INTERESTS, PREFERENCES, STYLES, AND PERSONALITY:
THE RELATIONSHIP BETWEEN
STRONG PERSONAL STYLE SCALES AND THE MBTI

DISSERTATION

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By

Beverly Diane Tuel, B.A., M.A.

* * * * *

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1997

Dissertation Committee:
R. K. Russell
W. B. Walsh
N. E. Betz

Approved by

Advice

Department of Psychology
ABSTRACT

This study investigated the relationship between the Personal Style Scales of the 1994 Strong Interest Inventory and the Myers-Briggs Type Indicator (MBTI). Participants included two groups of students (n = 132 & 96) and one group of clients in career counseling (n = 129). Males' and females' relationships between scales differed significantly. As predicted, in all samples Work Style was related to the MBTI Extraversion-Introversion and Thinking-Feeling scales. Learning Environment was associated with Sensing-Intuiting, and Leadership Style was correlated with both Extraversion-Introversion and Sensing-Intuiting. Risk Taking was related to Judging-Perceiving. Additional relationships varied by group or by gender. Canonical correlational analyses conducted with each gender revealed significant higher order relationships among the variables and suggested differing patterns of relationships among women and men.
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VITA

July 13, 1966

Born—Los Gatos, California

1989

Baccalaureate of Arts, Department of Psychology, University of California, Davis

1991 - present

Attended Ohio State University
Department of Psychology, Counseling Area

1991 - 1992

Graduate Administrative Associate, University College, Ohio State University

1993

Psychology Trainee, Department of Psychology, Veterans Administration Medical Center, Dayton, Ohio

1993

Master of Arts, Department of Psychology, Ohio State University

1992 - 1994

Student Personnel Assistant, Counseling and Consultation Service, Ohio State University

1994

Student Personnel Assistant, Division of Student Affairs, Ohio State University

1994 - 1996

Graduate Teaching Associate, Department of Psychology, Ohio State University

1996 - 1997

Psychology Intern, Counseling Center, University of Denver, Colorado

Fields of Study

Major Field: Psychology

Studies in Counseling Psychology
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CHAPTER 1
INTRODUCTION

Measures of career interests are widely used for both vocational and avocational purposes (Hansen, 1992). Over a decade ago Hansen (1984) estimated that approximately 3.5 million interest inventories were administered annually, and there is no evidence of decline in their popularity (Betz, 1992; Bubenzer, Zimpfer, & Mahrle, 1990). The Strong Interest Inventory (SII) is one of the most well-known of these measures (Bubenzer, et. al., 1990; Harmon, Hansen, Borgen, & Hammer, 1994). The subject of much research, this instrument has been continually assessed and revised throughout its seven decade history, and a new and updated revision was published in late 1994 (Harmon & Borgen, 1995; Harmon, et al., 1994). The original Strong Vocational Interest Blank (SVIB), upon which the SII was based, was developed in 1927 to compare a client's interests with the interests of individuals happily employed in several occupations. In 1972 the idea of adding personality dimensions to this measure of interests emerged (Campbell & Holland, 1972), and the 1974 revision of the SVIB introduced General Occupational Themes (GOTs) representing Holland's theory of vocational personality types. The newest version of the SVIB, now called the Strong Interest Inventory (SII), has been greatly expanded and updated to more accurately reflect the contemporary occupational world. It includes the six General Occupational Themes based on Holland's (1973) theory of careers, 25 Basic Interest Scales, 211 Occupational Scales, and a new innovation, four Personal Style Scales (PSS) developed specifically to measure personality dimensions (Harmon & Borgen, 1995; Harmon, et al., 1994).
Borgen (1986) noted that the assessment of interests has been an immensely successful venture with widespread practical application. However, the conceptual underpinnings of interests as a psychological variable remain unclear. To help expand our currently limited understanding of these issues, he called for exploring the linkage of personality and interests. Betz (1992) echoed this call, and the Personal Style Scales were developed as part of the revised Strong to assist in this endeavor (Harmon & Borgen, 1995; Harmon, et al., 1994).

The concept of linking interests with personality is not new. Indeed, the basis of person-environment or trait-factor theories of career development rests upon the assumption that individuals choose careers that will place them in environments compatible with salient personality characteristics such as interests and values (Hackett & Lent, 1992). The SII is built upon this assumption. Although early versions of the SVIB simply compared test-takers' interests to those of norm groups of people in various occupations, more recent versions have incorporated the work of Holland (1973) and have categorized interests into General Occupational Themes (GOTs) which represent Holland's hexagon or R-I-A-S-E-C (Realistic-Investigative-Artistic-Social-Enterprising-Conventional) model (Harmon & Borgen, 1995).

According to Holland's (1973) theory, interests influence career choice because they are an important component of individual personality type and reflected in the hexagonal model. Holland (1973) posited that individuals have a primary, interest-related personality type which influences the direction and stability of vocational choice as well as individual achievement and satisfaction with these choices. The specific mechanisms of Holland's theory have been the subject of much empirical study, but they have been met with mixed results (Hackett & Lent, 1992). However, the underlying assumption that
important personality characteristics can be assessed by measuring interests has remained relatively unexamined (Betz, 1992).

The current revision of the SII attempts to make the links between interest and personality more salient with the addition of four Personal Style Scales (PSS; Borgen, 1994; Harmon & Borgen, 1995). These scales have been developed to measure constructs matching their titles: Work Style, Learning Environment, Leadership Style, and Risk Taking/Adventure (Harmon, et al., 1994). The first two of these were empirically developed, and the other two were developed as homogeneous scales using factor analyses and inter-item correlations.

Another widely used instrument in career assessment and counseling has been the Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985). Boasting a history nearly as long as the SII’s, this measure of personality was based upon Jung’s (1921/1971) theory of personality. While the original SVIB was an entirely empirically-based instrument, the MBTI was exclusively theory driven. Although they emerged from different backgrounds, both have been widely used to identify potentially satisfying occupations for respondents (Bubenzer, et al., 1990; Lowman, 1993; McCaulley & Martin, 1995; Miller, Wells, & McGowan, 1989). In fact, a description of uses of the MBTI in career counseling stated the MBTI “provid(es) clients with an understanding of their interests and how they may wish to live their lives. In theory, occupations should attract particular types, and similar occupations should have similar type distributions” (Myers & McCaulley, 1985, p. 77). This description sounds remarkably similar to one of Holland’s theory which “views vocational interests as expressions of personality and argues that individuals make occupational choices which will place them in environments that are compatible with their predominant personality characteristics” (Martin & Bartol, 1986, p. 52).
In addition to its uses as a measure of personality type, the MBTI has been used to indicate preferred work (Apostal & Marks, 1990; Myers & McCaulley, 1985), learning (Apostal & Trontvent, 1989; McCaulley, 1988; Myers & McCaulley, 1985), and leadership styles (Roush & Atwater, 1992; McCaulley, 1988; Myers & McCaulley, 1985). It has also been used to determine how individuals perceive risks in various situations and whether they have risk-taking personalities (Morehouse, Farley, & Youngquist, 1990; Blaylock, 1981; McCaulley, 1988; Myers & McCaulley, 1985). As such, the potential for associations between the MBTI and the new PSSs of the Strong appear promising.

In addition to using the MBTI to understand the SII, and the SII to understand the MBTI, it is important to understand the contributions and relationships made by using both of these instruments in tandem. Lowman (1991 & 1993) called for the integration of interest, ability, and personality assessment in the practice of career assessment. He noted:

Extensive lines of research have emerged in relative isolation from one another in the areas of vocational interests, abilities, and personality characteristics; there has to date been relatively little systematic consideration of how interests, abilities, and personality characteristics interact to determine career choice and the need for change. Currently, the field of career assessment is filled with single-variable, single-domain and (worst of all) single test studies (perhaps most prolifically, using measures like the Myers Briggs Type Indicator (sic) [Myers & McCaulley, 1985], probably one of the most widespread misused psychological tests in existence in the sense that it is too often used simplistically and in isolation by persons with limited training). (Lowman, 1993, p. 550)

While many career counselors have used only one instrument to assess personality or interests in isolation, some have used MBTI types to infer interests and Holland profile patterns. For example, Miller and colleagues (Miller, et al., 1989) proposed a mapping of several personality measures, including the MBTI, onto the Holland system as assessed by the SII or similar instrument. Although this mapping may have some heuristic merit, it
was developed purely on the basis of armchair speculation without empirical verification. Without empirical evidence to support these claims, practitioners will be guilty of the charge levied by Lowman (1993).

Purpose

The primary purpose of the present study is to empirically investigate the relationship between the Personal Style Scales of the 1994 SII and the MBTI. Simple correlations between scale scores on these instruments will be assessed, and the higher order relationships between the four scales of each instrument will be examined. Whether the pattern of relationships differs between samples or between genders is an additional question for study. Finally, the relationship between the PSS and MBTI scores will be assessed. Specific hypotheses will be presented at the end of Chapter 2.
CHAPTER 2
LITERATURE REVIEW

The Strong Interest Inventory (SII, Harmon, et al., 1994) and the Myers-Briggs Type Indicator (MBTI, Myers & McCaulley, 1985) both have long histories as tools for assessment and research. Complete reviews of each of these instruments is beyond the scope of the current research, but interested readers should see *Strong Interest Inventory: Applications and technical guide* (Harmon, et al, 1994) and *Manual: A guide to the development and use of the Myers-Briggs Type Indicator* (Myers & McCaulley, 1985), the manuals accompanying each test. Three recent articles may be of additional interest. Two in the *Journal of Career Assessment* include Harmon’s and Borgen’s (1995) introduction of the 1994 SII revision and McCaulley’s and Martin’s (1995) discussion of the MBTI in career assessment. Pittenger (1993) offered a review assessing the utility of the MBTI in the *Review of Educational Research*. Consulting Psychologists Press publishes both instruments and books related to each.

The current review will introduce the SII and the MBTI, focusing on the Personal Style Scales (PSS) of the SII, the four Myers-Briggs dimensions, and extant research about the MBTI as it relates to constructs assessed by the Personal Style Scales. Validity issues will be addressed for both instruments, although the bulk of the research in this area addressed the MBTI rather than the new PSSs. Because these scales are new, they have not yet received widespread attention by researchers. This review will focus on the validity and purported constructs measured by PSSs as reported in the manual (Harmon,
et al, 1994) and will draw upon relevant published research related to these constructs and scales where it exists.

The Strong Interest Inventory (SII)

A new feature of the 1994 revision of the SII is the inclusion of Personal Style Scales (PSS). "Measuring preferences for and comfort with broad styles of living and working, these scales complement the traditional vocational interest scales that measure preferences for more specific aspects of the work itself" (Harmon, et al., 1994, p. 155). As stated in Chapter 1, these scales include Work Style, Learning Environment, Leadership Style, and Risk Taking/Adventure. All four PSSs were constructed as bipolar scales with distinctive preferences associated with each pole. All were standardized based on scores developed from the 1994 General Reference Sample of 18,951 people and have a combined-sex mean of 50 and standard deviation of 10. Profiles are scored using within-gender norms.

Work Style

The Work Style scale was developed to distinguish people who prefer to work with ideas, data, and things from those who would prefer to work with people. It is reported to have significant correlations with the GOT scales, with high scores on Work Style associated with E and S GOTs ($r = .57$ to $.64$) and low scores associated with R and I GOTs ($r = -.33$ to -.46; Harmon, et al., 1994). This scale is made up of interest-related items from the SII, and the naming of this scale as one reflecting "Personal Style" and its relationship with the General Occupational Themes make clear the assertion that interests are indeed thought to reflect relatively stable personality constructs.

This scale was empirically constructed using two subgroups of the General Reference Sample. As part of the new test booklet, respondents were asked to indicate
preferences between pairings of people, data, ideas, and things. Respondents who consistently selected people over any of the other three options comprised one group ($N = 6,681$) and those who consistently preferred one of the other three options over people made up the second group ($N = 5,574$). The 51 items on the SII which differentiated these groups by 16 percent were included in this scale. Females typically score higher on this scale than males; the mean for females is $53.1$ ($SD = 9.6$) while for males it is $46.9$ ($SD = 9.4$). The highest scoring occupations on the Work Style scale include: child care provider (female), home economics teacher (female), community service organization director, high school counselor, secretary (female), life insurance agent, human resources director, flight attendant, social worker, and school administrator. The lowest scoring occupations are physicist, chemist, mathematician, computer programmer/systems analyst, biologist, geologist, auto mechanic, plumber (male), engineer, and research and development manager. The distribution of occupations appears to support the validity of the scale (Harmon, et al, 1994).

The Work Style scale bears some resemblance to the Introversion-Extroversion (IE) scale of the 1985 SII (Hansen, 1992), with correlations between the two scales of -0.58 for women and -0.66 for men (Harmon, et al, 1994). The IE scale was correlated with GOTS in the same way that Work Style is. High scorers on IE (those who preferred working alone) had high R and I themes, and low scorers on IE (those who preferred working with people) had high S and E themes (Broday & Sedgwick, 1991). In the current edition, the Work Style scale is moderately correlated with Leadership Style for men ($r = 0.61$) and women ($r = 0.52$) but bears little relationship with Learning Environment or Risk Taking/Adventure ($r = -0.08$ to 0.07; Harmon, et al., 1994).
Learning Environment

The Learning Environment scale, though new to the revised SII, has been based largely on the former Academic Comfort scale. The Academic Comfort scale gave an indication of how comfortable respondents felt in academic settings. Scores were highly correlated with level of academic achievement. Although related to grades and academic success, the Academic Comfort scale was not a measure of ability but of interest in academic pursuits. People with low Academic Comfort scores tended to view their education as a means to an end. In contrast, high scorers valued education for the intrinsic value of learning (Hansen, 1992). Similarly, the Learning Environment scale differentiates people who are more comfortable in academic settings from those who prefer more practical, hands-on learning settings. The correlation between the two scales is .64 for women and .69 for men; one primary difference between the scales is that the newer scale has fewer items indicating liking of science and school subjects than the older scale (Harmon, et al., 1994).

Empirically constructed, the Learning Environment scale was developed to distinguish individuals in the General Reference Sample whose highest degree was from a technical or trade school (N = 422) from those who had earned master’s or Ph.D. degrees (N = 7,328). The 49 items which differentiated these groups by more than 20% were included in this scale. The mean of 50.0 is the same for males and females, although the standard deviations differ somewhat (SD = 9.5 and 10.4, respectively). People with bachelor’s and master’s degrees typically score at about the mean for this scale; those with high school or technical training usually score below 40 while those with Ph.D.s score about 56. This scale is most highly correlated with the A GOT (r = 0.65 and 0.70) and also with the I theme (r = 0.41 and 0.40). Correlations with the other GOTs range from -0.31 to .25. Learning Environment is somewhat correlated with Leadership Style (r =
0.49 and 0.50) but less correlated with the other two PSSs ($r = -0.08$ to 0.25). High scorers on this scale include college professors, geographers, lawyers, physicists, psychologists, public administrators, and sociologists; low scorers include agribusiness managers, auto mechanics, dental assistants, farmers, hair stylists, nurses (LPNs), and plumbers (Harmon, et al., 1994).

