsychology to undergraduate psychology and from undergraduate psychology to graduate psychology).

For further clarification, Zachar and Leong (1992) measured scientist–practitioner orientations using the SPI, Holland's RIASEC variables, and Coan's (1979) theoretical orientation in counseling, clinical, and experimental psychology graduate students. They discovered that scientist and practitioner orientations were predicted by the same variables in opposite directions: Theoretical orientation with a subjective view of the world was most predictive of strong practitioner interests, whereas theoretical orientation with an objective view of the world was most predictive of strong scientist interests. The study also replicated Leong and Zachar's (1991) previously established relationships among the SPI's and the VPI's subscales.

Zachar and Leong (2000) reported findings from a 10-year longitudinal follow-up for these results. In addition to reproducing the SPI's two-factor structure and key correlates, the authors proved that career specialty interests measured early in one's career (i.e., during graduate school) can predict his or her actual career later in life. Furthermore, Zachar and Leong demonstrated that the SPI's career specialty variables outperform the VPI's broader career interest variables in predicting the actual work tasks performed by psychologists. Taken together, these results lend strong support for the use of the SPI in measuring career specialty orientations as well as predicting aspects of one's later career.

In a study focusing on the underlying mechanisms explaining a psychologist's specialty choice, Leong, Zachar, Conant, and Tolliver (2007) investigated the relationship between SPI subscales and cognitive processing style in a sample of undergraduate psychology students planning to attend graduate school. They discovered that the need for cognition was associated with interest in scientist activities but not in practitioner activities, suggesting that motivation toward effortful processing may be one important dimension for psychologists leaning toward science rather than practice, while other (currently unknown) motivations may explain practitioners' inclinations.

Other scholars have also sought to measure and understand scientist and practitioner orientations in budding psychologists, albeit with approaches that focus on the unique interests of different disciplines. Hall, Davis, and Connelly (2000) examined career orientations by grouping psychologists from experimental psychology and evaluation, measurement, and statistics divisions into one scientist-orientation group, and psychologists of the clinical psychology and psychotherapy divisions into a one practitioner-orientation group. They found systematic differences in dispositional empathy between groups, providing support for Holland's (1997) and others' (e.g., Zachar & Leong, 1992) suggestions that personality plays a critical role in career decision making. Horn et al. (2007) studied the temporal stability of scientist and practitioner interests at both the beginning and completion of a doctoral program for graduate students in school and counseling psychology. They discovered that individuals in counseling psychology had significantly higher scores on the practitioner scale than those in school psychology at both time points. Martin, Gavin, Baker, and Bridgmon (2007) administered the SPI to graduate students in three programs (counseling, school, and educational psychology) and found differences in practitioner orientation from program to program, as well as differences in scientist and practitioner orientations within each program. Across these studies and others discussed earlier, one matter is clear: It is worthwhile to study scientist and practitioner orientations in psychology domains because they are predictive of actual career decision making (and the SPI is a valid and reliable tool for this purpose).

The Potential Value of a Scientist-Practitioner Inventory for I/O Psychology

After reviewing the encouraging literature regarding scientist and practitioner orientations in other areas of psychology—such as school, counseling, experimental, and clinical domains—it seems likely that the study of these orientations in I/O psychology will not only help guide students in making career specialty choices but will also benefit the field of I/O psychology as a whole and the management of I/O graduate programs in particular. For example, by examining scientist and practitioner orientations, the field can come to understand their impact on the initial development of psychologists and can take steps to effectively dedicate resources to promote and balance both. Like other psychology disciplines, I/O has endured the dichotomy of science and practice since it was first introduced (Zickar & Gibby, 2006). Although many I/O psychologists favor combining knowledge from science and practice, tension continues to exist within the field due to incompatible values between scientists who typically embrace the advancement of knowledge through rigorous research and practitioners who typically apply their knowledge to solve practical problems in the real world (Hergenhahn, 1997).

Yet the two sides may be more similar than they appear on the surface (Campbell, 1992) and may even overlap. Indeed, many graduate programs in I/O psychology have adopted a model of training that supports researching phenomena that occur in actual (vs. theoretical or laboratory-specific) venues and that emphasizes the merits of evidence-based practice. The Society for Industrial and Organizational Psychology (SIOP) has adopted an integrated model to equally value science, practice, and education (Koppes, 2006). However, although some creative approaches have been taken to evaluate the gap between science and practice (e.g., Brice & Waung, 2001), I/O psychologists' interests and preferences regarding science and practice have yet to be assessed. The examination of career specialty orientations in I/O psychology can be valuable not only to students interested in gauging themselves as a step toward choosing a career path but also to the design of graduate programs. To name just a few benefits for programs themselves, understanding the orientations of graduate students in a particular program would help faculty via assessing their needs, guiding their development, and understanding the influence of training and experience on students' interests over time.

Despite the potential benefits of the investigation of scientist and practitioner orientations in I/O psychology, no scale is currently available for their measurement. The original SPI scales, although theoretically relevant, were not created to measure preferences for I/O psychology in particular and, consequently, contain many irrelevant items. Specifically, while items from the scientist scale seem applicable to all psychology subdisciplines, the practitioner scale directly pertains to clinical and counseling psychology and thus is not applicable for use in I/O psychology. Therefore, the development of a version of the SPI for I/O psychology is in order.

