Examining Adolescents’ Gender Stereotypes and Ingroup Biases About Academics, Classroom Regulatory Behavior, and Occupations

by

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ABSTRACT

The major goal of the current study was to extend previous research on adolescents’
gender stereotyping by assessing adolescents’ academic, classroom regulatory behavior, and
occupational gender stereotypes. This was done by creating new measures of academic and
classroom regulation gender stereotypes. Using these measures, adolescents’ gender stereotypes in
core academic subjects, school in general, and classroom behavior were assessed. The coherence
of adolescents’ stereotypes was also examined. Participants were 257 7th grade students (M age =
12 years old, range 11-13 years old; 47% male. Students were administered surveys containing
several measures of stereotyping. The results indicated that, for academic subjects, contrary to
expectations, very few adolescents held traditional gender stereotypes; instead, most endorsed
egalitarian views. Moreover, unexpected patterns emerged in which adolescents reported counter-
traditional academic stereotypes. When sex differences were found in stereotyping patterns, they
could be explained in part by ingroup bias. Approximately half of the students stereotyped
classroom regulatory behaviors and occupations. Results provided support for the coherence of
gender stereotypes such that students who stereotyped in one domain tended to stereotype in other
domains. Strengths and limitations of the present study were discussed. Potentially important
steps remain for research on the relation between academic gender stereotyping and academic
performance.
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Chapter 1

INTRODUCTION

Researchers and policy makers have been focused for decades on the persistent gender gap in education. For years girls were the focus, with a particular emphasis on their struggles in math and science (American Association of University Women [AAUW], 1998). In recent years, however, conversations have shifted to “The Boy Crisis.” Bookstores have been filled with such works as The Trouble with Boys and Boys Adrift, describing how boys are now falling behind. With this concern about the gender gap, attention has turned towards boys’ and girls’ differential experiences in school during childhood and adolescence. This focus has also led to such policies as No Child Left Behind and the revamping of Title IX of the Education Amendments of 1972 (Office of Civil Rights, Department of Education, 2006; Halpern, 2009). Despite these efforts, the gender gap remains (National Science Foundation [NSF], 2007) and furthermore, it is likely that the gender gap is associated with children and adolescents’ gender stereotypes about academics (Nosek et al., 2009). Little is known about adolescents’ academic gender stereotypes, but some research about attitudes towards school suggests that children’s and adolescents’ interest and performance may be negatively influenced by their views of academics (e.g., Eccles, Wigfield, & Schiefele, 1998; Eccles & Wigfield, 2002). Unfortunately, research on academic stereotypes is limited, making it difficult to counter the potential negative impacts that such stereotypes could have on children and adolescents’ academic interests, aspirations, and performance.

Conceivably, academic gender stereotypes could be broadly defined to include stereotypes about performance in academic subjects, school in general, and stereotypes about classroom regulatory behavior (e.g., ability to sit still, pay attention, and control impulses). The limited research on children and adolescents’ academic gender stereotypes suggests that they typically categorize the academic domains of math and science as “boys’ subjects” (e.g., Nosek et al., 2008; Steele, 2002) and language arts and spelling as “girls’ subjects” (e.g., Heyman &

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1 Stereotype is defined as a “cognitive structure that contains the perceiver’s knowledge, beliefs, and expectancies about some human group” (Hamilton & Trolier, 1986, p. 133). Following this definition, academic gender stereotypes are cognitive structures that contain the perceiver’s knowledge, beliefs, and expectancies about specific academic domains with regard to males and females, or boys and girls.
Legare, 2004; Rowley, Kurtz-Costes, Mistry, Feagan, 2007; Plante, Theoret, & Favreau, 2009). Few of those studies, however, have included American adolescents and, moreover, no research to date has assessed children’s views of social studies or their global stereotypes about who is better at school. Additionally, although researchers have found that the genders differ in their mean level regulatory abilities (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006; Matthews, Ponitz, & Morrison, 2009; Rothbart, 2011) and that these abilities predict academic performance in younger children (e.g., Fabes, 1994; Mashburn & Pianta, 2006), no study has been conducted to examine adolescents’ stereotypes about regulatory behavior. Thus, it is important to explore whether children believe there are sex differences in classroom regulatory ability. In sum, despite their potential negative consequences, very little is known about the ways in which children and adolescents think about specific academic domains, school in general, or classroom regulatory behavior.

An important component of social stereotyping is ingroup bias, that is, favoritism for one’s own social group (e.g., gender, race). Empirical work has shown that young children’s attitudes about gender are particularly marked with ingroup biases (Powlishta, 1995a, 1995b, 2004). Elementary-aged children in these studies rated traits as being either positive or negative and as being masculine or feminine. The children endorsed some cultural stereotypes; however, they also attributed more traits they believed to be positive to their gender ingroup than to their outgroup, regardless of the cultural stereotypes. For example, boys and girls rated 13 of 48 traits consistent with traditional gender stereotypes (e.g., boys are messy and fight whereas girls are affectionate and shy), but 35 traits of the traits, boys and girls tended to show an ingroup bias. Specifically, on those 35 traits, if the child rated them as positive, they tended to classify them for their own gender and if they rated them as negative, they tended to classify the trait for the other gender. To address the gaps in the research, I am proposing to study adolescents’ stereotypes and ingroup biases about academic domains, school in general, and regulatory abilities.

Two cognitive-developmental theories, Gender Schema Theory (GST; Martin & Halverson, 1981; Martin, Ruble, & Szkrybalo, 2002) and Developmental Intergroup Theory (DIT; Liben & Bigler, 2006) provided the rationale for the proposed study. GST explains specifically
how gender stereotypes develop and the specific consequences of those stereotypes whereas DIT speaks to children’s cultural stereotype development and environmental factors that influence this process. Collectively, these theories provide a valuable theoretical framework to explain the development of adolescents’ academic gender stereotypes and the potential consequences of those stereotypes.

Additionally, the multidimensional view of gender informed the methodology of the current study. Multidimensional perspectives have been used in the past to argue for the need to define and distinguish between different dimensions of gender-typing (Constantinople, 1973; Kegan, 1964 as presented in Huston, 1983). Gender-typing is defined as “the mapping of objects, activities, roles, and traits onto biological sex such that they follow prescriptive cultural stereotypes of gender” (Liben & Bigler, 2002, p. 5). There is a debate among scholars as to how much multidimensionality exists among gender-typing concepts and further, which specific concepts of gender-typing (e.g., attitudes and personality) are related (Ruble et al., 2006). Most gender researchers agree that some multidimensionality exists among gender-typing concepts, but that it depends on which concepts are being investigated (Ruble et al., 2006). Ruble and colleagues (2006) argued that since the field lacks clear answers about how all these concepts relate, recognizing the possibility of multidimensionality can influence study methodology. To address this issue, they suggest that researchers should test multidimensionality directly. The majority of studies in this area, however, have investigated the coherence among gender-typed cognitions and behaviors (Eckes & Traunter, 2000; Miller, Trautner, & Ruble, 2006; Ruble et al., 2006). The current study will investigate coherence from a slightly different perspective; specifically, the coherence among a single dimension of gender-typing - gender stereotypes - will be investigated.

It is important to mention that the field not only lacks clear answers about what gender-typing concepts are related, it also lacks consistency in terminology, suggested methodology, and what evidence is necessary to determine multidimensionality (or lack of multidimensionality). It is due to these issues that I will avoid using the terminology “multidimensionality” or “multidimensionality” and instead use “coherence” terminology. Thus, the proposed study will
explore how new measures of various components of academic gender stereotypes relate to a valid and reliable measure of occupational gender stereotyping (i.e., OAT-AM; Liben & Bigler, 2002) to determine if adolescence tend to have coherence among different types of gender stereotypes (e.g., if they stereotype academic domains, do they also tend to stereotype occupations).

Adolescence is a particularly important time to study gender stereotypes surrounding academics. First, during adolescence, individuals begin to form their personal and group identities (Tajfel & Turner, 1986) and start to consider adult roles, including those that are gender-differentiated. With these identity explorations, adolescents also begin to form concrete academic and occupational interests and goals. There is evidence that adolescents’ gender-related cognitions regarding values and roles affect career paths (e.g., Gottfredson, 1996; Messersmith, Garrett, Davis-Kean, Malanchuk, & Eccles, 2008). Moreover, performance in junior high has been shown to be predictive of achievement all the way up to college (Buchmann, DiPrete, & McDaniel, 2008). This is strong evidence for the need to better understand academic gender stereotypes that could be affecting adolescents’ personal academic beliefs, aspirations, and achievement. To begin to understand these complex questions about the links between adolescents’ academic gender stereotypes and achievement, we need to first investigate the stereotypes that adolescents have about academic domains, school in general, and classroom regulatory behavior.

The goal of the present study is to fill these gaps in the psychological literature on stereotypes by examining adolescents’ gender stereotypes about academic domains, school, and classroom regulatory behavior. Specifically, the aims of the proposed study are fivefold: (1) to develop and evaluate new measures of academic gender stereotypes and gender stereotypes about classroom regulatory behaviors, (2) to ascertain the degree to which adolescents hold gender stereotypes about academics and classroom regulatory behavior, (3) to assess sex differences in adolescents’ academic and classroom regulatory behavior stereotypes, (4) to explore whether adolescents exhibit ingroup biases concerning academic domains and classroom regulatory behaviors, and finally, (5) to investigate the interrelations and coherence among gender stereotypes across multiple domains (academic domains, school, classroom regulatory behavior,
and occupations). I expect that adolescents will show evidence of gender stereotypes and ingroup biases regarding academic subjects, school in general, and classroom regulatory behaviors, and furthermore, I predict that there will be sex differences in those stereotypes such that boys will be more prone to stereotyping in these domains than will girls. Additionally, I expect that adolescents’ patterns of ingroup biases may be informative in understanding academic domain and classroom regulatory stereotypes. Ingroup bias will be determined by comparing how often boys and girls categorize academic domains as being for their own sex versus for the other sex. For instance, I predict that adolescents will, on average, show an ingroup bias by categorizing academic domains as being more for their own gender than for the other gender, particularly gender-consistent domains (girls with feminine domains and boys with masculine domains). Finally, I expect adolescents’ gender stereotypes to be related within and across domains. Specifically, I predict that academic gender stereotypes and classroom regulatory ability will be strongly and positively related to each other and both of these types of gender stereotypes will be strongly and positively related to occupational gender stereotypes.

In the following sections I will first review two cognitive-developmental intergroup theories, GST and DIT, and I will present how together they provide clear rationale regarding (a) why adolescents develop gender stereotypes about academic domains, school, and classroom regulatory ability and (b) why these stereotypes are important to consider. In a subsequent section, I will present the debate regarding the multidimensionality of gender. I will then review pertinent literature on academic gender stereotypes and classroom regulatory behavior with particular emphasis on the significance of understanding adolescents’ academic gender stereotypes, how they relate to each other, and how they relate to other gender stereotypes (i.e., occupations). Finally, I will propose a study to examine adolescents’ academic gender stereotypes, ingroup biases, and the multidimensionality of these stereotypes.

Chapter 2

LITERATURE REVIEW

Empirical evidence and theory suggests that the junior high years are an important time in the life of a developing individual. At this time, adolescents are actively trying to form their
identities and to determine how those identities relate to other individuals and groups around them (Erikson, 1950). This search for the self is a central component of adolescents’ experiences. Underlying the search for self are cognitive mechanisms and processes that yield certain consequences, such as the types of attitudes, stereotypes, and biases about social groups that adolescents develop (Erikson, 1950; Tajfel & Turner, 1986). Two developmental theories in particular, GST and DIT, provide understanding of these processes and the rationale for the current study.

Part I: Theoretical Background

Gender Schema Theory (GST) and Developmental Intergroup Theory (DIT).

According to two developmental intergroup theories, Gender Schema Theory (GST, Martin & Halverson, 1981; Martin et al., 2002) and Developmental Intergroup Theory (DIT, Bigler & Liben, 2006), children and adolescents categorize social groups and develop biases, stereotypes, and affective responses about those groups. Since GST was one of the foundational theories for DIT, the two theories have many points of similarity. In the following section, I will focus on the main principles of both theories that explain the initial development of stereotypes. Subsequently, I will use GST to explain why it is vital to understand the potential consequences of adolescents’ gender stereotypes about academics and classroom regulatory ability. For a diagram of an example of applying GST see Figure 1; for a diagram of DIT see Figures 2 and 3).

GST and DIT claim that children come into the world with a predisposition to understand it, and in their quest to understand the world, they notice environmental cues that serve to make social groups salient (Bigler & Liben, 2006; Martin & Halverson, 1981; Martin et al., 2002). As a consequence of this natural process, children are actively engaged in trying to determine which categories to use, and they seek to categorize the elements, people, and groups in their surroundings. The categories they rely on are those that are given cultural importance (Bigler & Liben, 2006; Martin & Halverson, 1981; Martin et al., 2002).

GST was originally developed to explain how gender schemas and stereotypes develop and how they affect children’s behavior. Schemas are essentially stereotypes, and are defined as “naïve theories that guide information processing by structuring experiences, regulating behavior,
and providing bases for making inferences and interpretations” (p.1120) (see Figure 1 for an example based on the model; Martin & Halverson, 1981).

In GST, two gender-typing schemas (own-gender schemas and ingroup-outgroup schemas) function to influence cognitions and behavior through “top-down” processing and aid children in establishing a self-identity as belonging to a gender group (i.e., I am a boy or I am a girl). The ingroup-outgroup schema, or the ‘superordinate schema’, is one of the main types of gender schemas involved in gender-typing and it acts as a gender stereotype (Martin & Halverson, 1981; Martin et al., 2002). This schema is made up of all the general information that children need to categorize objects, behaviors, traits, as well as gender roles and norms for both genders. The overall ingroup-outgroup schema is what allows children to make decisions about what is appropriate for their own and the other gender, and thus, decisions about what is and is not appropriate for them. According to GST, the other schema that is involved in these processes is an own-gender schema, a much more detailed and narrower schema (Martin & Halverson, 1981). Within this schema is detailed information about the behaviors, traits, and gender roles that individuals believe is associated with their own gender. These schemas allow children to make quick decisions about how to interact with people and objects. For example, if a boy is presented with a truck, he first evaluates whether that object is self-relevant by using his gender schemas. He will most likely conclude that the truck is self-relevant, that it is for boys, and thus it is for him. In this scenario, his gender schema is functioning in such a way that allows him to make a quick decision about the truck, and regulates his behavior such that he will then most likely play with the truck (and knows how to play with it or will come to know how).

Drawing from Martin and Halverson’s earlier work, Bigler and Liben (2006) proposed DIT, which offers a framework for explaining how children develop cultural stereotypes (e.g., gender, race, etc.) and associate affective responses with social group categorization. GST and DIT claim that underlying cognitive mechanisms direct the processes that determine how children single out certain social groups as targets of stereotyping. These cognitive mechanisms also determine ways by which children learn the characteristics, attributes, and affective responses associated with the groups prevalent within their culture.
In explaining how children develop stereotypes, Bigler and Liben (2006) identify three explicit processes (see Figure 2). Bigler and Liben (2006) use these processes to describe how stereotypes develop by attaching affective meaning to psychologically salient social groups. According to DIT, stereotypes arise out of a complex interaction between cognitive-developmental processes and the child’s environment. Similar to GST, Bigler and Liben (2006) argue that both externally driven factors (i.e., explicit and implicit attributions) and internally driven factors (i.e., essentialism and ingroup bias) contribute to whether a child develops stereotypes (see Figure 2).

According to both GST and DIT, explicit attributions come directly from children’s environments, such as teachers labeling certain groups as excelling or not at a classroom task (Patterson, 2007). Similarly, Martin and Halverson (1981, 1983) asserted that children receive an abundance of gender-related information through these means, which they termed social transmission. Implicit attributions are those that go beyond environmental information, but are inferences made by children based on their beliefs that social groups are distinct from one another. GST refers to children’s illusory databases, that is, children are assumed to draw inferences that are not derived from the environment, but rather are from the contribution the schema makes to the stimulus organization. Illusory databases can serve to “fill in the blanks” in situations when information is incomplete; however, they can also operate in situations where information is complete - reaffirming children’s stereotypes (Martin & Halverson, 1981, 1983). Children’s tendency to distinguish between social groups and apply schemas too enthusiastically may lead children to, for example, say that “mothers cook” even if they see both parents cooking on a regular basis.

Children’s attributions also arise out of illusory correlations, which are defined as a misjudgment of the degree of covariation between two categories of events (Chapman, 1967; Martin & Halverson, 1981, 1983). According to Martin and Halverson (1981, 1983), illusory correlations are reported correlations between two classes that are either not correlated at all or correlated to a lesser extent in reality. The belief that people of different ethnic groups have different blood types is an example of an illusory correlation that is not truly present in reality (Bigler & Liben, 2006), whereas an assumption that all girls like to play with dolls is an example
of an exaggerated correlation (Martin, Eisenbud, & Rose, 1995; Martin & Halverson, 1981, 1983; Martin & Ruble, 2004). Thus, explicit and implicit attributes both arise out of children’s interactions with their environments and are likely to develop about social groups that are given cultural importance.

In a similar vein, once children have categorized along certain dimensions, they have a tendency to construct differences between those groups along that dimension (Martin & Ruble, 2004) and furthermore, are likely to assume that group members share many attributes beyond those that are obvious (Gelman, 1989; Gelman & Markman, 1986, 1987). This tendency has been termed psychological essentialism, which is defined as the belief that members of a category share important, non-obvious qualities (Gelman, 2003). For example, children tend to suppose that all girls share certain physical characteristics (e.g., long hair), and also assume that all girls share the same behavioral and personality traits (e.g., liking dolls; Gelman, 2003). In a series of studies conducted by Martin and colleagues (1995), children were more likely to say that a novel toy they liked would be liked by other children of their own gender and not liked by children of the other gender. There is some empirical evidence to suggest that children assume that social group members share “essences” or deeper qualities (Gelman, 1989; Gelman & Markman, 1986, 1987), although there is individual variation in the extent to which children hold essentialist beliefs (Bigler & Liben, 1993). Importantly, both GST and DIT note that boys tend to hold more essentialist views of gender than girls and therefore, tend to stereotype to a greater extent than do girls (Cole, Jayaratne, Cecchi, Feldbaum & Petty, 2007; Mahalingham & Rodriguez, 2003; Smiler & Gelman, 2008).

Following group categorization, both children and adults tend to develop affective responses to groups; specifically, they tend to view their ingroup as being more positive on a variety of behaviors as compared to the outgroup (Bigler & Liben, 2006). Based on decades of theoretical writings and empirical work of social psychologists, both GST and DIT consider ingroup bias² to be one of the primary influential factors contributing to stereotype development.

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² In social psychology literature on intergroup behavior, the terms ingroup bias, ingroup favoritism, and ingroup positivity bias are often used interchangeable. However, they often imply
Prior to GST and DIT, work on ingroup bias primarily focused on adults (e.g., Brewer, 2001; Brewer & Brown, 1998); GST and DIT expanded on this work by dealing with cognitive-developmental issues associated with stereotyping processes and ingroup bias. Therefore, the discussion of ingroup bias for the current project will reflect the discussion of this construct within GST and DIT.

GST and DIT claim that ingroup bias influences stereotype development and that examining ingroup bias in conjunction with stereotypes is valuable for fully understanding the development and patterns of stereotyping (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al, 2002). According to both theories, ingroup bias is a function of categorizing gender and knowing to what group one belongs. GST posits that following categorization and self-identity to a gender group, children have a tendency to favor their ingroup as well as objects and behaviors that are associated with their ingroup. Indeed, there is extensive empirical evidence that children tend to favor same-gender peers over other-gender peers (e.g., Fabes, Martin, & Hanish, 2003; Martin & Fabes, 2001; Maccoby, 1998) and evaluate same-gender toys (Ruble et al., 2006) and novel toys labeled as being for their own gender more positively than those associated with the other gender (Martin et al., 1995).