**Leadership Style**

The Leadership Style scale, a third and entirely new scale on the revised Strong, was developed to reflect “a preference for meeting, directing, persuading, and leading other people” (Harmon, et al., 1994, p. 159). Developed from a factor analysis of SII items, this 23-item scale was originally based upon a 2,000 person subsample of the General Reference Sample and later verified using the complete sample. This leadership factor emerged as one of the first eight factors found in factor analysis, and it accounted for “substantial individual differences” (p. 161). People who score high on this scale are said to enjoy leading others while low scorers appear less comfortable assuming leadership positions. Occupations whose members tend to score high on this scale include broadcaster, corporate trainer, elected public official, high school counselor, minister, public administrator, public relations director, realtor, and school administrators. Auto mechanics, chemists, farmers, mathematicians, physicists, plumbers, radiological technologists, and veterinarians tend to score lower on this scale.

Although the Leadership Style scale was developed independently, the Leadership Style scale is “quite highly correlated with the Introversion-Extroversion scale which appeared in the 1985 Strong” (Harmon, et al., 1994, p. 159), but the exact correlations are not given in the *Applications and Technical Guide* nor in a refereed journal article presenting the newly revised instrument (Harmon & Borgen, 1995). The former Introversion-Extroversion (IE) scale was developed to differentiate students who scored
in the introverted and extroverted directions on the Minnesota Multiphasic Personality Inventory (MMPI). People who scored in the introverted direction tended to prefer working alone and with ideas and things rather than people. People scoring in the extroverted direction, in contrast, were more likely to choose to work on group projects and want to work with others and to enjoy being the center of attention (Hansen, 1992). The Leadership Style scale is related to this preference for working with people but was designed to reflect a preference for leading, persuading, and directing other people (Harmon, et al., 1994). The Leadership Style scale is reasonably correlated with the Work Style, Learning Environment, and Risk Taking/Adventure scales for men ($r = 0.61, 0.49, \text{and } 0.31$, respectively) and women ($r = 0.52, 0.50, \text{and } 0.32$, respectively). Its highest correlations with GOT scales are with E ($r = 0.50$ and 0.51), followed by S ($r = 0.37$ and 0.47) and A ($r = 0.35$ and 0.33). Male and female norms for this scale are virtually identical (Harmon, et al., 1994).

**Risk Taking/Adventure**

The fourth Personal Style scale is the Risk Taking/Adventure scale. This scale is simply the Adventure scale of previous versions which used to be considered a Basic Interest Scale. Douce and Hansen (1988) presented evidence that this scale measures more than simply a pattern of interests, and may in fact reflect a personality characteristic. To reflect this finding, it has been re-categorized as a PSS. People may score high on this scale (in the risk-taking direction) for a number of reasons. Some high scorers prefer physical risk-taking, and others are financial risk-takers. Some may be social risk-takers, have a love of travel, or a strong desire for independence. This scale may also reflect arrested emotional development or extreme discomfort in trying new activities without careful planning for low scorers. Substantial gender differences occur on this scale, with women averaging 46.9 ($SD = 9.7$) and men 53.1 ($SD = 9.4$; Harmon, et al., 1994). In
women, high scores on this scale may reflect a willingness to take risks in pursuing non-traditional careers (Douce & Hansen, 1990).

Originally developed in 1968, items for this homogeneous scale were chosen based on high inter-item correlations with similar content. Occupations whose members score high on Risk Taking include athletic trainers, auto mechanics, carpenters, electricians, emergency medical technicians, plumbers, and police officers. Low scoring occupations include dental assistants, dental hygienists, librarians, mathematicians, nurses (LPNs), and speech pathologists. Risk Taking shows its highest correlations with the R GOT (r = 0.44 and 0.41), understandable particularly given that it used to be placed as a Basic Interest Scale in the Realistic grouping. In both women and men, this scale is modestly correlated with I (r = 0.30 and 0.26, respectively), while with A it is only correlated for women (r = 0.30; Harmon, et al., 1994).

Myers-Briggs Type Indicator

The Myers-Briggs Type Indicator (MBTI; Myers & McCaulley, 1985) is another measure which has been widely used in both career and personal counseling. Based on Jung’s (1921/1971) theory of personality, Isabel Briggs Myers and her mother, Katharine Cook Briggs, developed the MBTI in an attempt to develop a test for personnel selection. They believed that different vocations appealed to different personality types, and they used Jungian theory to bridge the gap between personality and job performance (Pittenger, 1993). The MBTI would assess differences in individual preferences, particularly in perception and judgment which would be relevant criteria for sorting people into groups according to type (Myers & McCaulley, 1985).

The MBTI sorts personality types along four bipolar, mutually exclusive dimensions. Two of these, perception and judgement, are called functions, and are
modified by the attitudes of extraversion and introversion. These three dimensions were based directly upon Jung's theory as proposed in *Psychological Types* (1921/1971). The fourth dimension, orientation to the outer world, was only implicit in Jung's (1921/1971) work, but made explicit by Myers and Briggs as another modifier of the perception and judging functions. According to the manual, "perception involves all the ways of becoming aware of things, people, happenings, or ideas. Judgement involves all the ways of coming to conclusions about what has been perceived" (Myers & McCaulley, 1985, p. 1). The perception function has the categories sensing and intuition. People are classified as "sensing" (S) if they prefer to rely upon data observable by the senses to establish what exists. In contrast, "intuitive" (N) individuals prefer to use insight to perceive possibilities, meanings, and relationships. The judging function embodies the categories "thinking" (T) and "feeling" (F) and describes how individuals make rational sense of their world. Thinking individuals tend to "seek order and plan according to impersonal logic" (Myers & McCaulley, 1985, p. 13), and feeling people tend to "seek order according to harmony among subjective values" (Myers & McCaulley, 1985, p. 13).

The dimensions of "attitude" and "orientation to the outer world" modify the basic functions. The extraversion (E) and introversion (I) attitudes are described as "orientations toward life" (Myers & McCaulley, 1985, p. 13). In the extraverted attitude, attention tends to be focused outward on the objects and people of the environment and extraverts desire to act upon the environment and increase its effect. Introverts, in contrast, draw their energy from the environment and then internalize it. They tend to be focused more on the inner world of ideas and concepts than are their extrovert counterparts. The use of introversion and extraversion in MBTI theory is broader than the conventional usage of these terms; introversion implies far more than simply
“shyness” and extroversion more than “sociability.” The MBTI assumes both to be normal and valuable variants of human personality (Myers & McCaulley, 1985).

Finally, “judging” (J) and “perceiving” (P) are called “orientation to the outer world.” These preferences serve two roles in the MBTI. They describe “identifiable attitudes and behaviors to the outside world. Second, (they are) used, in conjunction with Extraversion-Introversion, to identify which of the two preferred functions is the leading or dominant function and which is the auxiliary” (Myers & McCaulley, 1985, p. 13). It is the first use that will be addressed here. People with a perceptive attitude are attuned to incoming information. They tend to focus on the importance of gathering information and characteristically seem to be “spontaneous, curious, and adaptable, open to new events and changes, and aiming to miss nothing” (Myers & McCaulley, 1985, p. 14). Alternately, people with a judging attitude are more concerned with “making decisions, seeking closure, planning operations, or organizing activities” (Myers & McCaulley, 1985, p. 14). They tend to focus on the importance of making decisions and will focus on perceptions only long enough to gather enough information to make a decision. These people appear to be “organized, purposeful, and decisive” (Myers & McCaulley, 1985, p. 14).

According to the manual, the two poles on each of the four MBTI dimensions are dichotomous and mutually exclusive types. Items ask respondents to select behavioral and descriptive preferences in a forced-choice format. Although continuous scores are generated for each dimension based on the number and weight of the items chosen, the final personality profile is in nominal (type) form. These types combine into one of 16 (2 x 2 x 2 x 2) four-letter codes used to describe personality. In earlier versions of the test, subjects who responded equally to each pole (at the zero point) would receive an “x” rather than a letter indicating no or unclear preference. In its current form, a tie-breaking
procedure is used so that all respondents will fall into one of the sixteen types (Myers & McCaulley, 1985).

Myers and Briggs began development of their instrument in the early 1940s, and in the intervening years revised their instrument several times. In 1975 Consulting Psychologists Press acquired the rights to the MBTI. Its current form, Form G, was published in 1977 based on a re-standardization of the previous Form F. Although research on the MBTI has been prolific, much of it has been conducted by the Center for the Application of Psychological Type and does not appear in refereed professional journals. The one exception to this is the Journal of Psychological Type (JPT), a refereed outlet for research on the MBTI. For present purposes, only studies appearing in mainstream professional journals and books (i.e., those indexed in PsychLit abstracts) will be reviewed. JPT meets this criteria, and relevant articles will be included.

Several recent reviewers have assessed the validity and utility of the MBTI and reached differing conclusions. The primary source of data about the MBTI has been the test manual (Myers & McCaulley, 1985). According to the manual, data about the MBTI strongly support its validity. As evidence, Myers and McCaulley (1985) have offered pages upon pages of correlations with other instruments and “type tables,” charts of the percentages of people of each type in any given sample. For example, in a sample of 1,458 male clergy from Protestant denominations, only 7 (0.48%) were of the type ESTP, but 233 (15.98%) were ENFJs (p. 43). According to the authors, these type tables provide evidence for the MBTI’s construct validity. “(I)f the type table for a given occupation has significantly more of the types predicted by theory to have interest in, and therefore be more likely to be members of, that occupation, then the type table contributes to construct validity” (p. 176). In general, it seems that the type tables presented offer data reasonably consistent with the theory, but systematic examination of these tables is
problematic without any accompanying statistical analyses on the differences between expected and observed results.

**Extraversion-Introversion (EI)**

Myers and McCaulley (1985) have offered correlations between MBTI continuous scores and other measures of psychological variables as evidence for the instrument's validity. On the EI dimension, correlations with other scales measuring concepts related to extraversion range from $r = -0.77$ for the Social Extraversion scale of the Omnibus Personality Inventory (Heist, Yonge, Connelley & Webster, 1968) to $r = -0.40$ on the social adjustment scale on Fricke's (1963) Opinion, Attitudes and Interest Scales. The Extraverted direction of the EI dimension is associated with others measures of extraversion, including measures assessing sense of comfort in, action on, quick response to, and over-reliance on the environment, as well as freedom of expression, sociability, and relatedness to other people. Interest scale measures of sales, marketing, leadership, and counseling and occupational scales measures of travel agents, YMCA secretaries, and elected public officials are all related to Extraversion ($r = -0.79$ to -0.51). The Introverted direction is associated with measures of occupational and social introversion, lack of comfort in the environment, reflective observation, lack of need for environmental stimulation, interest in privacy and solitude, occupations requiring sustained attention, and interest in concepts and ideas ($r = 0.75$ to 0.40; Myers & McCaulley, 1985).

**Sensing-Intuition (SN)**

Similarly, the perceptive functions of Sensing and Intuition correlate in expected ways with related measures. Negative correlations with the SN scale (in the Sensing direction) can be found in measures of practical outlook, rule-bound attitude, and orientation to economic reality as well as occupational scales requiring expertise in dealing
with tangible objects, often in a "hands-on" manner, and occupations requiring attention to detail (r = -0.67 to -0.40). In contrast, positive correlations (in the Intuitive direction) can be found with measures of experimental and flexible attitudes, complexity, artistic and academic interests, autonomy, thinking introversion, lability, creativity, aesthetic and theoretical interests, liberalism, existentialism, self-actualizing, sentience, inner-directedness, synergy, capacity for status, and feeling reactivity (r = 0.62 to 0.40). Interest relations include psychology, liberal and fine arts, education, and sciences (Myers & McCaulley, 1985).

**Thinking-Feeling (TF)**

Thinking and Feeling, the judging functions, are negatively correlated (in the Thinking direction) with counteraction, masculine orientation, abstract conceptualization, dominance, theoretical, distrust, assertiveness, autonomy, radicalism, achievement, and aggression and with occupations including science and engineering, military, business and finance, law, and technical fields (r = -0.57 to -0.40). Positive correlations can be found with measures of concern for others, affiliation and sociability, adaptability of feelings to others’ demands, and blame and conflict avoidance (r = 0.55 to -0.40). Occupational and interest correlations include creative fields in arts and humanities, teaching, religious and social service activities (Myers & McCaulley, 1985).

**Judging-Perceiving (JP)**

Finally, preference for Judging or Perceiving orientation to the outer world is correlated in the expected manner with many variables. Negative correlations (Judging) are found with measures of order, rule-bound attitude, stronger superego, endurance, self-control, achievement, counteraction, and strong desire for order (r = -0.59 to -0.40). Only a few occupational scales correlate with J, including nurse practitioner and interest in the biological sciences. Correlations may also be found with leadership, work, and
achiever personality characteristics. Positive relationships (Perception) exist with complexity, flexibility, autonomy, sentience, blame avoidance, reality-distance, aesthetic values, change as challenge, intellectual quality, impulse extraversion, succorance, imagination, social undesirability, and dyscontrol ($r = 0.57$ to $0.40$). Occupational relationships are found with art, languages, and humanities (Myers & McCaulley, 1985). 

**Support and Criticisms of the MBTI**

Other studies (e.g. Carlson, 1985; Zumbo & Taylor, 1993) have bolstered the findings cited above. However, most of the studies on the MBTI have focused on the dimension of EI and its correlation with other measures of extraversion. Pittenger (1993) criticized the MBTI and noted that its definition of extraversion differs markedly from other definitions of extraversion, and yet the scales are highly intercorrelated. “If all tests including the MBTI defined extroversion similarly, then these correlations would provide evidence of convergent validity. The MBTI, however, offers a theoretical account of extroversion that is different from other accounts of extroversion, suggesting that the MBTI’s account of extroversion may be incomplete” (p. 475).

A study by Zumbo and Taylor (1993), however, shed a different light on this controversy. These researchers combined three measures in order to fully understand dimensions of the construct of extraversion. They used the MBTI EI scale, the Extraversion scale of the Eysenck Personality Questionnaire (EPQ, Eysenck & Eysenck, 1968), and the five extraversion subscales of the Howarth Personality Questionnaire (HPQ, Howarth, 1980). A factor analysis yielded 4 factors of extraversion, of which the MBTI EI scale comprised one factor contributing 46.0% of the total variance. This factor was highly correlated ($r = 0.787$) with the third factor which combined sociability, the EPQ scale, and impulsiveness but was only weakly correlated with the other two factors, inferiority/anxiety and dominance, respectively. The four factors combined to form a
general second-order factor. These findings suggest that while Pittenger's statement may be correct, the MBTI concept of extraversion may be a subset of the larger extraversion construct.

Behavioral and observer ratings also have been correlated with MBTI dimensions. Behavioral ratings on the Adjective Check-List (ACL; Gough & Heilbrun, 1983) and the California Q-sort (Block, 1961, 1978) have yielded moderately supportive results (Myers & McCaulley, 1985; Thorne & Gough, 1991). Although all correlations with observer ratings were low to moderate, they appear to be in the direction predicted by MBTI theory. However, when adjectives were clustered by “type” and participants were rated on similarity to MBTI-type traits, significant intercorrelations were found between these measures, even between scales on which no correlations should exist (Thorne & Gough, 1991). These findings suggest that the self-report MBTI may not stand up to the test of observer-based behavioral ratings and that these behavioral “factors” may overlap more than the theory or instrument would suggest.