In the following sections, we describe two studies associated with this endeavor. In Study 1, we build the SPI-IO and assess its structure and correlates in a sample of undergraduate students from a large Midwestern University. In Study 2, we evaluate the SPI-IO's construct and criterion-related validity in a sample of I/O psychology graduate students from across the country.

Study 1

The primary goal of the current research is to develop and provide evidence of internal validity for a Scientist-Practitioner Inventory for I/O psychology. While reviewing Leong and Zachar's (1991) *scientist* items, originally created to measure career specialty orientations in clinical, counseling, and experimental psychology students, we decided that they translated well to the I/O domain and did not warrant replacement. All of the *practitioner* items, however, directly measured respondents' interests in counseling and clinical activities and therefore needed to be replaced. Thus, Study 1 represents our endeavor to create new practitioner items relevant to the domain of I/O psychology.

Method

First, a pool of SPI practitioner scale items was created with the intent to sample the full spectrum of work activities performed by I/O practitioners. Using the O*Net online database, we pulled information about the I/O psychologist occupation (Job code: 19-3032.00). Core tasks listed by O*Net were used to create 21 items such that each item contained one work task. Detailed work activities were also screened for three criteria: (a) having more than 50% rating of importance; (b) being unique to I/O practitioners; and (c) having no overlap with the 21 items identified in the core tasks. Thirteen additional items from these detailed work activities were added to the initial item pool, resulting in a total of 34 SPI-IO practitioner items. All items were worded in ways similar to items from Leong and Zachar's (1991) original SPI.

To select the most typical practitioner items from the initial item pool, a pilot study was conducted at the local I/O psychology graduate program. Four tenured I/O faculty members and 14 I/O graduate students participated in the pilot study. They rated how likely these initial items were to be performed by I/O practitioners, using a 5-point Likert-type scale, with 5 being *very likely* and 1 being *very unlikely*. Twenty-four items with a median of 4 and above and a mean of 3.5 and above were retained in the final SPI-IO practitioner scale.

Participants. Three hundred and twenty-five undergraduate students enrolled in introductory psychology courses at a large Midwestern university participated in Study 1. They filled out our online questionnaire anonymously and received extra credit in exchange for their participation.

Seventy-five percent of participants were female, 83% were Caucasian, and the mean age was 19 years. Among the participants, the percentage of freshmen, sophomores, juniors, and seniors were 37%, 29%, 21%, and 13%, respectively. Twenty percent of people in the sample majored in psychology.

Survey Measures

Specific Career Interests. Specific career interests in psychology were assessed using the new 24-item SPI-IO practitioner scale, as well as the original 21-item SPI scientist and (counseling and clinical psychology) practitioner scales. As described earlier, the original SPI is a 42-item inventory that consists of two 21-item scales: The scientist interest scale and the practitioner interest scale, both intended for use in the context of counseling and clinical psychology. The original SPI's factor structure, test–retest reliability, freedom from response bias, internal consistency, construct validity, and criterion-related validity has been established in several research studies (e.g., Leong & Zachar, 1991; Zachar & Leong, 1992, 2000). Both the original SPI and the new SPI-IO practitioner measures ask participants to rate their interest in performing a variety of work tasks using a 5-point Likert-type scale ranging from 1 being *very low interest* to 5 being *very high interest*.

General Career Interests. The 90-item *Revised Unisex Edition of the ACT Interest Inventory* (UNIACT-R; Swaney, 1995) provided us with a measure of Holland's broad career typology. Six scales are included in this inventory, each representing activities associated with certain types of work, namely realistic, investigative, artistic, social, enterprising, and conventional. Respondents indicated their interest in each of the 90 work-related activities using response options of "like," "indifferent," and "dislike." Research has evidenced that the UNIACT-R has acceptable psychometric properties (Swaney, 1995) and adequate convergent and discriminant validity with other career interest inventories (Savickas, Taber, & Spokane, 2002).

Results

Psychometric Properties of the SPI-IO. An exploratory factor analysis using principal axis factoring was conducted including the original SPI scientist and practitioner scales and the new SPI-IO practitioner scale. Although using the Kaiser criterion of eigenvalues larger than one would produce nine factors, the Kaiser criterion tends to overfactor (Ford, MacCallum, & Tait, 1986; Lance, Butts, & Michels, 2006). In this vein, examination of the scree plot indicated a clear three-factor structure, with 60.42% variance accounted for by the three factors (the original SPI scientist scale, the original SPI practitioner scale, and the new SPI-IO practitioner scale). Thus, in the final analysis, we constrained the number of factors to 3 and used a direct oblimin rotation to achieve simple structure. As a result, the three factors were significantly related to one another (r between original scientist and practitioner scales = .57, $p < .001$; r between original scientist and SPI-IO practitioner = .40, $p < .001$; r between original practitioner and SPI-IO practitioner = .34, $p < .01$). Other than two practitioner items (*Interpreting a test battery for a client*; *Presenting a report during a case conference*) and four scientist items (*Reviewing the literature on an issue in psychology*; *Supervising students' research projects*; *Designing an experiment to study a psychological process*; *Formulating a theory of a psychological process*), all items loaded on the hypothesized factors. All of the new SPI-IO practitioner items loaded highly on the same factor, with the lowest loading being .54 and with no cross loadings on the original SPI's scientist or practitioner factors. The average loading for the original SPI (and SPI-IO) scientist scale was .58; the average loading for the original SPI practitioner scale was .65; and the average loading for the new SPI-IO practitioner scale was .73.

