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CONFIRMATORY FACTOR ANALYSIS OF THE CAREER DECISION-MAKING SELF-EFFICACY SCALE AMONG SOUTH AFRICAN UNIVERSITY STUDENTS

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ABSTRACT

There is a need for South African researchers to explore the potential utility of career decision-making self-efficacy in understanding the career behaviour of tertiary students. Given the lack of standardised measures for this construct, the responses of 364 South African university students to the Career Decision-Making Self-Efficacy Scale : Short Form (CDMSE-SF) were analysed using item statistics, Cronbach's alpha and confirmatory factor analysis to determine whether items supported the theorized subscales. The results failed to support the original factors (Taylor & Betz, 1983). It is recommended that the total score is used in South Africa at present and that exploratory factor analysis of the CDMSE-SF be undertaken.

OPSOMMING

Dit is noodsaaklik vir Suid-Afrikaanse navorsers om die potensiële bruikbaarheid van loopbaanbesluitneming-selfdoeltreffendheid ("career decision-making self-efficacy") te ondersoek in 'n poging om die tersiêre studente beter te begryp. Gegewe die gebrek aan gestandaardiseerde meetinstrumente vir hierdie konstruk, is response van 364 Suid-Afrikaanse universiteitstudente op die Career Decision-Making Self-Efficacy Scale: Short Form (CDMSE-SF) met behulp van itemontleding, Cronbach se alpha en bevestigende faktorontleding ontleed, om te bepaal of die vraelys-items die teoretiese subskale ondersteun. Die resultate ondersteun nie die oorspronklike faktore nie (Taylor & Betz, 1983). Daar word voorgestel dat slegs die volskaaltellings in Suid Afrika gebruik word en dat ondersoekende faktorontleding van die CDMSE-SF onderneem word.

Bandura's (1986) theory of self-efficacy defines self-efficacy expectations as the belief and confidence individuals have in their ability to perform successfully given tasks or behaviours. Low self-efficacy expectations lead to avoidance of specific tasks or behaviours, while high self-efficacy expectations increase the frequency of approach behaviours. Bandura (1986) has proposed that self-efficacy expectations are primary mediators of how long behaviour is maintained in the face of challenging circumstances, such as aversive experiences and obstacles. Self-efficacy theory implies that how individuals behave can be better predicted by their beliefs about their capabilities than by their actual capabilities. Self-efficacy determines, thus, what individuals do with the skills they have.

Taylor and Betz (1983) have emphasised the utility of the self-efficacy construct in understanding career behaviour, hypothesizing that career indecisiveness reflects low self-efficacy expectations with respect to the tasks and behaviours required to make career decisions. The resultant avoidance of such tasks perpetuates career indecision. A review by Lent and Hackett (1987) suggests strong empirical support among tertiary students for the use of career decision-making self-efficacy as a predictor of various career entry behaviours such as the choice of majors and academic performance. Subsequent meta-analyses and reviews continue to endorse the construct as "one of the most heuristic and useful practices in career development research" (Betz & Voyten, 1997, p. 179).

The construct of self-efficacy has been used to explain an increasing diversity of career behaviours. For instance, career decision-making self-efficacy has been found to be a better predictor of career exploratory behaviour than goal-directedness (Blustein, 1989) and a better predictor of career maturity than locus of control (Luzzo, 1995) in college students. More recent research has demonstrated that individuals with stable and multiple trial career patterns have significantly greater career decision-making self-efficacy than individuals with unstable and more conventional career patterns (Gianakos, 1999). Gianakos argues that the concept of career decision-making self-efficacy has become synonymous with stability and persistence in career choice.

Career decision-making self-efficacy seems a particularly useful construct for understanding the career behaviours of South Africa's multicultural population. That many South Africans have faced and will continue to face challenging circumstances in their career development is well-documented (Stead & Watson, 1998a, 1999a). The career development of South Africans continues to be challenged by a lack of opportunity to explore and commit themselves to stable careers, by unstable and unpredictable environmental factors (Watson, 1999), by a lack of role models and support systems (Stead & Watson, 1998b), and by unemployment which stands as high as 48.5% in certain provinces (Kane-Berman, 1999). More recent labour legislation will affect the career opportunities of South Africans in various ways. While this has resulted in a plea for South African researchers to consider multicultural and economic contexts as important factors in understanding career behaviour (Stead & Watson, 1998a), there has been little research on how individuals cope with such contexts and how such contexts may impact on individuals' career self-efficacy expectations.