Another interesting finding from these studies was the difference in ratings of males and females on the TF dimension. The MBTI manual acknowledges the presence of gender differences on this dimension, and separate weights have been assigned to TF items based on gender. Even with the system of within-gender scoring, percentages of male and female Ts and Fs differ. Studies from the late 1950s through mid 1980s suggested that approximately 60% of males score in the T direction, while only 30% of females do (Myers & McCaulley, 1985). Research by Thorne and Gough (1991) shed new light on these differences and other differences found between male and female participants. Behavioral raters typically described T males as planful, steady, organized, efficient, seeking objectivity and rationality, ambitious, and power-oriented. Female Ts, while also labelled logical and ambitious, were additionally described as opinionated.
condescending, distrustful and tense. The opposite effect was found among people scoring in the F direction. Both male and female Fs were described as tender, affectionate, and sentimental and as having love for their mothers, but the genders evoked differing responses from raters; females drew nurturant responses while males were seen as petulant and self-pitying. Words such as feminine, appreciative, trusting, and warm described women while dependent, emotional, sensitive and weak were chosen for men. The researchers suggested that these differing descriptions may have resulted from cultural biases of the raters such that people not fulfilling expected sex-role types would be viewed more negatively. On the other hand, these differences could have reflected genuine maladaptive strategies adopted by males and females who have non-normative types. Although beyond the scope of the current research, these findings deserve further research attention and should alert consumers of the MBTI to possible gender biases.

Recent criticism of the MBTI has focused on two related issues: whether the MBTI truly measures types rather than traits and whether the four factors assessed are bipolar, bimodal, and dichotomous dimensions. Pittenger (1993) noted that the criteria for distinguishing personality types (dichotomous, mutually exclusive classes) differ from those needed to assess personality traits (continuous, bipolar dimensions). If the MBTI truly assess types, the data should show a bimodal distribution with a meaningful division point, and the four-letter type classification should be reliable. “If each of the 16 types is to represent a very different personality trait, it is hard to reconcile a test that allows individuals to make radical shifts in their type,” (p. 472) as has been shown in the research with as many as 50% of subjects being reclassified over a 5-week period. Furthermore, research cited in the manual as evidence for dichotomies he called “at best, weak” (p. 473) and at worst “misleading” (p. 473). Reviewing published research on the MBTI, Pittenger concluded that the “data suggest that the design of the MBTI forces a

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dichotomous category onto a continuous distribution. . . . Although the test does appear to measure several common personality traits, the patterns of data do not suggest that there is reason to believe that there are 16 unique types of personality” (p. 472-3).

Rytting and colleagues (Rytting, Ware, and Prince, 1994) offered a contrasting view of the type versus trait issue. Although they acknowledged the rarity of samples which exhibit bimodal score distributions, they argued that these samples, when found, offer strong evidence for the dichotomous nature of the MBTI. Most samples used for research, they maintained, comprise students and other individuals “who may not yet have highly developed preferences” (p. 17). Scores from these samples typically resemble normal distributions more closely than the bimodal distributions posited by type theory. However, in a sample of 348 successful CEOs, who “by inference . . . have highly developed self-images,” (p. 17) they found bimodal score distributions on several of the scales and interpreted these findings as supporting the validity of type theory.

Related to this issue have been factor and cluster studies which have attempted to verify the MBTI’s structure. Cluster analytic techniques group items on the basis of similarity across a set of attributes into homogeneous and mutually exclusive groups, types, or subsets. These techniques differ from factor analyses in that factor analyses isolate continuous dimensions of individual differences or traits. Lorr (1991) performed two cluster analytic techniques on two samples of 100 men given the MBTI (form G) and failed to replicate the 16 MBTI clusters. In this study, only four to six clusters emerged, and only one of them (ISFJ) matched one of the MBTI types in both samples. This study provided further criticism of the MBTI as measuring traits rather than types.

Factor analytic techniques have been more successful in replicating the four dimensions of the MBTI, albeit using trait rather than type criteria. A series of studies by Tzeng and colleagues (Tzeng, Ware, & Bharadwaj, 1991; Tzeng, Ware, & Chen, 1989)
investigated whether the MBTI items are bipolar or unipolar. They created three forms of the test, giving each form to all 125 participants. One form was the original with qualitative, forced-choice responses. The second (bipolar continuous) was a revision in which participants were asked to rate preference for items on a seven-point continuum, and the third (unipolar continuous) separated each of these items into two parts, asking participants to rate the desirability of each choice on a seven-point scale. These studies found that when all items from the three versions were factor analyzed together, four distinctive factors emerged recapturing the original constructs and accounting for over 50% of the total variance. Furthermore, average intercorrelations between the two competing alternatives for all markers were relatively high ($r = -0.56$ to $-0.66; p < .001$), while mean correlations between noncompeting alternatives were very low and nonsignificant ($r = .00$ to .06, N.S.), offering evidence of convergent and discriminant validity, respectively (Tzeng, Ware, & Chen, 1989). When factor analysis techniques were applied separately to the bipolar and unipolar continuous scales, the bipolar ratings showed higher factorial validity. In the bipolar case, four factors accounted for 85.8% of the variance, and these four factors perfectly recaptured the Ei, Sn, Tf, and Jp factors. The unipolar scale, however, only yielded two common factors, suggesting the preferability of the bipolar scale. Comparisons of the bipolar continuous and bipolar dichotomous (forced-choice) have not yet been published.

Another recent factor-analytic study (Harvey, Murry, & Stamoulis, 1995) utilized both confirmatory and exploratory analyses to examine the factor structure of the MBTI and to identify potential modifications which would improve model fit. Results “provided qualified support for the four-factor model” (p. 535) although even the best fitting model exhibited deficiencies. Exploratory analyses suggested several free secondary loadings which would improve model fit. Because only one sample was used for both
confirmatory and exploratory analyses, these suggested loadings need to be used in subsequent samples to determine whether they improve model fit.

When viewed as a whole, the literature on the MBTI appears to offer general support to its validity, particularly when viewed as a measure of traits rather than types. Because the existence of types is equivocal, the MBTI will be used as a continuous measure of traits in this study. We will turn now to studies in which the MBTI has been used to assess constructs similar to those measured by the Personal Style Scales of the SII: Work Style, Leadership Style, Learning Environment, and Risk Taking.

Work Style, Preference for Working With People, and the MBTI

According to Myers-Briggs theory, extraversion is characterized by the external flow of attention toward objects and people of the environment and “a desire to act on the environment, to affirm its importance, to increase its effect” (Myers & McCaulley, 1985, p. 13). While this definition seems very different from the definition of the SII Work Style scale, preference for working with people over data, things, and ideas, the two scales may not be terribly different. The extensive data collected by Thorne and Gough (1991), which correlated the MBTI scales with other personality measures, suggested that the EI continuum may more accurately be thought of as assessing sociability versus detachment. When thought of in this manner, the rationale for an hypothesized relationship between EI and Work Style becomes more obvious.

Furthermore, studies suggested that the IE scale of the former SCII, which correlates with Work Style (Harmon, et al., 1994) and the R, I, S, and E General Occupational Themes (Broday & Sedgwick, 1991) also correlates with the MBTI EI scale ($r = 0.33$ to $0.47$; Myers & McCaulley, 1985; Apostol & Marks, 1990). Research by Hammer and Kummerow (1992) found that in their sample of employed adults, all the
Extraverted MBTI types had means scores in the Extraverted range on the Strong I-E scale, while all the MBTI introverted types had mean score in the mid-range on the I-E scale. These findings may suggest that both types of extraversion tap similar preferences for being with people, but that introversion may tap something slightly different.

Because the Strong Work Style scale correlates strongly with the GOTs of S and E and negatively with R and I, falling as a bipolar axis across the GOT/Holland hexagon (Harmon, et al, 1994), examining relationships between the GOTs and MBTI types may shed additional light on the relationship between Work Style and the MBTI. Relationships between MBTI profiles and interests have been supported by research (e.g: Apostol, 1991; Martin & Bartol, 1986; Miller, Wells, & McGowan, 1989; Dillon & Weissman, 1987). Apostol (1991) used the previous edition of the Strong-Campbell Interest Inventory (SCII, Hansen & Campbell, 1985) to measure career interests and their relationship to MBTI personality types. The researcher concluded that male and female college students with intuitive-type (N) personality were more likely to score high on the artistic (A) and investigative (I) General Occupational Themes than students with sensing (S) personality types. Women in the sample who scored high on the conventional (C) GOT were more likely than others to have a sensing (S) personality type. Although these findings were only moderate in size, they were statistically significant and occurred in the expected directions based on MBTI theory. They suggest that the SN dimension of the MBTI would not be significantly correlated with Work Style because the A and C themes appear unrelated to Work Style.

Dillon and Weissman (1987) administered the MBTI and SCII to 394 college students seeking career counseling services and correlated the General Occupational Themes with the eight MBTI categories (both dimensions of each of the four functions and attitudes). They found that one-third of the data showed significant correlations
between the two instruments, and areas of correlation were consistent with Holland’s and Jang’s theories. For example, they found that women and men scoring as extraverts (E) on the MBTI scored highly on over half of the occupations in the social (S) and enterprising (E) GOTs. People with judging (J) attitude or sensing (S) functions scored highly on over 85% of the conventional (C) GOT occupations and students with perceptive (P) attitudes or intuitive (N) functions (the opposites of the judging attitude and the sensing function) scored highly on over 70% of the artistic (A) GOT occupations.

These results offer tentative suggestions for the relationship between interests and personality characteristics as measured by these two instruments and suggest again that the MBTI E scale is related to SCI S and E scales, and therefore perhaps the Work Style scale. Hammer and Kummerow’s (1992) research found similar relationships, adding that the Social theme was correlated with the F MBTI type in four out of five samples, perhaps predicting a moderate relationship between the Work Style scale and the MBTI’s TF dimension. This relationships is also predicted by MBTI theory. According to the manual “any career that deals mainly with people tends to attract more feeling (F) than thinking (T) types” (Myers & McCaulley, 1985, p. 73). A review of this research suggests the first hypothesis for study.

Learning Environment, Educational Achievement, and the MBTI

Although level of educational achievement was used to develop the SII Learning Environment scale, the SII manual used the words “practical” and “academic” (Harmon, et al., 1994, p. 156) to describe people scoring either low or high, respectively, on the scale. Following this lead, this section will investigate the theoretical and empirical relationships between the MBTI and practical and academic pursuits, academic achievement, academic comfort, and learning environment.
According to the MBTI theory, people with a preference for the Sensing mode of
gathering information are characterized as realists with "acute powers of observation,
memory for details, and practicality" (Myers & McCaulley, 1985, p. 12). People with an
Intuitive preference, in contrast, are called Innovators who are "imaginative, theoretical,
abstract, future oriented, or creative" (p. 12). However, the manual also says that the EI
dimension is also hypothesized to be "related to interest and/or performance in academics"
(p. 158). In the interaction between these scales, IN types are said to be "introspective
and scholarly. They are interested in knowledge for its own sake. . . . They are the least
practical of the types" (p. 37). ESs, the opposite of INs "are the most practical of the
types. They learn best when useful applications are obvious" (p. 37).

Theoretically, the relationship between the EI and SN scales and Learning
Environment appears clear. Empirical relationships between related variables, however,
have been more ambiguous. Thorne and Gough's (1991) research found some
relationship between these labels and MBTI types. The SN dimension was related to
measures of values, with S correlated with Economic values \( r = -0.30 \) \& \(-0.55; \ p < .01)\)
and N with Aesthetic values \( r = 0.37 \) \& 0.51; \( p < .01 \). Observers rated Ss high on
"Favors conservative values in a variety of areas" \( r = -0.39 \) \& -0.42; \( p \) not reported) and
"Is uncomfortable with uncertainty and complexities" \( r = -0.29 \) \& -0.33; \( p \) not reported) and
used the adjectives conventional \( r = -0.38 \) \& -0.45; \( p \) not reported), interests narrow
\( r = -0.24 \) \& -0.37; \( p \) not reported), and practical \( r = -0.22 \) \& -0.35; \( p \) not reported) to
describe them. The descriptor "practical," however, was also correlated with EI among
women \( r = -0.29; \ p \) not reported) and JP in both genders \( r = -0.22; \ p \) not reported).
Ns were highly rated on the statements "Thinks and associates to ideas in unusual ways"
\( r = 0.36 \) \& 0.40; \( p \) not reported) and "Genuinely values intellectual and cognitive
matters" \( r = 0.29; \ p \) not reported). Adjectives describing Ns included original \( r = 0.27 \)
& 0.37; \( p \) not reported). Based on the combined results of their entire data set, the authors concluded that "Ss have practical and realistic ways of dealing with problems" (p. 73) while also commonplace, simple, and narrow in their interests. N preferences may lead to the development of superior intellectual ability, cognitive cathexis, and unconventional thinking.

Another approach to developing hypotheses about Learning Environment and the MBTI is to examine the relationship between measures of academic success and the MBTI. Several sources of data may inform this investigation. For example, the Scholastic Aptitude Test (SAT) is one indicator of academic potential. Correlations have been found between the SAT and three of the MBTI's scales in data gathered from college students and applicants between 1958 and 1963. Correlations with the SN scale were found in nearly all samples reported for both the Verbal (SAT-V; \( r = 0.31 \) to 0.46; \( p < .001 \)) and Mathematical (SAT-M; \( r = 0.15 \) to 0.41; \( p < .001 \)) subtests. Smaller correlations were found between EI and the SAT-V (\( r = 0.13 \) to 0.29; \( p < .001 \)) and SAT-M (\( r = 0.14 \) to 0.24; \( p < .001 \)). Significant correlations between the JP scale and SAT-V (\( r = 0.14 \) to 0.29; \( p < .001 \)) were only found in some samples while a JP and SAT-M relationship was found in only one of the samples (\( r = 0.12; p < .001 \); Myers & McCaulley, 1985). In a multi-year study of students at Saint Louis University, Kalsbeek (1987) found differences between EI and SN type combinations in SAT scores, \( F(3, 984) = 30.5; p < .001 \). Post hoc tests revealed that the best scores were obtained by INs followed by ENs, ISs, and ESs (all \( ps < .05 \)). Another recent study, however, failed to find the hypothesized relationship between SAT scores and the SN and EI dimensions (Brown & DeCoster, 1991).

Some researchers have argued that the relationship between MBTI types and standardized test scores may not accurately reflect academic success for all types. Schurr
and colleagues (Schurr, Henriksen, Alcorn, & Dillard, 1992) studied a sample of 316
nurses and teachers to investigate the effectiveness of standardized tests as selection
devices. They argued that SJ types may not score as highly as other types on these types
of tests but may be equally successful on other measures of performance. In fact, they
found that although SJs scored lower on tests of general ability such as national licensure
examinations, they did not differ from other types on several measures of classroom
performance, including grade point average and school rank.

One study assessed the relationship between level of education and the MBTI SN
scale (Malley & Davis, 1988). This study of 56 managers found that the level of
educational attainment, regardless of field, was related to cognitive style as indicated by
SN score. Lower scores on the SN dimension (in the N direction) were associated with
higher educational levels (Kendall’s Tau = .285, p < .01).

