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APPLICATIONS OF SELF-EFFICACY THEORY TO UNDERSTANDING CAREER CHOICE BEHAVIOR

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This paper reviews the literature on applications of Bandura's (1977, 1982) self-efficacy theory to the career domain. After a description of the utility of the self-efficacy construct in understanding the mechanisms affecting women's disadvantaged status in the labor force and the usefulness of career self-efficacy in building models predicting the occupational choice behavior of men and women, a review of the research on career self-efficacy is provided. Investigations of self-perceptions of efficacy in relation to occupational choices provide support for the major hypotheses derived from self-efficacy theory.

Vocational psychology has been dominated historically by trait-factor and developmental approaches to the explanation, prediction, and modification of career behavior (Osipow, 1983; Walsh & Osipow, 1983). Only recently have researchers begun to systematically apply social learning theory approaches to career development (Krumboltz, Mitchell, & Jones, 1976; A. M. Mitchell, Jones, & Krumboltz, 1979), although these attempts at theory building have not yet explicitly included self-efficacy theory, also a relatively recent development (Bandura, 1977, 1982). The purpose of this paper is to provide a brief description of the applications of self-efficacy theory to the career domain, particularly to the career choice process, and then to review the empirical research on this topic.

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SELF-EFFICACY AND WOMEN'S CAREER DEVELOPMENT

The initial application of self-efficacy theory to the career area was our (Hackett & Betz, 1981) postulate that the concept of self-efficacy expectancies might prove useful in explaining two continuing problems related to women's career development—that is, their continued underrepresentation in many male-dominated career fields, particularly those in mathematics, engineering, and the sciences (Humphreys, 1982; National Science Foundation, 1984; Pfafflin, 1984); and the serious underutilization of their abilities and talents in career pursuits (Farmer, 1976; Fitzgerald & Crites, 1980). More specifically, we postulated that differential sex-role socialization provides different types and levels of Bandura's four sources of self-efficacy information to females versus males, and that the resulting gender differences in self-efficacy expectancies importantly influence the career-related behaviors and career choices of young women.

In addition to the emphasis by ourselves and our colleagues on gender differences in career self-efficacy, the broader impact of career self-efficacy on important career behaviors, such as range and type of career options considered, performance, and persistence, has also been a primary focus. We use the term "career self-efficacy" here as a generic label for self-efficacy expectancies in relation to the wide range of behaviors necessary to the career choice and adjustment processes. More descriptive terms are employed to refer to self-efficacy expectancies with regard to the specific type of career choice or career adjustment under investigation. The following review discusses occupational self-efficacy, mathematics self-efficacy, career decision-making self-efficacy, task-specific self-efficacy, and career adjustment.

OCCUPATIONAL SELF-EFFICACY

In our initial empirical test of the usefulness of self-efficacy theory in understanding the career choice process, we (Betz & Hackett, 1981) examined gender differences in self-efficacy with regard to the educational requirements and job duties of a variety of traditionally male and traditionally female occupations, and tested the utility of occupational self-efficacy in predicting the range (number) of occupational alternatives considered by our college-student sample. In this study, occupational self-efficacy was assessed by asking subjects to respond to questions about their capabilities with regard to the educational requirements and job duties of a series of 10 "traditional" occupations (defined as occupations in which two-thirds or more of the members are women)

and 10 "nontraditional" occupations (i.e., occupations in which men constitute the majority of the membership).

No significant gender differences were observed in overall occupational self-efficacy, but significant differences were found in the occupational self-efficacy expectancies of females and males when traditionality of the occupation was taken into account. Men's occupational self-efficacy was equivalent for traditionally male and traditionally female occupations; women's self-efficacy expectancies were lower than men's for nontraditional occupations, and significantly higher than men's for traditional occupations. These gender differences were highly predictive of gender differences in range of traditional and nontraditional occupations considered.

Stepwise regression analyses revealed that occupational self-efficacy, in combination with gender and measures of vocational interests, was significantly predictive of consideration of occupational alternatives. Measured ability, a major predictive variable in traditional vocational theories, was not found to be a significant predictor in this study. Interests and self-efficacy were significantly correlated, but the results support the importance and independent contribution of occupational self-efficacy in explaining gender differences in the consideration of traditional and nontraditional careers.

