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What is This?

The Career Development Inventory in Review: Psychometric and Research Findings

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First published over 15 years ago, the Career Development Inventory (CDI; Super, Thompson, Lindeman, Jordaan, & Myers, 1979) measures readiness for making educational and vocational choices and operationally defines Super's structural model of adolescent career maturity. The present article systematically analyzes the body of literature that has evaluated and explicated the psychometric characteristics and uses of the CDI. This review examines empirical findings pertinent to the reliability, factor structure, and validity of the CDI; evaluates the instrument's present status; and identifies topics for future research.

Career Development Inventory

Since the original publication of the CDI by Super et al. (1979, 1981) and its companion manuals by Thompson and Lindeman (1981, 1982, 1984), a substantial body of data on the inventory's psychometric characteristics and counseling uses has accumulated. An integrative analysis and synthesis of the literature on the CDI is, therefore, needed to summarize what is known about the measure and identify directions for future research. The present article does this by reviewing the literature on the CDI since 1979. After briefly describing the development of the measure, we review the CDI literature that deals with reliability, factor structure, and validity.

History and Description of the CDI

History

A concise history of the CDI's construction and development provides a context for reviewing the literature on the instrument (Betz, 1988; Savickas, 1990; Thompson & Lindeman, 1984). Research, beginning shortly after World War II, led Super to identify readiness to make educational choices, vocational choices, or both as a critical variable affecting career decision-making. In due course, Super articulated a developmental model of the career choice process in adolescents (Super, 1955). Subsequent investigations,

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notably the Career Pattern Study (CPS; Super & Overstreet, 1960), led to a structural model of adolescent vocational development and career maturity (Super, 1974). This structural model includes five dimensions: (a) an orientation to and planful attitudes toward life stages and vocational development tasks, (b) curiosity about and willingness to explore the world of work, (c) information concerning educational and vocational options and opportunities, (d) knowledge of decision-making principles and practice, and (e) realistic judgments about one's self and suitable occupations. Super and his colleagues (1981) constructed the CDI to appraise the first four of these career maturity dimensions. CPS research findings led to excluding choice realism from the CDI because it failed to relate significantly to adolescent career maturity (Savickas, 1990). A strong reality orientation was judged to be a quality that develops later, typically during early adulthood.

The 1979 and 1981 versions of the CDI represent the fourth and culminating forms of the instrument, which had evolved through three unpublished forms. In constructing the original 1972 form of the CDI, Super and colleagues built on their previous, unpublished career development measures, namely, the 87-item Student Questionnaire and its successor, the 236-item Career Questionnaire (see Thompson & Lindeman, 1984). Through factor analysis, Super and his research team turned the latter measure into the 91-item CDI Form I (Super & Forrest, 1972), which had three scales: Planning Orientation, Resources for Exploration, and Information and Decision Making. Each scale contained items designed to measure aspects of the first four dimensions described in Super's structural model of career maturity. CDI Form II provided a more expansive measure of these dimensions and led to Form III, a six-scale, 191item instrument based on a revised model of career maturity (Super & Thompson, 1979). Due to its excessive length, Form III underwent factor analysis and gave way to the more manageable 120-item Form IV, which emerged as the contemporary version of the CDI.¹

Description

Both CDI Form S and Form CU consist of a 16-page reusable test booklet, each with separate computer-scored answer sheets. Users learn both the purpose of the inventory and how to respond to it by reading the first page of the test booklet. The remainder of the booklet contains the 120 genderfair items that constitute the CDI's two parts: (I) Career Orientation and (II) Knowledge of Preferred Occupation. Part I includes four scales that measure Career Planning (CP), Career Exploration (CE), Career Decision Making (DM), and World-of-Work Information (WW). Part II consists of one scale that measures Knowledge of Preferred Occupational Group (PO). Computer scoring provides scores for each of these five scales. The complexity of the CDI precludes manual scoring. In addition to scores for each of the five scales, the scoring service provides three composite scores derived from

¹Consulting Psychologists Press publishes the CDI, as well as its accompanying manuals and materials. The inventory is available in both a School version (Form S; Super et al., 1979) and a College and University version (Form CU; Super et al., 1981).

summing individual scale scores as follows: Career Development Attitudes (CDA) combines the CP and CE scales; Career Development Knowledge and Skills (CDK) combines the DM and WW scales; Career Orientation Total (COT) combines the CDA and CDK composites.

In interpreting CDI scale scores, counselors are advised to begin with the CP scale to determine the client's orientation to the future and involvement in career planning activities. Low scores suggest that the work role is not salient to the client (Super, 1983; Super, Osborne, Walsh, Brown, & Niles, 1992) and that career intervention should arouse concern about the future and increase awareness of imminent developmental and decisional tasks. If the CP score is high and the CE score is low, then intervention should increase the client's curiosity, information-seeking skills, and exploratory behavior. The WW scale shows the client's knowledge about the world of work in general, whereas PO reflects knowledge about specific fields. Low scores on WW indicate that the client needs exploration-in-breadth and can benefit from learning about the occupational structure (e.g., Holland's [1992] hexagonal model) and identifying two or three fields to investigate. Low scores on PO indicate that the client needs exploration-in-depth and should gather much more information on the preferred field or specified occupation. The DM score shows the client's knowledge of decisional principles. Low scores mean that the client needs to learn and practice methods for matching herself or himself to fitting occupations. When all four scores are high, the client is ready to make matching choices and has the attitudes and competencies to maximally benefit from discussing results of interest inventories and ability tests. Several articles can be recommended to counselors looking for useful ideas about interpreting and using CDI scores in counseling (Jepsen, 1992; Jordaan, 1974; Niles & Usher, 1993; Savickas, 1990; Super, 1983; Super, 1990; Super et al., 1992).