Small but significant relationships have been found between the MBTI and other
measures of cognitive and academic ability. The SN scale has correlated with measures
of cognitive hierarchical integration (r = 0.256; Ferguson & Fletcher, 1987), reading rate
among women (r = 0.24; p < .05; Bruhn, Bunce, & Greaser, 1978), vocabulary (r =
0.48; p < .05; Bruhn, et al., 1978), and paragraph comprehension (r not reported; p <
.001; Millott & Cranney, 1976). Relationships have been found between EI and
paragraph comprehension (r not reported; p < .001; Millott & Cranney, 1976), IQ among
women (r = 0.27, p < .05; Bruhn, et al., 1978), and reading comprehension among men
(r = 0.25, p < .05; Bruhn, et al., 1978). TF and cognitive complexity (r = 0.18, p < .05),
verbal ability (r = 0.23, p < .05), and Wechsler memory scales (r = 0.24, p < .05) have
been found to be slightly related (Ferguson & Fletcher, 1987); and the JP scale has been
compared to the Weschler memory scales (r = -0.17, p < .05; Ferguson & Fletcher,
1987), reading comprehension for men (r = 0.27, p < .05, Bruhn, et al., 1978), and
paragraph comprehension ($r$ not reported; $p < .001$; Millott & Cranney, 1976). The relationship between these variables and level of educational achievement remains unknown.

A few researchers have attempted to study elements of learning environments, particularly in terms of matching MBTI types with environments best suiting their preferences. One study divided college students into $J$ and $P$ groups, and assigned equal numbers to structured and unstructured learning skills courses. The hypothesis was that $J$ students given the structured course would perform better than those given the less structured course and that $P$ students given the unstructured course would perform well compared to Ps in structured courses. While the results did not support the hypothesis and no interaction between $JP$ style and course structure, $Js$ did report higher use of and more positive attitudes toward study skills than $Ps$ (Robyak & Patton, 1977).

Another study examined the efficacy of hands-on, computer based instruction for college students of different type. Results indicated that differences in post-course test results could be accounted for by SN type, with students scoring in the S direction performing significantly better than their N counterparts (Kern & Matta, 1988). These results might be interpreted to suggest that $S$ students thrive in a learning environment which provides individualized, hands-on, applied instruction.

Kalsbeek (1987) proposed that MBTI type may be related to retention of college students. As previously reported, he found a relationship between SAT and EI/SN combinations in his on-going, multi-year, and university-wide study at Saint Louis University. Using stepwise multiple linear regression, he found that among MBTI scales, the SN scale contributed most of the variance accounted for in SAT scores ($R^2 = 0.08; F = 22.96, p < .05$). In comparing the relationship between first quarter grades and MBTI type, however, he found that EI accounted for 5% of the variance in GPA ($F =$
16.71; \( p < .01 \) when SAT scores were not partialled out, and an additional 4% when they were \( (F = 13.85; p < .01) \). The JP dimension contributed an additional 1% of the variance in each case, but SN only contributed additional variance when SAT scores were not included in the regression equation. Based on these findings, the researcher concluded that MBTI type does contribute to early success in college. However, differential performance based on type was not found among upper-division students who had selected a major and were presumably taking courses more consistent with their personality types. He hypothesized that college dropouts may be those whose MBTI preferences do not fit with the dominant type found in the environment, although the data available at the time of publication was inconclusive. If this hypothesis does have merit, then MBTI type would be related to level of academic achievement, but not in a unidimensional manner as suggested by the SII Learning Environment scale. Instead, the interaction would be one of person-environment fit.

Finally, looking at the relationship between the Academic Comfort scale of the former SII (Hansen, 1992) and the MBTI scales might shed light upon the relationship between Learning Environment and MBTI. One study of 151 undergraduates (96 women and 55 men) in a career development course found correlations between Academic Comfort and SN for both women \( (r = 0.26; p < .01) \) and men \( (r = 0.31; p < .05) \) and JP for women \( (r = -0.24; p < .05) \; \text{Apostal & Trontvent, 1989} \). Summarizing the data from eight samples, Hammer and Kummerow (1992) concluded that Academic Comfort was consistently associated only with scores toward the Intuitive end of the SN scale \( (r = 0.26 \) to \( 0.40; p < .01) \). Given that Academic Comfort is highly correlated with Learning Environment and that both scales have similar relationships with GOT scales, one might hypothesize that similar relationships might exist between Learning Environment and MBTI scales.
Leadership Style, Preference for Directing Others, and the MBTI

Professionals in business and management have used the MBTI extensively in the development and training of leaders (McCaulley, 1990), so using it to assess leadership style would appear to be reasonable. Indeed, several studies have found that although people of many types may become leaders, individuals having differing MBTI profiles tend to use differing leadership strategies (i.e., McCaulley, 1990; Roush & Atwater, 1992; Scheiger & Jago, 1982). For example, a study of 90 student leaders at the US Naval Academy found that leaders who scored in the Sensing and Feeling directions of the MBTI were rated as the most transformational, and they used more positive reinforcement with followers than other types (Roush & Atwater, 1992). Another study used 62 graduate students in business to investigate the differential use of autocratic versus participative decision-making methods among students of differing types. The researchers found that Sensing individuals used more participative methods than Intuitive people, although the effect size was small. They did not find support for an hypothesized relationship between the TF scale and decision-making methods (Schweiger & Jago, 1982).

Malley’s and Davis’ (1988) study of 56 organizational managers used the SN dimension of the MBTI to assess cognitive style in managers. Although they hypothesized that the SN scale would be related to managerial experience, hierarchical level, and managerial style (proactive versus reactive), these propositions were not supported (Kendall’s tau = -.165, -.198, and .082, respectively, p > .05). Only organizational longevity was associated with SN, with managers having the greatest longevity tending to be S types (tau = -.278, p < .01). Unfortunately this study contained significant flaws, including low reliability of the measure of managerial style (Cronbach’s alpha = .63), compromising its ability to shed light on the relationship between the MBTI
and leadership style. Although these three studies attempted to assess leadership style, they focused on types of methods used by leaders rather than whether MBTI profiles were related simply to status as a leader.

The SII Leadership Scale, in contrast, appears to be more related to interest in becoming a leader than type of leadership strategies preferred. Only one study, an unpublished one by Camiscioni cited in the MBTI manual, related the MBTI to a unidimensional measure of leadership. According to this brief report, EJ typed medical students scored the highest on the Leadership Scale of the 16PF, followed by EP, IJ and IP types. According to MBTI theory, the JP dimension is related to decisiveness versus adaptability. “Decisive extraverts” (EJs) would be the most active type in making things happen, and therefore they would score higher on a measure of leadership assessing active decision making, as they assume the 16PF to be (Myers & McCaulley, 1985). Based on this finding, one might suppose that people scoring lowest on the EI and JP dimensions would score the highest on the SII Leadership Scale.

Two studies have investigated the function of MBTI types among groups. In the first, 332 graduate students in business administration were divided into teams for three types of semester long, total enterprise simulations. In two of the three types of simulations, teams with higher percentages of Intuitive and Feeling dominant types [as defined by El and JP scores and explained by Myers and McCaulley (1985)] established early leads and maintained their leads throughout the simulations. Correlations between performance and types were high for these two ($r = 0.71$ & 0.79) but absent for the other ($r = 0.00$). The explanation given for the strong relationship between group type and performance in two of the simulations and its absence in the other was that in the two games in which correlations were found, the algorithms for winning and success were known to participants. In the other, more complex simulation, the requirements for
success were not revealed to participants (Patz, 1992). Although this study might suggest a relationship between MBTI types in groups, its relationship to leadership in actual business settings is unknown.

The other study of MBTI in groups utilized second-year medical students to understand whether group composition was related to leadership-sharing and other variables. One hundred twenty students were divided into 24 groups, twelve of which were defined as complementary (i.e., of types which would balance each other) and the others were random. During structured problem-solving tasks, observers rated the groups on a variety of variables. Ability to discern the within-group leaders did not differ based on group composition, and manner of grouping made little difference on the ways in which the groups functioned (Neiman, Murasko, & Gracely, 1994).

Finally, because the Leadership Style scale is “quite highly correlated” (Harmon, et al., 1994, p. 159) with the former Introversion-Extroversion scale (Hansen, 1992) and the new Work Style scale, it appears reasonable to expect Leadership Style relationships with MBTI scales to be similar to, but not the same as, those hypothesized for Work Style. The relationship would not be the same because Work Style and Leadership Style bear somewhat different relationships to the SII GOTs. Whereas Work Style is highly correlated with Social and Enterprising themes and negatively correlated with Realistic and Investigative themes, Leadership Style is correlated with Enterprising, Social, and Artistic themes \((r = 0.50, 0.37, \text{ and } 0.35, \text{ respectively, for females, and } r = 0.51, 0.47, \text{ and } 0.33, \text{ respectively, for males}; \text{ Harmon, et al., 1994})\). As stated previously, one study suggested that among employed adults, all the Extraverted MBTI types had mean scores in the Extroverted range on the Strong IE scale, while all the MBTI introverted types had mean score in the mid-range on the IE scale (Hammer & Kummerow, 1992). Perhaps
high scorers on the Leadership Scale would have similarly high MBTI Extraversion scores.

Risk Taking, Sensation Seeking, and the MBTI

The MBTI descriptions of J and P suggest that they may be related to a measure of risk taking. “Persons who characteristically live in the perceptive attitude seem in their outer behavior to be spontaneous, curious, and adaptable, open to new events and changes, and aiming to miss nothing” (Myers & McCaulley, 1985 p. 14). In contrast, the Judging attitude “is concerned with making decisions, seeking closure, planning operations, or organizing activities. . . . Persons who prefer J often seem in their outer behavior to be organized, purposeful, and decisive” (p. 14).

Only two empirical studies have sought to test the MBTI’s relationship with risk taking on an instrument other than the SII. In this study, 38 high school students were given the MBTI (Form F) and the Sensation-Seeking Scale (SSS, Zuckerman, 1979) and a visual preference test as measures of “Type T” or risk-taking personality. Type T personality was operationalized as scores on the SSS added to scores on visual preference test indicating preference for complexity. Results suggested that Type T measures were correlated with both the SN ($r = -0.52$, $p < .001$) and JP ($r = -0.34$, $p < .001$) scales, suggesting that higher risk taking may be associated with intuitive (N) and perceptive (P) personality traits (Morehouse, Farley, & Youngquist, 1990).

Data compiled by Thorne and Gough (1991) of 69 males and 69 females indicated significant correlations between the SSS (Zuckerman, 1979) and three of the MBTI factors. The SSS total score was correlated with EI ($r = -0.34 \& -0.40$ for males and females, respectively; $p < .01$), SN ($r = 0.48 \& 0.55$ for males and females, respectively; $p < .01$), and JP ($r = 0.67 \& 0.39$ for males and females, respectively; $p < .01$). The EI
scale was also related to the Disinhibition subscale which measures freedom from inhibition ($r = -0.43$ & $-0.30$ for males and females, respectively; $p < .01$), and SN was correlated with the Thrill and Adventure Seeking ($r = 0.30$ & $0.44$ for males and females, respectively; $p < .01$) and the Experience Seeking ($r = 0.45$ & $0.53$ for males and females, respectively; $p < .01$) subscales of the SSS. These data suggest that high risk-taking behaviors may be associated with Extraversion, Intuition, and Perception as assessed by the MBTI.

Correlations between the Adventure Basic Interest Scale of the SCII and the MBTI have been found which offer further support for its relationship with both the SN and JP scales. The MBTI manual reported modest correlations between Adventure and SN ($r = 0.08$ to $0.28$, $p < .01$) and JP ($r = 0.14$ to $0.30$, $p < .001$) scales (Myers & McCaulley, 1985). Hammer and Kummerow’s (1992) research again found correlations between Adventure and JP ($r = 0.20$ to $0.30$, $p < .01$) on three out of four sample, but correlations between Adventure and SN ($r = 0.28$, $p < .01$) and EI ($r = -0.24$, $p < .01$) each on only one of the four samples.

**Purpose**

As stated in Chapter 1, the purpose of the present study was to empirically investigate the relationship between the Personal Style Scales of the 1994 Strong Interest Inventory and the four dimensions of the Myers-Briggs Type Indicator. Based on the previously reviewed literature, the following hypotheses were developed.

**Hypothesis 1**

Work Style is negatively correlated with the MBTI EI scale, and positively correlated with the MBTI TF scale. In other words, high scores on Work Style (working with people) would be associated with MBTI Extraverted and Feeling scores.
Hypothesis 2

Learning Environment is positively correlated with the MBTI SN scale (in the Intuitive direction).

Hypothesis 3

Leadership Style is negatively correlated with the MBTI EI (Extraverted direction) and JP (Judging direction) scales.

Hypothesis 4

Risk Taking/Adventure is positively correlated with the MBTI JP (Perceiving direction) and SN (Intuitive direction) scales; correlations with the EI scale are negative (in the Extraverted direction).

In addition to these specific hypotheses, exploratory analyses were conducted to understand whether these relationships varied across groups or genders. Analyses of higher order constructs assessed by the combined measures were also conducted.
CHAPTER 3

METHOD

Participants

Participants were recruited from two undergraduate psychology courses at the Ohio State University and from the Midwest Career Development Service, a counseling agency serving practicing ministers, church workers, and seminary students. In all, 357 individuals participated in the study. The number of participants in the overall sample yielded a statistical power (1-β) greater than .99 assuming a population $r$ of .20 and a two-tailed test of $\alpha = .01$. In other words, the probability of detecting a correlation between measures in this sample if a correlation exists in the population would be 99 percent (Cohen & Cohen, 1983). Using the same significance level and population $r$, power estimates for the subsample of introductory psychology students, advanced psychology undergraduates, and career counseling clients are .84, .66, and .81, respectively.

Participants from each of two undergraduate psychology courses, “General Psychology” and “Counseling Psychology: An Introduction,” were asked to complete the SII and MBTI and to provide basic demographic data including gender, years of formal education, ethnicity, age, and whether they were currently in counseling for careers or personal concerns. The 132 students in the “General Psychology” course, hereafter referred to as “introductory psychology students,” were approximately 19 years old ($M = 19.3$, $SD = 2.9$). They included 50 men and 82 women, 60.3 percent of whom were in their first year of college, 20.7 percent in their second year, and 19.0 percent in their third
or fourth year. Eighty-one percent of them were Caucasian; 5.5 percent were African American; 5.5 percent were of Asian descent; 3.9 percent were Latino/Latina, and .8 percent were Native American. Three individuals (2.4 percent) listed their race as biracial or “other”, and 5 declined to disclose their ethnicity. Asked about paid employment, nearly half (47.8 percent) indicated that they did not work while 42.5 percent indicated working one to twenty hours per week. Fewer (9.7 percent) stated that they worked between 20 and 40 hours each week. Nineteen individuals did not answer this item. Nine of the introductory psychology students stated that they were in career or personal counseling at the time of their participation.

Students in the Counseling Psychology course will be referred to as “advanced psychology students.” The 96 participants in this group were nearly two-thirds female (67.7 percent) and one-third male (32.3 percent) with an average age of 22.7 (SD = 5.0). Only 5.3 percent were first- or second-year college students, while 33.7 were college Juniors and 43.2 percent were Seniors. Some (17.9 percent) had completed some post baccalaureate graduate work. Fourteen individuals indicated that they were engaged in career or personal counseling. The vast majority of these participants were Caucasian (90.4 %), followed by Asian Americans (4.3 %), African Americans (3.2 %), Native Americans and Latinos/Latinas (1.1 % each). Two individuals declined to answer this item.