An additional factor analysis was conducted on the 24 SPI-IO practitioner items alone and a single factor solution was found accounting for 64.16% of the variance. The internal consistency of the SPI-IO practitioner scale was calculated via Cronbach's α, which was .98. Taken together, these results suggest that the new SPI-IO practitioner scale is unidimensional, reliable, and distinct from the original SPI's scientist and practitioner scales.

Establishing Construct Validity: Relationships Among Specific (SPI and SPI-IO) and General (RIASEC) Career Interests. Because the patterns of correlations between scientist and practitioner orientations and more general career interests are expected to differ due to more or less developed levels of knowledge regarding the work, as Leong and Zachar's (1991) results showed when studying undergraduate psychology majors versus nonpsychology majors, the full sample was split into two subsamples according to major. Means, standard deviations, Cronbach's αs, and bivariate correlations among the original SPI scientist and practitioner scales, the SPI-IO practitioner scale, and the UNIACT-R scales are presented in Table 1.

Relationships among the SPI's scales and Holland's RIASEC variables replicated those reported by Leong and Zachar (1991). For undergraduates majoring in psychology, the SPI's scientist and practitioner scales were positively correlated ($r = .57$, $p < .001$). In terms of RIASEC interests, the scientist scale was only significantly correlated with investigative style ($r = .31$, $p < .05$) and the practitioner scale only with social style ($r = .40$, $p < .001$). As for undergraduate nonpsychology majors, the SPI's scientist and practitioner scales were highly correlated ($r = .82$, $p < .001$). Scientist and practitioner scales were positively correlated with investigative ($r = .28$, $p < .001$) and social styles ($r = .27$, $p < .001$), respectively, but they also correlated with other interest styles that were not predicted by theory or past research. Similar to Leong and Zachar's (1991) results, these findings imply that nonpsychology students perceive one overall dimension of psychologists' work tasks or orientation rather than multiple distinct specialties.

The correlations between the SPI-IO practitioner scale and general career interest variables were also examined. For psychology majors, the SPI-IO practitioner scale correlated with the original SPI's scientist and practitioner scales similarly ($r = .40$ and .34, respectively). The SPI-IO practitioner scale was also positively related to enterprising ($r = .44$, $p < .001$) and social interests ($r = .33$, $p < .01$), demonstrating convergence with Holland's code for I/O psychologists. Finally, the SPI-IO practitioner scale did not correlate with investigative style, lending support for discriminant validity (i.e., from the scientist scale that does correlate with investigative style).

While for psychology majors, the correlations between the SPI-IO practitioner scale and general career interest variables supported the theory, the same relationships for nonpsychology majors were slightly higher in magnitude and signified the influence of a lack of knowledge regarding careers in psychology. The SPI-IO practitioner scale was strongly related to the original SPI's scientist ($r = .70$, $p < .001$) and practitioner ($r = .69$, $p < .001$) scales, and was significantly related to all Holland's career interest styles except for investigative, with enterprising ($r = .54$, $p < .001$), social ($r = .39$, $p < .001$), and conventional ($r = .37$, $p < .001$) styles having the strongest correlations.

Table 1. Correlations Among Specific (SPI and SPI-IO) and General (RIASEC) Career Interests Scales for Psychology Samples and Nonpsychology Samples From Study 1.

	M	*SD*	1	2	3	4	5	6	7	8	9
1. SPI scientist	2.45 (2.92)	.78 (.78)	.95 (.95)	(.57***)	(.40***)	(.23)	(.31*)	(.08)	(.20)	(.18)	(.14)
2. SPI practitioner	2.76 (3.85)	.82 (.67)	.82***	.95 (.93)	(.34**)	(−.06)	(.15)	(.07)	(.40***)	(.01)	(−.09)
3. SPI-IO practitioner	2.59 (3.10)	.86 (.80)	.70***	.69***	.98 (.97)	(.13)	(−.04)	(.08)	(.33**)	(.44***)	(.21)
4. Realistic	1.85 (1.77)	.52 (.46)	.34***	.22***	.23***	.90 (.88)	(.34**)	(.29*)	(.11)	(.36**)	(.19)
5. Investigative	2.08 (1.96)	.50 (.53)	.28***	.20**	.08	.43***	.89 (.91)	(.38**)	(.05)	(.03)	(.15)
6. Artistic	2.14 (2.07)	.51 (.57)	.31***	.26***	.28***	.32***	.18**	.88 (.92)	(.21)	(.21)	(.13)
7. Social	2.58 (2.69)	.36 (.33)	.27***	.43***	.39***	.16*	.19**	.20**	.90 (.86)	(.33**)	(−.02)
8. Enterprising	2.14 (2.15)	.48 (.41)	.36***	.37***	.54***	.18**	.03	.24***	.39***	.89 (.83)	.41***)
9. Conventional	1.68 (1.45)	.60 (.47)	.28***	.15*	.37***	.28***	.09	.04	.08	.45***	.95 (.92)

Note. SPI-IO = scientist-practitioner inventory for industrial/organizational psychology.
Correlations for nonpsychology major sample presented below the diagonal ($N = 259$). Cronbach's α reported on diagonal and without parentheses. Correlations for psychology major sample presented above the diagonal and in parentheses ($N = 64$). Cronbach's α coefficients for psychology major sample reported on the diagonal and in parentheses.
***$p < .001$. **$p < .01$. *$p < .05$.