Two other studies investigating occupational self-efficacy replicate and extend our (Betz & Hackett, 1981) findings: those by Layton (1984) and Wheeler (1983). Layton (1984) compared a self-efficacy model of women's career development with a locus of control model in predicting career exploration behavior and the range of occupations under consideration by college females. Layton found that women's self-efficacy for traditionally female occupations was significantly higher than their nontraditional occupational self-efficacy, and that these differences in self-efficacy were moderately correlated with the range of traditional or nontraditional careers considered. Overall, the self-efficacy model was superior to the locus of control model, and nontraditional occupational self-efficacy was superior to all other variables, including interests, ability, and various background variables, in predicting choice of a nontraditional college major.

Wheeler (1983) compared a self-efficacy model of occupational choice to an expectancy-valence model. According to the expectancy model, occupational choice is dependent on the interaction between a person's work values and the availability of the outcomes in occupations being considered. In some ways, the expectancy model resembles aspects of Bandura's construct of outcome expectancies (Bandura, 1982).

Wheeler operationalized occupational self-efficacy with regard to a series of 17 occupations ranging from traditionally male to traditionally

female in two ways: (1) perceived match of abilities, and (2) perceived ease of success. Results indicated that both occupational self-efficacy and occupational valence were significantly related to occupational preferences, but that self-perceptions of occupational efficacy, when defined as perceived ability match, were significantly more predictive of preferences than was occupational valence. Gender differences in occupational self-efficacy were also observed; these gender differences were directly related to the relative percentages of males and females in the 17 occupations, and gender differences in self-efficacy expectancies were significantly correlated with gender differences in preferences.

Wheeler (1983) concluded that while self-efficacy with regard to occupations is significantly more useful than valence of occupational alternatives in predicting vocational preferences, both variables should be included in models of occupational choice. Given the previously mentioned similarities between Wheeler's expectancy-valence model and Bandura's (1982) construct of outcome expectancies, the results of this study are strongly supportive of the applicability of Bandura's concepts to career behavior.

A different approach to the assessment of occupational self-efficacy was taken by Ayres (1980). Ayres's selection of the four occupations of physician, nurse, college professor, and elementary teacher was intended to cross levels of sex-role traditionality of the occupation with science versus nonscience orientation. For each occupation, a list of tasks and competencies required for the successful pursuit of the occupation was generated. Subjects' self-efficacy with respect to these competencies was then assessed.

Ayres (1980) reported a significant relationship between self-efficacy expectancies and occupational consideration. Although no overall gender differences were found, gender differences were observed on specific tasks: For example, men scored higher in response to mathematics and science-related items, while women's self-efficacy expectancies were higher with regard to stereotypically feminine behaviors such as caring for the sick, child development, and teaching. Ayres also reported several moderate but significant correlations between self-efficacy and abilities.

Lent, Brown, and Larkin (1984) investigated the relationship between self-efficacy estimates and the degree of persistence and academic success of students majoring in the sciences and engineering. Using a relatively small sample of students who had declared college majors in engineering, Lent *et al.* found generally that students with higher confidence in their abilities relative to the scientific occupations sampled achieved higher grades and persisted longer in their majors. Moderate and significant correlations were also reported between technical/scientific self-efficacy and objective measures of mathematics apti-

tude and high-school achievement. No gender differences in occupational self-efficacy were found.

In a subsequent study, Lent, Brown, and Larkin (1985) conducted a partial replication and extension of their earlier study with a larger sample. In this study, a second measure of technical/scientific self-efficacy was developed, assessing self-efficacy beliefs with regard to "academic milestones"—that is, specific accomplishments critical to academic success in science and engineering majors, such as "completing the mathematics requirements" and "remaining enrolled in the college of technology." Lent *et al.* (1985) also included a measure of perceived vocational options in technical/scientific fields and measures of self-esteem, career decidedness, vocational preferences, and ability.

As in the previous study, results from this study indicated an absence of gender differences in self-efficacy expectancies, but technical/scientific self-efficacy was significantly predictive of grades in technical courses, persistence in a major, and range of career options considered. Hierarchical regression analyses provided support for the incremental contribution of occupational self-efficacy in the prediction of performance.

MATHEMATICS SELF-EFFICACY

Because of the increasing importance of adequate academic preparation in mathematics to the pursuit of a wide range of technical/scientific careers, and the significant gender differences found in mathematics achievement, mathematics self-efficacy has been deemed to be a crucial area of study for career self-efficacy research. We (Betz & Hackett, 1983) developed an instrument to assess expectancies of self-efficacy with regard to three mathematical domains (everyday math tasks, math problems, and math-based college courses) and explored the utility of mathematics self-efficacy in predicting the choice of math-related (or "science-based") college majors.

