Chapter 8
Are Female STEM Majors Academic Risk Takers?

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ABSTRACT
The existing literature does not focus on risk-taking differences within females and how these differences may influence academic choices in Science, Technology, Engineering, and Mathematics (STEM) fields. The current project examined differences in academic risk-taking between STEM and non-STEM female students. A total of 272 undergraduates from 3 universities in the United States participated in a total of 2 studies. Results from the first and second studies indicated differences between STEM and non-STEM females in academic risk-taking. Future studies should explore these academic risk-taking differences between STEM and non-STEM female students.

INTRODUCTION
As each semester begins, students discuss which courses they are taking and which ones they perceive to be difficult. Students may feel the course will be difficult because of the amount of work expected, the structure of the course, or poor instruction (Carter & Brickhouse, 1989; Ornek, Robinson & Huagan, 2008). For some students, these perceived difficulties might lead them to enroll in different sections or different courses altogether. Others are willing to take on the possible challenges of the course and the potential risk of doing poorly in the course or even failing the course. Science, Technology, Engineering and Math (STEM) courses, which are often viewed as difficult or challenging (Carter & Brickhouse, 1989; Ornek, Robinson & Huagan, 2008; Stodolsky, Salk & Glaessner, 1991), have historically been dominated by males. Are females avoiding the potential risks associated with these courses? There is a considerable amount of research on gender and risk-taking (see Byrnes, Miller & Schafer, 1999 for a review); however, most studies do not consider how gender differences in risk-taking may influence academic choices in the STEM fields. It is important to explore why females may see these courses as too much of a risk.

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BACKGROUND

Before examining the relationship between academic risk-taking and female STEM majors, we need to define both risk-taking and academic risk-taking. Slovic (1964) defines risk-taking as a chance of loss. Building on Slovic’s definition, Furby and Beyth-Marom (1990) define risk taking as the “action (or inaction) that entails a chance of loss” (p.3). Additionally, Slovic notes that risk is multidimensional in that a variety of factors influence how individuals assess risk. Risk must be measured looking at different dimensions including the probability of the risk, the magnitude (variance) of the risk, and the expected value of the risk. Of particular importance in this definition is the chance of loss weighed against the expected value. When students choose to enroll in certain courses, they may weigh their chances of not doing well and therefore not earning credit against the expected value of completing the course. Also, they may forfeit money and time by enrolling in a course they do not feel they will succeed in or pass. Despite these chances of loss, students may choose to take the course because it is a requirement for their major, which will eventually lead to a job in a lucrative field (e.g., engineering or medicine).

In the academic setting, when someone makes a choice to do a particular activity or take a particular course, he or she may be calculating the chances of earning a good grade, the benefits associated with the task or course, and how it will affect his or her self-esteem. If the student believes there is only a small chance of success despite the value associated with the task or course, he or she may opt not to take the chance. This calculation of risk, which involves educational choices, is academic risk-taking. It is defined as the selection of school-related achievement items or tasks varying in difficulty (Clifford & Chou, 1991). Put differently, a student may select a social sciences course over a physical science course because of the difficulty associated with the latter.

Clifford (1988) developed a measure, the School Failure Tolerance (SFT) scale, to predict students’ risk-taking in academic settings. The SFT is comprised of 36 Likert-type questions with a total of three subscales: feelings about failure, actions following failure, and preferred task difficulty. Individuals who score below 3.5 on this scale are categorized as less tolerant of school failure. Clifford (1991) found SFT scores (0 = no tolerance for failure; 6 = tolerance for failure) were lower for students in upper grade levels as compared to elementary age students. According to these studies, elementary students are more likely to take academic risks. As students moved through the school system, it is hypothesized they are less tolerant of failure and, therefore, less willing to take academic risks.

Many U.S. government organizations including the National Academy of Sciences and the U.S. Department of Education are concentrating their efforts and resources on STEM education. These organizations and others are investigating how to improve enrollment and retention in STEM fields. Between 1995-1996, males outnumbered females enrolled in STEM majors two to one. As of 2003-2004, 14% of undergraduates in the United States were enrolled in a STEM major (Chen, 2009). By 2007-2008, females were awarded 57% of bachelor’s degrees in (the U.S.), but males still dominated the STEM majors (Aud, Hussar, Planty, Snyder, Bianco, Fox… & Drake, 2010).

Though women do enter STEM fields, they are more likely to switch majors than their male counterparts (Chen, 2013). Chen (2013) notes there are numerous “contextual and climate factors” on college campuses and in future workplaces that might lead to the attrition of females in STEM fields. Some factors associated with such attrition is the lack of female peers, support and role models, and a distain for the competitive environment associated with STEM fields (Chen, 2013; Espinosa, 2011; Blickenstaff, 2005). The lack of females in these areas could lead other females to perceive they are taking a risk by entering STEM areas. The possible risk would be fulfilling the stereotype that women are not as com-