Differences in Career Interests Between Psychology and Nonpsychology Samples. Differences in career interests between the two samples were tested via independent *t*-tests. Psychology majors scored higher than nonpsychology majors on the SPI scientist, SPI practitioner, and SPI-IO practitioner scales ($t = 4.30, 4.35, 9.80$, respectively, $df = 321$, all $p < .001$). These results confirmed the expectation that students who chose psychology as their major would be more interested in psychology work tasks than those who did not. In addition, the psychology major sample scored higher on social work style ($t = 2.20$, $df = 321$, $p < .05$) and lower on conventional work style ($t = 2.80$, $df = 321$, $p < .01$).

Discussion

Study 1 documented the development of the I/O version of the SPI (the SPI-IO) and provided its initial validation. Using the original SPI scientist scale and our new SPI-IO practitioner scale, we evidenced acceptable factor structure and high internal consistency in an undergraduate sample. The SPI-IO practitioner scale was related to both the original SPI scientist and practitioner scales and was significantly related to certain RIASEC facets as consistent with previous research findings. As expected, when the sample was divided into psychology major versus nonpsychology major subsamples, psychology majors scored significantly higher on the SPI and SPI-IO scales.

Study 2

Although Study 1 assessed the psychometric properties of the SPI-IO, our use of an undergraduate sample did not allow us to describe developmental influences on career interests. For example, the amount of relevant training in I/O psychology should influence how much students understand each specialty and its uniqueness, thus affecting how items on the scientist and practitioner scales relate to one another. In addition, the patterns of correlations between specialty interests and general career interests in undergraduates differed from Holland occupational codes (Gottfredson & Holland, 1996) that describe I/O psychologists as social, enterprising, and investigative, and clinical/counseling psychologists as social, investigative, and artistic. We therefore pose the following question: Can the SPI-IO's more specific scientist–practitioner orientations account for more variance in actual career choice than Holland's more general career interest measures? In Study 2, we seek to directly address this question, using a sample of I/O graduate students to again support the SPI-IO's structure, construct validity, and criterion-related validity.

Method

Participants. Potential participants for Study 2 were sought via online searches of I/O psychology programs. The SIOP's list of programs, as well as online rankings and search engines, was used to develop a final list of 87 eligible I/O psychology programs. Programs were eligible for inclusion if they offered a masters or doctoral degree (or both) in I/O psychology, if graduate student enrollment was full time and live (not online), and if the program was located within the United States.

Four hundred and fifty-five graduate students from 79 I/O psychology programs chose to participate in this research. Each participant filled out an anonymous online questionnaire and was rewarded with the chance to win one of the fifty \$10 gift certificates for Amazon.com.

Thirty-five percent of participants were male, 78% were Caucasian, and the mean age was 26 years old. Sixty-three percent of participants were enrolled in doctoral or combined masters and doctoral programs; the rest were enrolled in terminal masters programs. Twenty-six percent of participants were in their first year of graduate school; 36% were in their second year, 13% in their third, 12% in their fourth, and 13% in their fifth year or beyond.

Survey Measures

Specific Career Interests. The SPI for I/O Psychology (the SPI-IO scientist and practitioner scales) was used to measure participants' specific career specialty orientations. All 21 scientist items were included from Leong and Zachar's (1991) original SPI. In Study 2, we did not include Leong and Zachar's original practitioner items because they were designed to measure applied interests in clinical and counseling psychology students and were therefore irrelevant for I/O psychology graduate students. Instead, we used only the 24 I/O-specific *practitioner* items developed in Study 1. Thus, the final SPI-IO consists of 21 scientist items and 24 practitioner items. Participants provided ratings of their preferences to perform the work task described in each item using a 5-point Likert-type scale ranging from 1 being *very low interest* to 5 being *very high interest*.

General Career Interests. Armstrong, Allison, and Rounds' (2008) RIASEC marker scale was used to measure participants' general career interests. When responding to this inventory, participants indicated how much they would prefer doing each of the 48 work activities (e.g., "Generate the monthly payroll checks for an office") using a 5-point Likert-type scale ranging from 1 being *strongly dislike* to 5 being *strongly like*. Of the 48 activities included, 8 items were used to measure each of Holland's realistic, investigative, artistic, social, enterprising, and conventional facets.

Training Environment. Kahn and Miller's (2000) revised short form of Gelso's 54-item Research Training Environment scale was used to assess how much support for and interest in *research* (science) existed in each participant's graduate program. For this scale, respondents answered 18 items using a 5-point Likert-type scale ranging from 1 being *strongly disagree* to 5 being *strongly agree*.