The third group comprised clients at Midwest Career Development Service, an agency which regularly administers both instruments as part of its standard assessment protocol. Data from 129 clients who completed both instruments during a nine-month period were utilized. They included 74 (57.4%) males and 55 (42.6%) females. Ninety-four were candidates for ministry and 35 were professional church workers. Of the 35 church workers, 83 percent were pastors or ministers of some sort, while 17 percent were
other church staff workers. The average age for the sample was 40.6 years ($SD = 10.8$), and most held college degrees (70.3%). A few had only completed high school (5.5%), or two years of college (5.5%), while some held masters (15.6%) or doctorate (3.1%) degrees. Data collected about seminary education revealed that 27.3 percent had no seminary education, but the rest had completed at least some seminary work. Approximately one-third (33.6%) were seminary graduates, with 14.8 percent 17.2 percent and 5.5 percent having completed two years, one year, and less than one year, respectively, of seminary education. A few (1.6%) had completed seminary graduate or doctoral degrees. In this sample which will be called “career counseling clients,” 89.9 percent were Caucasian, 6.2 percent African American, 1.6 percent each Native American and Asian American, and .8 percent Latino/Latina.

This group of career counseling clients was chosen as one which differs in many ways from the two student groups. In addition to presumably being more vocationally mature than undergraduate students, members of this population sought counseling and thus were likely to bear similarities to other career counseling clients in ways that the psychology student samples were not.

**Instruments**

Participants completed the SII (1994 edition) and MBTI (Form G) and provided basic demographic data including gender, years of formal education, ethnicity, age, and whether they were in counseling at the time of the study.

**Strong Interest Inventory**

Because the SII was discussed in detail in Chapter 2, this section will focus upon reliability data and other technical aspects of the instrument. The current version of the SII (Form T317) contains 317 items designed to measure an individual's occupational and
avocational interests and interest in working or living in a variety of environments. The
respondent is asked to answer "like," "indifferent," or "dislike" to each of the listed
occupations, occupational activities, school subjects, hobbies, leisure activities, types of
people, and her or his own characteristics (Harmon, et al., 1994). Responses are
analyzed by computer to derive scale scores. Scales include 6 General Occupational
Themes, 25 Basic Interest Scales, 211 Occupational Scales, four Personal Style Scales,
and three types of Administrative Indexes. Because the PSSs were the focus of the
current study, reliability data for only these scales will be discussed.

Reliability for the SII may be found in its Applications and technical guide
(Harmon, et al., 1994). The SII was normed using a General Reference Sample (GRS)
of 18,951 people. In the GRS, Cronbach alpha ranged from .78 for the Risk
Taking/Adventure scale to .91 for Work Style. Both Learning Environment and
Leadership Style had coefficients of .86 in this sample. Risk Taking is lowest because it
is the shortest PSS with only nine items, compared to the twenty-three to fifty-one item
length of the other scales. Across four different samples tested at one- and three- to six-
month intervals, test-retest reliability ranged from .86 to .92 Work Style, .83 to .91 for
Learning Environment, .81 to .88 for Leadership Style, and .85 to .89 for Risk
Taking/Adventure (Harmon, et al., 1994). These data suggest that the Personal Style
Scales have adequate internal reliability and stability over time.

Myers-Briggs Type Indicator (MBTI)

The MBTI was developed to measure personal preferences according to Carl
Jung's typology of personality. According to test developers, individuals have
preferences for attitudes, gathering of information, making decisions, and orientation
toward the world, and various combinations of these preference make up personality
types. Preferences are measured by four scales: Extraversion versus Introversion attitude
(E-I), Sensing versus Intuitive perception (S-N), Thinking versus Feeling judgement (T-F), and Judging versus Perceiving orientation toward the world (J-P). Understanding preferences has been useful in making career choices and dealing with other life problems (Myers & McCaulley, 1985).

Originally published in 1943, the MBTI has been revised several times and currently is used widely with non-psychiatric populations (DeVito, 1985). The current version (Form G) consists of 126 forced-choice items which can be machine scored. This self-report instrument has been demonstrated to produce a distribution of types identical to that of the original version (Form F; Myers & McCaulley, 1985). While the original normative group for the MBTI consisted largely of college-bound high school students of above-average socioeconomic status, the data bank now consists of well over 250,000 records representing a diverse population.

Much of the research on the MBTI has grouped individuals into sixteen personality types based upon various combinations of the four scales treated as dichotomous variables. Although consistent with Jung’s theory, empirical support has not adequately supported the assumption of dichotomy (see Chapter 2). Some researchers have treated scores on the four scales as continuous variables representing strength as well as direction of preference (Myers & McCaulley, 1985). Because of the lack of support for dichotomous scoring, the continuous score procedure will be used in this study. In the usual scoring method, respondents receive a letter showing the direction of preference and a number showing the reported strength of the preference. Using a procedure outlined in the manual (Myers & McCaulley, 1985), continuous scores are linear transformations of dichotomous scores. For scores of E, S, T, or J, the number representing the strength of preference would by subtracted from the midpoint score of 100. For scores of I, N, F, or P, the number is added to the 100 midpoint. The
resulting scores range from 33 to 167 on each of four scales with higher numbers representing the I, N, F, and P directions of the EI, SN, TF, and JP scales, respectively. For example, a preference score of S 14 becomes the SN continuous score of 86 (100 - 14). A preference score of I 27 would become the EI continuous score of 127 (100 + 27). Conventional notation puts all letters on the left (E, S, T, and J) as less than 100, and all letters on the right side of pairs as greater than 100 (I, N, F, and P). Therefore, other measures which are negatively associated with MBTI continuous scores are associated with the E, S, T, or J dimensions, while positive correlates are associated with the I, N, F, or P direction of the EI, SN, TF, and JP scales.

Reliability of the MBTI has been demonstrated using split-half and test-retest studies. The manual reports split-half reliability coefficients for the four scales ranging from the 0.70s to the 0.80s. Test-retest reliabilities range from 0.48 (14 months) to 0.87 (7 weeks).

Construct validity for the MBTI has been supported by correlating the MBTI with other psychological instruments and normative studies of occupations. Consistent patterns which support the MBTI’s constructs have been found between the Adjective Check List, California Psychological Inventory, Sixteen Personality Factor Questionnaire, and others (Myers & McCaulley, 1985). Research studies using the MBTI have tended to support the concurrent validity of the scales (DeVito, 1985). See Chapter 2 for additional validity information.

Procedure

Two different procedures were used for this study, one for the undergraduate psychology samples and one for the counseling agency. Volunteers were recruited from the psychology courses, and the study’s general purpose and 2-hour time commitment
were explained. Introductory psychology students received two hours of research credit for participating in this study. Advanced psychology students were either offered a small ($5) financial incentive to participate in the study or course extra credit, depending upon the wishes of the various instructors. Participants in both courses were given the opportunity to have their SII and MBTI profiles interpreted to them in group settings, with group sizes ranging from three to forty. Participants completed the SII, MBTI, and demographic data during group testing periods. Each participant's testing forms were identified only by number to ensure confidentiality. Debriefing information forms included a section which participants completed if they are interested in their individual profiles or results of the study. (See Appendix A.) These forms were coded with testing numbers, and names were obtained only from individuals who desired feedback on their own profiles. Forms linking names with coding numbers were destroyed following feedback sessions. Participants who received monetary compensation for their participation signed a cash receipt for tax record-keeping purposes only. Data linking results to names were not included on this form.

Because all clients at the career counseling center completed the SII and MBTI for assessment purposes, the procedure was somewhat different. In an agreement with the agency, access to test data were released for a consultant fee. Test scores were confidential, and names will be known only to the agency. Routine consent and feedback were given as part of the standard assessment protocol.

SII and MBTI scores were computer scored by the procedures indicated in each instrument's manual. Continuous scores on the MBTI scales were used instead of dichotomous scores to avoid loss of sample variance. Instructions for scoring scales in this way is contained in the MBTI users' manual (Myers & McCaulley, 1988). Financial support for the costs of this study, including payment to participants, materials and
consulting fee for use of Midwest Career Development Service data, were provided by a grant from Consulting Psychologists Press. (See Appendix B.)

Data analysis

In the initial analyses, means, standard deviations, and Pearson correlations were computed for the combined results of the three samples. Two multivariate analyses of variance (MANOVAs) were performed to determine what effect group status and gender had on PSS scores and MBTI scores. Follow-up analyses of variance (ANOVAs) and post-hoc tests were conducted to further clarify MANOVA results.

Next, means, standard deviations, and Pearson correlations were computed for each group and each gender, and gender differences between scores within each group were assessed using t-tests. Covariance matrices of PSS and MBTI scores were compared by group and by gender to determine whether the pattern of relationship differed between samples. LISREL maximum likelihood estimates were used for this purpose. The equivalence of matrices determined the level of analysis of the next steps. For example, if matrices were significantly different, analyses were performed at an increasing level of specificity. However, if matrices did not differ significantly, analyses were conducted using combined samples. Specific hypotheses were studied by examining correlations between measured variables in similar correlation matrices. Finally, canonical correlations were performed to explore higher order factors which may emerge from combinations of PSS and MBTI scores. Results are presented in Chapter 4.
CHAPTER 4
RESULTS

Following the procedures for data analysis outlined in the previous chapter, this section will present results of the study. In the first section, the overall sample will be described in terms of means, standard deviations, ranges, and Pearson correlations between scales. The second section includes results of MANOVAs, ANOVAs, and post-hoc comparisons using each of the PSS and MBTI scores as dependent variables. The third and fourth sections of this chapter present results of each of the three groups and two genders, respectively, analyzed independently. These sections also include tests of the study’s hypotheses. In the final section, results of the canonical correlations are presented.

Description of Overall Sample

Means, standard deviations, and ranges of the four Personal Style Scales and four Myers-Briggs Type Indicator scales are presented in Table 1. The average Work Style score of 56.5 is considered moderately high and suggests that the average respondent prefers working with ideas, data, and things rather than with people. The Learning Environment, Leadership Style, and Risk Taking scales all had mean scores in the average range, suggesting that respondents in this study were reasonably similar to the General Reference Sample on these three scales. Standard deviations ranged from 9.1 to 10.7, all similar to the standard deviations of 9.4 to 10.4 found in the Strong GRS. The
<table>
<thead>
<tr>
<th>Personal Style Scales</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
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<td>Work Style</td>
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<td>34</td>
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<td>10.3</td>
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<td>70</td>
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<td>9.1</td>
<td>31</td>
<td>92</td>
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<tr>
<td>Risk Taking</td>
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<td>10.7</td>
<td>32</td>
<td>70</td>
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<td>Myers-Briggs Type Indicator</td>
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<td></td>
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<td>Ei</td>
<td>97.3</td>
<td>24.9</td>
<td>49</td>
<td>153</td>
</tr>
<tr>
<td>SN</td>
<td>100.6</td>
<td>29.1</td>
<td>33</td>
<td>151</td>
</tr>
<tr>
<td>TF</td>
<td>103.5</td>
<td>22.0</td>
<td>39</td>
<td>141</td>
</tr>
<tr>
<td>JP</td>
<td>98.4</td>
<td>28.0</td>
<td>47</td>
<td>161</td>
</tr>
</tbody>
</table>

Table 1: Means, standard deviations, and ranges of PSS and MBTI scores for overall sample. \(N = 357\)
range of scores also suggests that participants covered the spectrum from the bottom ten percent to top ten percent of scores (Harmon, et al., 1994).

Scores for the MBTI also suggest that participants displayed a range of preferences, with average responses toward the midpoint of each of the four scales. Continuous scores differed slightly from 100 and suggest that the average respondent would have had slight preferences in the E, N, F, and J directions, although standard deviations were large enough that means may not be a valuable measure of central tendency. The wide range of scores suggests a diverse sample, and all 16 type preferences were represented in the sample.

Pearson correlations for the overall sample are presented in Table 2. Of the nine significant correlations found, six support the four hypotheses of the study. 

<table>
<thead>
<tr>
<th>Personal Style Scales</th>
<th>Work Style</th>
<th>Learning Environment</th>
<th>Leadership Style</th>
<th>Risk Taking</th>
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<td>EI</td>
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<td>-.25 **</td>
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<td>SN</td>
<td>-.03</td>
<td>.54 **</td>
<td>.29 **</td>
<td>.17 *</td>
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<tr>
<td>TF</td>
<td>.44 **</td>
<td>.10</td>
<td>.13</td>
<td>-.25 **</td>
</tr>
<tr>
<td>JP</td>
<td>-.11</td>
<td>.13</td>
<td>.01</td>
<td>.34 **</td>
</tr>
</tbody>
</table>

* p < .01  ** p < .001

Table 2: Correlations between PSS and MBTI scores for overall sample (N = 357). To reduce the effects of experiment-wise error, a significance criterion of $\alpha = .01$ was chosen.
negatively correlated with Work Style ($r = -.37, p < .001$) and positively correlated with TF ($r = .44, p < .001$) as hypothesized. Learning Environment was positively correlated with SN ($r = .54, p < .001$) as expected, and Leadership Style was negatively correlated with EI ($r = .41, p < .001$). However, Leadership Style was not related to JP as predicted ($r = .01$, N.S.), but was unexpectedly associated with SN ($r = .29, p < .001$). Finally, Risk Taking/Adventure was positively correlated with JP ($r = .34, p < .001$) and negatively with EI ($r = -.25, p < .001$) as expected, but the correlation with SN, predicted to be negative, was positive and significant ($r = .17, p < .01$). An unexpected relationship was found between TF and Risk Taking ($r = -.25, p < .001$).

Multivariate Analyses of Variance (MANOVAs)

Two MANOVAs were conducted to assess the effects of gender and group on two sets of dependent variables: a) the four Personal Style Scales, and b) the four MBTI scales, respectively. Results of both MANOVAs suggested main effects for gender and group without any significant gender by group interaction effects. In the PSS analysis, gender (Wilk’s lambda = .79, $F(4,348) = 23.8, p < .0001$) and group (Wilk’s lambda = .53, $F(8,696) = 32.6, p < .0001$) were significant, while the interaction term was not (Wilk’s lambda = .96, $F(8,696) = 1.9, p > .05$). Using the MBTI scales as dependent variables, gender (Wilk’s lambda = .87, $F(4,348) = 13.0, p < .0001$) and group (Wilk’s lambda = .80, $F(8,696) = 10.3, p < .0001$) were again significant and the interaction was not (Wilk’s lambda = .97, $F(8,696) = 1.3, p > .05$). These results suggest that both group and gender have significant effects upon PSS and MBTI scores, but that the extent of gender difference does not depend upon which group is analyzed.

To further understand the relationship between gender, group, and scale scores, eight separate analyses of variance (ANOVA)s were conducted using each of the four
PSS and four MBTI scales as a dependent variable. Results of these univariate ANOVAs are displayed in Table 3. As in the MANOVAs, group by gender interactions were not significant for any of the analyses, so simple main effects were examined. Main effects for gender were found on two of the PSSs and one MBTI scale. Females scored higher than males on Work Style (59.7 vs. 52.2, p < .05) and TF (108.3 vs. 97.3, p < .05), but lower on Risk Taking (50.8 vs. 55.6, p < .05).