Ingroup bias influences attitudes and behaviors as well. Indeed, children have been found to sometimes reject social stereotypes that are not favorable toward their ingroup (Powlishta, 1995a, b; Powlishta, 2004; Powlishta, Serbin, & Gulko, 1993). Additionally, children have a tendency to actively generate or construct more positive affective associations to their ingroup than to their outgroup and, therefore, associate more positive characteristics with their ingroup than with their outgroup (Bigler & Liben, 2006; Bigler, Brown, & Markell, 2001; Bigler et al., 1997; Brown & Bigler, 2002; Martin & Halverson, 1981, 1983). To illustrate this point, Bigler and Liben (2006) gave the example of when the first author’s six-year-old daughter for the different things depending on the items in a scale or even the response scale (e.g., bipolar response versus separate items about boys and girls; Brewer, 2001). For the purpose of the present study, I have used the most inclusive of these terms as well as the term that is used in both DIT and GST – ingroup bias. Ingroup bias is defined within the context of the intergroup theories I am using as marked favoritism for ones’ own social group or ingroup (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002).
first time saw oysters, she thought they were disgusting and said, “only boys eat oysters.” Since she viewed oysters negatively, she attributed oyster-eating with the less positively evaluated outgroup - boys. However, the way in which ingroup bias operates in adolescence, particularly with regards to stereotypes about academics and classroom regulatory abilities, is unknown and unexplored.

GST focused attention on why gender stereotypes are maintained so strongly, and moreover, the specific consequences of those stereotypes. The consequences arise from children trying to maintain schematic consistency between their behaviors and cognitions (Martin & Halverson, 1981, 1983; Martin & Rose, 2001; Martin et al., 2002). Schematic consistency is the idea that, once self-categorization into a gender group occurs, children are motivated to be like and to learn about their own gender group (Bem, 1983; Martin & Halverson, 1981, 1983). Numerous empirical studies have shown that gender schemas influence what children attend to, interact with, and remember (for reviews see Martin et al., 2002; Ruble et al., 2006). For example, children are more likely to attend to behaviors and interact with objects (e.g., toys) that are associated with their ingroup. Similarly, children are more likely to recall and remember objects and behaviors associated with their ingroup versus their outgroup (Martin & Halverson, 1981, 1983; Martin et al., 2002).

GST places particular importance on how cognitive development affects schematic processing. Specifically, children’s gender schemas and concepts of gender undergo significant developmental changes, which then promotes changes in the gender-related processing of newly incoming information (Kohlberg, 1966; Martin, 2000). GST argues that, as children’s cognitive capacity increases, schemas become more developed and their information-processing more efficient. Furthermore, once schemas are developed, they can become self-perpetuating because gender-consistent information is attended to, recalled, and acted upon. Furthermore, because children sometimes categorize neutral and inconsistent information as being congruent with their existing schemas, gender schemas resist disconfirmation and this may explain why children’s gender stereotypes are maintained even in the face of contradicting information (Kohlberg, 1966; Martin & Halverson, 1981; 1983; Martin, 2000; Martin et al., 2002). As a result, gender schemas
become more stable and resistant to change over time. Despite the expectation that schemas may become more consolidated and resistant to change with age, other developmental changes may counteract these processes.

One of these developmental changes is that as children get older, their lives are more influenced by their friends and peers. For example, older children (age 7 and older) may be more influenced by social sanctions and what their peers might evaluate as “good” and “bad” than younger children, also contributing to stereotype perpetuation and potentially to changes in stereotypes. As cognitive capacity increases and more information becomes included in gender schemas, there will be more overlap between the categories of “male” and “female” and, as a result, schemas become more flexible. Therefore, with age, there is a possibility that less evaluation will be associated with the own-gender schema and evaluation may lessen as a result of the increasing number of groups to which children can belong – not only male and female. Thus, some developmental processes might lead to less stereotyping; others to more. Not surprisingly, the literature is mixed as to how much stereotyping occurs in adolescence (for review, see Ruble et al., 2006).

Together GST and DIT offer a valuable framework to conceptualize why adolescents are likely to stereotype academics according to gender and the potential consequences of those stereotypes. Both theories explain how social stereotypes emerge as a result of naturally-developing cognitive mechanisms and children’s predispositions to categorize people and objects in the world. DIT provides information regarding environmental factors and specific mechanisms that contribute to the formation of stereotypes whereas GST offers more in terms of the specific consequences of gender stereotyping. Additionally, GST provides a more concrete explanation for how stereotypes are maintained or changed than does DIT. Both theories stress the importance of ingroup biases in studying cultural stereotypes, particularly gender ingroup biases stereotyping (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983).

**Applying GST and DIT to Studying Academic Gender Stereotypes.** GST and DIT can both be applied to studying adolescents’ academic gender stereotypes. Accordingly, it is expected that adolescents attribute certain academic domains to one gender or the other; however,
in line with GST and DIT, there will most likely be gender differences in their academic stereotype endorsement. Specifically, GST claims that the resulting stereotype can vary depending on the gender of the person who is stereotyping and the subject matter being stereotyped (Martin & Halverson, 1981, 1983; Martin et al., 2002). There is also significant evidence that boys are more prone to stereotyping than are girls (e.g., Liben & Bigler, 2002; Ruble et al., 2006) and they are not only judged more harshly by others for violating gender norms, but they also judge others more harshly for violating gender norms (Blakemore, 2003).

Moreover, according to DIT, ingroup biases are fundamental in the stereotype development process (Bigler & Liben, 2006). Therefore, it is likely that adolescent boys and girls will endorse cultural stereotypes, and that they will show some evidence of ingroup bias in their stereotyping patterns. On average, adolescents are likely to stereotype according to traditional gender stereotypes, but some girls and boys may not stereotype academic subjects accordingly but instead they may stereotype a subject to be for their gender even if it does not conform to the traditional gender stereotype. For example, some girls may report that math is more for girls than for boys whereas some boys may report that language arts is more for boys than for girls. Because not much is known about how ingroup bias is exhibited in association with academic domains and studies that have investigated ingroup bias have used a wide range of measures (Zosuls et al., 2011), ingroup bias analyses for the current project are primarily exploratory.

GST provides clear hypotheses regarding the potential consequences of gender stereotypes that can be directly applied to academic gender stereotypes. Namely, GST declares that the way in which children and adolescents think about academic subjects affects their performance and behavior and recent empirical findings support this argument. Specifically, studies show that implicit social cognitions about gender predict academic engagement and achievement in adolescents (Nosek et al., 2009) and adults (Nosek & Smyth, 2011). Although GST unmistakably shows gender stereotypes can influence behavior, it is not yet clear what kinds of academic stereotypes adolescents endorse. Therefore, before we can answer any questions regarding specific ways stereotypes can influence adolescents we must first investigate the nature of their academic stereotypes.
A similar argument can be applied to classroom regulatory behavior. With recent media attention on the “boy crisis”, some have argued stereotypes about academics might be shifting to favor girls (Mead, 2006) and again, there is some empirical evidence to support this argument (Martinot & Desert, 2007; Plante, et al., 2009). Although the media presents a stereotype of “troublesome boys” and some evidence exists that self-regulation and discipline give girls the edge in school (Duckworth & Seligman, 2006), no one has examined whether children or adolescents stereotype boys or girls as being better at regulating their behavior within the classroom.

**Multidimensionality and the Matrix of Gender-Typing.** A debate in the gender literature adds to the methodological framework for the proposed study. Although in the current study I propose to examine the *coherence* among gender stereotypes, a review of the multidimensionality literature provides background about why exploring relations among gender typed components is important. The multidimensionality view of gender is a useful way in which to conceptualize gender stereotypes. This view is that gender is multidimensional or multifaceted, meaning that gender is not some unitary essence of an individual that is the organizing feature of thoughts, knowledge, feelings, and behaviors (Eckes, & Traunter, 2000; Ruble et al., 2006). A clear distinction must be made, however, between the multidimensionality view and the idea that *all* gender-typing concepts are unrelated. Specifically, this view calls upon the importance of acknowledging the *possibility* that some gender-typing concepts are unrelated. Although most scholars agree that some multidimensionality exists among gender-typing concepts, there remains a lack of consensus regarding how much multidimensionality exists and how specific concepts relate to one another (Ruble et al., 2006). This debate surfaced in the 1960s and the nature of the debate has changed several times.

Prior to the 1960s, the majority of gender researchers operated under the assumption that gender-typing concepts were all tightly interconnected and related (Huston, 1983; Ruble & Martin, 1998). This assumption is evident in the measures that were commonly used during this time; specifically, one domain would be assessed (e.g., gender-typed toy play) as an indicator of gender-typing (Huston, 1983; Ruble & Martin, 1998). In the 1960s scholars began to view this theoretical
conceptualization of gender as well as the measures designed to tap it as problematic (Huston, 1983). Huston (1983) recounted that, during the 1960s, some gender scholars began to argue that many gender-typing constructs could be defined as bipolar opposites, either masculine or feminine. In the 1970s, however, this approach and the measures that assumed bipolarity came under attack by many gender and personality researchers who argued that masculinity and femininity were not two ends of a continuum, but instead were two independent dimensions (Huston, 1983).

Since the 1970s, scholars have argued that gender is not two-dimensional, but multidimensional and far more complex than had originally been proposed by researchers in the 1960s and 1970s (Eckes & Traunter, 2000; Huston, 1983; Ruble et al., 2006). Furthermore, many argued that ignoring the possibility of multidimensionality in gender-typing concepts as researchers had previously done can result in grave conceptual and methodological errors (Huston, 1983; Ruble & Martin, 1998; Ruble et al., 2006). Huston (1983) argued for the multidimensionality perspective using the Matrix of Gender-typing, which has since been expanded and revised by Ruble and colleagues (2006; see Appendix A for most recent version of the matrix). The matrix outlines and organizes multiple dimensions of gender and provides clear distinctions among aspects of gender-typing. Ruble and colleagues (2006) argued that the relations between and within dimensions are complex and stress the need for more research on the multidimensionality of gender-typing concepts, including gender stereotypes.

Unfortunately, excluding some research examining the links between gendered knowledge and behavior, little empirical research has examined multidimensionality directly; therefore, it is unclear to what extent multidimensionality exists (e.g., Ruble et al., 2006; Miller et al., 2009). Furthermore, very few studies have examined the coherence among different types of gender stereotypes. Much of the research that has been conducted examining multidimensionality can be categorized as being of two types: research investigating global versus more local associations. Global studies involve assessing links across groups of items representing abstract constructs. The majority of global studies have examined the links between children’s overall gender stereotype knowledge and their overall level of gender-typed behavior (Martin et al., 2002;}
Ruble et al., 2006). The results from these studies are mixed with some finding significant links and others not finding evidence of associations between knowledge and behavior (Ruble et al., 2006; Martin, 1993). Global studies examining links beyond those between knowledge and behavior have also been mixed (Ruble et al., 2006; Hort, Leinbach, & Fagot, 1991). Other researchers more closely match specific knowledge domains (e.g., stereotypes about toys) or even specific items (e.g., the stereotype about who like cars) with specific behaviors (e.g., whether a boy plays with cars) to assess coherence and have often found significant correlations (Aubry, Ruble, & Silverman, 1999; Coker, 1984; Martin, Fabes, Evans & Wyman, 1999; Serbin, Powlishta, & Gulko, 1993).

Collectively, these matched studies seem to suggest that at least some aspects of gender are more strongly related than others, and this idea is consistent with various theories of gender development, such as GST and DIT (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002; Ruble et al., 2006). However, the field is far from a consensus on the issue of multidimensionality, particularly because some studies show other factors can influence multidimensionality, adding to complexity of the debate. For example, in a meta-analysis of gender development, Signorella, Bigler, and Liben (1993) found that children’s motivations, attitudes, and other individual difference factors (e.g., self-esteem) influence the relation between their knowledge and behaviors. It is valuable to investigate whether adolescents who stereotype in one domain also stereotype in another or similarly, to investigate whether adolescents consistently hold egalitarian views across domains (i.e., hold stereotyped views that are consistent with the gender essentialist argument). Investigating the ways in which gender might help adolescents organize their world has important theoretical and practical implications.

**Academic Stereotypes, Classroom Regulatory Behavior, and the Current Gender-Typing Matrix.** The most recent gender-typing matrix is made up of four columns that define specific constructs and six rows that define specific content areas (Ruble et al., 2006; see Appendix A). Additionally, the matrix is divided up into specific cells that represent particular dimensions of gender-typing. Outlining gender development literature in this way makes it easier to identify the areas where more work is needed. One area that warrants further exploration is
how different types of gender stereotypes relate to one another, for instance, the relations among adolescents’ gender stereotypes about academics, school, classroom regulatory behaviors, and occupations. Specifically, it is yet unclear how these stereotypes relate to each other within domains (e.g., how stereotypes about math relate to stereotypes about language arts) and across domains (e.g., how stereotypes about math relate to stereotypes about occupations).

In conclusion, GST and DIT along with the multidimensionality perspective offer a model with which to conceptualize adolescents’ gender stereotypes and ingroup biases and their consequences. Nevertheless, few empirical studies have examined gender stereotypes and ingroup biases in children (Powlishta, 1995a, b; Powlishta, 2004; Powlishta, Serbin, & Gulko, 1993) and none have looked at ingroup bias in adolescents’ views of academic subjects, school in general, and classroom regulatory ability. Furthermore, of the few empirical studies that have examined academic gender stereotypes, only three have been conducted in the US (Cvencek, Meltzoff, & Greenwald, 2011; Heyman & Legare, 2004; Rowley et al., 2007).

The current project will fill these gaps by examining adolescents’ gender stereotypes and ingroup biases about academics, classroom regulatory ability, and the coherence among these stereotypes (or lack of coherence). The following section will review pertinent literature for the proposed study, specifically, empirical research on academic gender stereotypes, ingroup biases in stereotyping, and classroom regulatory ability.

Part II: Empirical Studies

Academic Gender Stereotypes. In Western culture, math and science have traditionally been stereotyped as masculine subjects and language arts has been classified as a feminine subject (Liben & Bigler, 2002). Very few studies, however, have examined children’s and adolescents’ perceptions of academics as gendered. Moreover, possibly due to the wide range in the academic subjects assessed, methodologies used, and age groups studied, those study findings are inconsistent. A few of the studies found results that are consistent with traditional gender stereotypes (Cvencek et al., 2011; Heyman & Legare, 2004; Rowley et al., 2007). Conversely, others found evidence that children endorsed counter-traditional stereotypes (e.g., girls were viewed as more competent than boys in math; Martinot & Desert, 2007; Plante et al., 2009;
Rowley et al., 2007). Because so few studies on academic stereotypes have been conducted, I will review each one briefly in the following section.

In a study investigating 4th, 6th, and 8th graders’ racial and gender stereotypes of academic domains, Rowley and colleagues (2007) found mixed results with some reflecting traditional gender stereotypes and others not showing a clear pattern. In this study, participants rated how capable they thought boys and girls were at specific academic subjects. Fourth grade boys and girls viewed girls as having a higher reading and writing ability than boys, and this difference increased in 6th and 8th grade. Fourth grade boys and girls each viewed their own gender as being more competent in math/science, but in 6th and 8th grade, boys expressed more egalitarian views whereas girls continued to view their own gender as better in math. Although girls reported their own gender as having advantages in math/science across all three grades, the gap between boys and girls decreased from 4th to 8th grade. Therefore, girls and boys both tended to endorse more egalitarian views as they got older. These results, particularly for math, reflect ingroup bias patterns such that children endorsed traditional gender stereotypes while simultaneously showing a bias for their own gender.

Similar ingroup bias patterns in children’s endorsement of academic gender stereotypes have been found by other researchers. For example, in a study investigating elementary-aged children’s beliefs concerning gender differences in academic (math and spelling) and social domains (physical aggression, relational aggression, and prosocial tendencies), children differentiated between boys and girls on some of these domains, but not all (Heyman & Legare, 2004). There seemed to be two groups of children in this study: those who endorsed traditional gender stereotypes about academics and aggression and those endorsed more egalitarian views. This study assessed children’s stereotypes with both explicit and implicit stereotype measures. The explicit tasks were a series of questions for which children had to rate whether only boys, only girls, or about the same were good at certain subjects or more likely to display specific social behaviors. The implicit measures they used were picture matching tasks during which children were asked to answer questions regarding which depicted child (a girl or boy) was better at certain subjects or was more likely to display certain social behaviors.
When children differentiated between the genders, they tended to rate girls as being higher on spelling ability and having more prosocial tendencies, whereas they tended to rate boys as higher on math ability and on both physical and relational aggression; however, responses on the explicit measures were not related to those on the implicit measures. The findings from the explicit measures mapped onto traditional gender stereotypes, but patterns of ingroup biases were also found. Specifically, younger children were more likely to report their own gender was better at math, spelling, and higher on prosocial tendencies whereas older children were more likely to respond according to cultural gender stereotypes. Overall, some children endorsed gender stereotypes in both academic and social domains whereas others did not. Furthermore, there were significant age differences such that younger children were more likely than older children to show patterns of ingroup bias.

Similar to Heyman and Legare (2004), Cvencek and colleagues (2011) used both explicit and implicit measures of children’s math stereotypes. First through 5th grade children were asked to associate pictures of either boys or girls with math skills (e.g., being good at math), math liking, and math interest to evaluate their math gender stereotypes. For example, children were asked questions such as “Who is better at math?” and children were instructed to point to a picture of a girl or a boy. Children also completed a modified version of the Implicit Associations Test (IAT) as a measure of implicit math stereotypes (Greenwald, McGhee, & Schwartz, 1998). Children as young as 1st grade endorsed the traditional cultural stereotype that math is for boys and, unlike Heyman and Legare study (2004), results were consistent across both explicit and implicit measures. Interestingly, Cvencek and colleagues (2011) also examined the developmental emergence of math stereotypes. These analyses revealed that math gender stereotypes increased linearly with age, suggesting that some academic gender stereotypes increase as children get older. However, this finding is contradictory to findings from other academic stereotype studies in which older children tended to endorse more egalitarian views (Rowley et al., 2007; Martinot & Desert, 2007). This lack of congruency suggests the need for more studies on academic gender stereotypes.
Two studies conducted abroad in French-speaking regions contribute to the inconsistencies in this literature. Martinot and Desert (2007) investigated 4th and 7th grade French students’ perceptions of males’ and females’ math ability. They found that 4th grade boys and girls evaluated their own gender as being higher on math ability. Conversely, 7th grade boys and girls reported girls as being higher in math ability than boys. These findings are evidence of ingroup bias in stereotyping such that younger girls and boys both report their own gender as having an advantage in math; however, unlike the other studies reviewed above, by 7th grade boys and girls actually endorse a stereotype that is counter to traditional gender stereotypes. Martinot and Desert (2007) do not explain these results in terms of ingroup bias, but claim that their results might be a reflection of girls’ better grades in school.