Taylor and Betz (1983) were the first to develop a standardized measure of career decision-making self-efficacy. The five subscales of their Career Decision-Making Self-Efficacy Scale (CDMSES) reflect the career choice competencies that Crites (1961) hypothesized as relevant to the career decision making process, i.e. accurate self-appraisal, gathering occupational information, goal selection, making plans for the future, and problem solving. Taylor and Betz's principal components factor analysis of the CDMSES failed to support the original five factors they proposed, with most items loading on a general factor. They concluded that the CDMSES may be more appropriate as a measure of general career decision-making self-efficacy.

Two other studies have reported on the subscale structure of the CDMSES. Robbins' (1985) discriminant analysis of the CDMSES has confirmed a considerable overlap between the five subscales. Taylor and Popma (1990) replicated Taylor and

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Betz's (1983) earlier principal components factor analysis and revealed a factor structure that was "slightly more clear-cut" (p. 227) than the original factor analysis. They found that most items did not have large loadings on more than one factor and that items were more evenly distributed across the five factors. While Taylor and Popma suggest the use of the CDMSES as a generalized career self-efficacy measure, they have also called for further factor analyses that would clarify whether the use of CDMSES subscales is justified. Similarly, Luzzo (1996) has called for further psychometric investigation of the CDMSES, particularly with regard to possible ethnically related limitations. The need for such investigation seems critical as recent international research continues to utilize subscale scores of the CDMSES (e.g., Gianakos, 1999).

There is also a need for South African researchers who would explore the potential utility of the career decision-making self-efficacy construct to conduct psychometric research. South African psychology has suffered from a severe lack of standardized measures that are applicable for its multicultural and multilingual society, with little research that has assessed the applicability and validity of international measures (Watson & Stead, 1996). There has been criticism in the national literature (Stead & Watson, 1999a) on the indiscriminant use of international measures and a call for the psychometric evaluation of proposed measures as the starting point of any research (de Bruin, 1999; Foxcroft, 1997; Psychometrics Committee, 1998). Foxcroft (1997) has argued convincingly that the use of potentially biased tests in South Africa has led to incorrect decisions about interventions, educational placement, and career choice. The present research examines the factor structure of the CDMSES in order to determine whether the use of its subscales is justified on a South African sample.

METHOD

Participants

The sample comprised 364 full-time first year students at a university in the Western Cape Province and consisted of 110 males and 235 females, with 19 students not indicating their gender. Students were registered mostly in the natural sciences (30,0%) and economic and management sciences (38,7%), with 20,6% registered in the arts and 10,7% in engineering. Participants' home language was predominantly Afrikaans (53%) or English (31%), with 13% indicating that they were bilingual. The age range was between 16 and 25 years, with a mean age of 18,1 years (SD = 0,81). Participants voluntarily completed the CDMSES-SF as part of a test battery administered under the supervision of registered psychologists.

Instrument

The Career Decision-Making Self-Efficacy Scale (CDMSES; Taylor & Betz, 1983) is a 50-item measure consisting of five 10-item subscales which assess an individual's career choice competencies in the areas of goal selection, gathering occupational information, problem-solving, planning, and self-appraisal. The internal consistency of the total CDMSES has been reported as ranging from 0,88 to 0,97 (Robbins, 1985; Taylor & Betz, 1983). Reliability coefficients for the five subscales range from 0,87 to 0,89 (Taylor & Betz, 1983). There is evidence for the construct, content and criterion validity of the CDMSES (Taylor & Betz, 1983), with the measure relating as expected to self-esteem (Robbins, 1985), career indecision (Taylor & Popma, 1990), and career exploratory behaviour (Blustein, 1989).

