



Gender stereotype endorsement and achievement-related outcomes: The role of competence beliefs and task values

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ABSTRACT

In most Western societies, males are stereotyped as having stronger mathematical abilities than females whereas females are stereotyped as having stronger verbal abilities than males. Exposure to negative ability stereotypes reliably undermines performance in laboratory experiments, yet the mechanisms by which such stereotypes may influence boys' and girls' achievement outcomes in the more naturalistic setting of primary and secondary school remain unclear. The current study evaluated a hypothesis suggested by expectancy-value theories (e.g., Eccles & Wigfield, 2002): the relationship between stereotypes and achievement outcomes is importantly mediated by a student's perceived competence and his or her valuation of the domain in question. We tested the hypothesis by examining the career intentions and grades of 762 sixth and eighth graders. As expected, even after controlling for prior achievement, stereotype endorsement primarily predicted grades and career intentions indirectly, through students' competence beliefs and task values. These results suggest that stereotypes predict achievement-related outcomes most clearly when students internalize them.

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1. Introduction

"Man often becomes what he believes himself to be. If I keep on saying to myself that I cannot do a certain thing, it is possible that I may end by really becoming incapable of doing it. On the contrary, if I have the belief that I can do it, I shall surely acquire the capacity to do it even if I may not have it at the beginning".

Mahatma Gandhi, cited in Attenborough (1983)

Educational research has provided ample verification of Gandhi's faith in the power of belief to shape reality. Studies conducted since the 1960s have found that students who hold or who are exposed to high expectations regarding their competence and potential achieve better outcomes and have higher aspirations than their unlucky counterparts who are exposed to lower expectations (Bandura, 1977; Bleeker & Jacobs, 2004; Jacobs & Eccles, 1992; Rosenthal & Jacobson, 1968; Tiedemann, 2000). Students' beliefs about their abilities are shaped by multiple influences and experiences. Our research examined the role of ability stereotypes, which por-

tray certain groups as either good or bad at some endeavor and hence provide a rough, category-based expectancy by which people may evaluate themselves and others (Aronson & Steele, 2005; Lips, 2005). Thus, African Americans are frequently stereotyped as intellectually inferior to Caucasian Americans, Asians are stereotyped as superior at mathematics, women are stereotyped as more verbal and less mathematical than men, and so on.

A great deal of research—particularly laboratory research based on stereotype threat theory—has shown how stereotypes can directly impact intellectual performance. *Stereotype threat* is said to occur when individuals' awareness of negative stereotypes about their group becomes an apprehension about confirming such stereotypes. According to the stereotype threat formulation, the activation of a negative stereotype via experimental instructions or other cues in the environment can elicit a disruptive state that can undermine performance and aspirations in stereotype relevant domains (see Aronson & Steele, 2005; Steele, 1997). Applied to academic gender stereotypes, research on stereotype threat generally finds that girls will perform more poorly when exposed to cues that remind them of the stereotypes that depict them as less able than boys in mathematics (Brown & Josephs, 1999; Inzlicht & Kang, 2010; Quinn & Spencer, 2001; Schmader & Johns, 2003; Spencer, Steele, & Quinn, 1999). The negative influence of stereotype threat is frequently cited as a factor in the underrepresentation of women in fields related to mathematics and in girls' tendency to lag behind

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boys in mathematics as they move to higher levels of schooling or when they take high-stakes, timed tests like the SAT (e.g., Aronson & Steele, 2005; Halpern et al., 2007). Yet, nearly all of the research on stereotype threat examines the effects of exposure to stereotypes over a brief period of time and measures their influence on a discrete, timed task of limited duration (e.g., a 30-min mathematical test taken during a psychology experiment). Moreover, the focus in the few stereotype threat studies of longer duration has been on college-level students (e.g., Massey & Fischer, 2005). This leaves unanswered vital questions about the role of academic stereotypes in school performance and career decision-making that we address with our research.

1.1. The relationship between mathematics stereotypes and achievement

First, do stereotypes predict performance in mathematics over time among students in elementary and high school? Laboratory experiments performed with college samples find that reminding students about gender stereotypes undermines females' performance on standardized mathematics tests (for reviews, see Aronson & Steele, 2005; Nguyen & Ryan, 2008). Yet in contrast to the results of such studies, girls at the elementary and high school levels tend to perform as well as or even better on standardized mathematics tests (Mullis, Martin, & Foy, 2008; Organisation for Economic Co-operation and Development (OECD), 2005) and earn better grades in mathematics than boys (Downey & Yuan, 2005; Hyde & Mertz, 2009). Although such achievement patterns do not necessarily mean that stereotypes alleging a male superiority in mathematics do not suppress elementary and high school girls' performance, they certainly underscore the possibility that stereotypes might produce different effects in schools than they do in laboratories. Moreover, surveys suggest that students' beliefs align with these performance patterns. Recent Australian studies, for example, have found that students believe mathematics a domain equally fitting for boys and girls (Forgasz, Leder, & Kloosterman, 2004), and recent studies from France (Martinot & Désert, 2007), America (Rowley, Kurtz-Costes, Mistry, & Feagans, 2007) and Canada (Plante, Théorêt, & Favreau, 2009), find that students perceive a female advantage in their mathematics courses. This match between stereotype endorsement and actual patterns of performance in school suggests that stereotype endorsement is likely to play an important role in shaping students' achievement in school over longer periods of time. However, very few studies have specifically focused on students' endorsement of stereotypes about mathematical ability to examine whether these conceptions are related to achievement.

