Development of an Instrument to Measure the Agriscience Education Self-Efficacy of Middle School Students

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Introduction

Experts in the field of career development have devoted much attention to investigating the factors that predict career choices in science, technical, engineering, and math-related disciplines (Quimby, Seyala, & Wolfson, 2007). One reason for the increased attention has been the desire to investigate the factors responsible for the underrepresentation of women and minorities in the STEM career fields (Hackett, Betz, Caas, & Rocha-Smith, 1992; Lent et al., 2005 as cited in Quimby, Seyala, & Wolfson, 2005). Similarly, factors influencing the educational and career choices in the agricultural sciences, especially urban minorities, has also been a topic of interest in career and technical education research (see Esters & Bowen, 2004; Esters & Bowen, 2005; Jones & Larke, 2003; Talbert, 1996, 1997; White, Stewart, Linhardt, 1994). One of the weaknesses of these studies however, has been the lack of attention to students at the middle school level.

Theoretical Framework

This study was guided by Social Cognitive Career Theory (SCCT; Lent, Brown, & Hackett, 1994). Social cognitive career theory is anchored in Bandura's (1986) social cognitive theory and focuses on three cognitive-person variables: self-efficacy beliefs, outcome expectations, and personal goals. SCCT has successfully been applied to areas such as science, mathematics, and engineering (e.g., Lent et al., 2001; Lent, Brown, Brenner, Lyons, & Treistman, 2003; Lent, Lopez, Lopez, & Sheu, 2008); however, it is particularly critical to examine other domain areas if the SCCT model is to be applied generally across occupational areas (Smith & Fouad, 1999). Recently, Esters (2006, 2007) applied SCCT to the domain of agriculture through the development of the Agriscience Education Self-Efficacy Scale (AGESES; Esters & Luster, 2004). For this study, agriscience education self-efficacy was operationalized as a students' belief in his/her ability to perform occupational tasks related to an agricultural career. The AGESES was originally developed for use with high school students; recently however, a version was developed for use with middle school students (see Esters, 2008). Although evidence of reliability was presented in this study, details regarding the development and psychometric properties of the middle school version have not been examined. As such, the purpose of this study was to describe the development of a reliable and valid instrument measuring the agriscience education self-efficacy of middle school students.

Methods

Participants for this study were students enrolled in middle school agriscience education programs (n = 150). Fifty-six percent of participants were male and 44% were female. Participants' age ranged from 12 to 15 (M= 13.5.0, SD = .73). The instrument used to collect data for the study was the AGESES (Esters & Luster, 2004) which was modified for use with middle school students. The instrument is comprised of four sections measuring variables of the SCCT framework: (1) Agriculture Self-Efficacy (AgSE), (2) Agriculture Outcome Expectations (AgOE), (3) Agriculture Goals/Intentions (AgGI), and (4) Agriculture Interests (AgInt). Development of the AGESES was based upon the guidelines set forth by Bandura (1995), Lent (2006), and Betz (2006) for measures based on social cognitive theory. An EFA using principal-axis factoring with an oblimin rotation was utilized. The number of factors to extract was

determined by examining the scree plot, Eigen values greater than 1.0, and conceptual interpretability of the factors using a factor loading cutoff of .40.

Results

The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy of the AGESES were above .85 and Bartlett's test of sphericity was significant ($p < .001$) for each of the four sections indicating the suitability of the data for factor analysis (Tabachinik & Fidell, 2001). Examination for the pattern matrices revealed two-factor solutions for AgSE, AgOE, and AgInt; and a one-factor solution for AgGI. The two factor structure of AgSE, AgOE, and AgInt accounted for 65.72, 74.19, and 64.27 of the variance respectively. The one-factor structure for AgGI accounted for 75.72 of the variance. The AgOE factors were labeled Future Ag Outcomes and Personal Expectations. The AgGI factor was labeled Educational and Career Intentions. Because both the AgSE and AgInt factor solutions focused on animals and plants, the two factor solutions were labeled animal and plant efficacy; and animal and plant interests. All of the values of internal consistency reliability for the AgSE, AgOE, AgINt, and AgGI full scales and subscales were $\geq$ .77.

Discussion

The purpose of this study was to describe the development of a valid and reliable instrument measuring the agriscience education self-efficacy of middle school students. Overall, findings indicate that the newly developed SCCT-based scales are a valid and reliable measure. Specifically, factor analysis revealed two-factor solutions of AgSE, AgOE, and AgInt; and a one-factor solution for AgGI. In sum, this study provides initial support for the Lent et al. (1994) SCCT model in occupational areas other than science, math, and engineering.

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