Results indicated that mathematics self-efficacy expectancies were significantly related to the extent to which students selected math-related college majors, and that college males' stronger math self-efficacy corresponded with their greater likelihood to choose a major in the math/science area. Math self-efficacy was significantly related to indices of attitudes toward mathematics, with the strongest relationships being among math self-efficacy, math anxiety, and confidence in learning mathematics. In the regression analysis, math self-efficacy was the strongest predictor of choice of a math-related major; mathematics scores from the American College Test did not enter into the prediction equation.

Although men scored significantly higher than women on the total scale and the three subscales, females' self-efficacy expectancies were equal to males' when the tasks involved stereotypically feminine activities (e.g., calculating a grocery bill in one's head, figuring out how much fabric to buy in order to make drapes). This finding, along with similar results (Ayres, 1980; Betz & Hackett, 1981), supports the hypothesis of sex-role socialization influences on self-estimates of efficacy, and suggests the importance of including traditionally female content areas in math problems and in the treatment of math avoidance and math anxiety.

We (Hackett & Betz, 1982) also found low to moderate correlations between mathematics self-efficacy and performance on a series of math problems. We concluded that math self-efficacy is more strongly related to other indices of math-related attitudes than to performance. Moreover, the results failed to support the hypothesis that women's math self-efficacy expectancies are unrealistically low.

Hackett (1985) tested the hypothesis that mathematics-related self-efficacy mediates the effects of gender and of mathematical preparation and achievement on the math-relatedness of college major choice. A causal model based on self-efficacy theory was constructed and tested using path-analytic techniques. Results consistent with a self-efficacy approach to career development were reported. Gender, sex-role socialization, high-school mathematical preparation, and mathematics achievement were all found to influence math self-efficacy, which in turn was significantly predictive of math-related major choice and also influenced math anxiety.

And finally, in a related vein, Kerns (1981) developed an analogous measure with respect to studying, performing, and majoring in chemistry. Like us (Betz & Hackett, 1983), Kerns found significant sex differences and relationships between self-efficacy and choices of major.

CAREER DECISION-MAKING SELF-EFFICACY

In vocational psychology, a major distinction is made between the content and the process of career choice (Crites, 1969, 1981). The "content" of career choice refers to *what* the individual considers or chooses (e.g., careers in science, careers requiring a college degree). The "process" refers to *how* decisions are made (e.g., the nature of the exploration and decision-making activities engaged in). Although most of our research program to date has focused on career choice content, one study examined the usefulness of self-efficacy in the understanding of process variables.

Taylor and Betz (1983) examined self-efficacy expectancies with regard to the skills and activities necessary to effective career decision making. Based on Crites's (1981) system of career choice competencies from his theory of career maturity, self-estimates of ability were measured with respect to (1) goal selection, (2) occupational information, (3) problem solving, (4) planning, and (5) self-appraisal. Self-efficacy for career decision making was significantly predictive of career indecision; that is, subjects who reported low levels of career decision-making self-efficacy were also more career-indecisive. No overall gender differences in self-efficacy for career decision making were observed, nor was there a relationship between career decision-making self-efficacy and academic ability.

TASK-SPECIFIC SELF-EFFICACY

Several analogue studies have been performed to test Bandura's propositions regarding the sources of information, particularly performance accomplishments, hypothesized to be influential in modifying career-related self-efficacy. We (Hackett & Betz, 1984) investigated the effects of failure at a math or verbal task on general and specific measures of mathematics self-efficacy, as well as on global ratings of math and verbal ability. Conflicting results emerged. Findings indicated that task failure influenced self-efficacy expectancies, but not always in the expected direction. Gender × task interactions were observed, and, contrary to predictions, the effects of task failure in one domain (i.e., either the math or the verbal task) in some cases positively influenced self-efficacy expectancies in the other domain.