In addition, 15 items were developed to measure how much support for and interest in *applied* (practice) work existed in each participant's graduate program. The wording of these items was intended to mirror the style of Kahn and Miller's (2000) scale items and used the same response options mentioned above.

Future Employment. Participants answered one question about the type of position they would prefer to hold after graduating. Example response options for this question include: "Professor at a university with emphasis placed on research, but not on teaching" and "Applied position in an organization that is hired by outside clients to carry out specific contracts." The item and response options were based on measures used in the American Psychological Association's annual employment survey.

Demographics. Participants responded to demographic items asking about their sex, age, and ethnicity. They also provided information about the type of degree they were pursuing, the nature of their enrollment, their year in graduate school, the name of their school, the title of their program, and the training philosophy of their department.

Results

Psychometric Properties of the SPI-IO. We conducted a principal axis factor analysis to assess the structure of the SPI-IO. Although using the Kaiser criterion of eigenvalues larger than 1 would produce eight factors, as mentioned earlier the Kaiser criterion tends to overfactor (Ford et al., 1986; Lance et al., 2006). Consistent with the way the scale was designed, the scree plot clearly indicated the presence of two factors. Thus, in the final analysis we constrained the number of factors to 2 and used a direct oblimin rotation to achieve simple structure. The two factors explained 48.50% of the total item variance. The scientist and practitioner scales were somewhat positively related to one another, $r = .16$.

The pattern matrix in Table 2 shows the loading of each SPI-IO item onto its underlying factor. Items with high first-factor loadings belong to the practitioner scale/construct; items with high second-factor loadings belong to the scientist scale/construct. All items loaded at .53 or above and onto expected factors. Scientist and practitioner scales also demonstrated high internal consistency, with Cronbach's αs of .96 and .98, respectively.

A full matrix of means, standard deviations, Cronbach's αs, and correlations among all Study 2 variables is presented in Table 3.

Relationships Among Specific (SPI-IO) and General (RIASEC) Career Interests. To examine whether the SPI-IO measured similar underlying phenomena as have other established career interest constructs in the literature, we calculated correlations between the SPI-IO scientist subscale, the SPI-IO practitioner subscale, and the six RIASEC facets. Previous research (e.g., Leong & Zachar, 1991) established a positive relationship between scientist interests and the investigative facet, a negative relationship between scientist interests and the social facet, a positive relationship between practitioner interests and the social facet, and a negative relationship between practitioner interests and the investigative facet.

As shown in Table 3, two of these relationships were found in the current research. Scientist interests were positively related to the investigative work style ($r = .30, p < .001$) and practitioner interests were positively related to the social work style ($r = .26, p < .001$). In addition, scientist interests were positively related to the artistic ($r = .12, p < .05$) work style and practitioner interests were positively related to the enterprising ($r = .28, p < .001$) and conventional ($r = .17, p < .001$) work styles.

Establishing Criterion-Related Validity of the SPI-IO. To investigate the criterion-related validity of the SPI-IO, we used its scientist and practitioner scales to predict students' plans for future employment. In other words, we sought to predict the type of position students would like to hold after finishing their graduate degrees from their responses on the SPI-IO. Accordingly, participants' original response options regarding future employment were recoded as scientist or practitioner.

As the first step in a multiblock logistic regression (Dependent variable = *preferred job category* where 1 = *academic/scientist* and 0 = *applied/practitioner*), we entered control variables representing aspects of the graduate program environment and the participant's year in school. Because these variables—namely the orientation of the graduate program and how much time the participant had spent in it—should affect his or her ultimate career choice, we sought to demonstrate the SPI-IO's predictive utility above and beyond what these variables contributed. In the second step, we added all six subscales of the RIASEC (general career interests). In the third step, we added both the scientist and the practitioner subscales of the SPI-IO. The results of this multiblock logistic regression are presented in Table 4.

The first block of the logistic regression included aspects of the graduate training environment (i.e., the graduate program's foci on research/science and applied/practice) and participants' year in school. Results showed that the odds of a student preferring academia versus applied work was higher when the environment was more research oriented ($\beta = .63, p < .05$, odds ratio = 1.88) and when the student was more advanced in his or her program ($\beta = .32, p < .01$, odds ratio = 1.38).

When RIASEC facets were added to the model in a second block, research training environment and year in school remained significant predictors of the choice to go academic versus applied ($\beta = .76, p < .05$, odds ratio = 2.15 and $\beta = .30, p < .01$, odds ratio = 1.36, respectively). One of the six RIASEC facets, enterprising, also predicted the choice to be academic versus applied ($\beta = -.75, p < .01$, odds ratio = .47).

After adding the SPI-IO scientist and practitioner subscales to the model as a third block, year in school remained a significant predictor of the decision to work in science versus practice ($\beta = .29$, $p < .05$, odds ratio = 1.34), but the research orientation of the graduate program environment was no longer significant in predicting students' career specialty choice. The enterprising facet of the RIASEC was also no longer significant, but the investigative and social facets became significant predictors ($\beta = -.47, p < .05$, odds ratio = .62 and $\beta = .68, p < .05$, odds ratio = 1.97, respectively).

Table 2. Exploratory Factor Analysis Loadings for SPI-IO Scales From Study 2.