The 27-page Career Development Inventory: User's Manual (Thompson & Lindeman, 1981) accompanied the initial published version of the CDI and contains information on the High School form (Form S) of the inventory. Information on Form CU of the CDI supplemented the user's manual shortly thereafter (Thompson & Lindeman, 1982). Together, the user's manual and 20-page College and University Supplement provide basic psychometric and normative data for making effective use of both Form S and Form CU. The 48-page Career Development Inventory: Technical Manual (Thompson & Lindeman, 1984) provides more detailed theoretical and research information on the measure. It also reports data from studies conducted prior to 1984 and from those that used earlier forms of the CDI. Thompson and Lindeman used these studies to describe the psychometric attributes of the instrument in both forms.

Many studies of the CDI have been reported since its original publication. A significant number of these studies have been conducted since 1984 and, therefore, do not appear in the technical manual. The remainder of this article provides a concentrated review of the literature on the CDI from its original publications in 1979 and 1981 to the present. For organizational clarity and to make it more useful to the reader, several sections comprise the review. Each section reviews articles on particular aspects of the CDI

and serves a twofold purpose: (a) to describe the inventory's psychometric properties, and (b) to identify research needs. Computerized literature searches of PSYCHLit and ERIC databases using the key phrases "career development inventory" and "career development" limited to tests and measures yielded 59 articles published between 1979 and 1995, 7 of which were common to both databases, leaving a total of 52 articles. After reading the article abstracts, we eliminated from review any studies previously discussed in the technical manual and added one article in press. This resulted in a total of 26 articles for review. We categorized the information in these 26 articles according to the four topics that structure the next four sections of the present article: reliability, construct validity, concurrent validity, and predictive validity.

Reliability

The CDI manuals present reliability data on both forms of the CDI in terms of internal consistency (Cronbach's coefficient alpha) and stability (test-retest correlation coefficients). Alpha coefficients range from .75 to .90 for the attitude scales and from .53 to .87 for the cognitive scales. Test-retest data indicate lower CDI individual scale reliabilities (CP, .79; CE, .73; DM, .70; WW, .67; and PO, .61) and higher composite score reliabilities (CDA, .83; CDK, .83; and COT, .84). Consequently, Thompson and Lindeman (1981, 1982) describe how to use the standard error of measurement for interpreting scale scores and score profiles.

Drawing from data reported in the manuals, Super and his collaborators (1992) noted that, at the secondary and higher education levels, "the CDA and CDK scales have reliabilities higher than .75, and the COT alphas are .85 and higher" (p.76). Similarly, Betz (1988) concluded that median CDI Form S coefficient alphas ranging from .78 to .89 give evidence of sufficient reliability for CP, CE, and WW scales. Median DM and PO scale reliability coefficients of .67 and .60, respectively, however, led Betz to question using these scales in counseling or research. Nonetheless, excluding DM (.62), WW (.67), and PO (.61) scales, Betz concluded that CDI Form CU shows adequate internal consistency. Specific to Form S, Hansen (1985) determined that six of its eight scales show adequate internal consistency. She concurred with Betz, as well as with the CDI's authors, that users should interpret individual DM and PO scale scores cautiously given the low median reliability estimates for these scales.

Internal Consistency

Several studies not included in the manuals have reported internal consistency estimates for CDI scales. Using Form III of the CDI, Kuhlman-Harrison and Neely (1980) obtained alphas ranging from .71 (WW) to .90 (CP). Graef, Wells, Hyland, and Muchinsky (1985) reported Form CU scale reliabilities (Kuder-Richardson 20) ranging from .55 (DM) to .89 (CP) in a sample of 200 college students. Nevill and Super (1988) reported internal consistency levels in the range of .61 for PO to .91 for CP.

After administering a 115-item British adaptation of the CDI to 492 third-, fourth-, and fifth-year comprehensive school students, Ward (1982)

reported coefficient alphas ranging from .58 (WW) to .93 (CP). Ward concluded that, although the British CDI demonstrated generally adequate reliability for group use, only the CP scale showed sufficient reliability for use with individuals.

Alpha coefficients also appear moderate to high in an Austrian version of the CDI. From a large data set (1,336 high school students), Seifert (1991) obtained alphas ranging from .72 for WW to .89 for CP. He also reported alphas of .89 for the CDA composite and .80 for the CDK composite.

Construct Validity

The CDI operationally defines Super's (1974) structural model of adolescent career maturity. Therefore, correlational and factor analyses of the CDI should show that the two attitudinal and two cognitive factors or scales correlate more highly with each other than with either of the other types of scales. For example, CP and CE should correlate more highly than do CP and WW or CP and DM. Moreover, factor analysis of the correlation matrix should produce two factors, one corresponding to attitudinal career maturity (CP and CE) and one corresponding to cognitive career maturity (WW and DM).

The CDI manuals present complete factor analytic data. Initial and subsequent analyses of the CDI strongly indicate that the measure can be characterized by a two-factor structure (Thompson & Lindeman, 1981). Consistent with Super's (1974) structural model of career maturity in adolescents, these two factors consist of a conative (attitudinal) component and a cognitive (knowledge) component. Evidence for the factor structure of the CDI thus bolsters the construct validity of the measure.

Kuhlman-Harrison and Neely (1980) administered the CDI Form III to 312 tenth graders (163 boys and 149 girls) to examine the discriminant validity of its scales. They obtained a median correlation coefficient of .23 corrected for attenuation between the attitude and cognitive scales. Given these findings, they concluded that, excluding two cognitive scales (i.e., Career Decision Making and Career Development Information), the scales measure separate constructs.

Studying the CDI in Britain, Ward (1982) compared the intercorrelations of the attitudinal and cognitive scales of the CDI. Without exception, the attitudinal scales related more highly to each other than to any of the cognitive scales. The converse of this also proved true, thus providing evidence for the CDI's construct validity.