The present research uses the 25-item short form (CDMSES-SF; Betz, Klein, & Taylor, 1996) of the measure which utilizes the best five items from each of the five subscales of the CDMSES. A coefficient alpha of 0,94 has been reported for the total score, with coefficient alphas for the subscales ranging from 0,73 (self-appraisal) to 0,83 (goal selection). Betz and Voyten (1997) have reported a coefficient alpha of 0,93 for the total score, with coefficient alphas for subscales ranging from 0,69 (problem-solving) to 0,83 (goal selection). Responses are scored on a 10-point Likert-type scale, ranging from "no Confidence at all" (0) to "Complete Confidence" (9). Scores for each subscale are obtained by summing the responses to the 5 items, with a maximum score for any subscale of 45. The summation of the subscale scores yields an overall CDMSES-SF score, with a maximum score of 225.

Statistical Analysis

Initial analyses involved the generation of item statistics. Means, standard deviations, skewness, kurtosis, item-total correlations, and coefficient alphas (if the item was deleted) were calculated to provide an indication of item quality. Items with higher item-total correlations, less skewness and a higher contribution to the overall reliability of subscales and the total score were considered to be more favourable. In addition, these statistics gave an initial indication of the appropriateness of subsequent analysis procedures. Cronbach's alpha was calculated for the full scale and the five subscales.

Confirmatory factor analysis, a technique subsumed under the general term Structural Equation Modelling, was used to determine if the items of the CDMSES-SF measured the five theorized subscales. Factors were assumed to be correlated and no secondary loadings were specified. A covariance matrix was calculated in deference to the correlation matrix, thus allowing for valid comparisons between different populations or samples. The original five factor measurement model is illustrated in Figure 1.

The overall fit of the proposed model was examined using the goodness-of-fit index (GFI) and the comparative fit (CFI) index. Values larger than 0,90 for these indices are acceptable (Stevens, 1996; Tabachnick & Fidell, 1996). The χ 2 statistic can be used to evaluate the goodness-of-fit of a model, with a statistically significant χ 2 suggesting a poor fit. Due to the sensitivity of this statistic to large sample sizes and violations of multivariate normality, the χ 2 statistic is reported but not used in evaluating goodness-of-fit. The Root Mean Square Error of Approximation (RMSEA) was used as an estimate of goodness-of-fit as it attempts to correct for the chi-square's sensitivity to large sample sizes (Hair, Anderson, Tatham, & Black, 1995). This value is representative of the goodness-of-fit that could be expected if the model were estimated in the population and not just in the sample used for estimation. Values between 0,05 and 0,08 are acceptable when using the RMSEA (Hair et al., 1995). Values lower than 0,05 are indicative of a close fit.

RESULTS

Initial item analysis

For the total 25-item CDMSES-SF, scores ranged from 58 to 218, with a mean score of 160,35 (SD = 23,07). Item means, standard deviations, kurtosis and skewness values were generated for the 364 complete cases. The mean item score was 6,41 (SD = 0,92). Skewness values had a mean of −0,45 and ranged from −0,21 to −1,67, suggesting some negative skewness of items. The mean kurtosis value was 0,93 and ranged from −0,04 to 4,29 and this did not suggest a significant departure from symmetry. Items are desirable if their means are close to the centre of the range of possible scores and if the items correlate highly with each other. Meir and Gati (1981) state that the standard deviation of an item should indicate sufficient dispersion and they suggest a guideline of greater than 0,15 for multiscale questionnaires. Items with less skew are desirable, indicating that the particular item discriminates well.

Item-total correlations were generated for the five subscales of the CDMSES-SF. The mean item full scale correlation was 0,53, with correlations ranging from 0,31 to 0,63. Regarding the interpretation of item-total correlations, Kline (1986) notes that items should ideally correlate beyond 0,2 with the total score. Item-total correlations with the full scale and item-total correlations with subscales, along with the values of alpha if that particular item is deleted, are presented in Table 1.