Item	SPI-IO practitioner	SPI-IO (SPI) scientist
Identifying training and development needs	.80	
Formulating and implementing training programs	.79	
Evaluating the outcomes and effectiveness of workplace programs	.75	
Investigating the effectiveness of workplace supervision and leadership	.75	
Designing job performance measurement systems for feedback and performance improvement	.73	
Implementing leadership effectiveness training and executive coaching	.73	
Observing and interviewing workers to obtain information about the requirements of jobs	.72	
Analyzing job requirements and content	.72	
Developing and implementing employee selection and placement programs	.71	
Applying principles of learning and individual differences in training programs	.70	
Developing interview techniques and psychological tests to assess skills and abilities	.70	
Evaluating work environment and organizational structures to assess organizational functioning	.70	
Investigating factors that motivate employees to perform effectively	.69	
Studying job design to increase employee satisfaction and reduce occupational stress	.69	
Surveying employee attitudes for organizational development	.68	
Facilitating organizational development and change	.67	
Planning studies of work problems or procedures	.64	
Reporting results of organizational climate surveys to management	.64	
Constructing tests for employee selection, placement, and promotion	.62	
Interpreting psychological test results to assist personnel decision making	.60	
Writing reports to suggest potential changes in organizational functioning	.58	
Encouraging and building mutual trust, respect, and cooperation among team members	.57	
Advising management concerning personnel policies and practices	.57	
Designing work life programs to improve quality of work life	.56	
Writing an article commenting on research findings		.79
Writing research papers for publication		.78
Designing an experiment to study a psychological process		.76
Analyzing data from an experiment you have conducted		.72
Writing a scientific book for psychologists		.70
Reviewing journal articles		.70
Formulating a theory of a psychological process		.68
Developing new explanations of well-accepted empirical studies		.68
Learning about new statistical procedures		.68
Working for a funded research institute		.67
Brainstorming about possible research studies with colleagues		.66
Serving on a thesis or dissertation committee		.66
Presenting research findings at a conference		.66
Reading a book on innovative research designs		.64
Applying for research grants		.62
Serving as an editor for a scientific journal		.62
Supervising students' research projects		.61
Helping a colleague understand confusing statistical findings		.61
Collecting data on a research project you designed		.61
Reviewing the literature on an issue in psychology		.60
Writing a statistical program		.53

Note. SPI-IO = scientist-practitioner inventory for industrial/organizational psychology.
Pattern matrix from principal axis factor analysis with direct oblimin rotation. All items loaded on expected factors.

Table 3. Correlations Among all Variables From Study 2.

	M	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	25.73	4.32	—													
2. Sex (1 = *Male*; 0 = *Female*)	.35	.48	.05	—												
3. Year in school	2.48	1.33	.42***	.01	—											
4. SPI-IO scientist	3.42	.73	.10*	.10	.04	.96										
5. SPI-IO practitioner	4.07	.66	−.04	−.11*	−.16**	.18***	.98									
6. Realistic	2.04	.75	.04	.24***	.10	.07	−.00	.87								
7. Investigative	3.03	.87	.12*	.07	.13*	.30***	−.04	.31***	.88							
8. Artistic	3.16	.86	.07	.01	−.05	.12*	.06	.24***	.36***	.83						
9. Social	3.45	.66	−.02	−.17**	−.08	.07	.26***	.08	.13**	.33***	.79					
10. Enterprising	2.83	.69	−.08	−.09	−.12*	−.00	.28***	.17***	.05	.25***	.39***	.79				
11. Conventional	2.69	.71	−.14**	−.10*	−.13*	.08	.17***	.35***	.11*	−.05	.15**	.41***	.85			
12. Research training environment	3.82	.55	−.11*	−.04	−.22***	.25***	.09	.02	.05	.04	.03	.06	.10	.86		
13. Applied training environment	3.71	.73	−.16**	−.05	−.40**	.05	.13**	.01	.03	−.00	.09	.04	.10	.55**	.92	
14. Future employment (1 = *Academic*; 0 = *Applied*)	.25	.43	.20***	.13**	.20***	.32***	−.39***	−.02	.08	.09	−.01	−.18**	−.15**	.05	−.10*	—

Note. SPI-IO = scientist-practitioner inventory for industrial/organizational psychology.
N ranges from 382 to 454. Significance reported based on sample size for each pair of variables. Cronbach's α reported on the diagonal.
$^{***}p < .001$. $^{**}p < .01$. $^{*}p < .05$.

Table 4. Results From Logistic Regression Analyses Predicting Preferences for Academia (Science) Versus Applied Work (Practice) After Graduation From Controls, RIASEC Facets, and SPI-IO Scales.

		Block 1		Block 2		Block 3	
Predictor	χ^2	β	Exp(β)	β	Exp(β)	β	Exp(β)
Block 1	20.34**						
Research training environment		.63*	1.88	.76*	2.15	.20	1.22
Applied training environment		−.35	.71	−.43	.65	−.16	.86
Year in school		.32**	1.38	.30**	1.36	.29*	1.34
Block 2	22.47**						
Realistic				−.09	.91	−.11	.90
Investigative				.09	1.09	−.47*	.62
Artistic				.34	1.41	.45	1.56
Social				.26	1.30	.68*	1.97
Enterprising				−.75**	.47	−.51	.60
Conventional				−.25	.78	−.08	.92
Block 3	112.70**						
SPI-IO: scientist						2.22**	9.22
SPI-IO: practitioner						−2.27**	.10

Note. SPI-IO = scientist-practitioner inventory for industrial/organizational psychology.
χ^2 values presented are for each block.
N = 379.
***p* < .01. **p* < .05.