Using two measurement models, Punch and Sheridan (1985) assessed the factor structure of the Australian CDI in a sample of 680 Australian high school students. The Australian CDI was adapted from CDI Form III. To examine the cognitive component of the CDI, Punch and Sheridan used Rasch's (1960, 1966) simple logistic model. In a Rasch model, item response represents a function of respondent ability and item difficulty. Items fitting the model comprise a unidimensional set measuring one specific trait. To examine the attitudinal component of the CDI, Punch and Sheridan used the rating response model (Andrich & Sheridan, 1980)—a generalized version

of the Rasch model and useful for analyzing Likert-type scales. Results indicated that the Australian CDI measures three unidimensional career development components consistent with the three scales in the Australian CDI: Career Planning, Career Exploration, and Career Decision Making. Although certain items keyed to each component misfit the models, Punch and Sheridan concluded that their evidence coupled with previous findings suggests that "the CDI possesses generally stable and desirable psychometric properties" (p. 201).

A factor analysis of the five CDI scales, two measures of time perspective, and two measures of career decision-making reported by Savickas (1984b) confirmed the factor structure of the first four CDI scales, yet raised questions about the place of the PO scale in Super's multidimensional model of adolescent career maturity. Originally, Super (1955, p. 156) classified "Specificity of Information about the Preferred Occupation" as a cognitive, not attitudinal, variable because it dealt with information and was more objective. However, in the Savickas (1984a) factor analysis, PO loaded with the attitudinal, not the cognitive, CDI scales. PO displayed significant correlations with the four other CDI scales and with the two measures of time perspective, and its highest correlation occurred with CP (.41). Savickas dealt with this unexpected finding by arguing for reclassifying Knowledge of Preferred Occupation as a variable in the career choice content realm rather than in either the cognitive or attitudinal dimensions of the career choice process realm.

Given the information about the reliabilities of the CDI scales and their factor structure, some researchers have suggested that the WW and DM scales be collapsed into one strong cognitive scale (although they do not recommend revising the structural model) or that each scale be lengthened to increase its reliability. Super preferred the latter course, and, at the time of his final illness, he was preparing to revise the CDI to increase the reliabilities of the cognitive scales.

Concurrent Validity

The validity of the CDI has been examined in a number of studies. These studies typically correlate scores on CDI scales to relevant external variables such as academic achievement, career development, and demographic characteristics. Data from studies conducted prior to 1984 and reviewed in both the user's manual and the technical manual support the validity of the CDI (Locke, 1988). Important aspects of the CDI's validity based on studies not included in the manuals are reviewed hereafter.

Relationships to Cognitive Variables

Knowledge about the relationships of CDI scales to measures of cognitive functioning has been particularly important since Westbrook (1983) called attention to the fact that measures of cognitive career maturity should relate moderately, at most, to measures of intelligence. If cognitive career maturity scales relate strongly to intelligence, then these scales may actually be measuring educational achievement or ability. Thomason and Winer (1994) examined the relationship between intelligence and career maturity in a sample of 53 male and 62 female college students. They reported statistically significant relationships between intelligence, as measured by the Wonderlic Personnel Test (Wonderlic, 1961), and four CDI scales (CP, DM, CE, and WW) for women, but not for men. Unfortunately, they did not report the specific values of these correlations, making it difficult to determine the strength of this association.

Healy and Mourton (1983) reported significant correlations between the CDI cognitive scales and grade-point average in a sample of 138 community college students. These correlations were rather low, however, ranging from .19 for Decision Making to .30 for Knowledge of Preferred Occupation to .31 for World-of-Work Information.

Studying the CDI in Britain, Ward (1982) reported that intelligence test scores related more highly to CDI attitudinal and cognitive scales than those CDI scales related to each other. These findings thus indicated that at least the British version of the CDI scales did not show discriminant validity in relation to measures of intelligence.

Investigating the relationship between career development variables and cognitive structure, Neimeyer, Nevill, Probert, and Fukuyama (1985) administered four CDI scales (CP, CE, DM, & WW), the Career Decision Scale (CDS; Osipow, Carney, Winer, Yanico, & Koschier, 1976), and the Cognitive Differentiation Grid (Bodden, 1970) to 101 undergraduate students. Individuals with more highly integrated vocational schemas (i.e., those perceiving various vocational dimensions, such as job status and salary, as highly connected) related positively to career planning and exploration. Individuals having more highly differentiated schemas (i.e., those able to process vocational information from a variety of perspectives), however, demonstrated lower levels of career planning. The authors explained this latter finding in terms of the need for individuals with less developed career plans to stay vigilant for potentially relevant career paths.

Involvement in a career education program has been shown to increase career maturity in Australian high school students. Trebilco (1984) reported a strong correlation between the presence of a career education program and growth in career maturity as measured by an Australian version of the CDI. Results of this study also indicated that verbal ability correlated highly with the cognitive scales of the Australian CDI. This finding prompted Trebilco to question the ability of the CDI to assess career maturity accurately in students of high academic ability.

It seems safe to conclude that CDI attitude scales diverge from measures of intelligence. However, the evidence is not as clear in regard to the cognitive scales. Any attempts at revising the CDI cognitive scales to increase their reliability should also attend to correlations to cognitive variables. It is desirable, but not essential, that cognitive career maturity scales diverge from intelligence. However, if they do not diverge, then it is essential that they converge with other indices of general maturity that are unrelated to intelligence. For example, world-of-work information should correlate significantly with future orientation, a variable that is unrelated to intelligence.

Relations to Career Development

Further concurrent evidence for the validity of the CDI comes from a study by Dupont (1992). She administered the CDI and the Career Education Questionnaire (CEQ; Dupont & Gingras, 1989) to a sample of 109 graduating high school students. The CDI scores correlated significantly with scores on comparable scales on the CEQ (coefficients ranged from .55 to .65).