The Martinot and Desert (2007) results are congruent with a study conducted in French-speaking Canada (Planet et al., 2009). In this study, 6th, 8th, and 10th grade boys and girls rated math and language arts as being either masculine or feminine domains. Only 6th grade boys perceived math to be a masculine domain whereas all other groups (i.e., 6th grade girls, 8th grade boys and girls, and 10th grade boys and girls) perceived math to be a feminine domain. Additionally, boys and girls in all age groups evaluated language arts to be predominantly a feminine domain. Children in 6th grade showed evidence of ingroup bias patterns; specifically, they claimed their own gender group was better in math. However, all children said girls were better at language arts and older children endorsed a counter-traditional stereotype for math by reporting girls were better than boys. Taken together, these international studies suggest that gender stereotypes are not universal and that they may be affected by cultural factors. They are also valuable to consider for the current study because they add to the inconsistency in the academic gender stereotypes literature and point to the need for more research to better understand academic stereotypes.

There are several reasons why studies of academic stereotypes might vary so much in their findings, including the use of different methodologies and measures, the assessment of different stereotypes (e.g., math stereotypes, science stereotypes, writing stereotypes), and the use of samples that differed in age and geographic location. First, with regards to methods and
measurement, each study used different measures and assessed varying academic domains, and further, none of them investigated all core academic domains separately (math, science, language arts, and social studies). For instance, Rowley et al. (2007) relied on visual analog scale (VAS), a 100-millimeter line for each item with descriptive anchors at each end (i.e., boys, girls) but others used structured interviews (Cvencek et al., 2011; Heyman Legare, 2004). Also, Rowley et al. (2007) examined academic stereotypes with one item measures and assessed students’ views of a combined math/science category and a combined reading/writing category. It is possible that children have different views regarding each academic domain; thus, combining them creates potential confounds. Another problem with this study is that the domains were measured with only one item, which makes it impossible to rule out confounds due to item wording or scale construction. Some studies used structured interviews as well as both explicit and implicit measures of children’s stereotypes (Cvencek et al., 2011; Heyman Legare, 2004). In a meta-analysis investigating different stereotype assessments and measures, Signorella, Liben, and Bigler (1993) showed that the use of “should” (e.g., “Who should be a doctor?”) or “can” wording (e.g., “Who can be a doctor?”) was associated with more “both” answers to the questions (e.g., both men and women should/can be doctors). Conversely, “usually” or “better” wording was associated with fewer “both” answers. Thus, depending on how questions were worded, children’s responses varied.

Second, prior studies are limited in the information that has been assessed and are not consistent in which academic domains are included or how they are defined (i.e., as separate or combined categories). Specifically, studies have been designed to explore stereotypes about separate domains including math (Martinot & Desert, 2007), math and spelling (Heyman & Legare, 2004), and math and language arts (Plante et al., 2009); conversely other studies combined academic domains (Rowley et al., 2007). Although some studies have been designed to explore school engagement and participation (Buchmann et al., 2008), no studies have been developed that ask children or adolescents their global stereotypes about school in general. This topic is particularly timely given the media hype regarding “the boy crisis”. Based on exposure to these stories, children may have developed a global stereotype that girls are better at school than are
boys. It is necessary to investigate children’s views to understand whether children and adolescents stereotype academic subjects and school in general.

Third, the previous studies involve a range of age groups from kindergarten (Heyman & Legare, 2004) through high school (Martinot & Desert, 2007). This is valuable for the field because it provides information across developmental periods; however, using different ages and different methodology makes comparisons across studies difficult. Furthermore, two of these studies are conducted in French-speaking regions (Martinot & Desert, 2007; Plante et al., 2009); thus, generalizability of these findings to children in the US is questionable.

Finally, with the exception of the Heyman and Legare (2004) study, none of the studies considered gender ingroup bias when studying academic gender stereotypes. As indicated by theory (GST and DIT), ingroup bias is a major component of the stereotyping process and should be considered when studying stereotypes (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002; Serbin et al., 1993).

Collectively, the above studies suggest that better measures, inclusion of separate questions about a range of academic subjects, and a stronger theoretical framework are necessary to better understand boys’ and girls’ academic gender stereotypes. The current study aims to fill these gaps by creating and evaluating new measures of academic gender stereotypes and classroom regulatory behaviors to gain a clearer picture of how adolescents view these domains.

**Classroom Regulatory Behavior Stereotypes.** Another important aspect of academic gender stereotypes that has been overlooked in the extant literature is children’s and adolescents’ gender stereotypes about classroom regulatory behavior. Regulatory ability is highly predictive of scholastic achievement in both younger children (McClelland, Morrison, & Holmes, 2000) and older children (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000); however, no study has yet investigated children’s perceptions of gender differences in regulatory ability or behaviors. To succeed in school, children need to be able to sit still, follow directions, and stay on task. It is likely, then, that children might associate being low on regulatory ability with doing poorly at school, leading them to develop a stereotype about regulatory ability that is related to academic
ability (e.g., the children who cannot stay on task or constantly get reprimanded are not doing well in school).

Furthermore, there is a marked gender difference in regulatory ability favoring girls and this gender difference is evident from the first day of school (Else-Quest et al., 2006; Matthews et al., 2009; Rothbart, 2011). Boys engage in more disruptive classroom behavior than do girls according to teachers (Downey & Vogt Yuan, 2005; Schaefer, 2004) and are overrepresented in disciplinary referrals, suspensions, and expulsions (Gilliam, 2005; Skiba, Michael, Nardo, & Peterson, 2000). Based on these differential patterns, children could develop a stereotype that boys are not good at school because they cannot sit still, focus, or easily follow directions. Hence, classroom regulatory behaviors are an untapped component of academic gender stereotypes.

It is surprising given the evidence of how important classroom regulatory abilities are to performance that no study to date has assessed children’s or adolescents’ perceptions of classroom regulatory ability. Therefore, to better understand these issues, it is necessary to create and evaluate new measures that assess academic gender stereotypes and children’s perceptions of classroom regulatory behavior. The proposed study will build upon the extant literature on academic gender stereotypes as well as contribute to the assessment of new domains of academic behavior. These new developed measures will be constructed in a way that allows for an examination of another understudied aspect of gender stereotyping: ingroup bias.

**Gender Stereotyping and Ingroup Bias Patterns.** As discussed in the first part of this literature review, both GST and DIT provide strong arguments for the importance of assessing ingroup bias when studying stereotypes (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002; Serbin et al., 1993). In recent years, developmental researchers have begun to investigate children’s attitudes and ingroup biases, particularly surrounding gender (Powlishta 1995a, 1995b, 2004; Powlishta, Serbin, Doyle, & White, 1994; Susskind & Hodges, 2007). Unfortunately, these studies are difficult to compare because they use different measures to assess attitudes and biases (Zosuls et al., 2011). Specifically, some studies used trait rating measures in which children are asked to rate boys and girl separately on a number of positive and negative trains (Powlishta, 1995a, 1995b; Powlishta et al., 1994; Susskind & Hodges, 2007). Other studies
have used global affective ratings (e.g., “I like girls/boys”; Yee & Brown, 1994). Furthermore, these studies tend to be focused on early (Yee & Brown, 1994) to middle childhood (Powlishta, 1995a, b, 2004; Powlishta et al., 1994; Susskind & Hodges, 2007) with little attention paid to adolescents.

Empirical studies investigating young children’s ingroup biases have shown that younger children’s racial and gender stereotypes are more marked by ingroup bias than are older children’s (Doyle & Aboud, 1995; Powlishta, 1995a, b, 2004). Ingroup bias persists in adulthood and has been a popular topic of investigation in the social psychological literature (see for review Brewer & Brown, 1998). Given that both children and adults show ingroup biases, we would expect to find that adolescents also show these biases, but the nature of these biases has not been explored. It could be that patterns of ingroup biases relate to specific academic gender stereotypes that adolescent boys and girls endorse. To answer some of these speculative questions about adolescents’ stereotypes and ingroup biases specifically, more developmental research exploring adolescents’ ingroup biases is needed.

In sum, relatively little is known about adolescents’ ingroup biases related to gender and academics. The current study will aim to fill these gaps in the literature by examining adolescents’ ingroup bias patterns in their endorsement of gender stereotypes surrounding academic stereotypes and classroom regulatory ability.
Chapter 3
THE PROPOSED STUDY

Specific Aims

The overarching goal of the present study is to contribute to the psychological literature on stereotypes by examining adolescents’ gender stereotypes about academics and classroom regulatory behavior. To meet this goal, the proposed study has five specific aims. The first is to develop and evaluate new measures to assess adolescents’ gender stereotypes surrounding academic domains, school in general, and classroom regulatory behaviors. The second goal is to use these newly developed measures to evaluate the degree to which adolescents hold gender stereotypes about academics and classroom regulatory behavior. The third goal is to assess sex differences concerning academic and classroom regulatory gender stereotypes. The fourth goal is to examine if adolescents show ingroup bias associated with academic domains and classroom regulatory behavior stereotypes. The fifth goal is to investigate the interrelations among gender stereotypes across multiple gender-typing domains (academics, classroom regulatory behavior, and occupations), assessing the extent of multidimensionality in these specific gender stereotypes.

To accomplish these aims, two academic gender stereotype measures (see Appendices B and C), and a classroom regulation gender stereotype measure (see Appendix D) were designed for the current study. Because past research has shown that wording of items can significantly impact stereotype endorsement (Signorella et al., 1993), one measure had ‘ease’ wording to assess perceived “natural” abilities and one had ‘better than’ wording to assess perceived academic competencies (see Appendix B for natural abilities measure and Appendix C for competency measure). According to the most recent version of the gender-typing matrix (see Appendix A; Ruble et al., 2006), these academic and classroom regulatory abilities gender stereotypes fall under the Personal-social attributes domain (content area 3A). These measures were administered in conjunction with a reliable and valid measure of occupational gender stereotypes, falling under
Activities and interests (content area 2A), enabling an investigation of the coherence among adolescents’ gender stereotypes.

Hypotheses

With regards to the first aim of evaluating the new measures, exploratory item analyses will be conducted and adolescents’ response patterns examined to compare wording across different domains of academic skills. Although these analyses are exploratory, I expect that gender stereotypes within the academic domain will relate to each other (e.g., math items will relate positively to each other); however, based on previous work (Signorella et al., 1993), I also predict that there will be varying patterns of responses across item wordings (‘ease’ versus ‘better’).

With regards to the second study aim of evaluating adolescents’ stereotypes, I predict that adolescents will show evidence of endorsing traditional gender stereotypes (Liben & Bigler, 2002). Specifically, I expect that, on average, they will report that masculine domains (math and science) are easier for and attribute them more to boys than girls whereas they will report that feminine domains (language arts and school) are easier for and attributed more to girls than boys. I will also explore whether adolescents view social studies as gendered. There are no clear gender disparities in social studies achievement, and so it is often considered to be a neutral subject (Buchmann et al., 2008). Furthermore, the topics covered in social studies are highly variable (e.g., ranging from politics and war to women’s rights and historical events). Therefore, because social studies is often considered a neutral subject, I expect adolescents not to endorse any gender stereotypes about the social studies. Additionally, based on empirical evidence of the gender differences favoring girls in regulatory ability (Else-Quest et al., 2006; Matthews et al., 2009; Rothbart, 2011), I hypothesize that adolescents will hold gender stereotypes regarding classroom regulatory behavior; namely, I predict that adolescents will view boys as less able than girls to regulate behavior within the classroom (e.g., sit still, follow directions).

In relation to the third study aim, drawing off previous research that has found boys to stereotype to a greater extent than girls (for review see Ruble et al., 2006), I expect to find sex
differences in academic, classroom regulatory, and occupational gender stereotypes. In particular, I expect both boys and girls to endorse stereotypes, but I predict that boys will endorse stereotypes to a greater degree than will girls. However, regarding the fourth study aim, as in the studies reviewed above (Heyman & Legare, 2004; Rowley et al., 2007; Powlishta, 1995a, b, 2004), I predict that, on average, both boys and girls will also show evidence of ingroup bias such that girls will be more likely to attribute academic subjects that are consistent with their ingroup (e.g., same-gender-typed domains) more to girls than to boys (e.g. girls are better at feminine domains) and similarly, that boys will be more likely to attribute subjects that are consistent with their ingroup more to boys than to girls (e.g., boys are better at masculine domains).

In contrast, girls and boys will be less likely to show ingroup bias on domains that are inconsistent with their ingroup (e.g., other-gender-typed domains). For example, girls may still endorse the stereotype that boys are better at math than girls whereas boys may still endorse the stereotype that girls are better language arts than boys. I predict, however, that both girls and boys endorse stereotypes that are consistent with their ingroup to a greater extent than those that are not consistent with their ingroup. As in some of the reviewed studies (Martinot & Desert, 2007; Rowley et al., 2007; Plante et al., 2009), some adolescents may also endorse counter-traditional stereotypes (e.g., girls are better at math than boys). It is not expected that adolescents will endorse counter-traditional stereotypes that favor their own gender to the degree that has been found in younger children in which the majority endorse counter-traditional stereotypes (Powlishta, 1995a, 1995b).

The current study, however, will allow an exploration of that possibility and a comparison with the few studies that have found evidence of counter-traditional stereotypes favoring girls in particular (e.g., girls are better at math and science). Therefore, on average, I expect adolescents’ stereotypes to vary by sex of respondent and gender-type of the domain being assessed.

This ingroup bias pattern, however, is not hypothesized to be found with regards to masculine and feminine occupations. Previous research has shown that boys tend to endorse occupational gender stereotypes to a greater degree than do girls (Liben & Bigler, 2002). Further,
although traditionally masculine occupations tend to be higher in status than traditionally feminine occupations, the authors of the scale purposely balanced the status of the masculine and feminine jobs (see Appendix F). Therefore, the occupations do not have the same positive valiance as being good as academics or being better at a desirable behavior such as regulating disruptive behavior (e.g., not sitting still, not following directions) in a classroom. In sum, if the stereotype is negative for their group (e.g., for girls, that girls are not as good at math as boys and, for boys, that they are not as good as girls at regulating behavior), adolescents will endorse the stereotypes to a lesser degree than will adolescents of the other sex.

With regards to the fifth aim of investigating interrelations among the measures, I hypothesize, based on the gender-typing matrix (See Appendix A; Ruble et al., 2006), that I will find relations among the different domains of gender stereotypes being investigated in the current study. Namely, I expect that academic stereotypes will relate to classroom regulatory stereotypes and further, that both gender stereotypes about academics and classroom regulatory ability will relate to a reliable and valid measure of occupational gender stereotypes (OAT-AM; Liben & Bigler, 2002). Specifically, gender stereotypes across the domains of Personal-social attributes (content area 3A; academic subjects and classroom regulatory behaviors) and Activities and interests (content area 2A; occupations) will be positively related. It is also expected that gender stereotypes will relate significantly and positively to each other within domain than across domains. In particular, academic stereotypes will relate significantly and positively to stereotypes about classroom regulation because they are within the same cell in the Matrix of Gender-typing matrix (Ruble et al., 2006; see Matrix). Moreover, based on past stereotype research showing some children have more stereotyped views than others (Bigler & Liben, 1993; Bigler & Liben, 2006), and consistent with the gender essentialist argument (e.g., Gelman, 1989; Gelman, 2003; Gelman & Markman, 1986, 1987), I hypothesize that adolescents will show similar patterns of stereotyping across the different types of stereotypes (academics, classroom regulatory ability, and occupations). Thus, adolescents who stereotype one domain will be likely to stereotype other domains. Accordingly, adolescents who endorse more egalitarian views (i.e., not endorse stereotypes) in one domain will endorse egalitarian views in other domains (e.g., if they endorse
egalitarian views about academics, they will also do so for classroom regulatory ability and occupations).

The findings to be generated in this research will have important implications for education practitioners, policy-makers, and for future research on gender stereotypes. Furthermore, understanding children and adolescent’s beliefs about academics, school in general, classroom regulatory ability, and occupations could have implications for the development of self-conceptions and the relation between stereotypes and behavior (see Heyman & Legare, 2004; Miller et al., 2009 for related arguments). Theory and past empirical research suggests that children’s, adolescents’, and adults’ gender stereotypes about academic subjects hinder performance (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002; Nosek et al., 2008). Related research on stereotype threat and task motivation has shown that when children (e.g., Ambady, Shih, Kim& Pittinsky, 2001; Aronson, 2002; Aronson & Good, 2002; Huguet & Regner, 2009) and adults (Aronson, Quinn, & Spencer, 1998; Spencer, Steele, & Quinn, 1999) believe an academic subject or task is for the other gender, their performance is hindered. Moreover, knowing how adolescents use gender as a way to organize their worlds has important theoretical implications. Specifically, do adolescents show coherence among stereotypes, regardless of the direction of those stereotypes (i.e., for boys or for girls).

Results from this study will inform educators about the specific gender stereotypes that adolescents hold (e.g., “Girls are much better at school than are boys.” “Girls should not be police officers.”). Given evidence that these stereotypes can affect academic achievement (Denissen, Zarrett, & Eccles, 2007; Eccles et al., 1998; Eccles & Wigfield, 2002; Wigfield & Eccles, 2002) and educational and occupational aspirations (Bandura et al., 2001), it is imperative we investigate adolescents’ perceptions in an attempt to intervene and reduce stereotypes. Armed with the information from the current study, educators can help to combat these gender stereotypes that have great potential to affect children’s academic self-concepts and achievement as well as their academic and occupational aspirations.

Chapter 4

METHODOLOGY

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The proposed study takes advantage of my work on a two-year longitudinal study (Co-PIs Richard Fabes, Carol Martin, and Erin Pahlke) designed to investigate the consequences and correlates of single-gender versus mixed-gender classes. This study was funded by the Challenged Child Project, a Presidential Intellectual Fusion Initiative at Arizona State University and by the ASU School of Social and Family Dynamics as part of the Lives of Girls and Boys Enterprise.

**Participants**

Participants were adolescents enrolled in one large junior high school (grades 7 and 8) in a middle-class southwestern city. This school was selected in collaboration with the school district and school principal for a longitudinal study because the school has both single-sex and mixed-sex classes. Because theoretically gendered classroom context (single- versus mixed-sex classroom context) could impact gender stereotypes (Bigler & Liben, 2006), students who had any exposure (direct or indirect) to single-sex classes in the year preceding data collection or at the time of data collection, were dropped from the study \(n = 628\). For details of sample characteristics, see Table 1.

The final sample consisted of \(N = 257\) 7th graders (136 boys and 121 girls, \(M\) age = 12.00 years; range: 11-13). Thirty-six percent of the participants in the final sample were White, 22% were Mexican American, 18% were multiethnic, and 12% were Latino or Hispanic. Relatively few participants were Black (4%), Asian (4%), American Indian or Alaska Native (2%), and Other (2%). Because the majority of the participants in the dropped sample were in 8th grade (all 8th graders were dropped due to indirect exposure to single-sex classes), it was expected that participants in the final sample would differ significantly on age, but there was no reason to assume they would differ in any other ways. As expected, the dropped sample and the final sample differed significantly on participant age, \(\chi^2(4) = 861.48\), \(p < .001\), but did not differ significantly on sex, \(\chi^2(1) = .01\), \(p = .91\). However, unexpectedly, the two samples also differed significantly on ethnic background, \(\chi^2(7) = 441.82\), \(p < .001\).

**Procedures and Measures**

All data used in the current study are survey data collected in the fall of the academic school year. Although this is a longitudinal study, only data from wave one will be used in the
current study. Students were told they were completing surveys about their opinions about gender and their junior high experiences with academics and friends; students completed the survey packets in their social studies classrooms. Surveys included measures assessing gender stereotypes, classroom stress, educational aspirations and expectations, and academic engagement; however, only measures assessing academic and occupational gender stereotypes, and stereotypes about classroom regulatory ability were used in the current study.

Two to three researchers (i.e., project affiliated research staff, graduate students, and faculty) administered the surveys to students within the classrooms over the course of an entire school day. Students completed the measure on their own, but researchers were available to answer questions. All students in the school were included in the study unless their parents opted them out, they were absent, or the students refused to participate (n = 43).