Six of the eight scales had significant main effects for group, although no particular between-group comparison was responsible for these results. Fisher's Least Significant Difference (LSD) test was used to control comparison-wise type I error. A family-wise alpha of .05 and critical t value of 1.97 were used. On the two MBTI scales with group effects (SN and TF), all possible comparisons of means were significantly different except career counseling clients versus advanced psychology students which did not significantly differ from each other. On the PSSs, the two student groups did not differ from each other on Leadership Style or Risk Taking, but they did differ significantly on Work Style and Learning Environment. Comparisons between the career counseling clients and each student group were significant for all PSSs except Work Style. See Table 4 for a list of group means.

Within- and Between-Group Analyses

Because group differences were so prominent in both univariate and multivariate analyses of variance, each group was next examined individually. Means, standard deviations, and ranges for each group are presented in Table 4. Descriptive data for males and females within each group are found in Table 5, along with t-tests assessing within-group gender differences. Work Style and TF had consistent within-group gender
<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Work Style</th>
<th>Learning Environ.</th>
<th>Leadership Style</th>
<th>Risk Taking</th>
<th>EI</th>
<th>SN</th>
<th>TF</th>
<th>JP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (G)</td>
<td>1</td>
<td>62.8 **</td>
<td>4.0</td>
<td>.9</td>
<td>27.1 **</td>
<td>5.7</td>
<td>1.5</td>
<td>40.4 **</td>
<td>.7</td>
</tr>
<tr>
<td>Group (Gr)</td>
<td>2</td>
<td>6.8 *</td>
<td>82.7 **</td>
<td>19.6 **</td>
<td>17.5 **</td>
<td>1.3</td>
<td>8.9 **</td>
<td>23.6 **</td>
<td>2.3</td>
</tr>
<tr>
<td>G x Gr</td>
<td>2</td>
<td>3.0</td>
<td>1.9</td>
<td>.2</td>
<td>1.1</td>
<td>.7</td>
<td>1.2</td>
<td>.9</td>
<td>2.3</td>
</tr>
<tr>
<td>Error</td>
<td></td>
<td>3.51</td>
<td>(77.0)</td>
<td>(70.0)</td>
<td>(75.9)</td>
<td>(99.9)</td>
<td>(612.9)</td>
<td>(807.3)</td>
<td>(401.4)</td>
</tr>
</tbody>
</table>

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

Table 3: Analysis of variance for PSS and MBTI scores. Values enclosed in parentheses represent mean square errors. Because of the large number of tests conducted, a significance criterion of α = .01 was selected.
<table>
<thead>
<tr>
<th>Personal Style Scales</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work Style</td>
<td>54.8</td>
<td>10.9</td>
<td>58.4</td>
<td>8.8</td>
<td>56.7</td>
<td>8.8</td>
</tr>
<tr>
<td>Learning Environment</td>
<td>42.0</td>
<td>8.7</td>
<td>47.6</td>
<td>9.4</td>
<td>55.7</td>
<td>7.2</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>51.1</td>
<td>9.1</td>
<td>51.1</td>
<td>8.7</td>
<td>57.0</td>
<td>8.3</td>
</tr>
<tr>
<td>Risk Taking</td>
<td>55.8</td>
<td>11.1</td>
<td>53.1</td>
<td>10.6</td>
<td>49.7</td>
<td>9.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Myers-Briggs Type Indicator</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>94.3</td>
<td>23.4</td>
<td>98.1</td>
<td>26</td>
<td>99.8</td>
<td>25.5</td>
</tr>
<tr>
<td>SN</td>
<td>92.6</td>
<td>27.7</td>
<td>101.3</td>
<td>28</td>
<td>108.3</td>
<td>29.2</td>
</tr>
<tr>
<td>TF</td>
<td>96.0</td>
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<td>104.2</td>
<td>21.3</td>
<td>110.8</td>
<td>19.3</td>
</tr>
<tr>
<td>JP</td>
<td>101.3</td>
<td>27.0</td>
<td>99.4</td>
<td>29.0</td>
<td>94.7</td>
<td>28.2</td>
</tr>
</tbody>
</table>

Table 4: Means and standard deviations of PSS and MBTI scores for each group.
<table>
<thead>
<tr>
<th></th>
<th>Introductory</th>
<th></th>
<th>Advanced</th>
<th></th>
<th>Career-</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Psychology Students</td>
<td></td>
<td>Psychology Students</td>
<td></td>
<td>Counseling Clients</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Men</td>
<td>t</td>
<td>Women</td>
<td>Men</td>
<td>t</td>
</tr>
<tr>
<td>Personal Style Scales</td>
<td>(n = 82)</td>
<td>(n = 50)</td>
<td>(n = 65)</td>
<td>(n = 31)</td>
<td>(n = 74)</td>
<td>(n = 55)</td>
</tr>
<tr>
<td>Work Style</td>
<td>M</td>
<td>58.9</td>
<td>48.1</td>
<td>.63**</td>
<td>60.5</td>
<td>53.8</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>9.4</td>
<td>9.7</td>
<td></td>
<td>8.5</td>
<td>7.9</td>
</tr>
<tr>
<td>Learning Environ.</td>
<td>M</td>
<td>41.5</td>
<td>42.8</td>
<td>.83</td>
<td>56.1</td>
<td>50.5</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>8.4</td>
<td>9.2</td>
<td></td>
<td>9.3</td>
<td>9.2</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>M</td>
<td>51.5</td>
<td>50.3</td>
<td>-.70</td>
<td>51.2</td>
<td>51.1</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>8.2</td>
<td>10.3</td>
<td></td>
<td>9.1</td>
<td>7.8</td>
</tr>
<tr>
<td>Risk Taking</td>
<td>M</td>
<td>52.7</td>
<td>60.7</td>
<td>4.26**</td>
<td>51.8</td>
<td>55.8</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>11.3</td>
<td>8.9</td>
<td></td>
<td>11.0</td>
<td>9.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MBTI</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EI</td>
<td>M</td>
<td>91.5</td>
<td>98.9</td>
<td>1.78</td>
<td>94.9</td>
<td>104.9</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>23.4</td>
<td>22.8</td>
<td>27.0</td>
<td>22.8</td>
<td>24.4</td>
</tr>
<tr>
<td>SN</td>
<td>M</td>
<td>90.0</td>
<td>96.9</td>
<td>1.38</td>
<td>98.8</td>
<td>106.4</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>28.1</td>
<td>26.8</td>
<td>28.0</td>
<td>28.7</td>
<td>27.9</td>
</tr>
<tr>
<td>TF</td>
<td>M</td>
<td>101.5</td>
<td>87.0</td>
<td>3.76**</td>
<td>109.9</td>
<td>92.2</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>21.8</td>
<td>20.9</td>
<td>20.0</td>
<td>18.3</td>
<td>17.5</td>
</tr>
<tr>
<td>JP</td>
<td>M</td>
<td>97.4</td>
<td>107.8</td>
<td>2.20</td>
<td>98.7</td>
<td>100.7</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>28.2</td>
<td>23.6</td>
<td>29.5</td>
<td>28.5</td>
<td>28.9</td>
</tr>
</tbody>
</table>

* p < .01  ** p < .001

Table 5: Differences between PSS and MBTI scores for women and men in each group. To reduce the effects of experiment-wise error, a significance criterion of α = .01 was chosen.
### Personal Style Scales

<table>
<thead>
<tr>
<th>MBTI Scales</th>
<th>Work Style</th>
<th>Learning Environment</th>
<th>Leadership Style</th>
<th>Risk Taking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory Psychology Students (n = 132)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI</td>
<td>-.34 **</td>
<td>.01</td>
<td>-.36 **</td>
<td>-.12</td>
</tr>
<tr>
<td>SN</td>
<td>-.13</td>
<td>.52 **</td>
<td>.22</td>
<td>.30 **</td>
</tr>
<tr>
<td>TF</td>
<td>.45 **</td>
<td>.00</td>
<td>.14</td>
<td>-.20</td>
</tr>
<tr>
<td>JP</td>
<td>-.27 *</td>
<td>.28 *</td>
<td>-.04</td>
<td>.37 **</td>
</tr>
</tbody>
</table>

Advanced Psychology Students (n = 96)

| EI          | -.40 **    | .11                  | -.49 **          | -.36 **     |
| SN          | -.13       | .54 **               | .21              | .18         |
| TF          | .45 **     | .00                  | .14              | -.20        |
| JP          | -.27 *     | .28 *                | -.04             | .37 **      |

Career-Counseling Clients (n = 129)

| EI          | -.45 **    | -.15                 | -.54 **          | -.28 *      |
| SN          | .08        | .51 **               | .32 **           | .20         |
| TF          | .35 **     | -.13                 | -.03             | -.21        |
| JP          | .01        | .31 **               | .12              | .26 *       |

* p < .01
** p < .001

Table 6: Correlations between PSS and MBTI scores for students and career counseling clients. To reduce the effects of experiment-wise error, a significance criterion of α = .01 was chosen.
differences. Women scored higher than men on both of these scales. Gender differences also were found on Risk Taking in two of the three groups, the introductory psychology students and career counseling clients. No other significant gender differences were found.

Pearson correlations between PSS and MBTI scales for each of the three groups are reported in Table 6. Interestingly, many of the significant between-scale correlations are found in all three groups. In fact, results of the LISREL Maximum Likelihood Estimate suggest that the pattern of relationships between the PSS and MBTI scales do not differ significantly between groups ($\chi^2 (32) = 44.22, p > .05$). Covariance matrices were used in this analysis because of the difficulty in using correlation matrices in this particular procedure. As hypothesized, Work Style was negatively correlated with EI ($r = -.34$ to $-.45, p < .001$) and positively correlated with TF ($r = .35$ to $.45, p < .001$) in all three samples. Learning Style was correlated with SN ($r = .51$ to $.54, p < .001$), and Leadership Style with EI ($r = -.36$ to $-.54, p < .001$). Risk Taking was positively correlated with JP ($r = .26, p < .01$, to $r = .37, p < .001$) in all three samples, supporting part 1 of Hypothesis 4.

The hypothesized relationship between Leadership Style and and JP was not found in any group ($r = -.04$ to $.12, p > .01$), and the relationship between Risk Taking and EI ($r = -.28, p < .01$ to $r = -.36, p < .001$) was only found in the client and advanced student samples. The relationship between Risk Taking and SN ($r = .30, p < .001$) was only significant in the introductory psychology student group. A significant positive relationship between Learning Environment and JP was found in all three groups ($r = .28, p < .01$, to $r = .31, p < .001$), and a relationship between Work Style and JP ($r = -.27, p < .01$) was found in both student samples, although neither of these
relationships had been hypothesized to exist. Finally, a relationship between Leadership Style and SN \((r = .32, \ p < .001)\) was found in the career counseling client sample.

**Within- and Between-Gender Analyses**

Although differences between genders were not as prominent in the analyses of variance as differences between groups, both genders were examined separately. Means, standard deviations, and ranges are presented in Table 7, and correlations between PSS and MBTI scores in Table 8. Interestingly, LISREL Maximum Likelihood Estimates suggest that the overall pattern of relationships between these variables differs between genders \((\chi^2 (16) = 28.75, \ p < .05)\). Seven relationships are significant in both males and females, but four relationships are significant for one gender but not for the other.

<table>
<thead>
<tr>
<th>Personal Style Scales</th>
<th>Women ((n = 202))</th>
<th></th>
<th></th>
<th>Men  ((n = 155))</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(M)</td>
<td>(SD)</td>
<td>Range</td>
<td>(M)</td>
<td>(SD)</td>
<td>Range</td>
</tr>
<tr>
<td>Work Style</td>
<td>59.7</td>
<td>8.7</td>
<td>30 - 75</td>
<td>52.2</td>
<td>9.3</td>
<td>22 - 72</td>
</tr>
<tr>
<td>Learning Environ.</td>
<td>46.9</td>
<td>10.2</td>
<td>19 - 70</td>
<td>50.5</td>
<td>10.0</td>
<td>23 - 67</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>53.1</td>
<td>9.1</td>
<td>33 - 92</td>
<td>53.4</td>
<td>9.2</td>
<td>31 - 69</td>
</tr>
<tr>
<td>Risk Taking</td>
<td>50.8</td>
<td>10.8</td>
<td>32 - 70</td>
<td>55.6</td>
<td>9.9</td>
<td>32 - 70</td>
</tr>
<tr>
<td>EI</td>
<td>94.5</td>
<td>24.9</td>
<td>49 - 153</td>
<td>101.0</td>
<td>24.5</td>
<td>49 - 153</td>
</tr>
<tr>
<td>SN</td>
<td>98.3</td>
<td>29.0</td>
<td>39 - 151</td>
<td>103.7</td>
<td>29.1</td>
<td>33 - 151</td>
</tr>
<tr>
<td>TF</td>
<td>108.3</td>
<td>21.0</td>
<td>43 - 141</td>
<td>97.3</td>
<td>21.7</td>
<td>39 - 135</td>
</tr>
<tr>
<td>JP</td>
<td>97.8</td>
<td>28.7</td>
<td>47 - 161</td>
<td>99.2</td>
<td>27.2</td>
<td>47 - 157</td>
</tr>
</tbody>
</table>

Table 7: Means, standard deviations, and ranges of PSS and MBTI scores for each gender.
### Personal Style Scales

<table>
<thead>
<tr>
<th>MBTI Scales</th>
<th>Work Style</th>
<th>Learning Environment</th>
<th>Leadership Style</th>
<th>Risk Taking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women (n = 202)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI</td>
<td>-.37 **</td>
<td>.08</td>
<td>-.38 **</td>
<td>-.29 **</td>
</tr>
<tr>
<td>SN</td>
<td>-.12</td>
<td>.51 **</td>
<td>.27 **</td>
<td>.18</td>
</tr>
<tr>
<td>TF</td>
<td>.35 **</td>
<td>.08</td>
<td>.03</td>
<td>-.14</td>
</tr>
<tr>
<td>JP</td>
<td>-.09</td>
<td>.22 *</td>
<td>-.05</td>
<td>.35 **</td>
</tr>
<tr>
<td><strong>Men (n = 155)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EI</td>
<td>-.43 **</td>
<td>-.05</td>
<td>-.47 **</td>
<td>-.28 **</td>
</tr>
<tr>
<td>SN</td>
<td>-.15</td>
<td>.57 **</td>
<td>.33 **</td>
<td>.11</td>
</tr>
<tr>
<td>TF</td>
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<td>.27 **</td>
<td>-.29 **</td>
</tr>
<tr>
<td>JP</td>
<td>-.13</td>
<td>-.01</td>
<td>-.05</td>
<td>.33 **</td>
</tr>
</tbody>
</table>

* p < .01  ** p < .001

Table 8: Correlations between PSS and MBTI scores for women and men. To reduce the effects of experiment-wise error, a significance criterion of α = .01 was chosen.
Learning Environment is significantly correlated with JP in women \(r = .22, p < .01\) but TF in men \(r = .23, p < .01\). Leadership Style is correlated with EI and SN for both women and men, but is additionally correlated with TF in men \(r = .27, p < .001\). TF is also negatively correlated with Risk Taking in men \(r = .29, p < .001\), but not women. In fact, TF is significantly related to all PSSs in men, but only Work Style in women.