In a study cited earlier in this review, Ward (1982) examined the relationships of scores on a British version of the CDI to concomitant and direct career maturity variables. He reported that the CDI related more highly to concomitant variables (socioeconomic status [SES], likely educational attainment, and educational aspiration) than to direct career maturity measures. Ward conceded that the poor quality of the career maturity measures used in his study (expert and teacher ratings of students' maturity) may account for these findings. Correlation coefficients for the CDI with concomitant variables reached only as high as r = .45. These results led Ward to question the concurrent validity of the CDI. However, his results also indicated that his specificity of planning ratings correlated significantly with the CP and CE scales of the British CDI for 3rd-year (r = .32 and r = .23, respectively) and 4th-year students (r = .33 and r = .33).21, respectively). His planning specificity ratings also correlated significantly with CP (r = .28) for 5th-year students. In addition, teacherrated preparedness correlated significantly with career planning attitudes for 5th-year students in the study (r = .44). Although low, these correlations provide additional support for the concurrent validity of the attitudinal scales of the CDI adapted for use in Britain. The correlations of his planning specificity measure to the two CDI attitudinal scales (but not to the two cognitive scales) coincide with Savickas' (1984b) findings and support his suggestion that the PO scale be considered a content rather than a process variable.

Halpin, Ralph, and Halpin (1990) correlated the CDI to a measure of career development, the Adult Career Concerns Inventory (ACCI; Super, Thompson, Lindeman, Jordaan, & Myers, 1988) using a sample of students who had been accepted into a graduate program in nursing. The ACCI measures concern with developmental tasks encountered in the career stages of exploration, establishment, maintenance, and disengagement. Theoretically, the CDI should correlate highly with concerns about career exploration, but not with concerns about career establishment, maintenance, or disengagement. Canonical correlations between the ACCI and CDI scales indicated that individuals concerned with changing careers and exploring alternative occupations, as opposed to those interested in the tasks of establishment, maintenance, and disengagement, scored higher on the CDI planning and exploring scales. These results support the convergent validity of the CDI in showing that CDI scales pertain to the exploration stage and its developmental tasks and do not measure concern or planfulness regarding developmental tasks in other career stages. Moreover, low redundancy coefficients for the canonical variates indicated that the CDI and ACCI share little common variance. These results support the discriminant validity of the CDI in showing that the CDI measures choice attitudes and

competencies, not developmental task mastery. For practical purposes, the study suggests that the CDI can make an important contribution to the vocational assessment of adults who are considering changing careers.

Career theory and empirical research such as that done by Halpin et al. (1990) indicates that the CDI measures attitudes and competencies for coping with the developmental tasks of the exploration stage. These tasks involve *crystallizing* preferences for an occupational field and ability level, *specifying* an occupational choice, and *implementing* that choice. In more closely examining the relation of the CP scale to these tasks, Savickas (1984a) reported that planfulness related more strongly to crystallizing preferences than to specifying a choice. A planful orientation to the future seemed more helpful in formulating preferences than in narrowing down preferences to a specific choice. Unfortunately, Savickas did not investigate the contributions of CE, WW, and DM to coping with crystallizing preferences and specifying choices. It is presumed that at least WW and DM should relate more strongly to making a specific choice than to formulating general preferences.

The validity of the CP scale was further examined in another study by Savickas (1984b). This study examined the hypothesis, framed earlier by Super (1955, 1983), that time perspective is a major, if not *the* major, variable in the planning orientation dimension of career maturity. In a sample of college students, Savickas analyzed the relations among the five CDI scales, two measures of time perspective, and two measures of career decision-making (i.e., degree of indecision and satisfaction with career choice). Time perspective proved to be a component in attitudinal career maturity based on a factor analysis and on zero-order correlation coefficients. The two time perspective measures correlated significantly to CP (.50 and .38) and to CE (.30 and .22), but not to WW and DM. Clearly, time perspective is a major variable in the formation of planful attitudes toward career development and decision-making.

Responding to Campbell and Fiske's (1959) call for multitrait, multimethod approaches to establishing validity, Luzzo (1993) examined three career development measures that included the DM scale of the CDI. DM scale scores correlated significantly (r = .72, p < .001) with open-ended responses to an interview method designed to assess career decision-making skills. These results supported the convergent validity of the DM scale.

The studies that have examined the relationship of CDI scales to career development have strongly and consistently supported the validity of all four CDI scales.

Relationships to Vocational Identity and Decidedness

In a study of career choice crystallization and career maturity (Blustein, 1988), 158 community college students responded to the CDI and two crystallization measures: the Career Commitment Scale (CCS; Jordaan, 1983) and the CDS. Results of a canonical analysis extracted one significant canonical root showing that a variate essentially defined by the CP scale (loading = -.93) correlated .66 (p < .001) to a variate constituted by the CCS (loading = .64) and the CDS (loading = .48). Clearly, CP systematically

covaries with both certainty about and commitment to an occupational choice. Unfortunately, the article did not report a zero-order correlation matrix, so we cannot determine the correlation of each CDI scale to the two commitment scales. Blustein used his results in tandem with previous findings to suggest that many individuals may crystallize a career choice without completing much exploratory behavior or developing sufficient information and decisional competencies.

Using a Dutch adaptation of the CDI, Helbing (1984) examined the relationships among career maturity, self-concept, and identity constructs in 224 male and 185 female high school students. Findings indicated that low CDI scores related directly to low self-esteem, inadequate self-confidence, and a weak sense of identity.