Academic Gender Stereotypes. Participants completed two measures of academic gender stereotypes designed by the researcher in collaboration with the co-chairs of the current project. The first measure was designed to explore adolescents’ gender stereotypes about “natural” abilities of girls and boys in academics (see Appendix B for natural abilities stereotype measure). Students rated whether core academic subjects (math, science, language arts, and social studies) and school in general are Definitely easier for boys than girls (1), A little bit easier for boys than girls (2), Equally easy for boys and girls (3), A little bit easier for girls than boys (4), or Definitely easier for girls than boys (5) (e.g., “For whom it is easier to be good at math?” “For whom is it easier to do well in school?”). Participants were given an option to rate each item as “equally easy for boys and girls” because previous findings have shown that this response option is important for tapping participants’ beliefs in (rather than simply their knowledge of) cultural stereotypes (Signorella et al., 1993; Liben & Bigler, 2002).

The second academic stereotype measure was designed to assess adolescents’ perceptions of girls’ and boys’ competencies in academic domains (See Appendix C for competency measure). Specifically, participants rated whether they believe Boys are a lot better (1), Boys are better (2), Boys are a little better (3), Absolutely no difference (4), Girls are a little bit better (5), Girls are better (6), and Girls are a lot better (7) at the core academic subjects (math, science, language
arts, and social studies) (e.g., ‘Are there difference between how good boys and girls are at
math?’) and school in general (e.g. ‘Are there differences between how good boys and girls are at
school in general?’). This slightly elongated response scale was also based on previous research
and similar scale construction (Signorella et al., 1993; Liben & Bigler, 2002).

Classroom Regulatory Behavior Stereotypes. Participants completed a classroom
regulation stereotype measure (See Appendix D for classroom regulation stereotype measure)
designed by the researcher in collaboration with the co-chairs to assess whether adolescents
perceived seven classroom regulatory behaviors (follow teacher directions, stay quiet while others
are talking, not yell out answers, stay in their eat, focus on a task for a long time, not act out in
class, and listen to teacher) to be Definitely easier for boys than girls (1), A little bit easier for
boys than girls (2), Equally easy for boys and girls (3), A little bit easier for girls than boys (4), or
Definitely easier for girls than boys (5) (e.g., “For whom it is easier to follow teacher directions?”,
“For whom is it easier to not act out in class?”). Again, this response scale was modeled off
previous research and similar scale construction (Signorella et al., 1993; Liben & Bigler, 2002).
Additionally, “ease” wording was used in an attempt to tap a perceived inherent gender difference
in the ability to regulate behavior in a classroom setting.

Scoring Academic Stereotype and Classroom Regulatory Stereotype Measures. Scoring
of the academic stereotype measures and the classroom regulatory stereotype measure will vary
depending on goal of analysis. The five aims of analyses are: (1) to examine overall patterns of
responses for each item on the three designed measures, (2) to ascertain whether adolescents
adhere to traditional gender stereotypes, (3) to examine whether there are sex differences in
stereotype endorsement, (4) to determine whether adolescents show evidence of holding ingroup
bias in academic domains and classroom regulatory ability, and finally, (5) to test
multidimensionality of gender stereotypes. Before any analyses can be conducted, the elongated
response scale for the competency measure will be collapsed into a 5-point likert scale in order to
compare this measure to the natural abilities measure and to the classroom regulation measure.
Specifically, I will collapse across response options 2 (‘Boys are better’) and 3 (‘Boys are a little
bit better’) and 5 (‘Girls are a little bit better’) and 6 (‘Girls are better’) so that those two options
become one option. The resulting response scale will range from *Boys are a lot better (1)*, *Boys are a little better (2)*, *Absolutely no difference (3)*, *Girls are a little better (4)*, and *Girls are a lot better (5)*.

With regards to the first goal, the 1 to 5 *raw scores* will be used on all measures. When evaluating the nature of the gender stereotypes about academics as part of the exploratory item analysis, I will examine the percentages of adolescents who assign scores 1 and 2 (stereotype the item for boys); 4 and 5 (stereotype the item for girls), and 3 (no stereotyping). With regards to the second goal, both raw and directional scoring will be used. To create a *directional stereotype score*, categorizing items as either masculine, feminine, or neutral is necessary. Therefore, based on previous research, I will categorize math and science as masculine and language arts as feminine (e.g., Liben & Bigler, 2002). There is no empirical evidence that social studies is gender-typed; thus, social studies will be categorized as neutral. Similarly, based on a budding media stereotype of “troublesome and failing boys”, and empirical evidence that girls now earn better grades than boys in school and have significantly higher school engagement and liking (Bandura, Barbaranelli, Vittorio Caprara, & Pastorelli, 2001; Duckworth & Seligman, 2006; Eccles et al., 1998; Eccles & Wigfield, 2002), school will be categorized as feminine. Further, based on past research (Else-Quest et al., 2006; Matthews et al., 2009; Rothbart, 2011), all classroom regulatory items will be categorized as feminine. Following categorization, a *directional gender stereotype score* will be calculated for each participant. To obtain this stereotype score for each traditionally masculine domain (math and science), each participant with scores of 1 or 2 (i.e., matching the traditional stereotype) will be recoded as 1 (stereotyped), and scores of 3, 4, or 5 (i.e., not matching the traditional stereotype) will be recoded 0 (not traditionally stereotyped). Similarly, for each traditionally feminine domain (language arts, school, and all regulation items), each participant with scores of 4 or 5 (i.e., matching the traditional stereotype) will be recoded 1 (stereotyped), and scores of 1, 2, or 3 will be recoded 0 (not traditionally stereotyped). For social studies, however, unless the item analysis shows students are stereotyping this subject, this item will be excluded from further analysis. If it is not found to be neutral in the item analysis, it will be categorized in the direction of the stereotype in
the item analysis. Specifically, if participants stereotype social studies as for girls it will be categorized as feminine and if they stereotype it as for boys it will be categorized as masculine. Scores will be summed across the classroom regulatory measure, but the way in which directional gender stereotype scores are collapsed for the academic measures will depend upon the item analysis (discussed below).

To determine whether there are sex differences in adolescents’ stereotype patterns, the third study aim, the directional gender stereotype scores will be used. To assess the fourth goal of determining if boys and girls show ingroup bias on academic domains, a directional ingroup bias composite score will be calculated. This will again be done separately for each item on each academic stereotype measure; however, the scores will not be dependent upon the sex-type of the item. Scores will be collapsed across feminine domains and masculine domains, resulting in ingroup bias scores for both domains. Specifically, boys who report scores of 1 or 2 (i.e., attributing that item to boys) will be recoded as 1 (showing an ingroup bias on that item), and scores of 3, 4, or 5 will (attributing the item to both or to girls) be recoded as 0 (not showing ingroup bias). Conversely, girls who report scores of 4 or 5 (i.e., attributing that item to girls) will be recoded as 1 (showing an ingroup bias on that item) and scores of 1, 2, or 3 will be recoded as 0 (not showing ingroup bias). After the scores are calculated, ingroup bias scores will be averaged across language arts and school to represent ingroup bias in feminine academic domains whereas scores will be averaged across math and science to represent ingroup bias masculine academic domains. This same scoring will be applied to the classroom regulatory measure. Again, scores will be summed across the classroom regulatory measure, but the way in which these scores are collapsed across the two the academic stereotype measures will depend upon the item analysis (discussed below).

To examine multidimensionality, the fifth and final goal, I will ignore the categorization of masculine and feminine and create a nondirectional gender stereotype score that is a proportion of gender stereotypic responses (i.e., agreement that only or mostly members of one gender should hold occupations) with higher scores indicating more stereotyped views (Liben & Bigler, 2002). Therefore, regardless of the gender-type of the item, all responses of 1, 2, 4, or 5 will be recoded
as 1 (stereotyped) and 3 will be recoded as 0 (not stereotyped). Scores will then range from 0 to 1 and will indicate a categorization of one gender or the other as being naturally better at or more competent in the academic domains and classroom regulation.

**Occupational Stereotypes.** Participants completed the Occupations subscale of the Occupations, Activities, and Traits Attitude Measure (OAT-AM; Liben & Bigler, 2002; See Appendix E). Participants rated whether *Only men* (1), *Mostly men and some women* (2), *Both men and women* (3), *Mostly women and some men* (4), or *Only women* (5) should perform a series of masculine, feminine, and gender-neutral occupations (e.g., “Who should be a police officer?,” “Who should be a secretary?”). To obtain scores that are comparable across measures, the *directional gender stereotype score* ranging from 0 (not traditionally stereotyped) to 1 (traditionally stereotyped) will be calculated as a measure of adolescents’ occupational gender stereotypes in the same way described above. However, to assess multidimensionality, the *nondirectional gender stereotype score* will be calculated.

**Overview of Analytic Plan**

The analyses for the proposed study will consist of preliminary item analyses and descriptive statistics with the goal of assessing the psychometric properties (e.g., variability, normal distributions) of the created measures (natural abilities academic stereotype, competency academic stereotype, and classroom regulation stereotype measures). A secondary goal is to compare the pattern of responses on items of the two academic stereotype measures.

The second part of the analysis will vary depending on the results of the item analysis. Specifically, if the item analysis yields evidence that suggests the natural abilities measure and the academic competency measure are tapping different constructs or that they have different response patterns, they will be used independently of one another. If the response patterns are not determined to be different across the two measures, academic domains across the two measures will be collapsed to create composite scores for each academic domain (math, science, language arts, social studies, and school). For all analyses, scores on the classroom regulatory measure and OAT will be collapsed to create a *composite classroom regulatory stereotype score* and a *composite occupational stereotype score.*
Part I: Item, Preliminary, and Descriptive Analyses

Basic individual item analyses and descriptive statistics will be conducted to investigate the psychometric properties of and the patterns of responses on the two new measures of academic gender stereotypes and on the new measure of gender stereotypes about classroom regulatory ability (see Appendices A and B for academic stereotype measures and Appendix C for classroom regulatory measures). For the item analysis, I will use the 1 to 5 raw scores from the natural abilities and classroom regulatory stereotype measure and the converted 1 to 5 raw scores from the competency measure. The item analysis will not be conducted on the OAT as it has been shown to be a reliable and valid measure of occupational gender stereotypes (Liben & Bigler, 2002); however, basic descriptive statistics will still be conducted.

First, I will examine response frequencies for each new measure in order to evaluate the patterns of responses. Specifically, I will examine the percentage of adolescents who assign scores of 1 and 2 (stereotype item as being for boys), 4 and 5 (stereotype item for girls), and 3 (not stereotyping item). Second, I will look at histograms fit with a normal curve for each item to examine whether those responses are normally distributed. Third, I will look at basic descriptive statistics of each item individually including central tendencies (e.g., mean, median) and measures of variability (e.g., standard deviation, variance) to ensure that there are no issues at this level. Fourth, with specific reference to the academic stereotype measures, I will conduct a series of comparative analysis to determine if the measures that are worded somewhat differently are tapping the same concept.

To do these comparisons, I will first conduct bivariate correlations and Kappas to examine whether similar items are correlated and have high enough Kappas (at least .60) that the items could be combined to create a composite score for each academic domain (math, science, language arts, social studies, and school) (see Crocker & Algina, 2008). Subsequently, to examine the response patterns on the two different measures, I will examine cross-tabulations and a chi-square statistic across similar items to investigate whether responses on one measure correspond with responses on the other (e.g., If a respondent says it is definitely easier for boys to be good at math, do they also say that boys are definitely better at math?). To determine whether items can
be combined to create composite scores for each academic domain, all three criteria described above must be met. Specifically, correlations between similar items (e.g., “easier for” math with “better at” math) must reach at least .80 and Kappas must be .60 or above. Furthermore, the chi-square test must be found to be significant between similar items, indicating a significant relationship between those items. If any or all of these criteria are not met, composite scores cannot be created and separate academic stereotype measures will be used.

Endorsement of Gender Stereotypes. As part of the preliminary analyses I will also determine whether on average adolescents tend to stereotype academic domains and classroom regulatory behavior according to traditional gender stereotypes (or not). This will be accomplished by conducting a series of one-sample t-tests will be conducted on the 1 to 5 raw scores to determine if, overall, the responses significantly differ from 3 (the egalitarian response). If a specific item or domain does not differ significantly from 3, students are not stereotyping that item. If scores differ significantly from 3, the stereotype will be interpreted in combination with the directional analyses from the item analysis. That is, if the item analysis indicates that a majority of students report that math is easier for boys than for girls and the t-test indicates that math stereotypes significantly differ from 3, it can be discerned that on average, adolescents stereotype boys as being naturally better at math. Depending on item analysis, stereotype scores will either be collapsed across academic domains or examined item by item (e.g., each math item on the two academic stereotype measures); however, as previously mentioned the classroom regulatory directional stereotype score will be a composite score of all seven items.

Part II: Sex Differences in Gender Stereotypes and Ingroup Biases

The results from the item analysis will influence the analysis that is conducted to examine sex and domain differences in adolescents’ gender stereotyping of academic subjects. Specifically, if the two academic stereotype measures can be combined a 2 (sex) X 4 (domain: math, science, language arts, school)\(^3\) repeated measures ANOVA with sex as the between-

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\(^3\) If social studies is not found to be neutral in the item analysis, it will be categorized in the direction of the stereotype in the item analysis. Additionally, it will be used in these analyses and the ANOVA will be a 2 (sex) X 5 (domain: math, science, language arts, social studies, school) on the five academic domain stereotype scores.
subjects factor and domain as the repeated measure to analyze the *directional gender stereotype scores*. This will provide information about sex differences in adolescents’ endorsement of academic stereotypes and further, allows for comparisons among adolescents’ endorsement of academic stereotypes across academic domains. Moreover, the repeated measure procedure controls for the correlated nature of responses to repeated items. If, however, the two measures cannot be combined, two similar 2 (sex) X 4 (domain: math, science, language arts, school) repeated measures ANOVAs will be run separately on the four *directional gender stereotype scores* from the natural abilities measure and from the competency measure.

Regardless of whether or not the measures can be combined main effects of sex and domain as well as all sex by domain interactions will be examined using the same procedures. Specifically, if the repeated measure analysis shows a significant main effect for sex in the presence of a non-significant sex by domain interaction, then means will be examined and to determine if the hypothesis that boys stereotype to a greater extent than girls. If the analysis shows a significant domain effect in the presence of a non-significant sex by domain interaction, post hoc pairwise comparisons will be conducted with a Tukey HSD correction for type I error. Tukey HSD is one of the more lenient corrections for pairwise comparisons; however, is recommended for this many pairwise comparisons because more stringent corrections such as the Bonferroni correction can produce too small an alpha value, producing very small power\(^5\) (e.g., Keppel & Wickens, 2004). These post hoc tests will allow exploratory comparisons of gender stereotyping on all pairs of academic domains (math with science, math with language arts, etc.). All significant sex by domain interactions will be probed in two ways: (1) one-way ANOVAs with sex as the between-subject factor on the scores split by domain, and (2) one-way repeated measures ANOVAs with domain as the repeated factor split by sex boys and girls. Probing interactions the first way allows an examination of sex differences in each domain separately whereas the second way allows an examination of whether boys and girls stereotype some academic domains more than others (e.g., girls stereotype language arts significantly more than

\(^4\) See footnote 4 regarding treatment of social studies.  
\(^5\) \(a(a-1)/2\) comparisons where \(a = \text{group}\). \(4(4-1)/2 = 6\) (Keppel & Wickens, 2004).
science, but boys stereotype science more than language arts). These are both valuable questions as past research has show that boys tend to stereotype more than girls (e.g., Ruble et al., 2006), but it is not known whether boys and girls have different patterns of stereotyping across domains. Additionally, to ascertain whether there are sex differences on gender stereotypes about classroom regulatory behavior, a one-way ANOVA with sex as the between-subjects factor will be conducted on the classroom regulatory *directional gender stereotype composite score*. A significant effect of sex will indicate sex differences in students’ endorsement of classroom regulatory gender stereotypes and means will be investigated to determine if the hypothesis is supported that boys stereotype to a greater extent than girls.

To examine whether there is evidence of ingroup bias in adolescents’ endorsement of academic gender stereotypes and classroom regulatory behaviors, first basic descriptive of the ingroup bias scores ranging from 0 (no ingroup bias) to 1 (ingroup bias) will be examined separately for both masculine and feminine domains and the *composite classroom regulatory ingroup bias score*. Descriptive statistics will be examined first over the entire sample, and then separately for boys and girls.

To determine whether there are sex differences in ingroup bias in adolescents’ endorsement of academic gender stereotypes, I will conduct a similar 2 (sex) X 2 (sex-type: masculine vs. feminine) repeated measures ANOVAs with sex as the between-subjects factor and academic domain as the repeated measure on the masculine and feminine domain *ingroup bias scores* (math and science making up the masculine domain and language arts and school making up the feminine domain). Again, depending on the results from the item analysis, I will either run one 2 (sex) X 2 (sex-type: masculine vs. feminine) ANOVA on the composite *ingroup bias scores* or I will run two similar 2 (sex) X 2 (sex-type: masculine vs. feminine) ANOVAs on the *ingroup bias scores* from the two academic stereotype measures separately. A significant effect of sex in the analysis will indicate that there are sex differences in adolescents’ ingroup biases regarding academic subjects. Further, if the domain effect is significant, means will be investigated to

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6 Again, see footnotes 4 and 7 regarding the treatment of social studies given the results from the item analysis.
determine if the hypothesis that both boys and girls will show evidence of ingroup bias, but that those ingroup biases will be stronger for same-gender-typed subjects is supported. This analysis will also determine if adolescents show different ingroup bias patterns about masculine vs. feminine academic domains.

Additionally, to determine if there are sex differences in adolescents’ ingroup biases with regards to classroom regulatory behaviors, a one-way ANOVA with sex as the between-subjects factor will be conducted on the composite classroom regulatory ingroup bias score. Means will also be examined to determine whether the hypothesis that the sex-type of the domain affects ingroup bias scores; namely in the case of classroom regulatory behaviors, that girls have a higher ingroup bias than boys.

Finally, to assess sex differences in adolescents’ endorsement of occupational gender stereotypes, a one-way ANOVA with sex as the between-subjects factor will be conducted on the nondirectional stereotype composite OAT score. Again a significant ANOVA will indicate sex differences in students’ endorsement of occupational gender stereotypes and an examination of the means will determine the direction of the effect; specifically, to ascertain whether the hypothesis that boys will stereotype to a greater extent than will girls is supported.

Coherence Among Academic, Classroom Regulatory, and Occupational Gender Stereotypes. To test the coherence among academic, classroom regulatory, and occupational gender stereotypes (fifth and final study aim), the nondirectional gender stereotype score will be used for all measures (both academic stereotype measures, classroom regulatory ability measure, and the OAT). The nondirectional gender stereotype score will be used as opposed to the directional gender stereotype score because the goal of these analyses is to determine whether adolescents who stereotype in one domain also stereotype in another domain – regardless of the direction of the stereotype. This analysis is aimed to investigate adolescents’ degree or level of stereotyping in the domain of gender and whether or not there is coherence among those levels of stereotyping. That is, it is not the goal to determine if the direction of stereotypes are consistent across domains (e.g., if adolescents who stereotype math to be for boys also stereotype masculine
Moreover, these types of questions, specifically, sex and academic domain differences will be answered from the preceding analyses.