1.2. The relationship between language arts stereotypes and achievement

A second question is whether stereotypes affect boys, who are stereotyped as less able than girls in language arts—and who consistently perform worse than girls on tests and school performance in the language arts domain. For example, in the most recent administration of the Programme for International Student Assessment (PISA), female students outperformed male students in reading literacy in every country (OECD, 2010). Coupled with the fact that vulnerability to stereotypes has been documented among both sexes in the laboratory (Inzlicht, McKay, & Aronson, 2006; Nguyen & Ryan, 2008), this raises the possibility that stereotypes may interfere with the verbal performance and learning of boys in school. Moreover, recent studies found that students from elementary and high school strongly endorse stereotypes alleging a female advantage in language arts (Plante et al., 2009; Rowley et al., 2007). However, field studies examining the links between the endorse-

ment of verbal stereotypes and boys' and girls' school outcomes are, to our knowledge, nonexistent. The current study thus surveyed students to examine the relationships between their endorsement of both mathematics and language arts stereotypes and two important educational outcomes: grades and career intentions.

1.3. The role of competence beliefs and task values in the relationship between stereotype endorsement and achievement

What are the mechanisms underlying the relationship between students' endorsement of mathematics or language arts stereotypes and their achievement outcomes in school? Stereotype threat experiments have identified numerous mediators of stereotype-performance effects (see Schmader, Johns, & Forbes, 2008; Smith, 2004). However, there are reasons to believe that the mechanisms involved in the stereotype-achievement relationship will differ over longer stretches of time and in the school context—where stereotypical cues are probably less consistent and salient than in the laboratory. As a step toward identifying these mechanisms, the present study investigated the role of competence beliefs and task values, two motivational variables assumed to mediate the relationships between gender stereotypes and achievement in school (Eccles, 1994; Eccles & Wigfield, 2002).

Expectancy-value models posit that important achievement outcomes, such as grades and occupational choices, are influenced most proximally and directly by students' expectations of success in a domain and the degree to which they value that domain (Eccles et al., 1983; Pintrich & Schunk, 2002; Wigfield & Eccles, 2000). The expectancy component refers to individuals' beliefs about their competence and self-efficacy whereas the value component corresponds to the degree to which they believe that an academic task is worthwhile, important, and interesting (see Eccles & Wigfield, 2002; Eccles et al., 1983).

An extensive literature supports the validity of expectancy-value models by showing that students' competence beliefs and task values predict achievement and choices in mathematics (Greene, DeBacker, Ravindran, & Krows, 1999; Marsh & Yeung, 1998; Spinath, Spinath, Harlaar, & Plomin, 2004) and language arts (Eccles, 1987; Meece, Wigfield, & Eccles, 1990; Spinath et al., 2004). More specifically, performance in school appears to stem directly from feelings of competence (Eccles et al., 1983; Marsh & Yeung, 1998; Meece et al., 1990), whereas plans and enrollment decisions appear to be a function of the value students place on a particular ability domain (Crombie et al., 2005; Eccles, 2005; Stevens, Wang, Olivarez, & Hamman, 2007). Thus, the expectancy and value components of the model have independent and complementary effects on behaviors and both are necessary to predict career aspirations and choices as well as overall achievement.

Both competence beliefs and task values are thought to be influenced by socio-cultural variables (Eccles & Wigfield, 2002; Feather, 1988; Pintrich, 2003). For instance, Eccles et al. (1983) propose that social stereotypes affect students' competence beliefs and task values, which in turn, influence their school performance and career decisions. In other words, students' competence beliefs and task values should mediate the relationships between ability stereotypes and achievement-related outcomes. Only recently has the validity of this mediational hypothesis been empirically examined. Bonnot and Croizet (2007) evaluated the direct and indirect links between the mathematics stereotypes endorsed by female university students enrolled in a field related to mathematics, their competence beliefs, and their grades. Among these women, internalization of stereotypes favoring males in mathematics predicted lower competence beliefs in mathematics, which in turn predicted lower grades in this domain.

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