In a study of adolescent career development, Wallace-Broscious, Serafica, and Osipow (1994) administered the CP and CE scales, along with measures of career decidedness, self-concept, and identity status, to 238 high school students. Results supported hypothesized relationships between career choice attitudes and self-esteem, especially among seniors. A significant relationship between career choice attitudes and identity formation also was reported. Specifically, their findings indicated that the CP and CE scales related directly to identity achievement and inversely to moratorium and diffuse identity statuses. Expected intercorrelations resulted from separate pairings of the CDI scales with the two variables of self-concept and identity status. Specifically, CP correlated significantly at the .05 probability level or below with the self-concept dimensions of scholastic competence (.17), job competence (.27), and behavioral conduct (.22) for freshmen and self-worth (.26) and scholastic competence (.27) for seniors. In the freshman group, the CP scale correlated higher and more convincingly with the identity status variables of ideology achievement (.41), moratorium (-.34), and diffusion (-.39). For the seniors, intercorrelations between CP and identity variables ranged from a low of -.18 for foreclosure to a high of only -.42 for diffusion. Overall, CE did not correlate significantly with either the self-concept or identity status variables.

As part of a study about using life history data (e.g., SES, warmth of parental relationship) to predict career maturity, Graef and colleagues (1985) administered the CDI Form CU, My Vocational Situation (MVS; Holland, Daiger & Power, 1980), and the CDS to 200 freshman and sophomore college students (103 men, 97 women). For men, CDI scales related only modestly to the MVS vocational identity score and CDS decidedness scores. Significant correlations emerged between CP and MVS (.54), CP and CDS (.49), DM and CDS (.23), CDA and MVS (.23), and COT and MVS (.23). For women, most CDI scales correlated significantly in expected directions with MVS and CDS scores. These correlations ranged from .20 (p < .05) between CDK and CDS to .65 (p < .001) between CP and MVS. Exceptions for women were that DM, WW, and CDK scales did not correlate significantly with MVS or CDS scores. Overall, these results provide some evidence that certain CDI scales relate as expected with relevant criterion variables.

Taken together, the studies that have correlated the CDI scales to measures of identity and other self-variables persuasively show that CP, alone, shares significant variance with indicators of identity achievement, including vocational identity, career-choice commitment, and career decidedness. These results coincide with Super's (1983) contention that planful attitudes are the most important dimension of career maturity. Future research might investigate whether the correlations between CP and identity indicators exist because they both strongly relate to a third variable such as future orientation.

Relationships to Career Salience

Career maturity, as assessed by the CDI, also has been shown to relate to work role salience. Two parallel studies that examined the relationship between SES and role salience supported the validity of the CDI. In the first study, Super and Nevill (1984) reported significant relationships between the CDI attitudinal scales and the Commitment to Work and Commitment to Home and Family scales of the Salience Inventory (Super & Nevill, 1983) in a sample of high school students. The CDI cognitive scales did not correlate significantly with role salience, however. This led Super and Nevill to surmise that high school students lack career knowledge because, given their career stage, to them the world of work seems far removed from everyday life. In the second study (Nevill & Super, 1988), commitment to work did relate to both the attitudinal and cognitive scales of the CDI in a sample of 372 college students. This finding further supported Super and Nevill's (1984) earlier contention that high school students would not be as interested in obtaining career information as would more developmentally advanced college students for whom assuming the work role presents a much more salient and pressing developmental task.

The findings relative to work role salience are important in supporting not only the validity of the CDI, but also the logic of Super's (1983) model for Career Development Assessment and Counseling. Recall that the prime interpretation of low CP scores is low work-role salience and that the suggested intervention is arousal of interest in the world of work. Super repeatedly taught counselors that for individuals who display little interest in the work role, scores from the CDI and interest inventories lack real meaning.

Relationships to Interests

Although CDI scales measure career-choice *process* variables, two studies investigated their relationships to career-choice *content* variables. Using Holland's (1973) RIASEC model, Healy and Mourton (1984a) examined the relationship between personality type and level of career maturity. They explored the possibility that students with different interests (i.e., Realistic, Investigative, Artistic, Social, Enterprising, and Conventional) might exhibit different levels of career maturity consistent with their personality characteristics. Some expected relationships between scores on the Self-Directed Search (SDS; Holland, 1979) and the CDI emerged (e.g., men with Investigative interests showed higher CP scores, and women with Investigative and Artistic interests showed higher WW scores). Overall, however, their findings indicated inconsistent and statistically weak associations between personality and CDI scales. These weak relationships coincide with what career development theory would predict and support the contention that career development measures make a unique contribution to vocational assessment. Interests and career choice readiness constitute distinct dimensions; interests reflect choice content, and career development scores reflect choice process.

A related study by Healy and Mourton (1984a) examined whether the results obtained on an SDS would improve the WW, DM, and PO scores of 173 community college students. Students in an experimental group responded to the SDS first and the CDI 1 week later. Control group students first completed the CDI and then responded to the SDS the following week. Results from six ANOVAs failed to indicate an effect for SDS on WW and DM. This study supports the expectation that interests and personality types represent a different dimension than career development attitudes and competencies represent. Career development theory suggests that students with greater degrees of career maturity would benefit more from an interest inventory interpretation. Unfortunately, this study did not examine whether students with higher CDI scores were more satisfied with or changed by the SDS intervention. Combining the results of this study with those of Healy and Mourton (1984b) suggests that interest and personality data may have limited value for identifying individuals in need of career development interventions.

Relationships With Demographic Variables

Significant differences in the CDI scores of various groups can be noted. Wallace-Broscious and colleagues (1994) conducted a MANOVA on CP and CE scores obtained from a sample of 134 ninth-grade and 134 twelfthgrade students. Although grade and sex did not interact, significant differences on these variables resulted from both MANOVAs and univariate analyses. These results included overall as well as specific grade and sex effects on the CE and CP scales. Consistent with Super's (1974) theory, 12th graders had mean CP and CE scores of 112.59 and 116.19, respectively. Ninth graders, however, averaged only 94.55 on CP and 98.18 on CE. In terms of sex, girls as a group outscored boys 106.46 to 100.74 on CP and 109.96 to 104.49 on CE.