As described above, the proportion of gender stereotypic responses (i.e., agreement that only or mostly members of one gender should hold occupations) will be calculated. Thus, higher scores indicate more stereotyped views (Liben & Bigler, 2002) and scores will range from 0 (not stereotyped) to 1 (stereotyped). With regards to the academic stereotyping measures, if the item analysis produces the expected results, academic stereotype scores will be derived separately (e.g., two separate math stereotype scores, one from the natural abilities measure and one from the competency measure). If the item analysis does not yield those results, stereotype scores will be summed across each academic domain (e.g., stereotype score for math that is the average of the stereotype score from the natural abilities measure and the competency measure). All possible interrelations among the stereotypes will be investigated using bivariate correlations. Gender stereotypes within (e.g., math with language arts, language arts with school) and across domains (e.g., academic stereotypes with occupational and classroom regulatory gender stereotypes) will be examined to determine if the hypothesis that all gender stereotypes will be related is supported.
Chapter 5

RESULTS

Frequencies of Stereotyped Responses

As a first step, the response frequencies were examined for each measure separately to determine what percentage of adolescents were assigning scores of 1 and 2 (stereotype item as being for boys), 4 and 5 (stereotype item for girls), and 3 (not stereotyping item). See Tables 2-4 for response frequencies.

For both academic stereotype measures, adolescents most often chose the egalitarian response. On the natural abilities measure, egalitarian responses ranged from 74.6% to 81.3% (see Table 2) and on the competency measure, egalitarian responses ranged from 65.2% to 72.4% across items (see Table 3).

For the 7 items on the classroom regulation stereotype measure, around half of the adolescents chose the egalitarian response. Among adolescents who stereotyped the items, responses that stereotyped the behaviors as being “easier for girls” appeared to be substantially more frequent than responses that stereotyped the behaviors as being “easier for boys” (see Table 4).
Part I: Item and Preliminary Analysis

After response frequencies on the academic and classroom regulation stereotype measures were examined, basic descriptive statistics were conducted on the raw scores for each measure at the item level to investigate any issues with non-normality. These analyses indicated no significant issues with skewness on any of the items (see Tables 5 and 6) and no issues with kurtosis on either the competency (see Table 5) or classroom regulation stereotype measure items (see Table 6).

Analyses did yield evidence of significant kurtosis on items from the natural abilities stereotype measure (Tabachnick & Fidell, 2007; see Table 5). In all cases, kurtosis was positive, indicating a significant leptokurtic pattern in the raw scores that resulted from many respondents falling at 3 (the mid-point and egalitarian response on the scale) on the 1-to-5 scale. Simulation studies have found that one-sample *t*-tests are robust against significant kurtosis (e.g., Reineke, Baggett & Elfessi, 2003), and so it was determined that the one-sample *t*-test was justified to evaluate whether students were stereotyping these items. However, non-normality can affect homogeneity of variance, a violation that can inflate the *F*-value and increase Type I error (Tabachnick & Fidell, 2007). Therefore, because of the evidence of non-normality at the raw score level, I made plans to test for skewness and kurtosis of all scales (i.e., all directional and counter-traditional stereotype scores and ingroup bias scores) before conducting ANOVAs. If these additional analyses yield evidence of non-normality, the most conservative corrections will be applied to analyses to overcome any violations of assumptions (i.e., the Welch correction).

After the raw scores were examined, the fourth part of the item analysis was conducted, which involved determining whether the two academic stereotype measures of each domain (e.g., natural ability in math and competency in math) could be combined to form a composite measure. First, I ran bivariate correlations and Kappas between all matching items (e.g., math item related to natural abilities with math item related to competency). Additionally, all possible item correlations on all three stereotype measures were examined (see Table 7 for correlations among all academic and classroom regulation stereotype items). As expected, all the matching items were positively and significantly related, *rs* ranged from .47 to .57, *ps* all < .001 (See Table 7).
Next, Kappas were run on the matching items as a rough indication of respondents’ agreement across the two items taking into account chance agreement (Crocker & Algina, 2008). As expected, Kappas between the matching items were all significant. Specifically, Kappas were .41, .43, .37, .38, and .33 for math, science, social studies, language arts, and school, respectively, ps all < .001. However, neither of these analyses yielded results that met the criteria for combining the two measures (i.e., correlations between matching items of at least .80 and Kappas of at least .60; Crocker & Algina, 2008). Therefore, the hypothesis that the two measures would have significantly different response patterns was confirmed. Thus, cross-tabulations and chi-squared analyses were not conducted and the two academic stereotyping measures will be treated separately for all remaining analyses.

**Endorsement of Academic Stereotypes.** To determine whether on average adolescents tend to classify academic domains and classroom regulatory behaviors according to traditional gender stereotypes, a series of one-sample t-tests were conducted on the 1 to 5 raw scores for each item to determine if, overall, the responses significantly differ from 3 (the egalitarian response). On the natural abilities measure, the math $t(241) = 2.08, p < .05$, language arts, $t(241) = 3.96, p < .001$, and school items, $t(239) = 5.44, p < .001$, were significantly different than 3, whereas the science, $t(239) = -1.41, p = .16$, and social studies items, $t(240) = 1.51, p = .13$, were not (see Table 4). The same pattern was found for items on the competency measure. Specifically, the math, $t(246) = 3.19, p < .01$, language arts, $t(244) = 4.09, p < .001$, and school items, $t(243) = 4.96, p < .001$, were significantly different than 3, whereas the science, $t(245) = -1.79, p = .08$, and social studies items, $t(245) = -0.21, p = .84$, were not (see Table 5). Therefore, as predicted, students stereotyped math, language arts, and school, but did not stereotype social studies on either academic stereotype measure. As expected, on average students stereotyped language arts and school to be for girls versus boys; however, contrary to hypotheses, on average students stereotyped math to be for girls – the opposite direction than predicted. Additionally, students did not stereotype science (see Table 5).

Students stereotyped all items on the classroom regulation stereotype measure as indicated by significant one-sample t-tests conducted on the individual items, $ts$ ranged from 8.72
to 11.11, *p* all < .001 (see Table 6). In all cases, the classroom regulation behaviors were stereotyped as being for girls.

Interestingly, the hypotheses that adolescents on average would stereotype math and science to be for boys were not confirmed. This is particularly surprising because it conflicts with prior research (e.g., Liben & Bigler, 2002; Ruble et al., 2006). Further, although science was not significantly stereotyped, it was the only subject that appeared to be stereotyped in the boy direction. In addition, the individual item statistics showed a high frequency of respondents endorsing counter-traditional stereotypes (i.e., stereotyping math and science in the girl direction; see Table 5). Given these results from the preliminary and item analyses, to fully examine the nature of adolescents’ academic stereotypes, science was retained for the analyses. Additionally, as originally proposed, math and science were categorized as masculine subjects, language arts and school as feminine subjects and *directional stereotype scores* were created accordingly. In addition, due to the high frequency of adolescents endorsing counter-traditional stereotypes (e.g., math is for girls, school is for boys), I also created *counter-traditional stereotype scores* and ran identical analyses on those scores. For example, for the counter-traditional stereotype analyses, if respondents reported a 4 or a 5 for math (corresponding to believing that math is for girls), they were given a 1 (endorsing a counter-traditional stereotype) and if they reported a 1, 2, or 3, they were given a 0 (not endorsing a counter-traditional stereotype). Categorizing and scoring the measures in this way – both directionally and counter-directionally – and conducting similar analyses will allow a full examination of adolescents’ gender stereotypes about academics.

Due to the significant issues with non-normality in the raw scores on the natural abilities measure, descriptives and item statistics were also warranted on all directional stereotype scores, counter-traditional stereotype scores, and ingroup bias scores before conducting the ANOVAs to examine sex and domain differences.

**Descriptives of Stereotype and Ingroup Bias Scores.** Directional stereotype scores on the two academic stereotype measures were relatively low (see Table 8). Specifically, on the natural abilities measure, math and science were stereotyped to be for boys by only 7% and 13% of students respectively whereas language arts and school were stereotyped for girls by 18% and
25% of respondents (see Table 8). On the competency measure, math and science were stereotyped for boys by only 9% and 19% of students. Language arts and school were stereotyped for boys by 24% and 27% of respondents. On the natural abilities measure, there was significant skewness (i.e., skewness > 3; Tabachnick & Fidell, 2007) on the math item only. However, there was significant kurtosis (i.e., kurtosis greater than 7; Tabachnick & Fidell, 2007) for the math item on both measures (see Table 8). There were no issues with either skewness or kurtosis on the classroom regulatory behaviors stereotype composite directional stereotype score (see Table 8).

Counter-traditional stereotypes were also examined. On the natural abilities measure, math and science was stereotyped for girls by 15% and 8% of respondents whereas both language arts and school were stereotyped for boys by only 5% of respondents. On the competency measure, math and science were stereotyped for girls by 23% and 13% of respondents whereas both language arts and school were stereotyped to be for boys by only 7% of respondents (see Table 8). On the natural abilities measure, there was significant skewness on the counter-traditional stereotype scores for science, language arts, and school. There was significant kurtosis on the counter-traditional stereotype scores for all items (i.e., science, math, language arts, and school; see Table 8). For the competency measure, there was significant skewness and kurtosis for language arts and school, but not math and science.

Next, ingroup bias scores from the two academic stereotype measures and the classroom regulatory behaviors stereotype measure were examined. Ingroup bias scores were .17 and .12 (corresponding to 17% and 12% of respondents showing ingroup bias) for the feminine and masculine subscales on the natural abilities measure whereas they were .22 and .21 for the feminine and masculine subscales on the competency measure (see Table 8). The ingroup bias composite score on the classroom regulation stereotype measure was .28 ($SD = .37$). Thus, it appears that adolescents are showing signs of endorsing ingroup biases with regards to academics and classroom regulatory behaviors. There were no problems with skewness and kurtosis for any of these measures when taken together, but given the gender-specific nature of ingroup bias scores, significant issues were found when looking at boys and girls separately (see Table 9 for ingroup bias scores by gender). Specifically, there was significant issues with skewness and
kurtosis for boys’ ingroup bias scores on the feminine subscale from the natural abilities measure and on boys’ ingroup bias scores from the classroom regulation stereotype measure (see Table 9). No issues with skewness or kurtosis were found for girls’ ingroup bias scores.

Descriptive statistics were also conducted on the OAT; however, examining each item was not necessary as the OAT is a valid and reliable measure of occupational gender stereotypes (Liben & Bigler, 2002). The OAT stereotype score represents the proportion of students who stereotyped occupations for one gender or the other. See Table 10 for stereotype scores on the OAT by gender and subscale.

Although there were significant issues with skewness and kurtosis, the $F$-test is robust against violations of non-normality (Keppel & Wickens, 2004; Tabachnick & Fidell, 2007); however, when non-normality is accompanied with other violations (e.g., non-homogeneity of variances), it is necessary to correct for these violations (Tabachnick & Fidell, 2007). Thus, where analyses yield further violations, the most conservative correction available was applied. To err on the conservative side, I used the lower-bound correction for Type I error – the most conservative correction possible (Tabachnick & Fidell, 2007). Other correction methods like the Greenhouse-Geisser (G-G) and the Huynh-Feldt (H-F) often inflate the value of epsilon and therefore, do not adequately correct. Additionally to be conservative throughout analyses, I used the most robust multivariate test recommended for sphericity violations, Pillai’s trace (Tabachnick & Fidell, 2007). As proposed, I corrected for Type I error of comparisons with the Tukey HSD correction, which is deemed by statisticians as an adequate correction for sphericity violations (Keppel & Wickens, 2004; Tabachnick & Fidell, 2007). Finally, due to the violation of sphericity, when probing interactions, the robust tests for equality of means, which do not take into account the pooled variance in its calculations (i.e., Welch correction) were used when the Levene’s test for homogeneity of variances was significant, again a more conservative test. This correction was

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7 The OAT was not scored directionally because the scale was designed to have directionality built in to the masculine and feminine subscales (Liben & Bigler, 2002).

8 Throughout the remainder of the manuscript, when an $F$ value is reported for a univariate test where the assumption of sphericity is violated, the $F$ value is the corrected Welch statistic that does not take into account pooled variance, thus correcting for the violation (Keppel & Wickens, 2004; Tabachnick & Fidell, 2007).
only used when the Levene’s test was significant because it is less powerful when sphericity holds (Keppel & Wickens, 2004).

**Part II: Sex Differences in Endorsement of Academic Stereotypes**

To examine sex differences and domain differences in adolescents’ gender stereotyping of academic subjects, two 2 (sex) X 4 (domain: math, science, language arts, school) repeated measures ANOVAs were run on the *directional gender stereotype scores* from the two academic stereotype measures separately.

The ANOVA conducted on the *directional gender stereotype scores* from the *natural abilities measure* revealed that the assumption of sphericity was violated, $W = .746, \chi^2(5) = 68.65, p < .001$. This ANOVA revealed a significant main effect of domain, $F(1, 236) = 14.34, p < .001, \eta^2 = .06$, and this main effect was subsumed by a significant sex by domain interaction, $F(1, 236) = 6.32, p < .05, \eta^2 = .03$.

The interaction was first probed with one-way ANOVAs with sex as the between-subject factor on the *directional stereotype scores* for math, science, language arts, and school. The Levene’s test revealed that the assumption of homogeneity of variances was violated in all cases except for math. One-way ANOVAs indicated that boys and girls were not significantly different in their stereotyping of math, $F(1, 241) = .17, p = .68$, science, $F(1, 230.16) = 2.16, p = .14$, or language arts, $F(1, 231.05) = 1.84, p = .18$. In contrast, boys and girls did differ significantly on their stereotyping of school (girls higher), $F(1, 221.08) = 9.45, p < .01$ (see Table 8). Next, the interaction was probed with one-way repeated measures ANOVAs with domain as the repeated factor split by sex. Mauchley’s test of sphericity again showed that for both boys, $W = .729, \chi^2(5) = 36.24, p < .001$, and girls, $W = .722, \chi^2(5) = 38.63, p < .001$, the assumption of sphericity was violated. The ANOVAs indicated that there were significant domain differences for girls, $F(1, 116) = 16.56, p < .001, \eta^2 = .16$, but not for boys, $F(1, 120) = 2.34, p = .137, \eta^2 = .01$. Pairwise comparisons showed that girls stereotyped math significantly less than both language arts, $p < .001$, and school, $p < .001$, and stereotyped school significantly more science, $p < .01$. Girls did not stereotype math and science significantly different nor did they stereotype language arts and school differently. It appears then that girls were stereotyping masculine domains significantly
less than feminine domains whereas boys were stereotyping similarly across all domains (See Table 8 and/or Figure 4).

To examine sex differences in academic stereotypes on the competency measures, a 2 (sex) by (domain: math, science, language arts, and school) repeated measures ANOVA was conducted on the *directional gender stereotype scores from the competency measure*. Similar to analysis on the natural abilities stereotype scores, this ANOVA revealed that the assumption of sphericity was violated, $W = .821; \chi^2(5) = 47.19, p < .001$. This ANOVA yielded a significant main effect of domain, $F(1, 241) = 13.23, p < .001, \eta^2 = .05$, and this main effect was subsumed by a significant sex by domain interaction, $F(1, 241) = 13.23, p < .05, \eta^2 = .05$.

Therefore, the first interaction was probed with one-way ANOVAs with sex as the between-subject factor on the *directional stereotype scores* for math, science, language arts, and school. The Levene’s tests showed that the assumption of homogeneity of variances was violated in all cases. One-way ANOVAs indicated that boys and girls were significantly different in their stereotyping of math (boys higher), $F(1, 196.63) = 9.16, p < .01$, science (boys higher), $F(1, 224.66) = 12.58, p < .01$, and school (girls higher), $F(1, 223.78) = 11.35, p < .01$. Boys and girls were not significantly different on their stereotyping of language arts, $F(1, 236.15) = 1.48, p = .22$ (see Table 8). Next, the interaction was probed with one-way repeated measures ANOVAs with domain as the repeated factor split by sex. Mauchley’s test of sphericity again showed that for both boys, $W = .837; \chi^2(5) = 21.84, p < .001$, and girls, $W = .664; \chi^2(5) = 47.40, p < .001$, the assumption of sphericity was violated. The ANOVAs indicated that there were again significant domain differences for girls, $F(1, 117) = 24.89, p < .001, \eta^2 = .18$, but not for boys, $F(1, 124) = 3.23, p = .08, \eta^2 = .03$. Pairwise comparisons revealed that girls stereotyped math significantly less than all other domains, all $ps$ at least $< .05$ (i.e., science, language arts, and school), science significantly less than both language arts, $p < .001$, and school, $p < .001$, and finally, they stereotyped language arts and school similarly. This pattern was similar than the one found with the natural abilities; boys stereotyped all domains similarly and the pattern for girls was only different with respect to the masculine domains. ON the competency measure, girls stereotyped masculine domains significantly less than feminine domains; however, on this measure, girls
stereotyped math less and science more (see Table 8), making the difference between those subjects significant.

**Sex Differences in Endorsement of Occupational Stereotypes.** To determine if there were sex differences in adolescents’ occupational gender stereotypes, a one-way ANOVA with sex as the between-subjects factor was conducted on the total occupational stereotype scores. The ANOVA was only marginally significant, $F(1, 240) = 3.07, p = .08$, suggesting trend difference in how boys and girls stereotyped occupations ($M_s = .56$ and .50 respectively; see Table 10). When examining the feminine and masculine occupational stereotypes separately, there was a significant effect for feminine occupations, $F(1, 241) = 4.81, p < .05$, such that boys stereotyped feminine occupations ($M = .55, SD = .30$) significantly more than did girls ($M = .47, SD = .30$); however, boys and girls did not differ on their masculine occupational stereotypes, $F(1, 240) = 1.39, p = .24$. Boys stereotyped masculine ($M = .57, SD = .33$) and feminine occupations ($M = .55, SD = .30$) similarly, but girls stereotyped feminine domains ($M = .52, SD = .34$) more than masculine domains ($M = .47, SD = .30$).

**Sex Differences in Endorsement of Classroom Regulatory Stereotypes.** To determine if there were sex differences in adolescents’ classroom regulatory behavior gender stereotypes, a one-way ANOVA with sex as the between-subjects factor was conducted on the classroom regulation stereotype scores. The ANOVA was significant $F(1, 239) = 9.51, p < .01$, such that girls stereotyped classroom regulatory behavior ($M = .55, SD = .37$) significantly more than did boys ($M = .40, SD = .40$). This was consistent with the academic and occupational stereotypes results in that girls stereotyped this feminine domain more than did boys.

**Sex Differences in Endorsement of Academic Counter-traditional stereotypes.** Due to the large percentage of respondents who endorsed counter-traditional stereotypes (e.g., girls are better at math), counter-traditional stereotypes were examined as well. Therefore, each item on both of the academic stereotype measures was scored in the opposite direction (i.e., counter-traditional stereotype scores).

A 2 (sex) X 4 (domain: math, science, language arts, and school) repeated measures ANOVA was conducted on counter-traditional stereotype scores from the natural abilities
measure to examine sex differences in academic counter-traditional stereotypes. This ANOVA revealed that the assumption of sphericity was violated, W = .839; χ²(5) = 41.70, p < .001. This ANOVA yielded a significant main effect of domain only, F(1, 238) = 7.92, p < .01, \( \eta^2 = .03 \), indicating there were significant differences in counter-traditional stereotypes depending on domain regardless of sex (see Table 8).

Pairwise comparisons with a Tukey HSD correction to examine domain differences in academic counter-traditional stereotypes indicated that students counter-traditional stereotyped math significantly more than science and language arts and they counter-traditional stereotyped school significantly more than language arts, ps all < .05 (see Table 8 and/or Figure 5). Students endorsed a counter-traditional stereotypes regarding school, but the proportion of students who endorsed this stereotype was not higher than the proportion who endorsed the traditional stereotype (See Table 8). Excluding school, the pattern of stereotyping was reversed with math being the most counter-traditionally stereotyped item, followed by science, then language arts.