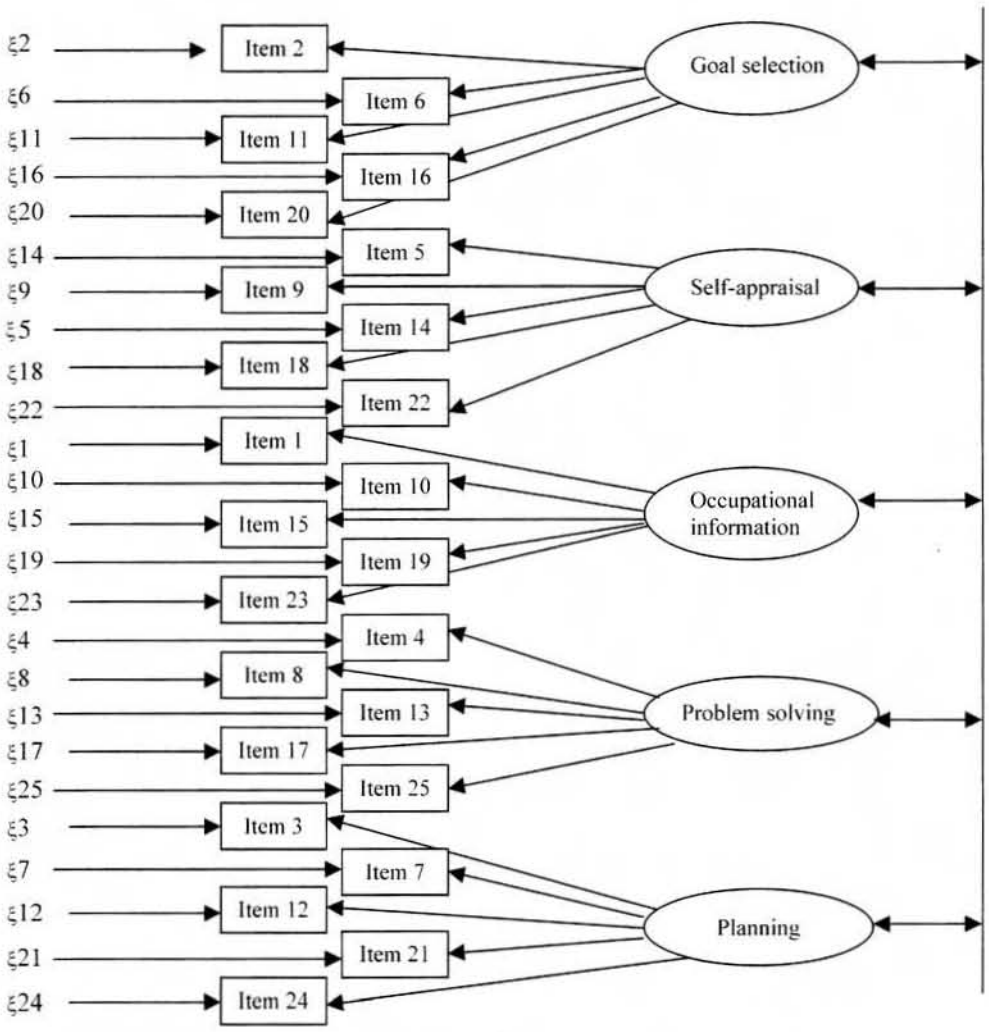

Figure 1: **Path diagram for confirmatory Factor Analysis**

TABLE 1
ITEM-TOTAL CORRELATIONS FOR 25 ITEMS OF THE CDMSE SHORT FORM

		Adjusted item-total correlation with subscale	Alpha if deleted	Adjusted item-total correlation with full scale α =.91	Alpha if deleted
Self-appraisal α=.64	Item 5	0,50	0,53	0,63	0,91
	Item 9	0,39	0,59	0,51	0,91
	Item 14	0,50	0,54	0,58	0,91
	Item 18	0,24	0,68	0,31	0,91
	Item 22	0,41	0,58	0,50	0,91
Occupational information α = .74	Item 1	0,42	0,72	0,49	0,91
	Item 10	0,44	0,72	0,55	0,91
	Item 15	0,56	0,67	0,51	0,91
	Item 19	0,52	0,69	0,54	0,91
	Item 23	0,58	0,66	0,55	0,91
Goal selection α = .75	Item 2	0,45	0,73	0,58	0,91
	Item 6	0,57	0,68	0,51	0,91
	Item 11	0,60	0,67	0,60	0,91
	Item 16	0,41	0,76	0,45	0,91
	Item 20	0,58	0,68	0,63	0,91
Planning α = .73	Item 3	0,39	0,73	0,54	0,91
	Item 7	0,52	0,68	0,59	0,91
	Item 12	0,53	0,67	0,53	0,91
	Item 21	0,51	0,68	0,58	0,91
	Item 24	0,53	0,67	0,62	0,91
Problem solving α = .73	Item 4	0,49	0,68	0,60	0,91
	Item 8	0,35	0,73	0,50	0,91
	Item 13	0,49	0,68	0,39	0,91
	Item 17	0,53	0,66	0,47	0,91
	Item 25	0,58	0,64	0,53	0,91