In a study of career maturity and familial independence, Thomason and Winer (1994) obtained scores on the CDI for 115 college students (53 men, 62 women). They reported that women achieved higher levels of overall career development than did men, based on women's higher mean CDI-COT scores (95.13 versus 81.53). No gender differences emerged on the CDA scale, however, indicating that men and women may differ in terms of cognitive, but not attitudinal, career maturity.

Super and Nevill (1984) examined SES and commitment to work as causal factors in the career maturity of 204 high school students. The sample included students representing a full range of socioeconomic levels. Consistent with previous findings, their results indicated no direct relationship between SES and career maturity as measured by the CDI. They concluded that students gain exposure to the world of work, which fosters their career maturity regardless of SES. Super and Nevill also reported a tendency for girls with a high commitment to work to outscore both other girls and boys of any work commitment level on career maturity.

In a later study, Nevill and Super (1988) conducted multivariate analyses to determine the effect of sex and SES on career maturity in a sample of 372 college undergraduate students representing primarily upper socioeconomic levels. Results yielded no main effect for either sex or SES on career maturity. A significant main effect for college level did result from a multivariate analysis. However, univariate analyses produced significant effects for only the CP scale, indicating that significantly more career planning had been done by seniors and juniors than by sophomores and freshmen.

Higher levels of career maturity have been associated with higher vocational identity in women but not in men (Healy & Mourton, 1985). Further, Healy and Mourton reported that women scoring high on congruence and vocational identity tended to score highest on the DM and WW scales of the CDI. This result did not emerge for men in their college student sample.

Kelly and Cobb (1991) investigated gender and multicultural differences in the career development characteristics of gifted adolescents. Scores on the CDK and PO scales of the CDI for their sample of 107 gifted adolescents ages 11 to 14 years significantly exceeded both the 9th- and 12th-grade norms. The gifted adolescents also outperformed the 9th-grade norm group on the CDA scale of the CDI. They scored lower on the CDA scale, however, in comparison to the 12th-grade norm group. In terms of gender and cultural differences, female adolescents in the study scored higher on CDK than did male adolescents. Asian, Black, and White participants showed no statistically significant differences in their career development characteristics. Kelly and Cobb aptly emphasized the need, however, for studies with larger and more diverse samples before reaching any firm conclusions about how culture relates to the career development of gifted individuals.

As measured by a Dutch version of the CDI, Helbing (1984) reported small gender differences in planning orientation. He reported that female high school students grow more planful, as well as more decided and involved in decision making, with increasing age. This finding did not occur for male students in the study.

As part of a study to determine the influence of a computerized career guidance system on vocational maturity, Drodge and Sumarah (1990) examined the effect of gender, as well as work experience, on the career maturity of 57 ninth graders as measured by the CDI. No differences were found in CDI scores between students who received the computer guidance treatment and students in a control group. Similarly, the CDI scale mean scores for male and female students, as well as for students with or without work experience, did not differ significantly. Consistent with other studies,

gender did not have a significant effect on career maturity. The very small sample used and the limited treatment exposure of students in the experimental group severely constrain these results, however.

Seifert (1985) systematically evaluated guidance and counseling programs in Vienna and Linz, Austria. As part of his assessment, Seifert administered an adapted version of the CDI to a total of 641 eighth- and ninth-grade students from general compulsory schools, prevocational schools, and lower commercial schools (i.e., full-time vocational schools). Students in the prevocational schools had significantly higher mean scores on the adapted CDI scales, with particularly elevated WW and DM scores, than did the general compulsory school students.

These studies suggest that the CDI scores are far less confounded by sex and SES than are measures of career choice content. Moreover, although no studies directly compared two or more measures of career choice process with regard to sex and SES, the CDI seems to be among the few career instruments that are only weakly associated with sex and SES. When sex differences do emerge, they have generally favored women. This fact has prompted more than one observer to conclude that female advantages in career maturation do not necessarily translate into more congruent and satisfying career choices because of sexism in the educational system and occupational sex segregation.

Predictive Validity

A small number of studies have examined the predictive validity of the CDI. Dupont (1992) administered the first four scales of the CDI to 365 graduating high school seniors in Quebec (159 girls, 134 boys) at the time they made their postsecondary school choices. One year later, she telephoned 331 of those graduates to ascertain their satisfaction with their choices. Students labeled "persevering or stable" (60% of the sample) continued in their original career choices, whereas "nonpersevering" students (40%) changed career direction. Results of t-tests indicated small but significant differences in the mean scores of the two groups on the CE, DM, and WW scales. Persevering students scored significantly higher than the nonpersevering students scored in each case. Thus, these CDI scales may be useful in predicting career choice perseverance, a behavioral component of career maturity.

In a sample of 1,336 eleventh- and twelfth-grade students, Seifert (1991) investigated the predictive validity of the Austrian version of the CDI. He reported that various CDI scales best predicted five career-related criterion variables. These variables included career choice concerns, self-assessed appropriateness and certainty of realizing a preference, length of time considering the preferred option, intrinsic motivation, and decidedness.

Lewis, Savickas, and Jones (in press) used the CDI in a prospective, longitudinal study of 111 first-year medical students whose progress was followed during their first 2 years in medical school. They concluded that, in predicting academic difficulties in medical school, the CDI accounted for statistically significant amounts of variance beyond the variance attributed to academic variables such as mental ability and educational achievement. The CDI was twice as effective as the academic variables in predicting which students would encounter academic difficulties. Thus, this study showed that the CDI measures variables distinct from academic achievement and intelligence.