A 2 (sex) X 4 (domain: math, science, language arts, and school) repeated measures ANOVA was conducted on a counter-traditional stereotype scores from the competency measures to examine sex differences in academic counter-traditional stereotypes as well. Again, this ANOVA revealed that the assumption of sphericity was violated, W = .673; χ²(5) = 95.04, p < .001. As before, all previously mentioned corrections will be used in the following analysis. This ANOVA yielded a significant main effect of domain, F(1, 238) = 7.92, p < .01, \( \eta^2 = .07 \) and this effect was subsumed by a sex by domain interaction, F(1, 241) = 6.57, p < .05; \( \eta^2 = .03 \) (see Table 8).

The interaction was first probed with one-way ANOVAs with sex as the between-subject factor on counter-traditional stereotype scores for math, language arts, and school. The Levene’s test revealed that the assumption of homogeneity of variance was violated for all cases excluding math. The one-way ANOVAs indicated that boys and girls were not significantly different in their counter-traditional stereotyping of math, F(1, 246) = .05, p = .59, or science, F(1, 215.70) = 3.83, p = .05. However, they were significantly different in their counter-traditional stereotyping of language arts (boys higher), F(1, 165.67) = 11.70, p < .01, and school (boys higher), F(1, 163.85)
= 11.76, \( p < .01 \). Next, the interaction was probed with one-way repeated measures ANOVAs with domain as the repeated factor split by sex. Mauchley’s test of sphericity again showed that for both boys, \( W = .355; \chi^2(5) = 119.837, p < .001 \), and girls, \( W = .355; \chi^2(5) = 35.88, p < .001 \), the assumption of sphericity was violated. The ANOVAs indicated that there were again significant domain differences for girls, \( F(1, 117) = 18.62, p < .001, \text{eta}^2 = .14 \), and for boys, \( F(1, 124) = 4.16, p < .05, \text{eta}^2 = .03 \). Pairwise comparisons revealed that girls endorsed counter-traditional stereotypes about math and science significantly more than they did language arts and school, \( ps \) both < .001. Again, girls also endorsed similar counter-traditional stereotypes within the feminine domains (i.e., language arts and school) and within the masculine domains (i.e., math and science). Boys showed a different pattern than did girls such that they endorsed a counter-traditional stereotype about math significantly more than science, \( p < .01 \), but all other domains were similarly counter-traditionally stereotyped (see Table 8 and/or Figure 4). Interestingly both boys and girls are endorsing as stereotype that girls are better at math.

**Sex Differences in Ingroup Bias of Academic Subjects.** To determine whether there are sex differences in ingroup bias in adolescents’ endorsement of academic gender stereotypes, I ran two 2 (sex) X 2 (domain sex-type: masculine vs. feminine) repeated measures ANOVAs with sex as the between-subjects factor and sex-type of domain as the repeated measure on the masculine and feminine domain *ingroup bias scores* (math and science make up the masculine domain and language arts and school make up the feminine domain).

The first ANOVA was conducted on the ingroup bias scores from the *natural abilities measure*. The Box’s M test was statistically significant, indicating that homogeneity of variances was violated. This ANOVA yielded a significant main effect for sex, \( F(1, 240) = 13.84, p < .001; \text{eta}^2 = .06 \), a main effect of gender-typed domain, \( F(1, 240) = 7.99, p < .01; \text{eta}^2 = .03 \), and these main effects were subsumed by a significant sex by gender-typed domain interaction, \( F(1, 240) = 28.53, p < .001; \text{eta}^2 = .11 \).

This interaction was first probed with one-way ANOVAs with sex as the between-subjects factor on the ingroup bias scores for feminine and masculine domains separately. The one-way ANOVA on the feminine, but not the masculine ingroup bias scores revealed a
significant Levene’s test. These ANOVAs indicated that boys and girls were significantly different on feminine, $F(1, 185.17) = 31.64, p < .001$, but not masculine domains, $F(1, 241) = .42, p = .52$, such that girls had higher ingroup bias scores than did boys. The interaction was then probed with one-way repeated measures ANOVAs with gender-typed domain as the repeated factor separately for boys and girls. These ANOVAs revealed a significant domain difference for both boys, $F(1, 123) = 4.28, p < .05, \text{eta}^2 = .03$, and girls, $F(1, 117) = 25.93, p < .001, \text{eta}^2 = .18$. Examining the means show reverse patterns of ingroup bias for girls and boys. Specifically, girls showed significantly higher ingroup bias in the feminine domain ($M = .28, SD = .36$) than in the masculine domain ($M = .14, SD = .27$) whereas boys showed a significantly higher ingroup bias in the masculine domain ($M = .11, SD = .28$) than in the feminine domain ($M = .07, SD = .20$; see Table 9 and/or Figure 6).

I also ran a second 2 (sex) X 2 (domain sex-type: masculine vs. feminine) repeated measures ANOVA with sex as the between-subjects factor and gender-typed domain as the repeated measure on the masculine and feminine domain ingroup bias scores from the competency measure. The Box’s M test was statistically significant, indicating that homogeneity of variances was violated. This ANOVA yielded a significant main effect for sex, $F(1, 243) = 22.56, p < .01; \text{eta}^2 = .03$, and this main effect was subsumed by a significant sex by gender-typed domain interaction, $F(1, 243) = 22.63, p < .001; \text{eta}^2 = .09$.

This interaction was first probed with one-way ANOVAs with sex as the between-subjects factor on the ingroup bias scores for feminine and masculine domains separately. The one-way ANOVA on the feminine ingroup bias scores revealed a significant Levene’s test. These ANOVAs indicated that boys and girls were significantly different on feminine, $F(1, 220.98) = 22.22, p < .001$, but not masculine domains, $F(1, 246) = .01, p = .96$. Specifically, girls had higher ingroup bias scores than did boys, and this effect was accentuated within the feminine domain (see Table 9 and/or Figure 6). The interaction was then probed with one-way repeated measures ANOVAs with gender-typed domain as the repeated factor separately for boys and girls. These ANOVAs showed there were significant domain differences for both girls, $F(1, 117) = 13.19, p < .001; \text{eta}^2 = .10$, and boys, $F(1, 126) = 9.21, p < .01; \text{eta}^2 = .07$. The same pattern in ingroup bias
scores was found for the competency measure as was found for the natural abilities measure. Namely, girls showed significantly higher ingroup bias in the feminine domain \((M = .32, SD = .36)\) than in the masculine domain \((M = .21, SD = .31)\) whereas boys showed a significantly higher ingroup bias in the masculine domain \((M = .21, SD = .28)\) than in the feminine domain \((M = .13, SD = .28)\); see Table 9 and/or Figure 6). As hypothesized, girls and boys were more likely to show an ingroup bias for same-gender-typed domains on both the natural abilities and the competency stereotype measures.

**Sex Differences in Ingroup Biases of Classroom Regulatory Behaviors.** To determine if there were sex differences in ingroup bias scores in adolescents’ classroom regulatory gender stereotypes, a one-way ANOVA with sex as the between-subjects factor was run on the composite ingroup bias scores from the classroom regulation stereotype measure. The ANOVA yielded a significant Levene’s test. The ANOVA was significant \(F(1, 149.88) = 159.68, p < .001\), such that girls had higher ingroup bias scores \((M = .53, SD = .37)\) than did boys \((M = .06, SD = .15)\). Classroom regulation is a feminine domain and therefore, the hypothesis that girls would show a higher ingroup bias in same-gender-typed domains was supported as it was with the academic stereotype analyses.

**Coherence of Academic, Classroom Regulatory, and Occupational Gender Stereotypes**

To test the coherence of academic, classroom regulatory, and occupational gender stereotypes, the *nondirectional gender stereotype* score will be used for all measures (both academic stereotype measures, classroom regulatory ability measure, and the OAT). All possible interrelations among the stereotypes (academic, classroom regulation, and occupational stereotypes) were investigated using bivariate correlations to determine relations among these different types of stereotypes.

The results of these analyses were consistent with hypotheses that there would be coherence among adolescents’ academic and classroom regulatory gender stereotypes (see Table 11). Additionally, the hypothesis that both gender stereotypes about academics and classroom regulatory ability would relate to a reliable and valid measure of occupational gender stereotypes (OAT-AM; Liben & Bigler, 2002) was also confirmed. Specifically, gender stereotypes across the
domains of *Personal-social attributes* (content area 3A; academic subjects and classroom regulatory behaviors) and *Activities and interests* (content area 2A; occupations) were related. Also as hypothesized, academic stereotypes were found to relate significantly to stereotypes about classroom regulation and to stereotypes regarding occupations (see Table 10 for correlations among stereotypes). Adolescents therefore showed similar patterns of stereotyping across the different types of stereotypes (academics, classroom regulatory ability, and occupations). Thus, adolescents who stereotyped one domain tended to also stereotype other domains. Accordingly, adolescents who endorsed more egalitarian views (i.e., not endorse stereotypes) in one domain tended to endorse egalitarian views in other domains (e.g., if they endorse egalitarian views about academics, they will also do so for classroom regulatory ability and occupations).

Chapter 6

DISCUSSION

The major goal of the current study was to extend previous research on adolescents’ gender stereotyping by assessing their academic, classroom regulatory behavior, and occupational
gender stereotypes. To accomplish this, two new measures of academic gender stereotypes (one assessing stereotypes about natural abilities and one assessing stereotypes about competency) and one new measure of stereotyping of classroom regulatory behaviors were developed and evaluated. Using these measures and a valid and reliable measure of occupational gender stereotypes (OAT-AM; Liben & Bigler, 2002), I examined four research questions regarding adolescents’ gender stereotypes: (1) to what degree do adolescents hold gender stereotypes about academics and classroom regulatory behavior? (2) are there sex differences in adolescents’ academic and classroom regulatory behavior stereotypes? (3) do adolescents exhibit ingroup biases concerning academic domains and classroom regulatory behaviors? and finally, (4) is there evidence of coherence among adolescents’ gender stereotypes across multiple domains (academic domains, school, classroom regulatory behaviors, and occupations)? This study was the first to simultaneously assess adolescents’ academic and classroom regulatory gender stereotypes and ingroup biases as well as the coherence among different types of gender stereotypes.

**Adolescents’ Endorsement of Academic Stereotypes**

A primary goal of this study was to assess the degree to which adolescents endorse stereotypes about academic domains, school, and classroom regulatory behaviors. Surprisingly, rather than showing strong stereotyping, the majority of students in this study endorsed egalitarian views regarding academic subjects and school. Depending on the item, 65% to 81% of adolescents said that there was no difference between boys’ and girls’ in aptitude or ability in academics.

The high frequency of adolescents who endorsed egalitarian views could be a function of changing societal views about academics. Children and adolescents in schools today have a wider array of possible scholastic and career paths than in past years. For example, there has been a push to enhance girls’ motivation and interest in math and science through creative curricula (AAUW, 1998; Meece & Jones, 1996). In addition, although gender stereotypes are still prevalent in society, some stereotypes have changed (Huston, 1983; Ruble & Martin, 1998; Ruble et al., 2006). For instance, it would be considered unacceptable for teachers to tell girls that they should aim to be good housewives and mothers, and to tell boys that they should aim for a high-paying
career in order to be a successful breadwinner. This progression in society’s views gives children of both genders more opportunity to pursue all types of careers than in the past and could be reflected in the views that adolescents reported in the current study. Although this is a positive outcome of society’s advancement, there still remain large gender divides in occupational settings with women being underrepresented in masculine professions (e.g., engineering) and men being underrepresented in feminine occupations (e.g., nursing, education; AAUW, 1998; Bureau of Labor Statistics, 2006). Moreover, women still earn significantly less money than do men, sometimes even in the same occupational positions (Blau & Kahn, 2000). Therefore, efforts to lessen and eventually close these gaps should not be abandoned.

Alternatively, students may have been responding in a more socially desirable way. For example, the egalitarian response could be viewed as the more socially desirable way to respond to stereotyping questions; however, this same pattern was not found for classroom regulatory or occupational gender stereotypes. Specifically, the lowest percentage of students endorsing the egalitarian view on academics was 65% whereas approximately 40% endorsed this view regarding occupations and 50% endorsed an egalitarian view regarding classroom regulatory abilities. This suggests that there may be something specific about academics and therefore, more research on academic stereotypes should be conducted to replicate these findings. Replicating the findings would help answer whether there is something specific about academics that leads adolescents to not stereotype them to the same extent they do other domains (e.g., occupations and classroom regulation).

Although the majority of students did not stereotype, there was a group of students who did. Across individual items, between 21% and 34% of students reported that they believed academic subjects and school in general to be more for one gender or the other (i.e., endorsed either a traditional or counter-traditional stereotype). Specifically, on the natural abilities measure, 22% of students endorsed a gender stereotype about math, 21% about science, 23% about language arts, and 30% about school. On the competency measure, 32% endorsed a stereotype about math, 32% about science, 31% about language arts, and 34% about school. Students did not rely on traditional stereotypes as much as was expected: only between 7% and 27% of students
endorsed traditional stereotypes. Specifically, on the natural abilities measure 7% endorsed a traditional gender stereotype about math, 13% about science, 18% about language arts, and 25% about school. On the competency measure, 9% endorsed a traditional stereotype about math, 19% about science, 24% about language arts, and 27% about school. The difference between the percentage of students who stereotyped and the percentage who showed traditional stereotypes shows that, for some students, stereotypes have changed to be counter-traditional.

Out of those few adolescents who reported traditional stereotypes, as expected, they believed that language arts and school were for girls. This finding is consistent with prior research that has found children and adolescents tend to stereotype language arts to be for girls (Heyman & Legare, 2004; Rowley et al., 2007) and theoretical work on the feminization of schools (Pollack, 1998).

It is difficult to compare the percentage of students stereotyping in this study with past studies. Past studies have used Likert-type scales that make it impossible to determine what percentages of students are actually endorsing academic stereotypes. Future work is needed to determine whether the majority of students in the US are endorsing stereotypes. To address this need, future stereotyping studies need to report what percentages of students are agreeing with each response option on likert-type scales (i.e., the percentage of student who are endorsing stereotypes about academics).

The present study expanded upon previous research by exploring whether adolescents stereotype social studies. Social studies has not been included in other studies of gender stereotyping, perhaps because it has never been consistently classified as traditionally masculine or feminine. The results of this study supported the hypothesis that social studies is neutral.

Contrary to expectations, adolescents in the study did not significantly stereotype science as being for males. The finding that students did not stereotype science is inconsistent with the past stereotyping studies that have shown that adolescents tend to stereotype science as masculine (e.g., Rowley et al., 2007). However, when students did stereotype science, it was the only academic subject that students tended to rate as being for boys.
Another surprising finding was that adolescents in my sample stereotyped math as being for girls. Prior work on math stereotypes conducted in the US has shown that math is stereotyped as being for males (Cvencek et al., 2001; Rowley et al., 2007). In fact, in one study children as young as 1st grade classified math as a masculine subject and these stereotypes tended to increase through 6th grade in one study (Cvencek et al., 2001). Despite not matching cultural stereotypes, this finding that math is for girls is consistent with two studies conducted in France and French-speaking Canada with middle school-aged children and adolescents (Marinot & Desert, 2007; Plante et al., 2009).

The unexpected results regarding science and math may also be partially due to the changing educational landscape in the US and may reflect the new American reality. Girls have been shown to outperform boys in classroom achievement across all core subjects (AAUW, 1998; Cole, 1997; Pomerantz, Altermatt, & Saxon, 2002) and have higher GPAs (Perkins et al., 2004). Additionally, on many math and science standardized achievement tests, girls now perform as well as boys (e.g., Planty et al., 2009).

In further support of the idea that the educational landscape is changing, a sizable percentage of students endorsed counter-traditional stereotypes regarding academics and school in general: 5% to 23% (15% and 23% for math, 8% and 13% for science, 5% and 7% for language arts, and 5% and 7% for school on the natural abilities and competency measures respectively). These counter-traditional stereotypes, like the unexpected patterns regarding math and science, could be a result of the reality that girls tend to outperform boys across all subjects, including math (e.g., Perkins et al., 2004). Students therefore, may have been reporting on the reality of their social world – girls are outperforming boys in not only language arts, but in math and science as well.

Theoretical work on stereotyping suggests that children can notice statistical regularities in their environments (e.g., girls getting praise from teachers and performing better in class than boys) and use that information to form stereotypes (Martin & Halverson, 1981; Martin & Ruble, 2004). Consistent with this idea is a study that investigated national level implicit math and science stereotypes and found that 70% of men and women stereotyped these subjects to be for
males, and these implicit stereotypes relate to national level achievement in math and science (also favoring males). Future research should extend this work by replicating this finding with explicit stereotypes and also examine whether school-level stereotyping is related to school-level achievement. This, in addition to studies examining the relations between children and adolescents’ attributes and skills and their stereotypes, would help answer the question regarding how much of students’ reported stereotypes are a function of what they observe around them.

Another promising approach is to ask children and adolescents to explain the basis for their stereotypes. Studies such as these may be helpful for determining the extent to which adolescents’ academic gender stereotypes is the reality of what they observe in their classes or at their school (e.g., I think that math is for girls because all the girls in my class get better grades on tests.).

Exploring the potential contributing factors to the formation of these stereotypes in future studies should focus attention on students’ individual competence and achievement as well as to the achievement patterns of peers when examining gender stereotypes of academics.

**Endorsement of Classroom Regulatory Behavior Stereotypes**

This study was also the first study designed to examine hypotheses regarding classroom regulatory gender stereotypes; in particular, it was predicted that adolescents would endorse the stereotype that girls were better able to regulate themselves in a classroom. To test this idea, I developed a new measure of classroom regulatory stereotypes. This hypothesis was based on the increased media hype surrounding the “boy crisis” and the extensive body of literature that consistently documents boys as being lower in regulatory ability (e.g., Else-Quest et al., 2006; Matthews et al., 2009; Rothbart, 2011) and higher than girls in disruptive behavior (Downey & Vogt Yuan, 2005; Schaefer, 2004) across a wide range of ages. It has also been argued that part of the reason girls are shown to have an “edge” in school against boys is largely due to their greater regulatory ability (Duckworth & Seligman, 2006).

Approximately half of the adolescents stereotyped classroom regulatory behaviors and these stereotypes followed the expected patterns. There was no evidence of counter-traditional stereotyping of classroom regulatory behaviors. Thus, the main hypotheses related to classroom
regulation were confirmed; adolescents believed that it was easier for girls to regulate their behavior in class.

Adolescents seemed to on average be more likely to endorse stereotypes about classroom behavior than about achievement: only 7% of adolescents endorsed at least one traditional academic stereotype whereas 45% of adolescents endorsed at least one classroom behavior stereotype. A possible explanation for a relatively higher percentage of adolescents endorsing classroom regulatory behavior stereotypes might be due to the salience of classroom behaviors versus academic performance. For example, it could be that classroom behavior is more salient to kids in a classroom than is academic aptitude or performance. That is, it may be very apparent to everyone that boys are fidgeting, being reprimanded, etc. more than girls on a daily basis, but it may be less apparent that they are falling behind academically. Past empirical studies (Downey & Vogt Yuan, 2005; Schaefer, 2004), have found that boys tend to be reprimanded verbally more than girls. Therefore, the fact that both boys and girls see and hear boys being reprimanded for their behavior could influence children and adolescents’ development of gender stereotypes about classroom regulation. Again it may be that children and adolescents notice statistical regularities in their environments and develop stereotypes based on that information (Martin & Halverson, 1981, 1983; Martin & Ruble, 2004). Moreover, GST clearly states that when stereotypes are counter to what they expect, people do not remember or recall that information as much as information that confirms their schemas. This stressed the need for more research on the consequences and correlates of stereotype development to tease out all these complex influential factors.