Three of this study’s hypotheses were supported among males but only two were entirely supported among females. The remaining hypotheses received partial support. As expected, Work Style was found to be negatively correlated with the EI scale and positively with TF in both men and women. Also as predicted, Learning Environment was associated with SN, although relationships with JP (for women) and TF (for men) were unexpected. Leadership Style was negatively correlated with EI as expected, but was not associated with JP. Instead correlations with SN (males and females) and TF (males only) were found. Finally, Risk Taking was positively correlated with JP and negatively correlated with EI as hypothesized, but no relationship between with SN and Risk Taking was discovered. Instead, Risk Taking was negatively associated with TF among males.

**Canonical Correlations**

As previously noted, the pattern of relationships among PSS scores and MBTI scores differed significantly in the male and female samples, but did not significantly differ across groups (students and clients). Because canonical correlation attempts to discover higher order relationships among two sets of variables, these analyses were conducted separately for the male and female samples. Results for the men are summarized in Table 9; women’s results are in Table 10.
<table>
<thead>
<tr>
<th></th>
<th>Canonical variate 1</th>
<th></th>
<th>Canonical variate 2</th>
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<th>Canonical variate 3</th>
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<td></td>
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<td>Work Style</td>
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<td>.96</td>
</tr>
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<td>.37</td>
<td>.22</td>
<td>.54</td>
<td>-.36</td>
<td>-.64</td>
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<tr>
<td>Risk Taking</td>
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<td>.09</td>
<td>.93</td>
<td>.82</td>
<td>.20</td>
<td>.29</td>
</tr>
<tr>
<td>% of variance</td>
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<td>.19</td>
<td></td>
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<tr>
<td>Redundancy</td>
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<td>.05</td>
<td></td>
<td>Total = .34</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ei</td>
<td>-.48</td>
<td>-.45</td>
<td>-.63</td>
<td>-.67</td>
<td>.60</td>
<td>.57</td>
</tr>
<tr>
<td>SN</td>
<td>.78</td>
<td>.84</td>
<td>.03</td>
<td>.02</td>
<td>.57</td>
<td>.70</td>
</tr>
<tr>
<td>TF</td>
<td>.48</td>
<td>.24</td>
<td>-.53</td>
<td>-.59</td>
<td>-.41</td>
<td>-.56</td>
</tr>
<tr>
<td>JP</td>
<td>-.04</td>
<td>-.36</td>
<td>.50</td>
<td>.53</td>
<td>.32</td>
<td>.08</td>
</tr>
<tr>
<td>% of variance</td>
<td>.27</td>
<td>.23</td>
<td>.24</td>
<td></td>
<td>Total = .74</td>
<td></td>
</tr>
<tr>
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Table 9: Results of canonical correlation analysis of male sample: Correlations (Corr.) and standardized canonical coefficients (Coeff.) between PSS and MBTI scores and corresponding canonical variates (n = 155). Percent of variance and redundancy are standardized indices.
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Table 10: Results of canonical correlation analysis of female sample: Correlations (Corr.) and standardized canonical coefficients (Coeff.) between PSS and MBTI scores and corresponding canonical variates \( (n = 202) \). Percent of variance and redundancy are standardized indices.
Among the men, three significant canonical correlations were found. The first was .65 [42% of variance shared between the two canonical variates, $F(16,450) = 14.71, p < .001$]; the second was .57 [33% of shared variance, $F(9,360) = 14.30, p < .001$], and the third was .53 [28% of shared variance, $F(4,298) = 14.09, p < .001$]. The fourth canonical correlation was not significant at $p < .05$.

Correlations between each PSS and MBTI scale and their canonical variate, standardized canonical variate coefficients, percent of variance, redundancies, and canonical correlations are included in Table 9. Percent of variance refers to the within-set variance accounted for by the set’s corresponding canonical variate. Redundancy refers to the amount of within-set variance accounted for by the opposite canonical variate. For example, in the male sample, the first canonical variate associated with the Personal Style Scales accounts for 48 percent of the variance within the set of four PSSs. The first canonical variate for the MBTI scales accounts for 20 percent of the variance in PSSs (redundancy), suggesting some overlap between these scales and the MBTI variate. Both percent of variance and redundancy are standardized.

The first PSS variate accounts for 48 percent of the variance in Personal Style Scales, suggesting a substantial effect. The second and third account for 25 and 19 percent of variance, respectively, suggesting that all three variate associated with significant canonical correlations make important contributions, although the contribution of the first variate is largest. Likewise, each MBTI variate accounts for a sizable percent of variance, and because all are roughly equivalent, all must be considered.

By examining the standardized canonical coefficients associated with each variable, the relative contribution of each variable to its variate may be understood. In the first variate pair, three of the PSS scales were related to all four MBTI scales. These results suggest that individuals who were interested in working with people (high Work
Style), expressed comfort in academic environments (high Learning Environment), and enjoyed directing others (high Leadership Style) were also likely to be Extraverted, Intuitive, Feeling and Judging types. The opposite pairings of these scores must also be considered. Individuals who were interested in working with data, ideas, and things (low Work Style), practical learning environments (low Learning Environment), and leading by example (low Leadership Style), were likely to be Introverted, Sensing, Thinking, and Perceiving types. Among PSSs, Learning Environment (.59) should be considered the most important contributor, followed by Leadership Style (.37) and Work Style (.24). The contribution of Work Style is roughly half of the contribution made by Learning Environment. Similarly, the SN contribution is the largest in the MBTI set (.84), followed by EI (-.45), JP (-.36), and TF (.24).

Results of the second pair of variates found in the sample of men suggest that a combination of three of the MBTI scales were related to Risk Taking (.82), and to a lesser extent, Leadership Style (.54), Learning Environment (-.37), and Work Style (-.30). High Risk-Taking scores along with somewhat high Leadership Style scores, and somewhat low Learning Environment and Work Style scores were associated with Extraversion, Thinking, and Perceiving; low risk taking scores (modified by lower leadership and higher learning environment and work style) scores were related to Introversion, Feeling, and Judging dimensions.

In the third canonical variate, Learning Environment makes a substantial contribution (.96), although this time it is modified by lower Leadership Style (-.64), lower Work Style (-.46), and somewhat by high Risk Taking (.29). This combination is associated most strongly with MBTI preferences for Intuition (.70 on SN) but also with Extraversion (.57 on El) and Thinking (.56 on TF). The counterpart to this
relationship would be preferences for practical learning, directing others, working with people, and risk avoidance related to MBTI Sensing, Feeling, and Extraversion.

Results of canonical correlational analysis using women's scores may be found in Table 10. Among women, all four canonical correlations were significant. The first was .62 [38 percent of variance shared between the two canonical variates, \( F(16, 593) = 16.67, p < .001 \)]; the second was .52 [27 percent of shared variance, \( F(9, 475) = 16.26, p < .001 \)]; the third was .44 [19 percent of shared variance, \( F(4, 393) = 18.07, p < .001 \)], and the fourth was .34 [12 percent of variance, \( F(1, 197) = 25.88, p < .001 \)]. Each of the four pairs of variates extracts a substantial portion of variance from the two variable sets, with percent of variance ranging from 13 to 34 in PSSs and from 21 to 28 in the MBTI.

The first pair of variates extracted from the sample of women suggests that interest in working with ideas, data, and things (low Work Style, -.77), comfort in academic environments (high Learning Environment, .47), and to a lesser extent interest in taking risks (high Risk Taking, .22) and leading others (high Leadership Style, .22) may be related to a combined MBTI profile of Intuition (.83 on SN) and Thinking (-.65 on TF) and somewhat to Introversion (.34 on EI). Conversely, interest in working with people, practical learning environments, and playing it safe without leading are associated with Sensing, Feeling, and Extraversion.

The second pair of canonical variates associates an interest in directing others (.73 Leadership Style) modified by Risk Taking (.54) and practical learning (.23 Learning Environment) with Extraverted (-.94 on EI), and to a lesser extent Intuitive (.24 on SN) personalities. Low scorers on Leadership Style who also score low on Risk Taking and high on Learning Environment would likely be classified as Introverts with a Sensing dimension.
The third pair of canonical variates extracted a relationship between high Learning Environment (.98) and Work Style (.75) and somewhat with low Leadership Style (-.32) and Risk Taking (-.27) on one hand with the MBTI dimensions of Feeling (.73), Intuition (.66), and Judging (-.38) on the other. This relationship would also imply that preferences for practical learning environments, working with data, ideas, and things while leading others and taking risks would be associated with a combination of Thinking, Sensing, and Perceiving.

The fourth and final variate pair links the combination of low interest in leadership (-1.15), high risk taking (.82), people-oriented work style (.65) and academic learning environment (.54) with the MBTI Perceptive attitude (1.14), and to a much lesser extent, to Sensing (-.58) and Feeling (.31). This relationship would also suggest that high interest in leadership combined with low interest in taking risks, preference for not working with people, and practical learning would be related to Judging MBTI types modified by Intuition and Thinking.
CHAPTER 5
DISCUSSION

Results of this study suggest that the Personal Style Scales of the Strong Interest Inventory and the four dimensions of the Myers-Briggs Type Indicator bear relationships to each other that have some consistency across samples. Individuals in the three samples included in this study—introductory psychology students, more advanced psychology undergraduates, and ministry career counseling clients—exhibited a range of scores, and measures of central tendency varied from one group to another. These results would be expected given, for example, that people in various occupations tend to score differently than individuals in other occupations on the two measures (Harmon, et al., 1994; Myers & McCaulley, 1985). The most notable finding of this study, however, is that although scores differed across groups and across genders, the relationships between the scales remained similar across samples. Differences in the relationship between scales were found between men and women, but these results make some sense when viewed in context of existing data and theory about these measures. This discussion will review the findings of the current study with attention given both to the tested hypotheses and more exploratory analyses. Results as they apply to Personal Style Scales individual will be reviewed and interpreted within the context of other literature about the scales. Results of the exploratory canonical correlations will be discussed along with patterns observed and preliminary interpretations. Limitations of the study and implications for counselors will be explored. Finally, directions for future research will be offered.
Work Style and Hypothesis 1

Work Style was one of seven out of the nine significant correlations found in the overall sample which also were found in the male and females samples analyzed independently. Although men’s and women’s scores differed in all three groups, Work Style was negatively related to the MBTI EI scale and positively associated with TF in both genders. Both of these results were predicted by Hypothesis 1. The Work Style scale was developed to assess an interest in working with people (high scores) versus things, data, and ideas (low scores). Not surprisingly, high scores on this scale were associated with the Extraverted end of the EI scale, which also reflects an interest in people and other external stimuli. Although these effect sizes were moderately large (Cohen & Cohen, 1983), the fact that the two scales were not perfectly correlated suggests that they measure at least somewhat different constructs. According to the MBTI manual, introverts would be expected to be more interested in ideas and data, but extraverts would prefer people and things (Myers & McCaulley, 1985). In other words, the EI scale puts data and ideas at one end of the continuum and things and people at the other. Work Style, in contrast, puts data, ideas, and things at one end and people alone at the other. These differences suggest that although these scales appear to be related, they may tap somewhat different constructs.

Interestingly, Work Style was also associated with the TF scale in all three groups and both genders. Higher scores on Work Style (people direction) were associated with higher scores on TF, or scores in the Feeling direction. These associations were nearly as strong as those found between Work Style and EI, suggesting that the TF constructs are as important as extraversion-introversion in understanding Work Style. Although often described only as “seek(ing) rational order according to harmony among subjective values” (Myers & McCaulley, 1985, p. 13), the Feeling direction of TF also reflects “an
understanding of people, a concern with the human . . . aspects of problems, a need for affiliation, (and) a capacity for warmth” (Myers & McCaulley, 1985, p. 13). The moderately large relationship between Work Style and EI and TF offers construct validity for both instruments.

Learning Environment and Hypothesis 2

Scores on the Learning Environment scale differed between the three samples studied, but did not differ between genders. This scale was designed to differentiate individuals having higher and lower levels of education, and between-sample differences support its validity. Lowest scores (more practical) were found among introductory psychology students, most of whom were first- or second-year college students. Advanced psychology students, mostly juniors and seniors, scored higher, and career-counseling clients, most of whom had completed baccalaureate degrees, scored the highest (more academic). Gender differences on this scale were not found in any group studied.

In the overall sample, Learning Environment demonstrated a fairly high relationship with SN, and this finding was true for males as well as females, offering support for Hypothesis 2. Learning Environment is said to assess “practical” versus “academic” learning preferences (Harmon, et al., 1994, p. 156) while SN taps preferences for “what is immediate and real” versus what is “possible and imagina(ble)” (Myers & McCaulley, 1985, p. 13). The relationship between these scales makes intuitive sense and offers validity to the notion that Learning Environment reflects something other than simply academic achievement.

Although the relationship between Learning Environment and SN was predicted, additional relationships were found which were not predicted but which require
explanation. Moderate correlations were found between Learning Environment and JP in all three groups studied, but when analyzed by gender, the relationship only existed among women. However, the male sample demonstrated a relationship between Learning Environment and TF not found among females. Although this relationship was not found in any of the three groups, the smaller number of men in each sample may have obscured this relationship. Apparently women who scored high on Learning Environment (more academic) were more likely to score in the Perceiving direction of the JP scale, whereas men who scored high on Learning Environment were more likely to score higher on the Feeling dimension of TF. Perhaps interest in traditional academic pursuits is related to a spontaneous, curious, and adaptable attitude among women, but to an orientation towards subjective values and concern for others among men. This finding might be specific to the populations studied. Men in both the minister and counseling psychology samples might be different than men in other populations in the way their interest in academic learning relates to their valuing of affiliation, harmony and the concerns of others. People in each of these groups may recognize both the importance of subjective values and a traditional approach to learning and knowledge. The meaning and existence of these relationships in other samples remains a question for future research.

Leadership Style and Hypothesis 3

In the overall sample, Leadership Style was associated with both EI and SN, and these relationships were found among both males and females. The relationship between EI and Leadership Style was predicted in Hypothesis 3, suggesting that people who score higher on Leadership Style, that is having an interest in leading others, tend to also be Extraverts on the EI scale. This finding is not surprising. The second part of Hypothesis 3, however, was not supported. No relationship between Leadership Style and JP was
found in any sample. The relationship between JP and leadership found in a previous study (Camiscioni, cited in Myers & McCaulley, 1985) may reflect leadership ability or style rather than simple interest in leadership. Apparently the SII Leadership Style scale is unrelated to the Perceptive and Judging attitudes characterized by openness, curiosity, and spontaneity; and decisiveness, planfulness, and organization, respectively. One could certainly imagine an individual interested in leadership having any combination of these traits.