Additional studies about the CDI's ability to predict subsequent career development remains perhaps the primary area for future research. Further study over longer periods of time will enhance knowledge about the CDI's predictive validity. Those who wish to conduct research concerning the predictive validity of career development measures should consult an article by Savickas (1993) that discusses theoretical issues and practical problems in selecting appropriate criteria for predictive validity studies.

Conclusions

The body of career literature that deals with the CDI strongly supports the sensitivity and specificity of the inventory as a measure of readiness to make educational choices, vocational choices, or both, and as an operational definition of Super's (1974) structural model of adolescent career maturity. If the CDI is revised, attention should focus on increasing the reliability of the two cognitive scales and extending their divergence from measures of mental ability and educational achievement. The most pressing CDI research need concerns studies that examine its predictive validity. Finally, counselors and researchers who use the CDI must remember that it measures coping behaviors that deal with the career development tasks of crystallizing and specifying career choices; the CDI should not be used to measure career development variables that the CDI items do not address.

References

Andrich, D., & Sheridan, B. (1980). Rate: A Fortran IV program for analyzing rated data according to a Rasch model (Research Rep. No. 5). Nedlands, Western Australia: University of Western Australia, Department of Education, Measurement and Statistics Laboratory.

Betz, N. E. (1988). The assessment of career development and maturity. In W. B. Walsh & S. H. Osipow (Eds.), *Career decision making* (pp.77-136). Hillsdale, NJ: Erlbaum.

Blustein, D. L. (1988). A canonical analysis of career choice crystallization and vocational maturity. *Journal of Counseling Psychology*, 35, 294-297.

Bodden, J. (1970). Cognitive complexity as a factor in appropriate vocational choice. Journal of Counseling Psychology, 17, 364-368.

Campbell, D., & Fiske, D. (1959). Convergent and discriminant validation by the multitraitmultimethod matrix. *Psychological Bulletin*, 54, 81-105.

Drodge, E. N., & Sumarah, J. C. (1990). The effects of the computer-based program, "Career Search," on the vocational maturity of grade nine students. *Canadian Journal of Counselling*, 24, 26-35.

Dupont, P. (1992). Concurrent and predictive validity of career development inventory. International Journal for the Advancement of Counselling, 15, 163-173.

Dupont, P., & Gingras, M. (1989). *Questionnaire sur l'education a la carriere* [Career Education Questionnaire]. Sherbrooke, Quebec, Canada: Centre de recherche sur l'éducation a la carriere, Université de Sherbrooke.

Graef, M. I., Wells, D. L., Hyland, A. M., & Muchinsky, P. M. (1985). Life history antecedents of vocational indecision. *Journal of Vocational Behavior*, 27, 276-297.

Halpin, G., Ralph, J., & Halpin, G. (1990). The Adult Career Concerns Inventory: Validity and reliability. *Measurement and Evaluation in Counseling and Development*, 22, 196-202.

Hansen, J. C. (1985). Career Development Inventory. Measurement and Evaluation in Counseling and Development, 17, 220-224.

Healy, C. C., & Mourton, D. L. (1983). Derivatives of the Self-Directed Search: Potential clinical and evaluative uses. *Journal of Vocational Behavior*, 23, 318-328.

Healy, C. C., & Mourton, D. L. (1984a). The effects of an abbreviated Self-Directed Search on the career decision competencies of community college students. *Vocational Guidance Quarterly*, 33, 55-62.

Healy, C. C., & Mourton, D. L. (1984b). The Self-Directed Search personality scales and career maturity. *Measurement and Evaluation in Guidance*, 17, 3-14.

Healy, C. C., & Mourton, D. L. (1985). Congruence and vocational identity: Outcomes of career counseling with persuasive power. *Journal of Counseling Psychology*, 32, 441-444.

Helbing, J. C. (1984). Vocational maturity, self-concepts, and identity. *International Review of Applied Psychology*, 33, 335-350.

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

Holland, J. L. (1979). The Self-Directed Search: Professional manual. Palo Alto, CA: Consulting Psychologists Press.

Holland, J. L. (1992). Making vocational choices (2nd ed.). Odessa, FL: Psychological Assessment Resources.

Holland, J. L., Daiger, D. C., & Power, P. G. (1980). My vocational situation. Palo Alto, CA: Consulting Psychologists Press.

Jepsen, D. A. (1992). A developmental career counseling approach for the case of Rachel. *Career Development Quarterly*, 41, 36-38.

Jordaan, J. P. (1974). The use of vocational maturity instruments in counseling. In D. E. Super (Ed.), *Measuring vocational maturity for counseling and evaluation* (pp. 113-121). Washington, DC: National Vocational Guidance Association.

Jordaan, J. P. (1983). Career Commitment Scale. Unpublished manuscript, Teachers College, Columbia University, New York.

Kelly, K. R., & Cobb, S. J. (1991). A profile of the career development characteristics of young gifted adolescents: Examining gender and multicultural differences. *Roeper Review*, 13, 202-206.

Kuhlman-Harrison, J., & Neely, M. A. (1980). Discriminant validity of Career Development Inventory scales in grade 10 students. *Educational and Psychological Measurement*, 40, 475-478.

Lewis, D. M., Savickas, M. L., & Jones, B. J. (in press). Career development predicts medical school success. *Journal of Vocational Behavior*.

Locke, D. C. (1988). Review of the Career Development Inventory. In J. T. Kapes & M. M. Mastie (Eds.), A counselor's guide to career assessment instruments (pp. 176-179). Alexandria, VA: National Career Development Association.

Luzzo, D. A. (1993). A multi-trait, multi-method analysis of three career development measures. *Career Development Quarterly*, 41, 367-373.