Stereotypes might also develop through other means. For instance, children may learn about them directly from adults. Although explicit labeling was not investigated in the current study, according to both GST (Martin & Halverson, 1981, 1983) and DIT (Liben & Bigler, 2006), explicit labeling is one of the most powerful factors that influence stereotype development. Explicit labeling makes associations with gender more salient, which increases attention to these features of the environment (Liben & Bigler, 2006; Martin & Halverson, 1981, 1983). It could be that teachers who label gender more in the classroom and make explicit attributions (e.g., ‘look at
the girls sitting so quietly and following instructions’) contribute to students’ gender stereotypes; this argument has been made in a previous empirical study (Hilliard & Liben, 2010), but has not yet been investigated. Thus, future studies should examine the way in which teachers and others in the classroom label gender and respond to boys’ and girls’ behavior to see how this type of labeling might influence children and adolescents’ stereotypes. Explicit attributions could also contribute to the development of academic gender stereotypes (e.g., ‘the girls performed better than the boys did on this test’).

**Sex Differences in Adolescents’ Stereotypes and Ingroup Biases**

Another important goal of the current study was to assess sex differences in adolescents’ academic, classroom regulatory ability, and occupational gender stereotypes. It was predicted that sex differences in stereotyping would be explained by ingroup biases. Specifically, I expected that girls would show ingroup bias by stereotyping more than boys in feminine domains whereas boys would show ingroup bias by stereotyping more than girls in masculine domains. These hypotheses were only partially supported.

Overall, in this study, there were not clear patterns in terms of sex differences in stereotyping. Past research has found that boys are more likely than girls to endorse gender stereotypes (Blakemore, 2007; Liben & Bigler, 2002; Ruble et al., 2006). In the current study, however, on the eight items that assessed traditional academic stereotypes, girls were more likely than boys to endorse stereotypes on two of the items expected to be stereotyped for girls (natural ability in school and competency in school), whereas boys were more likely than girls to endorse stereotypes on two of the items expected to be stereotyped for boys (competency in math and competency in science). On the other four traditional items, there were not a significant gender differences. On the eight counter-traditional academic stereotype items, there were only two sex differences: boys were more likely than girls to endorse counter-traditional stereotypes about language arts and school. Finally, girls were more likely than boys to endorse stereotypes about classroom regulatory behaviors. These stereotype patterns may be explained in part by ingroup biases. Where sex differences were found, they were in same sex-typed domains. In other words, girls were more likely than boys to say that their gender was naturally better and more competent.
in school (as opposed to, for example, believing their gender was better in the traditionally masculine domain of math). Boys, meanwhile, were more likely than girls to say that their gender was more competent in math and science (as opposed to the traditionally feminine domain of language arts). The finding regarding counter-traditional stereotypes further supports this point: boys were more likely than girls to agree that boys were better at language arts and school, which are traditionally feminine domains.

To further explore the role of ingroup bias, I computed ingroup bias scores. Findings from these measures show that girls are showing significantly higher ingroup biases compared to boys, but only in the feminine domains (i.e., language arts and school). There were no significant ingroup bias sex differences in the masculine domains (i.e., math and science). These findings are consistent with past work; in two studies, Powlishta (1995b, 2004) found that girls were more prone than boys to show ingroup biases. These findings are also consistent with ideas proposed in GST (Martin & Halverson, 1981, 1983) and DIT (Liben & Bigler, 2006): specifically, if a child identifies with a social group and they categorize certain academics to be for their gender, they may also be more prone to want to do better in those subjects. Therefore, they may be more likely to rate themselves as being better than the other gender in those subjects. By identifying patterns of stereotypes and ingroup biases, this study sets the stage for future studies to focus on examining the relations between stereotypes and behavioral outcomes such as achievement and performance.

Future work should explore whether ingroup biases function to protect or inhibit students’ academic performance and whether or not ingroup biases affect boys and girls differently. GST (Martin & Halverson, 1981, 1983) and DIT (Bigler & Liben, 2006) both propose that gender cognitions influence behaviors. Thus, it is likely that if adolescents stereotype a subject to be for the other gender, their performance in that subject may be hindered. This is particularly important given the “boy crisis” and the fact that in this study every academic subject and classroom regulatory behavior were stereotyped for girls. If both boys and girls stereotype every subject for girls, this could contribute to boys feeling incompetent in school and in individual academic subjects. This is consistent with GST; specifically, if boys and girls
stereotype academics to be for girls, boys may be less interested in excelling in school, be unmotivated, and not perform according to their potential. Thus, future work should also examine how adolescents’ gender stereotypes of academics and classroom regulation influence their behaviors in the specific domains. Future work should also examine the differences between students stereotypes about boys’ and girls’ competencies (i.e., their abilities to perform), and boys’ and girls’ actual performance.

This study was among just a few studies conducted in the US (Cvencek et al., 2011; Heyman & Legare, 2004; Rowley et al., 2007) to examine academic stereotypes. Among those studies previously conducted some found results that are consistent with traditional gender stereotypes (Cvencek et al., 2011; Heyman & Legare, 2004; Rowley et al., 2007) whereas others found evidence that children endorsed counter-traditional stereotypes (Rowley et al., 2007). The current study found some evidence of counter-traditional stereotypes, adding to this complex mix of findings. However, it is possible that the results may show that academic stereotyping patterns are different from other types of domains examined by gender researchers (e.g., physical appearance, activities, interests; Ruble et al., 2006). Taken with the few other studies that have examined academic stereotypes, these results make it clear that more research on academic stereotypes is needed.

Lastly, regarding the occupational gender stereotypes, the hypothesis that boys would stereotype occupations more than girls was not supported; there was only a marginally significant sex difference in boys’ and girls’ stereotyping of occupations. Again this sex difference is not consistent with past research (Blakemore, 2007; Liben & Bigler, 2002; Ruble et al., 2006) that typically finds that boys stereotype more than do girls. However, there was a sex difference favoring girls in the feminine occupations domain, which is consistent with research that has found girls are more future-oriented than are boys (Seginer, 2009). In adolescence when gender-typed interests in careers become increasingly salient (Gottfredson, 1981; Hartung, Porfeli, & Vondracek, 2005), girls may think about possible future careers more than do boys and they may become increasingly aware of the cultural stereotypes about feminine careers. Future research
could explore this hypothesis by examining whether adolescents’ endorsement of gender stereotypes about occupations is related to their goals for the future.

**Coherence of Academic, Classroom Regulatory, and Occupational Gender Stereotypes**

The final aim in the current study was to examine the degree of coherence in adolescents’ academic, classroom regulatory, and occupational gender stereotypes. I hypothesized that there would be coherence such that adolescents who stereotype in one domain (e.g., academics) would also stereotype in another domain (e.g., occupations) or likewise, that adolescents who endorsed egalitarian views in one domain would endorse egalitarian views in another domain. Results confirmed my hypotheses.

The present method of assessing coherence directly extends the current work on multidimensionality of gender and gender stereotyping. Coherence among gender-typing concepts traditionally has focused on coherence between gender cognitions and behaviors. The current study highlights that coherence can be thought about – and measured – within the domain of gender cognitions (i.e., stereotypes about different areas). It is important to explore how children and adolescents might use gender as a unifying construct. The current study provided initial support for the presence of a unifying gender concept, as adolescents who stereotyped in one domain also tended to stereotype in other domains. This line of work can provide additional support to scholars examining adolescents’ gender essentialist views (e.g., Gelman, 2003). Future work should build upon the current study to further examine the coherence of gender stereotypes across other domains and across ages. Previous work suggests younger children’s gender stereotypes are more rigid (for review, see Ruble et al., 2006); therefore it is possible that younger children might have even more coherence in their stereotypes.

These findings also have important practical implications. Adolescents’ tendencies to endorse coherent stereotypes across domains may have important implications for intervention programs targeted at reducing stereotypes. However, these results suggest that programs may be able to take a broad (rather than subject-specific) approach. If an intervention program can successfully eradicate an adolescent’s gender stereotype about math, for example, we may see a reduction in the adolescent’s stereotyping of other non-targeted domains as well (e.g.,
occupations). However, it is also possible that the coherence of gender stereotypes makes such intervention programs particularly challenging. That is, it may be difficult to change adolescents’ stereotypes about math because their stereotypic views about math are consistent with their views in many other domains. Indeed, past work suggests that it can be quite difficult to induce long-term reductions in gender stereotypes through targeted intervention programs (e.g., Pahlke, Bigler, & Green, 2010).

In the current study, coherence was established by significant correlations; however, there are potential drawbacks of this approach. Namely, given the large sample size in the study, a significant correlation is a fairly low qualification for coherence. Future work in the area of gender research is needed to establish consistent terminology, methodology, and qualifications for coherence among gender-typing constructs. Additionally, in the current study gender stereotypes were examined that were expected to be strongly related. Future research should also investigate the coherence of stereotypes in domains that are more distal (e.g., stereotypes about academics and physical appearance). These results could provide an even stronger case for coherence and adolescents’ tendency to use gender as a unifying construct across multiple stereotyping domains.

Strengths of the Current Study

The current study expanded upon previous empirical and theoretical work on gender stereotypes. Specifically, this study was the first to examine adolescents’ gender stereotypes about social studies, school in general, and classroom regulatory behaviors. This study also added to the body of literature on gender stereotypes about math, science, and language arts. In order to accomplish these study goals, I developed new gender stereotyping measures. These measures improved upon past measures that included combined academic categories (e.g., math/science; Rowley et al., 2007). Importantly, however, I found that adolescents’ stereotyping responses varied significantly depending on how items were worded. This calls attention to the need to thoroughly consider measurement issues with regards to academic stereotypes and the need to further develop these new measures. The new measures in this study also allowed for a calculation of the percentage of students who endorsed stereotypes in various directions (i.e., traditional stereotypes, counter-traditional, and egalitarian), which past studies have not reported.
The current study was also the first to examine adolescents’ stereotyping and ingroup biases of academics, and classroom regulatory behaviors. Although ingroup bias has been argued to be a major component of stereotyping (Bigler & Liben, 2006; Martin & Halverson, 1981, 1983; Martin et al., 2002), studies investigating stereotyping in conjunction with ingroup biases have been extremely limited. Examining stereotypes in conjunction with ingroup biases helped to explain some of the stereotyping patterns found in the current study. These results provide some support for the theoretical argument that ingroup bias patterns affect stereotyping (GST; Martin & Halverson, 1981, 1983; DIT; Bigler & Liben, 2006). It is important for future work to continue to consider ingroup biases when investigating stereotypes.

Results from this study have the potential to inform educators about the specific gender stereotypes that adolescents hold (e.g., “Girls are much better at school than are boys.” “Girls should not be police officers.”). By exploring these stereotypes, educators may be better able to combat these gender stereotypes that have potential to affect children’s academic self-concepts and achievement as well as their academic and occupational aspirations.

**Limitations and Conclusions**

Several limitations must be mentioned about the current study. First, by varying wording of stereotyping questions, it was clear that composite stereotype scores could not be computed and therefore, the two measures had to be analyzed separately. Thus, there is room for improving upon the measures included in the current study. Specific recommendations include adding more items in order to create subscales for each academic domain. Additionally, changing the wording of items in a way that could allow a likert-type rating scale instead of the rating scale modeled off of the OAT (Liben & Bigler, 2002) could possibly ameliorate some scoring issues (e.g., traditional versus counter-traditional stereotype scoring). More studies should also examine how different type of wordings affects stereotype response patterns. It is possible that when asked about whom is more competent in the subjects, adolescents relied more on the reality of what they observe in school whereas when asked about boys’ and girls’ natural abilities, they relied more on their stereotypes or gender essentialist beliefs. Regarding the classroom regulatory measure, although this measure had high internal consistency, future studies should aim to include more some
negatively worded items as per psychometric recommendations (e.g., Crocker & Algina, 2008). Furthermore, it would be useful to include items that measure areas where boys have traditionally been considered strong (i.e., independence and autonomy in completing tasks, or confidence to speak out in class).

Third, these data come from students in only one school and so may not be representative of adolescents across the US. The study took place at a high performing school in a middle-class neighborhood in a Southwest city. Furthermore, of more concern is that this school is a non-traditional academic context in that it has both single- and mixed-sex classes. Data were collected during the first two weeks of school and only 7th graders who had never been directly exposed to single-sex classes were included in the study; however, it is possible that indirect exposure to single-sex classroom environments during the two weeks previous to data collection could have affected stereotyping in some way. Caution should be taken in generalizing the results of this study; therefore, more studies on academic stereotypes are needed to determine if the results can be replicated.

Fourth, there could be potential factors influencing results that were not explored in this study. For example, it is possible that important individual difference factors influence the way in which children stereotype academics, such as students’ views of their own academic competence, interest in academic subjects, and relationships with teachers. To further complicate matters, these individual difference factors are most likely interrelated. Namely, if a girl is interested in math, is competent in math, performs well in math, and has had positive relationships with math teachers, she may not stereotype math to be for boys but instead believe it to be neutral or even to be for girls. That is, her personal experiences may color the development of her stereotypes (Liben & Bigler, 2002; Martin & Dinella, 2011). Because the current study was focused on identifying the patterns of adolescents’ gender stereotypes and ingroup biases about occupations, academics, classroom regulation, none of these factors were explored. Further work is needed to explore these factors and how they relate to stereotype formation.

In conclusion, the findings regarding adolescents’ endorsement of academic stereotypes has important implications for educators and researchers. For a number of years efforts have been
focused on creating a positive educational environment across subjects, especially for girls in math and science (AAUW, 1998). It is possible that these efforts have contributed to girls’ continued improvement in school. However, national data (Planty et al., 2009), empirical studies (Buchmann et al., 2008; Perkins et al., 2004), and media reports on the “boy crisis” and the feminization of schools (Pollack, 1998) paint a grim picture for boys’ education. More efforts thus should aim to promote positive attitudes about all school subjects and school in to foster school liking and egalitarian views towards core subjects and school in general, starting as soon as preschool.

It is important to consider that half of the students did not endorse these stereotypes, but instead endorsed an egalitarian stereotype regarding classroom regulatory ability. It may be that children and adolescents are responding in a more socially desirable way by saying that they do not perceive any difference between boys’ and girls’ abilities to regulate their behavior. These results could alternatively be a reflection of adolescents’ true views, that approximately half of them endorse egalitarian views and half endorse a stereotype that girls are better than boys at behaving and following instructions in class. It is important to know children and adolescents’ stereotypes about classroom regulation and more importantly, to know where they come from. More studies should examine these types of stereotypes in combination with adolescent stereotypes and investigate the possibility that they influence one another. For example, if adolescents stereotype boys as behaving poorly in class, does that influence their stereotypes about who performs better academically?

Finally, although the results from the current study are not entirely consistent with past research on gender stereotypes (for review see Ruble et al., 2006), not many studies have examined adolescents’ academic stereotypes. It could be that stereotypes about academics are a special subtype of stereotypes and adolescents simply stereotype this domain differently than other domains. More research examining academic stereotypes is needed to determine if the patterns found in the current study can be replicated.
References


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APPENDIX A

MATRIX OF GENDER-TYPING WITH AREAS OF INTEREST BOXED (RUBLE, MARTIN, & BERENBAUM, 2006)
<table>
<thead>
<tr>
<th>Content Area</th>
<th>A. Concepts or Beliefs</th>
<th>B. Identity or Self-Perception</th>
<th>C. Preferences</th>
<th>D. Behavioral Enactment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Biological/categorical sex.</td>
<td>1A. Gender awareness, labeling, and constancy.</td>
<td>1B. Personal sense of self as male or female.</td>
<td>1C. Wish to be male or female.</td>
<td>1D. Displaying bodily attributes of one’s gender (e.g., clothing, body type, or hair); transvestism, transsexualism.</td>
</tr>
<tr>
<td>2. Activities and interests: Toys, play activities, occupations, household roles, or tasks.</td>
<td>2A. Knowledge of gender stereotypes or beliefs about toys, activities, and so on.</td>
<td>2B. Self-perception of interests and activities as related to gender.</td>
<td>2C. Preference for toys, games, or activities.</td>
<td>2D. Engaging in gender-typed play, activities, occupations, or achievement tasks.</td>
</tr>
<tr>
<td>3. Personal-social attributes: Personality traits, social behaviors, and abilities.</td>
<td>3A. Knowledge of gender stereotypes or beliefs about personality or role-appropriate social behavior.</td>
<td>3B. Perception of own traits and abilities (e.g., on self-reporting questionnaires).</td>
<td>3C. Preference or wish to have gender-linked attributes.</td>
<td>3D. Displaying gender-typed traits (e.g., aggression, dependence) and abilities (e.g., math).</td>
</tr>
<tr>
<td>4. Social relationships: Sex of peers, friends, lovers; or play qualities.</td>
<td>4A. Concepts about norms for gender-based relationships.</td>
<td>4B. Self-perception of own patterns of friendships, relationships, or sexual orientation.</td>
<td>4C. Preference for social interactions or judgments about social relationships based on sex or gender.</td>
<td>4D. Engaging in social activity with others on the basis of sex or gender (e.g., same-sex peer play).</td>
</tr>
<tr>
<td>5. Styles and symbols: Gestures, speech patterns (e.g., tempo), appearance, or body image.</td>
<td>5A. Awareness of gender-related symbols or styles.</td>
<td>5B. Self-perception of non-verbal stylistic or symbolic characteristics or body image.</td>
<td>5C. Preference for gender-typed stylistic or symbolic objects or personal characteristics.</td>
<td>5D. Manifesting gender-typed verbal and nonverbal behavior.</td>
</tr>
<tr>
<td>6. Values regarding gender.</td>
<td>6A. Knowledge of greater value attached to one sex or gender role than the other.</td>
<td>6B. Self-perceptions associated with group identification.</td>
<td>6C. In-group/out-group biases, prejudice, or attitudes toward egalitarian roles.</td>
<td>6D. In-group/out-group discrimination.</td>
</tr>
</tbody>
</table>
APPENDIX B

ACADEMIC GENDER STEREOTYPE MEASURE: NATURAL ABILITIES MEASURE
<table>
<thead>
<tr>
<th>For Whom is it Easier to:</th>
<th>Definitely easier for boys than girls</th>
<th>A little bit easier for boys than girls</th>
<th>Equally easy for boys and girls</th>
<th>A little bit easier for girls than boys</th>
<th>Definitely easier for girls than boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Be good at math</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Be good at science</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Be good at language arts</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Be good at social studies</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Do well in school</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
APPENDIX C

ACADEMIC GENDER STEREOTYPE MEASURE: COMPETENCY MEASURE
1. Are there differences between how good boys and girls are at math?

<table>
<thead>
<tr>
<th>Boys are a lot better at math</th>
<th>Boys are better at math</th>
<th>Boys are a little bit better at math</th>
<th>Absolutely no difference in math</th>
<th>Girls are a little bit better at math</th>
<th>Girls are better at math</th>
<th>Girls are a lot better at math</th>
</tr>
</thead>
</table>

**IF YOU THINK BOYS ARE BETTER AT MATH (EVEN IF IT’S JUST A LITTLE BIT BETTER),**

Why are boys better at math?

- Boys are naturally better at math than girls
- Boys work much harder than girls at math

**IF YOU THINK GIRLS ARE BETTER AT MATH (EVEN IF IT’S JUST A LITTLE BIT BETTER),**

Why are girls better at math?