Campbell and Hackett (1985; Hackett & Campbell, 1985) then conducted two additional experimental studies of the effects of task success or failure on mathematical and verbal task self-efficacy, task interest, and performance attributions. The results were consistent with theoretical predictions: Task success led to an increase in self-efficacy expectancies, while task failure led to a corresponding drop in both level and strength of task self-efficacy; task performance similarly influenced ability ratings, task interest, and performance attributions. Gender differences and gender × task interactions in self-efficacy and task interest appeared as a result of success or failure at the mathematical task, but were not found in response to verbal task performance. Furthermore, a trend was found for women to be more strongly affected than men by both success and failure.

CAREER ADJUSTMENT

Although most of our own and our colleagues' research has focused on career choice, self-efficacy theory has great potential as well for the understanding and facilitation of career adjustment. In vocational psychology, "career adjustment" refers to the processes of implementing one's career choice and finding both success and satisfaction in one's chosen career (Crites, 1969; Lofquist & Dawis, 1984). Although there are a variety of factors capable of influencing vocational success and satisfaction, self-efficacy expectancies with respect to both content and process career competencies are postulated to be among those factors.

As a first step in applying self-efficacy theory to career adjustment, it was necessary to delineate the domain of requisite career competencies. Since the vocational literature had not directly addressed this issue, we developed a taxonomy of such competencies to guide research efforts. Specifically, we (Hackett, Betz, & Doty, 1985) interviewed 50 academic women about their perceptions of factors influential in their career development, identified specific behavioral competencies described by these women, and classified the information. The resulting taxonomy contained both content competencies (i.e., specific job-related skills, such as writing ability, knowledge in one's subject, etc.) and process competencies (e.g., leadership, assertion, and problem-solving skills). Research efforts designed to examine self-efficacy expectancies with respect to such competencies have to date focused on leadership behaviors (Konitsney, 1981) and "career facilitation skills" (i.e., behaviors indicative of proactive rather than reactive pursuit of educational and career objectives) (Betz & Hackett, 1982). Related research includes Lee's (1983, 1984) work on assertiveness and Moe and Zeiss's (1982) work on social skills. Much work remains to be done in the area of career adjustment, particularly in addressing difficulties with the measurement of self-efficacy with regard to complex social and career-related behaviors.

SUMMARY AND IMPLICATIONS

The results of the studies reviewed herein provide strong support for the major mediational role played by occupational self-efficacy in the process of choosing a career. Occupational self-efficacy is an important variable to include in extant and developing models of career choice, and interactions between occupational self-efficacy and various other career-related variables (e.g., vocational interests, career salience, and

work values) will undoubtedly prove to be heuristic to research on career development.

Career self-efficacy appears to be important in understanding women's career choices when the traditionality of the occupational alternatives is taken into account. Likewise, when investigating expectancies with regard to specific skills, tasks, or abilities, the sex-role stereotypicality of the task or activity is a major determinant of gender differences in self-efficacy.

Summarized below are suggestions for directions in research on career self-efficacy. For a fuller exposition of suggested future research, as well as discussion of the methodological and conceptual issues in career self-efficacy, the reader is referred to Lent and Hackett (1985).

First, more attention to measurement issues is needed. Identification of appropriate levels of specificity for measuring self-efficacy expectancies is needed, as is work on the reliability and validity of the instruments employed. Second, the issue of generalizability must be explored; samples other than college students should be studied. Third, more attention to career adjustment, as opposed to career choice, is necessary in order to establish the usefulness of the self-efficacy construct in the explanation and prediction of a wide range of career behaviors. Specifically, investigations of the relationship between career self-efficacy and job satisfaction, work adjustment, and occupational stress offer promise in enhancing our knowledge of important career-related problems. Fourth, further efforts directed toward model testing and comparisons between theoretical models in predicting career choice and adjustment should take advantage of the sophisticated causal-modeling procedures available (e.g., Bentler, 1980; Joreskog & Sorbom, 1984). These statistical techniques will allow the investigation of the complex interactions of factors reflecting Bandura's (1978) concept of reciprocal determinism. They will also allow the construction of more accurate and realistic models of career behavior.

Finally, the most important test of the career self-efficacy construct will come in studies investigating the effectiveness of theory-based interventions. The career counseling literature already contains a vast array of interventions of varying potencies (Lunneborg, 1983; L. K. Mitchell & Krumboltz, 1984; Spokane & Oliver, 1983). Self-efficacy theory may not lead to new counseling procedures, but it may be very useful in redesigning interventions or in guiding the development of treatment packages consisting of multiple interventions, which will eventually prove to be more effective in facilitating satisfying career choices and career development in general.

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