Neimeyer, G. J., Nevill, D. D., Probert, B., & Fukuyama, M. (1985). Cognitive structures in vocational development. *Journal of Vocational Behavior*, 27, 191-201.

Nevill, D. D., & Super, D. E. (1988). Career maturity and commitment to work in university students. *Journal of Vocational Behavior*, 32, 139-151.

Niles, S. G., & Usher, C. H. (1993). Applying the Career-Development Assessment and Counseling Model to the case of Rosie. *Career Development Quarterly*, 42, 61-66.

Osipow, S., Carney, C.G., Winer, J.L., Yanico, B., & Koschier, M. (1976). The Career Decision Scale (3rd rev.). Odessa, FL: Psychological Assessment Resources.

Punch, K. F., & Sheridan, B. E. (1985). Some measurement characteristics of the Career Development Inventory. *Measurement and Evaluation in Counseling and Development*, 17, 196-202.

Rasch, G. (1960). Probabilistic models for some intelligence and attainment tests. Copenhagen: Danish Institute for Educational Research (Expanded ed., 1980. Chicago: University of Chicago Press).

Rasch, G. (1966). An item analysis which takes individual differences into account. British Journal of Mathematical and Statistical Psychology, 19, 49-57.

Savickas, M. L. (1984a). Construction and validation of a physician career development inventory. *Journal of Vocational Behavior*, 25, 106-123.

Savickas, M. L. (1984b). Time perspective in vocational maturity and career decision making. *Journal of Vocational Behavior*, 25, 258-269.

Savickas, M. L. (1990). The use of career choice process scales in counseling practice. In E. Watkins, Jr., & V. Campbell (Eds.), *Testing counseling practice* (pp. 373-417). Hillsdale, NJ: Erlbaum.

Savickas, M. L. (1993). The predictive validity of career development measures. Journal of Career Assessment, 1, 93-104.

Seifert, K. H. (1985). Evaluation of guidance and counseling in Austria. International Journal for the Advancement of Counselling, 8, 55-73.

Seifert, K. H. (1991). Measures of career development and career choice behavior. Applied Psychology: An International Review, 40, 245-267.

Super, D. E., (1955). The dimensions and measurement of vocational maturity. *Teachers College Record*, 57, 151-163.

Super, D. E. (Ed.). (1974). Measuring vocational maturity for counseling and evaluation. Washington, DC: National Vocational Guidance Association.

Super, D. E., (1983). Assessment in career guidance: Toward truly developmental counseling. *Personnel and Guidance Journal*, 61, 555-562.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown, L. Brooks, & Associates (Eds.), *Career choice and development: Applying contemporary theories to practice* (2nd ed., pp. 197-261). San Francisco: Jossey-Bass.

Super, D. E., & Forrest, D. J. (1972). Career Development Inventory, Form I: Preliminary manual. (Mimeo). Teachers College, Columbia University, New York.

Super, D. E., & Nevill, D. D. (1983). The Values Scale and the Salience Inventory of the Work Importance Study. Gainesville, FL: Department of Psychology, University of Florida.

Super, D. E., & Nevill, D. D. (1984). Work role salience as a determinant of career maturity in high school students. *Journal of Vocational Behavior*, 25, 30-44.

Super, D. E., Osborne, W. L., Walsh. D. J., Brown, S. D., & Niles, S. G. (1992). Developmental career assessment and counseling: The C-DAC model. *Journal of Counseling* and Development, 71, 74-80.

Super, D. E., & Overstreet, P. L. (1960). The vocational maturity of ninth-grade boys. New York: Teachers College Press.

Super, D. E., & Thompson, A. S. (1979). A six-scale, two-factor measure of adolescent career or vocational maturity. *Vocational Guidance Quarterly*, 28, 6-15.

Super, D. E., Thompson, A. S., Lindeman, R. H., Jordaan, J. P., & Myers, R. A. (1979). Career Development Inventory: School form. Palo Alto, CA: Consulting Psychologists Press.

Super, D. E., Thompson, A. S., Lindeman, R. H., Jordaan, J. P., & Myers, R. A. (1981). Career Development Inventory: College form. Palo Alto, CA: Consulting Psychologists Press.

Super, D. E., Thompson, A. S., Lindeman, R. H., Jordaan, J. P., & Myers, R. A. (1988). Adult Career Concerns Inventory. Palo Alto, CA: Consulting Psychologists Press.

Thomason, S. L., & Winer, J. L. (1994). Career maturity and familial independence among college freshmen. *Journal of Career Development*, 21, 23-35.

Thompson, A. S., & Lindeman, R. H. (1981). Career Development Inventory: User's manual. Palo Alto, CA: Consulting Psychologists Press.

Thompson, A. S., & Lindeman, R. H. (1982). Career Development Inventory college and university form supplement to user's manual. Palo Alto, CA: Consulting Psychologists Press.

Thompson, A. S., & Lindeman, R. H. (1984). Career Development Inventory: Technical manual. Palo Alto, CA: Consulting Psychologists Press.

Trebilco, G. R. (1984). Career education and career maturity. Journal of Vocational Behavior, 25, 191-202.

Wallace-Broscious, A., Serafica, F. C., & Osipow, S. H. (1994). Adolescent career development: Relationships to self-concept and identity status. *Journal of Research on Adolescence*, 4, 127-149.

Ward, R. (1982). An assessment of the psychometric adequacy of the British adaptation of the Career Development Inventory. *British Journal of Guidance and Counselling*, 10, 185-194.

Westbrook, B. W. (1983). Career maturity: The concept, the instrument, and the research. In W. B. Walsh & S. H. Osipow (Eds.), *Handbook of vocational psychology* (Vol. 1, pp. 263-304). Hillsdale, NJ: Erlbaum.

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Wonderlic, E. F. (1961). Wonderlic Personnel Test manual. Northfield, IL: Author.