Finally, both the scientist and the practitioner subscales of the SPI-IO were significant predictors of the academic versus applied choice in the third block of the model ($\beta = 2.22, p < .01$, odds ratio = 9.22 and $\beta = -2.27, p < .01$, odds ratio = .10, respectively). This indicates that, as a student moves up one unit on the SPI-IO scientist scale (e.g., 4 to 5), the odds of choosing academia/scientist versus applied/practitioner work are 9.22. And as a student moves up one unit on the SPI-IO practitioner scale, the odds of choosing academia versus applied work are .10. These results support our predictions: When students have stronger scientist orientations and weaker practitioner orientations, they are more likely to prefer academia and less likely to prefer applied work.

Discussion

Study 2 tested the SPI-IO in a graduate sample. The final SPI-IO includes the original SPI's scientist subscale and the new SPI-IO practitioner scale that was developed and initially validated in Study 1. We found acceptable factor structure and high internal consistency using this graduate sample. Indicating support for construct validity, the SPI-IO practitioner scale correlated as expected with Holland's social, enterprising, and conventional work styles. Also as expected, the SPI-IO scientist scale was related to Holland's investigative work style.

One unexpected finding was the positive relationship between the SPI-IO scientist and practitioner scales. In previous research, scientist and practitioner scales have been shown to relate negatively to one another such that a person who is high on one is low on the other. In our study, the correlation between the two is not only positive but significant, indicating some overlap. This may be due to the emphasis in I/O psychology on the merging of science and practice, as well as the growing acceptance of academics who engage in applied work and of practitioners who utilize research in their work and teach students in adjunct.

We also tested the criterion-related validity of the SPI-IO and found that its scales significantly predict graduate students' career specialty choices to be academic (scientist) or applied (practitioner)—

even after taking into account aspects of the program (i.e., how research–oriented or applied–oriented the atmosphere was), the student's year in school, and Holland's general career interest variables. Overall, Study 2's results provide strong support for the validity and predictive utility of the SPI-IO in measuring career specialties.

General Discussion

In the current research, we developed and provided initial evidence of validity for a version of the Scientist-Practitioner Inventory for Industrial/Organizational Psychology. In Study 1, we reviewed and maintained Leong and Zachar's (1991) original scientist scale. We then designed a completely new practitioner scale comprised of work tasks relevant for I/O psychologists in particular. We measured scientist and practitioner orientations in undergraduate introductory psychology students. Factor analyses demonstrated support for the new SPI-IO practitioner scale's structure and a favorable Cronbach's α evidenced its internal consistency. Correlations with general career interest variables (i.e., Holland's RIASEC work styles) provided initial evidence of the SPI-IO's construct validity. In Study 2, we reestablished the factor structure, internal consistency, and construct validity of the SPI-IO, this time using an I/O psychology graduate student sample. In addition, we ascertained criterion-related validity for the SPI-IO: After accounting for control variables and general career interest markers, the SPI-IO scales significantly predicted graduate students' career specialty choices.

Limitations and Future Directions

We discovered strong support for the validity and utility of the SPI-IO. However, as with any research endeavor, some limitations must be noted. First, we realized retrospectively that it would be preferable to measure the development of career specialty orientations over time. In Study 1, we divided our sample into psychology versus nonpsychology majors and discovered that relationships among interest scales are more aligned with theory in the former but less so in the latter. Based on previous research findings, we suggested that, as knowledge of the specialties available increases, individuals gradually move from holding one general interest in psychology to more specific interests (e.g., in science vs. practice). Unfortunately, the anonymity of our surveys prevented repeated measures, and consequently we are unable to empirically support this reasoning. Future research investigating the development of one's career specialty orientation—or perhaps, critical incidents prompting changes in one's career specialty orientation—would certainly be worthwhile.

In addition, although we assessed scientist and practitioner orientations in undergraduates (Study 1) and graduate students (Study 2), it would be valuable to use the SPI-IO to measure career specialty orientations in working I/O psychologists as well. Confirming the validity of the SPI-IO in this third sample—namely by being able to evaluate orientations of I/O psychologists in the midst of their (science- or practice-based) careers would provide additional support for the legitimacy of our inventory.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

References

Armstrong, P. I., Allison, W., & Rounds, J. (2008). Development and initial validation of brief public domain RIASEC marker scales. *Journal of Vocational Behavior*, *73*, 287–299.

Baruch, Y., Bell, M. P., & Gray, D. (2005). Generalist and specialist graduate business degrees: Tangible and intangible value. *Journal of Vocational Behavior*, *67*, 51–68.

Borges, N. J., & Gibson, D. D. (2005). Personality patterns of physicians in person-oriented and technique-oriented specialties. *Journal of Vocational Behavior*, *67*, 4–20.