- Girls are naturally better at math than boys
- Girls work much harder than boys at math

2. Are there differences between how good boys and girls are at science?

<table>
<thead>
<tr>
<th>Boys are a lot better at science</th>
<th>Boys are better at science</th>
<th>Boys are a little bit better at science</th>
<th>Absolutely no difference in science</th>
<th>Girls are a little bit better at science</th>
<th>Girls are better at science</th>
<th>Girls are a lot better at science</th>
</tr>
</thead>
</table>

**IF YOU THINK BOYS ARE BETTER AT SCIENCE (EVEN IF IT’S JUST A LITTLE BIT BETTER),**

Why are boys better at science?

- Boys are naturally better at science than girls
- Boys work much harder than girls at science

**IF YOU THINK GIRLS ARE BETTER AT SCIENCE (EVEN IF IT’S JUST A LITTLE BIT BETTER),**

Why are girls better at science?
Girls are naturally better at science than boys | O O O O | Girls work much harder than boys at science

3. Are there differences between how good boys and girls are at social studies?

| O O O O O O O O | Boys are a lot better at social studies | Boys are better at social studies | Boys are a little bit better at social studies | Absolutely no difference in social studies | Girls are a little bit better at social studies | Girls are better at social studies | Girls are a lot better at social studies |

IF YOU THINK BOYS ARE BETTER AT SOCIAL STUDIES (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are boys better at social studies?

| O O O O | Boys are naturally better at social studies than girls | Girls work much harder than girls at social studies |

IF YOU THINK GIRLS ARE BETTER AT SOCIAL STUDIES (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are girls better at social studies?

| O O O O | Girls are naturally better at social studies than boys | Girls work much harder than boys at social studies |

4. Are there differences between how good boys and girls are at language arts?

| O O O O O O O O | Boys are a lot better at language arts | Boys are better at language arts | Boys are a little bit better at language arts | Absolutely no difference in language arts | Girls are a little bit better at language arts | Girls are better at language arts | Girls are a lot better at language arts |

IF YOU THINK BOYS ARE BETTER AT LANGUAGE ARTS (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are boys better at language arts?

| O O O O | Boys are naturally better at language arts | Boys work much harder |
language arts than girls than girls at language arts

IF YOU THINK GIRLS ARE BETTER AT LANGUAGE ARTS (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are girls better at language arts?

Girls are naturally better at language arts than boys O O O O Girls work much harder than boys at language arts

5. Are there differences between how good boys and girls are at school in general?

<table>
<thead>
<tr>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys are a lot better at school</td>
<td>Boys are better at school</td>
<td>Boys are a little bit better at school</td>
<td>Absolutely no difference in school</td>
<td>Girls are a little bit better at school</td>
<td>Girls are better at school</td>
<td>Girls are a lot better at school</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IF YOU THINK BOYS ARE BETTER AT SCHOOL IN GENERAL (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are boys better at school?

Boys are naturally better at school than girls O O O O Boys work much harder than girls at school

IF YOU THINK GIRLS ARE BETTER AT SCHOOL IN GENERAL (EVEN IF IT’S JUST A LITTLE BIT BETTER),

Why are girls better at school?

Girls are naturally better at school than boys O O O O Girls work much harder than boys at school
APPENDIX D

CLASSROOM REGULATORY BEHAVIOR STEREOTYPE MEASURE
For Whom is it Easier to:

<table>
<thead>
<tr>
<th></th>
<th>Definitely easier for boys than girls</th>
<th>A little bit easier for boys than girls</th>
<th>Equally easy for boys and girls</th>
<th>A little bit easier for girls than boys</th>
<th>Definitely easier for girls than boys</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Follow teacher directions</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>2. Stay quiet while others are talking</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>3. Not yell out answers</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>4. Stay in their seat</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>5. Focus on a task for a long time</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>6. Not act out in class</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>7. Listen to the teacher</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
APPENDIX E

SHORT VERSION OF THE OCCUPATIONS SUBSCALE FROM THE OCCUPATIONS, ACTIVITIES, AND TRAITS ATTITUDE MEASURE (OAT-AM; LIBEN & BIGLER, 2002)
WHO SHOULD DO THESE JOBS?
Here is a list of jobs. We want you to tell us if you think each job should be done by men, by women, or by both men and women. There are no right or wrong answers. We just want to know who you think should do these jobs.

<table>
<thead>
<tr>
<th>WHO SHOULD:</th>
<th>Only Men</th>
<th>Mostly Men, Some Women</th>
<th>Both Men And Women</th>
<th>Mostly Women, Some Men</th>
<th>Only Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Be a dishwasher in a restaurant</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>2. Be a refrigerator salesperson</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>3. Be an artist</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>4. Be an elevator operator</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>5. Be an interior decorator*</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>6. Be an auto mechanic</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>7. Be a telephone installer</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>8. Be a librarian</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>9. Be a cook in a restaurant</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>10. Be a secretary</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>11. Be a plumber</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>12. Be a nurse</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>13. Be a ballet dancer</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>14. Be a hair stylist</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>15. Be an engineer</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>16. Be a police officer</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>17. Be an umpire</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>18. Be a dental assistant</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>19. Be a ship captain</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>20. Be a florist</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>21. Be a welder*</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>22. Be an electrician</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>23. Be a manicurist*</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>24. Be a dietician*</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
<tr>
<td>25. Be a physical therapist</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
</tr>
</tbody>
</table>

Note. Starred items had definitions to ensure participants understood the job they were rating.
APPENDIX F

MASCHULINE, FEMININE, AND NEUTRAL OCCUPATIONS FROM THE OCCUPATIONS
SUBSCALE OF THE UAT-AM (LIBEN & BIGLER, 2002)
<table>
<thead>
<tr>
<th>Masculine</th>
<th>Feminine</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Refrigerator salesperson</td>
<td>1. Interior decorator</td>
<td>1. Dishwasher in a restaurant</td>
</tr>
<tr>
<td>2. Auto mechanic</td>
<td>2. Librarian</td>
<td>2. Artist</td>
</tr>
<tr>
<td>3. Telephone installer</td>
<td>3. Secretary</td>
<td>3. Elevator operator</td>
</tr>
<tr>
<td>5. Engineer</td>
<td>5. Ballet dancer</td>
<td>5. Physical therapist</td>
</tr>
<tr>
<td>6. Police officer</td>
<td>6. Hair stylist</td>
<td></td>
</tr>
<tr>
<td>7. Umpire</td>
<td>7. Dental assistant</td>
<td></td>
</tr>
<tr>
<td>10. Electrician</td>
<td>10. Dietician</td>
<td></td>
</tr>
</tbody>
</table>
Table 1

Demographic Characteristics for Full and Subsamples

<table>
<thead>
<tr>
<th></th>
<th>Sample 1(^a)</th>
<th>Sample 2(^b)</th>
<th>Sample 3(^c)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>((n = 885))</td>
<td>((n = 628))</td>
<td>((n = 257))</td>
</tr>
<tr>
<td>Males</td>
<td>449</td>
<td>313</td>
<td>121</td>
</tr>
<tr>
<td>Females</td>
<td>436</td>
<td>315</td>
<td>136</td>
</tr>
<tr>
<td>7th Graders</td>
<td>420</td>
<td>163</td>
<td>257</td>
</tr>
<tr>
<td>8th Graders</td>
<td>465</td>
<td>465</td>
<td>0</td>
</tr>
<tr>
<td>Age ((M))</td>
<td>12.53</td>
<td>12.75</td>
<td>12.00</td>
</tr>
<tr>
<td>Ethnic Background (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>32.30</td>
<td>30.90</td>
<td>35.80</td>
</tr>
<tr>
<td>Black</td>
<td>4.30</td>
<td>4.30</td>
<td>4.30</td>
</tr>
<tr>
<td>Mexican</td>
<td>22.10</td>
<td>22.10</td>
<td>22.20</td>
</tr>
<tr>
<td>Latino or Hispanic</td>
<td>14.50</td>
<td>15.40</td>
<td>12.10</td>
</tr>
<tr>
<td>Asian</td>
<td>3.50</td>
<td>3.20</td>
<td>4.30</td>
</tr>
<tr>
<td>American Indian or</td>
<td>2.30</td>
<td>2.20</td>
<td>2.30</td>
</tr>
<tr>
<td>Multiethnic</td>
<td>19.50</td>
<td>20.40</td>
<td>17.50</td>
</tr>
<tr>
<td>Other</td>
<td>1.50</td>
<td>1.40</td>
<td>1.60</td>
</tr>
</tbody>
</table>

Note: \(^a\) Full sample. \(^b\) Sample with direct or indirect exposure to any single-sex classroom environments. \(^c\) Study sample with adolescents that have no direct or indirect exposure to any single-sex classroom environments.
Table 2

Adolescents’ (N = 240) Response Frequencies and Percentages on Items from the Natural Abilities Stereotype Measure

<table>
<thead>
<tr>
<th></th>
<th>Math</th>
<th>Science</th>
<th>Studies</th>
<th>Arts</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely easier for Boys</td>
<td>7(2.9)</td>
<td>7(2.9)</td>
<td>6(2.5)</td>
<td>5(2.1)</td>
<td>5(2.1)</td>
</tr>
<tr>
<td>A little bit easier for boys</td>
<td>9(3.7)</td>
<td>23(9.6)</td>
<td>12(5.0)</td>
<td>6(2.5)</td>
<td>6(4.6)</td>
</tr>
<tr>
<td>Equally easy for boys and girls</td>
<td>190(78.5)</td>
<td>191(79.6)</td>
<td>196(81.3)</td>
<td>188(77.7)</td>
<td>168(74.6)</td>
</tr>
<tr>
<td>A little bit easier for girls</td>
<td>29(12.0)</td>
<td>14(5.8)</td>
<td>15(6.2)</td>
<td>30(12.4)</td>
<td>49(20.4)</td>
</tr>
<tr>
<td>Definitely easier for girls</td>
<td>7(2.9)</td>
<td>5(2.1)</td>
<td>12(5.0)</td>
<td>13(5.4)</td>
<td>12(5.0)</td>
</tr>
</tbody>
</table>

Note. Valid percentages of responses in parentheses.
Table 3

Adolescents’ (N = 244) Response Frequencies and Percentages on Items from the Competency Stereotype Measure

<table>
<thead>
<tr>
<th></th>
<th>Math</th>
<th>Science</th>
<th>Studies</th>
<th>Arts</th>
<th>School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys are definitely better</td>
<td>7(2.8)</td>
<td>5(2.0)</td>
<td>5(2.0)</td>
<td>5(2.0)</td>
<td>5(2.0)</td>
</tr>
<tr>
<td>Boys are a little bit better</td>
<td>15(6.1)</td>
<td>42(17.1)</td>
<td>29(11.8)</td>
<td>13(5.3)</td>
<td>13(5.3)</td>
</tr>
<tr>
<td>No difference</td>
<td>168(68.0)</td>
<td>168(68.3)</td>
<td>178(72.4)</td>
<td>169(69.0)</td>
<td>159(65.2)</td>
</tr>
<tr>
<td>Girls are a little bit better</td>
<td>51(20.6)</td>
<td>28(11.4)</td>
<td>31(12.6)</td>
<td>51(20.8)</td>
<td>57(23.4)</td>
</tr>
<tr>
<td>Girls are a lot better</td>
<td>6(2.4)</td>
<td>3(1.2)</td>
<td>3(1.2)</td>
<td>7(2.9)</td>
<td>10(4.1)</td>
</tr>
</tbody>
</table>

Note. Valid percentages of responses in parentheses.
Table 4

Adolescents' (N = 240) Response Frequencies and Percentages on Items from the Classroom Regulatory Behavior Stereotype Measure

<table>
<thead>
<tr>
<th></th>
<th>Follow teacher directions</th>
<th>Stay quiet</th>
<th>Not yell out</th>
<th>Stay in seat</th>
<th>Focus on task</th>
<th>Not act out</th>
<th>Listen to teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys are definitely better</td>
<td>1(4)</td>
<td>4(1.7)</td>
<td>2(8)</td>
<td>3(1.2)</td>
<td>2(8)</td>
<td>3(1.2)</td>
<td>3(1.3)</td>
</tr>
<tr>
<td>Boys are a little bit better</td>
<td>8(3.3)</td>
<td>13(3.4)</td>
<td>5(2.1)</td>
<td>6(2.5)</td>
<td>6(2.5)</td>
<td>8(3.3)</td>
<td>4(1.7)</td>
</tr>
<tr>
<td>No difference</td>
<td>119(49.6)</td>
<td>119(49.4)</td>
<td>128(53.1)</td>
<td>134(55.6)</td>
<td>133(55.2)</td>
<td>120(49.8)</td>
<td>143(59.6)</td>
</tr>
<tr>
<td>Girls are a little bit better</td>
<td>79(30.7)</td>
<td>75(31.1)</td>
<td>82(34.0)</td>
<td>70(29.0)</td>
<td>81(33.6)</td>
<td>83(34.4)</td>
<td>65(27.1)</td>
</tr>
<tr>
<td>Girls are a lot better</td>
<td>33(12.8)</td>
<td>30(12.4)</td>
<td>24(10.0)</td>
<td>28(11.6)</td>
<td>19(7.9)</td>
<td>27(11.2)</td>
<td>25(10.4)</td>
</tr>
</tbody>
</table>

Note: Valid percentages of responses in parentheses.
Table 5

*Means, Standard Deviations, Skewness, and Kurtosis on the Raw Scores from the Academic Stereotype Measures (N = 240)*

<table>
<thead>
<tr>
<th>Natural Abilities Measure</th>
<th>Competency Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>Math</td>
<td>3.08a</td>
</tr>
<tr>
<td>Science</td>
<td>2.95</td>
</tr>
<tr>
<td>Language</td>
<td>3.17a</td>
</tr>
<tr>
<td>Arts</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>3.06</td>
</tr>
<tr>
<td>Studies</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>3.24a</td>
</tr>
</tbody>
</table>

*Note:* a values significantly different than 3 at p at least < .05, b values greater than 7 indicating significant kurtosis.
Table 6  
*Means, Standard Deviations, Skewness, and Kurtosis on the Raw Scores from the Classroom Regulatory Behavior Stereotype Measures (N = 240)*

<table>
<thead>
<tr>
<th>Classroom Regulatory Stereotypes Measure</th>
<th>Mean</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow teacher directions</td>
<td>3.56*</td>
<td>.78</td>
<td>.316</td>
<td>-.25</td>
</tr>
<tr>
<td>Stay quiet</td>
<td>3.47*</td>
<td>.84</td>
<td>.02</td>
<td>.24</td>
</tr>
<tr>
<td>Not yell out answers</td>
<td>3.50*</td>
<td>.74</td>
<td>.28</td>
<td>.41</td>
</tr>
<tr>
<td>Stay in seat</td>
<td>3.47*</td>
<td>.78</td>
<td>.28</td>
<td>.48</td>
</tr>
<tr>
<td>Focus on a task for a long time</td>
<td>3.45*</td>
<td>.71</td>
<td>.27</td>
<td>.63</td>
</tr>
<tr>
<td>Not act out in class</td>
<td>3.51*</td>
<td>.78</td>
<td>.07</td>
<td>.40</td>
</tr>
<tr>
<td>Listen to the teacher</td>
<td>3.44*</td>
<td>.75</td>
<td>.39</td>
<td>.78</td>
</tr>
</tbody>
</table>

*Note:* * values significantly different than 3 at p at least < .05.
Table 7

Zero-Order Correlations Among All Items on the Natural Abilities, Competency, and Classroom Regulation Stereotype Measure (N = 240)

<table>
<thead>
<tr>
<th></th>
<th>Follow directions</th>
<th>Stay quiet</th>
<th>Not yell answers</th>
<th>Stay in seat</th>
<th>Focus on task</th>
<th>Not act out</th>
<th>Listen to teacher</th>
<th>Math</th>
<th>Science</th>
<th>Language Arts</th>
<th>Social Studies</th>
<th>School</th>
</tr>
</thead>
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<td>.26**</td>
<td>.17**</td>
<td>.37**</td>
<td>.37**</td>
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</tr>
</tbody>
</table>

Note: Correlations that are not bolded are correlations between an item and an item on the natural abilities measures whereas bolded correlations are those between an item and an item on the competency measure. The italicized correlations are correlations between matching items on the natural abilities and competency stereotype measures. The bottom triangle contains correlations between non-matching items on the natural abilities and competency measures.
### Table 8

*Means, Standard Deviations, Skewness, and Kurtosis of Directional and Counter-Traditional Stereotype Scores on the Academic and Classroom Regulation Stereotype Measures (N = 240)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Directional Stereotype Scores</th>
<th>Counter-Traditional Stereotype Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>SD</td>
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<tr>
<td>Natural Abilities</td>
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<tr>
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<td>.33</td>
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<td>.38</td>
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<tr>
<td>School</td>
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<td>.44</td>
</tr>
<tr>
<td>Competency</td>
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<tr>
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<td>.09</td>
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<tr>
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<tr>
<td>Classroom Regulation</td>
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<td>.39</td>
</tr>
</tbody>
</table>

*Note: *<sup>a</sup> values greater than 3 indicating significant skewness, <sup>b</sup> values greater than 7 indicating significant kurtosis. Classroom regulation stereotype and counter-traditional stereotype scores are composites of all 7 items.
Table 9

Means, Standard Deviations, Skewness, and Kurtosis of Ingroup Bias Scores on the Academic and Classroom Regulation Stereotype Measures \((N = 249)\)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
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</thead>
<tbody>
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<td>SD</td>
<td>Skewness</td>
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<tr>
<td>Natural Abilities</td>
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</table>

Note: *a* values significantly different than 3 at \(p \leq .05\), *b* values greater than 7 indicating significant kurtosis.
Table 10

*Means and Standard Deviations on the OAT by Gender (N = 240)*

<table>
<thead>
<tr>
<th></th>
<th>Masculine</th>
<th>Feminine</th>
<th>Total</th>
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</thead>
<tbody>
<tr>
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</tr>
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<td>Boys</td>
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<td>.55*</td>
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<td>Girls</td>
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<tr>
<td>Total</td>
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<td>.51</td>
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</tbody>
</table>

*Note.* Items with subscript `\*` are marginally significant across rows at $p = .08$, items with subscript `\*\*` differ significantly across rows at $p < .05$. 
Table 11

Zero-Order Correlations Among Non-Directional Stereotype Scores on the Academic Stereotype, Classroom Regulation Stereotype, and OAT Measures (N = 240)

<table>
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<th>Language Arts₂</th>
<th>School₂</th>
<th>Math₃</th>
<th>Science₃</th>
<th>Language Arts₃</th>
<th>School₃</th>
<th>Classroom Regulation</th>
<th>OAT Feminine</th>
<th>OAT Masculine</th>
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</tbody>
</table>

Note: Academic subjects with the subscript ₂ are from the natural abilities stereotyping measures. Academic subjects with the subscript ₃ are from the competency measure.
Figure 1.

The schematic processing model of gender role stereotyping (Martin & Halverson, 1981)
Figure 2.
The process involved in the formation of social stereotypes and prejudices (Bigler & Liben, 2006)
Figure 3. The process involved in the maintenance or modification of social stereotypes and prejudice (Bigler & Liben, 2006).
Figure 4.

Boys' and girl's directional stereotype scores on natural abilities and competency measures
Figure 5.
Boys' and girls' counter-traditional stereotype scores on natural abilities and competency measures.
Figure 6.
Boys' and girls' ingroup bias scores on natural abilities and competency measures