Although only one of the hypothesized relationships was found, others require explanation. High Leadership Style scores were associated with Intuitive preferences in the overall sample and when women and men were analyzed independently. Interestingly, this relationship was found among the clients, but was not significant in both student samples. The sample of ministers in career counseling scored higher on Leadership Style and SN than both groups of students, perhaps contributing to the differing results. Perhaps ministers’ unique position of providing spiritual leadership to others makes the relationship between leadership and an intuitive preference understandable. Providing leadership of a spiritual nature would seem to require intuitive perceptions involving meanings, relationships, and possibilities far more than sensing perceptions associated with immediate experience, details, and practicality. Alternately, although the correlation did not reach significance in the student samples, the correlations were in the same direction as the client sample, and LISREL analyses did not reveal significant overall differences in the pattern of relationships between groups. Perhaps this small difference detectable in some analyses resulted from simple sampling bias.

Leadership Style also was associated with TF among men, although this relationship did not appear in any of the group analyses. The number of women in each group out-numbered men, so it is possible that the relationship was simply obscured by
the larger number of women. Among men, higher Leadership Style scores were associated with the Feeling direction of the TF dimension, possibly suggesting another gender difference in leadership preferences. However, this relationship defies traditional stereotypes of logical, tough-minded, and objective male leaders. As with the relationship between Learning Environment and TF, this correlation may be the result of the unusual group of males in counseling psychology courses and ministry-related professions. Although men scored lower than women on TF (in the Thinking direction) in all groups, the introductory psychology students scored lower on TF than either of the other two groups, lending support to this claim. Perhaps men interested in counseling psychology courses or in ministerial professions enjoy leadership, but prefer to lead in a manner which honors subjective values more than their male counterparts in other professions. Again, this issue raises possibilities for future research.

Risk Taking/Adventure and Hypothesis 4

Hypothesis 4 stated that Risk Taking would be significantly correlated with three of the four MBTI scales. In fact, in the overall sample, Risk Taking was significantly correlated with all four MBTI scales. Some of these relationships were no longer significant when subsamples were analyzed separately. As predicted, Risk Taking was positively correlated with the JP scale in the overall, by group, and by gender analyses. This finding suggests that people who score higher on the Risk Taking/Adventure scale also tend to score in the Perceptive direction of the JP scale. Perceptive individuals have been described as “open, curious, . . . spontaneous, and adaptable” (Myers & McCaulley, 1985) while words such as organized, purposeful, and decisive described Judging individuals. It makes sense that high risk takers would score in the Perceptive direction, offering construct validity data to both measures.
This result, however, was the only clear finding about the Risk Taking scale. While Risk Taking was expected to correlate with SN, this relationship was only significant in the overall sample and in the group of introductory psychology students. One previous study (Morehouse, et al., 1990) which found a relationship between SN and measures of risk taking examined only high school students. Others which found this type of relationship have done so only on some of the samples studied. Risk Taking may only be related to SN in some samples. For example, Risk Taking may be related to SN only in adolescents. As people age, their interest in taking risks may decline (Harmon, et al., 1994). The fact that the sample of introductory psychology students in this study had higher Risk Taking scores than either other sample lends tentative support to this explanation. The mere reduction of Risk Taking scores does not appear to be enough of an explanation, however. If higher scores in general indicated a higher correlation with SN, then the relationship between SN and Risk Taking should be significant in the male sample, because men scored higher on Risk Taking than women. Such was not the case. The nature of the relationship between SN and Risk Taking remains an area for future research.

Although introductory psychology students demonstrated a unique relationship between SN and Risk Taking, they also were the only group not to show a relationship between EI and Risk Taking. In all other groups and in both genders, EI was significantly and negatively correlated with Risk Taking. In other words, high risk takers were likely to be MBTI Extraverts, as well. Although the lack of the hypothesized relationship in the introductory student group dampens its support, the rest of the results do support the proposed relationship between Risk Taking and SN.

Finally, an unexpected relationship between TF and Risk Taking was found among men, and it was also reflected in the overall sample. Males who scored higher on
the Risk Taking scale were also likely to score in the Thinking direction of the TF scale. The reason for this relationship is unclear. Thinking individuals have been described as objective, concerned with justice and fairness, critical, and impersonal (Myers & McCaulley, 1985). For some people, the Risk Taking/Adventure scale may reflect “a need for autonomy and independence in their jobs as well as in their personal lives” (Harmon, et al., 1994, p. 160). Perhaps the relationship between TF and Risk Taking reflects a relative desire for independence versus affiliation, rather than more traditional concepts of risk.

Another explanation for this finding may be simply that men typically score higher than women on Risk Taking and lower than women on TF, and the results of the current study support these gender differences. The TF scale was the only MBTI scale in which gender differences were found in every group, and Risk Taking also differed between women and men in two of the three groups. Furthermore, when males were analyzed independently, the TF scale was significantly correlated with every Personal Style Scale, although only one of these relationships had been predicted to exist. One MBTI researcher who endorsed the MBTI called the TF scale “the weakest scale” on the MBTI (Rytting, et al., 1994). Taken together, these data suggest the possibility that problems on the TF scale compromise its utility as an assessment and research tool. Future research could tease out these interwoven concepts and attempt to discover in what way gender, thinking and feeling constructs, and risk taking relate to each other.

Higher Order Relationships Between the PSSs and MBTI

Canonical correlational analyses suggested that higher order relationships exist between combinations of Personal Style Scales and MBTI scales. Interestingly some patterns emerged which were similar between men and women, although notable
differences also occurred. Three significant canonical correlations were found in the male sample, and four were found among women. These findings suggest that relationships between combinations of these two sets of measures may be as important as looking at the relationship between pairs of single variables. For example, Hypothesis 1 predicted a relationship between Work Style and EI and TF. This relationship was in the expected direction among five of the six canonical correlations. In the men’s first and third canonical correlations and women’s first, third, and fourth canonical correlations, combinations of Extraversion and Feeling were related to PSS variates which included high Work Style. However, in the men’s second canonical correlations, a combination of Extraversion, Thinking, and Perceiving was related to low Work Style, high Risk Taking, high Leadership Style, and low Learning Environment. Perhaps something in the relationship between Work Style and the other PSS variables in combination makes its relationship with the MBTI scales different than expected.

Some similarities may be found in comparing the pattern of results of women and men. In men, the first pair of variates suggests a relationship between high Work Style, Learning Environment, and Leadership Style (and to a small degree, Risk Taking), on one hand, with Extraverted, Intuitive, Feeling, and Judging traits. In the language of Myers-Briggs, the MBTI code would be ENFI. In the third variate pair found in the women’s sample, an _NFJ profile was associated with high Work Style, high Learning Environment, low Risk Taking, and low Leadership Style. Interestingly, these Myers-Briggs types are similar, but their corresponding PSS profiles differ. Work Style and Learning Environment were high in both genders, but Leadership Style differed. This dimension in men would be associated with high interest in directing others and some interest in taking risks, but in women would be associated with low interest in leadership and risk taking.
A similar phenomenon may be found in examining the first women’s and third men’s variate pairs. Among women, an Introverted, Intuitive, and Thinking MBTI profile (INT_) was associated with low Work Style, and high Learning Environment, Leadership Style, and Risk Taking. In men, the same MBTI profile (INT_) was associated with the same PSS patterns, except in the case of Leadership Style. It appears that in men, this personality pattern is associated with lower interest in directing and leading others. Taken together, these findings suggest that leadership in women and men may be associated with different dimensions of personality. If these differences indeed exist and are not merely artifacts of the current study, the reasons for such differences need to be explored.

Limitations of the Study

Results of this study should be viewed in light of some possible limitations. This study was intended as an exploration of the construct validity of both the MBTI and SII Personal Style Scales. Because it was correlational in nature, no directionality or causality may be inferred. Furthermore, relationships discovered in the analyses could have resulted from sampling errors, restricted range, or other issues unique to the samples included. Participants in the student groups were self-selected, and this selection could have created selection bias. Motivation differed between and within samples, as well, possibly creating additional biases. For example, clients in career counseling who were intrinsically motivated to complete the instruments may have experienced different demand characteristics than students whose sole purpose was to participate in one of several required experiments. Finally, the samples studied were fairly well-educated, predominantly Caucasian, and of limited occupational variability. Although theses types
of limitations are common in studies utilizing convenience samples, they should not be ignored.

Additional problems may have arisen in instrument use and interpretation. The MBTI is a fairly transparent measure, and no way to detect socially desirable responding has been developed. The same may be said for the SII, although it was empirically constructed and responses may not elicit the same type of socially desirable response set. Also, because no uniform way of using the MBTI as a research instrument has been developed, results of the current study could differ substantially had other techniques been used. Probably most importantly, if the MBTI does turn out to truly measure a bimodal, non-continuous, qualitative type in all or most populations, the statistical manipulations such as canonical correlation used in the current study would be meaningless and potentially misleading.

Implications for Counseling

The attention to gender differences in the current study is perhaps the most important point to be made when applying these results to the practice of career and personality assessment. The current version of the SII takes gender into account by comparing respondents’ scores with same-gender norms, and the MBTI uses a different scoring scheme for determining men’s and women’s TF score. These scoring techniques take into account the gender differences of specific scales, but they do not address the different patterns of relationships which may emerge for women and men. Using Leadership Style as an example, counselors may need to take into account the context and inter-relationship of scores when making interpretations. The complex relationship between MBTI types and PSS scales may have significant practical applications, particularly for individuals work and function in opposite-gender or mixed-gender
settings. However, because patterns of relationships in this study were quite varied, gender should be considered, but not to the exclusion of understanding an individual's unique pattern of interests, preferences, and personality traits.

Counselors should also be aware of both the similarities between these two instruments and their notable differences. Some clear relationships were found, such as between Work Style and EI and TF dimensions. Others, including Leadership Style and Risk Taking demonstrated more complex relationships in these samples. Counselors should be cautious in their attempts to infer scores on one of these scales from scores on the other. No one-to-one mapping of scales was found, and attempts to predict individual scores based upon this type of correlational data would be ill-advised. The best use of these scales would be to use them in conjunction, recognizing that each has its purpose and strength, and both have their limitations.

Directions for Future Research

The present study represents a preliminary attempt to understand the relationship between the Personal Style Scales and the MBTI dimensions. Future research should investigate the relationship between these scales in other types of samples to determine the generalizability of the present and future studies. Other samples for study should include diverse occupational groups, clients and non-clients, and ethnically heterogeneous groups. The relationships found between TF and Leadership Style, for example, may be unique to the samples of psychology students and ministerial career-counseling clients studied. Additional questions for research include those raised in the preceding discussion. Learning Environment and its association to JP in women and to TF in men needs to be understood, and researchers would benefit from exploring the relationships between Leadership Style and SN, SN and Risk Taking, and Risk Taking and TF.
The question of whether the MBTI measures traits or types has not been adequately settled, and the relationship of MBTI scores to behavioral measures remains unclear. Although both the MBTI and SII are widely used measures, their scales still require additional reliability and validity studies. The need is particularly great for the new PSSs. Studies utilizing both the MBTI and PSS to predict satisfactory career decision making, entry, and longevity would be particularly useful.

Furthermore, the current study is among the first to utilize canonical correlational analyses to understand the relationship between the SII scales and MBTI scales. Future research should take advantage of this multivariate technique to understand how sets of variables relate to each other, and these variables should include measures such as lifestyle and work-related variables in addition to paper-and-pencil measures. Patterns of relationships should emerge across samples and across studies which would increase our understanding of the similarity of personality and career assessment.

Finally, future research should seek to understand how useful these scales are in their predictive and descriptive abilities in work with actual career counseling clients. Counselors may be able to glean much information from these scales used individually and in combination, but these benefits are dubious if they do not meet the needs of clients or if they are misinterpreted by clients. Researchers should pay attention to applied issues such as the interaction of personal styles and Myers-Briggs preferences with responses to career assessment and counseling. For example, Leadership Style purports to distinguish individuals who have an interest in directing others from those who prefer to follow. One might suspect, then, that people who score low on this scale might be more inclined to accept counselors' suggestions and test results at face value, or perhaps they might follow counselors' leads if they also scored low on Learning Environment or Risk Taking.
Understanding the practical implications of these scales could be quite fruitful, both for counselors and the clients they serve.
REFERENCES


APPENDIX A

PARTICIPANT DEBRIEFING FORM
"How Related Are Interests to Personality? Testing the Validity
of Strong Personal Style Scales Using the Myers-Briggs Type Indicator"

Debriefing Information

Thank you for completing the Strong Interest Inventory (also called the Strong) and the Myers-Briggs Type Indicator (also known as the MBTI) today. Results from these instruments will be used as part of my dissertation study. The Strong was originally developed in 1927 to help people identify their career-related interests and how these interests compare to people who are happily employed in various occupations. It has been updated, and the new version was released this August. You completed this new version, and the results are confidential. Also, the only way I will know your name is if you complete the bottom portion of this form in order to receive results. After results are given, the forms with your name and subject number on them will be destroyed, rendering the data anonymous.

When any new psychological measure gets published, it must undergo research to validate it. The study you participated in today will seek to understand how some new scales of the Strong, called Personal Style Scales (PSS), compare to an already established measure of personality. The new PSSs are called Work Style, Learning Environment, Leadership Style, and Risk Taking/Adventures.

The MBTI measures individual preferences in style of gathering data, processing information and making decisions, concepts that are at least somewhat related to interests and personal styles. The MBTI has been widely used to indicate preferred work, learning, and leadership styles, and to determine how individuals perceive risks in various situations and whether they have risk-taking personalities. As such, it makes sense to see how the well-established MBTI compares to the new Strong scales. This data will be used to help career counselors, researchers, and everyday people make sense of the Strong and better understand their vocational interests.

Because the Strong and the MBTI can be useful in understanding career interests and personal preferences, your individual results will be available to you if you are interested. If you would like to attend a group session to find out about your results, please complete the form below. I will contact you after the inventories are scored to inform you of the time and location of interpretive sessions. On the form below, you may also request a summary of the dissertation study when it is complete next year.

Detach here. Return bottom portion to box in front of room.

Check as many as apply: (PLEASE PRINT)

___ YES, I am interested in finding out about my individual results at a group interpretive session. Please contact me by phone to inform me of the time and location.

___ YES, I am interested in receiving a summary of the overall results of the entire study. This will be mailed to me sometime next year.

Name: ____________________________ Subject #: ____________________________
Address: ____________________________ Phone Number: ____________________________

College of Social and Behavioral Sciences
APPENDIX B

GRANT NOTIFICATION LETTER

FROM CONSULTING PSYCHOLOGISTS PRESS
September 15, 1994

Beverly D. Tuel
4991 Arbor Village Drive - Apt. C:32
Columbus, Ohio 43214

Dear Ms. Tuel,

I am pleased to inform you that the Strong Research Advisory Board has approved funding of your proposed project, “How Related Are Interests to Personality? Testing the Validity of Strong Personal Style Scales Using the Myers-Briggs Type Indicator.” The board has granted scoring for 200 administrations of the Strong Interest Inventory interpretive reports, 200 administrations of the Myers-Briggs Type Indicator Form G narrative reports, and $770.00 for direct support. Please inform us of how you would like to receive the direct support.

The board requests semi-annual progress reports on January 1 and July 1 of each year until a final report is submitted. The Board may, in some cases, request access to the raw data for further analyses. You would, of course, have the option to be a full participant in any publications resulting from re-analyses of your data.

Congratulations on your award. We look forward to seeing the results of your very interesting study.

Sincerely yours,

[Signature]

Tom Prehn
Director of Test Publishing & Information Services

cc: Advisory Board members.