Brice, T. S., & Waung, M. (2001). Is the science-practice gap shrinking? Some encouraging news from an analysis of SIOP programs. *The Industrial-Organizational Psychologist*, *38*, 29–37.

Campbell, J. P. (1992, May). *The latent structure of science and practice: A confirmatory test*. Paper presented at the 7th Annual Conference of the Society for Industrial and Organizational Psychology, Montreal, Canada.

Coan, R. W. (1979). *Psychologists: Personal and theoretical pathways*. New York, NY: Irvington.

Ford, J. K., MacCallum, R. C., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: A critical review and analysis. *Personnel Psychology*, *39*, 291–314.

Gottfredson, G. D. (1987). Employment setting, specialization, and patterns of accomplishment among psychologists. *Professional Psychology: Research and Practice*, *18*, 452–460.

Gottfredson, G. D., & Holland, J. L. (1996). *Dictionary of Holland occupational codes*. Odessa, FL: Psychological Assessment Resources.

Hall, J. A., Davis, M. H., & Connelly, M. (2000). Dispositional empathy in scientists and practitioner psychologists: Group differences and relationship to self-reported professional effectiveness. *Psychotherapy: Theory, Research, Practice, Training*, *37*, 45–56.

Hartung, P. J., Borges, N. J., & Jones, B. J. (2005). Using person matching to predict career specialty choice. *Journal of Vocational Behavior*, *67*, 102–117.

Hergenhahn, B. R. (1997). *An introduction to the history of psychology*. New York, NY: Brooks.

Holland, J. L. (1985). *Vocational preference inventory manual*. Odessa, FL: Psychological Assessment Resources.

Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Odessa, FL: Psychological Assessment Resources.

Horn, R. A., McGowan, M. R., Mitchell, D. R., Mellott, R. N., Lilly, K., & Martinez, L. (2007). A pilot study examining the longer term stability of the scientist-practitioner model of training. *American Behavioral Scientist*, *50*, 830–841.

Kahn, J. H., & Miller, S. A. (2000). Measuring global perceptions of the research training environment using a short form of the RTES-R. *Measurement and Evaluation in Counseling and Development*, *33*, 103–119.

Kimble, G. A. (1984). Psychology's two cultures. *American Psychologist*, *39*, 833–839.

Koppes, L. L. (2006). Science and practice. *The Industrial-Organizational Psychologist*, *43*, 15–17.

Lance, C. E., Butts, M. M., & Michels, L. C. (2006). The sources of four commonly reported cutoff criteria—What did they really say? *Organizational Research Methods*, *9*, 202–220.

Leong, F. T. L., Hardin, E. E., & Gaylor, M. (2005). Career specialty choice: A combined research-intervention project. *Journal of Vocational Behavior*, *67*, 69–86.

Leong, F. T. L., & Zachar, P. (1991). Development and validation of the scientist-practitioner inventory for psychology. *Journal of Counseling Psychology*, *38*, 331–341.

Leong, F. T. L., Zachar, P., Conant, L., & Tolliver, D. (2007). Career specialty preferences among psychology majors: Cognitive processing styles associated with scientist and practitioner interests. *The Career Development Quarterly*, *55*, 328–338.

Martin, W. E., Jr., Gavin, M., Baker, E., & Bridgmon, K. (2007). Analysis of the effects of gender and doctoral program emphasis on scientist and practitioner interests. *American Behavioral Scientist*, *50*, 820–829.

Meir, E. I., & Melamed, S. (2005). Occupational specialty congruence: New data and future directions. *Journal of Vocational Behavior*, *67*, 21–34.

O*Net Online. (n.d.). Retrieved December 27, 2011, from http://online.onetcenter.org/link/summary/19-3032.00

Savickas, M. L., Taber, B. J., & Spokane, A. R. (2002). Convergent and discriminant validity of five interest inventories. *Journal of Vocational Behavior*, *61*, 139–184.

Super, D. E. (1953). A theory of vocational development. *American Psychologist*, *8*, 185–190.
Swaney, K. B. (1995). *Technical manual: Revised unisex edition of the ACT interest inventory (UNIACT)*. Iowa City, IA: American College Testing.
Taber, B. J., Hartung, P. J., & Borges, N. J. (2011). Personality and values as predictors of medical specialty choice. *Journal of Vocational Behavior*, *78*, 202–209.
Zachar, P., & Leong, F. T. L. (1992). A problem of personality: Scientist and practitioner differences in psychology. *Journal of Personality*, *60*, 665–677.
Zachar, P., & Leong, F. T. L. (1997). General versus specific predictors of specialty choice in psychology: Holland codes and theoretical orientations. *Journal of Career Assessment*, *5*, 333–341.
Zachar, P., & Leong, F. T. L. (2000). A 10-year longitudinal study of scientist and practitioner interests in psychology: Assessing the Boulder model. *Professional Psychology*, *31*, 575–580.
Zickar, M. J., & Gibby, R. E. (2006). Four persistent themes throughout the history of I-O psychology in the United States. In L. L. Koppes (Ed.), *Historical perspectives in industrial and organizational psychology* (pp.61–80). Mahwah, NJ: Lawrence Erlbaum.