N = 364

Cronbach's alpha for the full scale was calculated at 0,91 which can be considered high. Coefficient alphas for the five subscales were good with only the Self-Appraisal subscale producing a coefficient alpha below 0,70.

Confirmatory factor analysis

Confirmatory factor analysis (CFA) was performed using 364 valid cases. The goal of CFA was to assess the assumptions that there were five correlated factors and that the observed variables (items) loaded on such factors. The loading of the observed variables on the factors is indicated in Figure 1. The first of each set of regression paths linked to the factors was fixed at 1,0. The observed variables' errors of measurement were uncorrelated. A five factor measurement model (Figure 1) was generated using EQS (Bentler, 1995). The maximum likelihood estimation method was employed. The maximum likelihood parameter estimates ranged from a low of 0,64 on the Self-Appraisal subscale to a high of 1,25 on the Goal Selection subscale.

The resultant model fit did not fit the data adequately. Both the CFI and the GFI were 0,83 while the AGFI was 0,79. The RMSEA index was calculated at 0,075 which is acceptable. A chi-square test for goodness of fit revealed significant results [χ^2 (265, N = 364) = 807.53, p ‹ 0,001] which indicated an inadequate fit.

Post-hoc model modifications were conducted to determine whether the following would provide better fitting models. The Lagrange multiplier test and the Wald test were employed.

based on the reported CFA results, and a second-order CFA hierarchical model with a general factor on the second level was tested. In both instances the resultant models were found to be inadequate.

DISCUSSION

The construct of career decision-making self-efficacy has been strongly endorsed in international career literature over the last decade and is deserving of greater attention by South African career researchers and practitioners. There are problems, however, in the operationalisation of the construct. Given the absence of any South African research on career decision-making self-efficacy, the present research has initiated a psychometric evaluation of a major measure of this construct. Specifically, a confirmatory factor analysis of the CDMSES-SF was conducted in order to determine whether the use of the CDMSES-SF subscales are justified on a South African tertiary sample. While the measure has a high internal consistency coefficient for all items, the confirmatory factor analysis indicates a poor fit. This finding supports previous international research (Taylor & Betz, 1983; Taylor & Popma, 1990) on the CDMSES-SF and queries the continued use of subscale scores in recent research (e.g., Gianakos, 1999). South African practitioners should consider the CDMSES-SF as a measure of general career decision-making self-efficacy at present until further psychometric evaluation is undertaken.

There are several possible directions that future research of the career decision-making self-efficacy construct can take. One direction is a multitrait-multimethod approach which would allow for an examination of the construct validity of the present subscales, given the potential utility of the construct that this measure taps and the generally favourable reliability coefficients generated for the total measure as well as the five subscales. While further psychometric research which reflects on the diversity of student enrollment at South African tertiary institutions is also called for, such research will continue to limit the potential of the career decision-making self-efficacy construct to tertiary students, a point of concern in the international literature (e.g., Taylor & Popma, 1990). This would suggest that empirical assessment of the scale across different career developmental phases is also necessary. A second possibility given the psychometrically equivocal findings on the CDMSES-SF to date is to consider recent calls for the indigenous development of instruments in South Africa (Stead & Watson, 1999b). Specifically, the meaning of career decision-making self-efficacy in South Africa needs to be determined and, thereafter, the psychometric development of instruments could proceed using South African samples. Given both the present findings and the potential usefulness of the career decision-making self-efficacy construct for South Africa's multicultural population, these suggestions for future psychometric research need to be considered.

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