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Gender Differences in Behavioral Regulation in Four Societies: The United States, Taiwan, South Korea, and China

Shannon B. Wanless[a], Megan M. McClelland[b], Xuezhao Lan[c], Seung-Hee Son[d], Claire E. Cameron[e], Frederick J. Morrison[f], Fu-Mei Chen[g], Jo-Lin Chen[g], Su Lh[i], Kangyi Lee[i], & Miyoung Sun[j]

[a] University of Pittsburgh, [b] Oregon State University, [c] McKinsey and Company, [d] University of Utah, [e] University of Virginia, [f] University of Michigan, [g] Fu Jen Catholic University, [h] Chinese Academy of Sciences, [i] Seoul National University, [j] Seokyeong University

The current study investigates gender differences in behavioral regulation in four societies: the United States, Taiwan, South Korea, and China. Directly assessed individual behavioral regulation (Head-Toes-Knees-Shoulders, HTKS), teacher-rated classroom behavioral regulation (Child Behavior Rating Scale, CBRS) and a battery of school readiness assessments (mathematics, vocabulary, and early literacy) were used with 814 young children (ages 3 to 6 years). Results showed that girls in the United States had significantly higher individual behavioral regulation than boys, but there were no significant gender differences in any Asian societies. In contrast, teachers in Taiwan, South Korea, as well as the United States rated girls as significantly higher than boys on classroom behavioral regulation. In addition, for both genders, individual and classroom behavioral regulation were related to many aspects of school readiness in all societies for girls and boys. Universal and culturally specific findings and their implications are discussed.

Keywords: behavioral regulation; gender; Asia; measurement; school readiness

Accumulating evidence in the United States and Asia suggests that boys may be at risk for a host of difficulties as they move through school (United Nations Economic and Social Commission for Asia and the Pacific, 2011; Wetzstein, 2011), with particular difficulties in aspects of self-regulation (Causadias, Salvatore, & Sroufe, 2012; Heckman, Stixrod, & Urzua, 2006; McClelland, Acock, Piccinin, Rhea, & Stallings, 2012; Merritt, Wanless, Cameron Ponitz, & Rimm-Kaufman, 2012; Moffitt et al., 2011). Although previous research has focused on samples from the United States, initial findings suggest that this phenomenon may extend to other parts of the world. Research on young children in Asia, for example, suggests that compared to girls, boys are more aggressive, and have more difficulty with academic and social skills when rated by peers and teachers (Chen, Cen, Li, & He, 2005; Chen & Li, 2000; Coie & Dodge, 1998; Lai, 2010). In contrast, Asian girls are more inhibited than boys

(Jose, Huntsinger, Huntsinger, & Liaw, 2000), which is related to positive social and psychological outcomes in Asia (Chen & French, 2008; Rubin et al., 2006). We built on these previous studies by examining the universality or cultural specificity of gender differences in behavioral aspects of self-regulation the United States and Asia.

The Importance of Behavioral Regulation for School Readiness

Behavioral regulation is a set of developmentally acquired skills involved in controlling, directing, and planning one's cognitions and behavior, and includes inhibitory control, attentional or cognitive flexibility, and working memory (Carlson & Moses, 2001; Eisenberg, Smith, Sadovsky, & Spinrad, 2004; Mischel, Shoda, & Rodriguez, 1989). Research supports the notion that behavioral regulation includes these aspects of executive function skills and reflects the integration of these cognitive processes into behavior (McClelland, Cameron, Wanless, & Murray, 2007; McClelland & Cameron Ponitz, 2012; McClelland, Cameron Ponitz, Messersmith, & Tominey, 2010). The term behavioral regulation is related to similar constructs such as executive function (from the cognitive psychology and neuroscience fields), effortful control (from the fields of temperament and personality) and approaches to learning or learning-related skills (from the applied developmental field). We use the term behavioral regulation because our focus is on how the cognitive processes underlying behavioral regulation are manifested into behavior in important learning contexts such as classrooms (McClelland & Cameron Ponitz, 2012; McClelland et al., 2010). This conceptualization of behavioral regulation as an educationally relevant construct aligns with a recent review of many constructs that fall under the umbrella of self-regulation but reflect different levels of analysis (Rimm-Kaufman & Wanless, 2012).

Early behavioral regulation supports young children's acquisition of early math, vocabulary, and early literacy skills in the United States (Blair & Razza, 2007; Bull & Scerif, 2001; McClelland, Acock, & Morrison, 2006), and in Asian societies (Chung & McBride-Chang, 2011; Lan, Legare, Cameron Ponitz, Li, & Morrison, 2011; Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011; Wanless, McClelland, Acock, Chen, & Chen, 2011). Early math, vocabulary, and reading skills are assessed in the present study as representing elements of school readiness, as they have in the Head Start Child Development and Early Learning Framework, and previous school readiness research (Administration for Children and Families/Office of Head Start, 2011; Barnett, Lamy, & Jung, 2005; Matthews, Cameron Ponitz, & Morrison, 2009).

We conceptualize individual behavioral regulation as a child's behavioral regulation skills in a one-one-one situation and classroom behavioral regulation as a child's behavioral regulation skills in the context of a classroom with peers and teachers. There may be differences in children's abilities to activate their regulatory abilities in an individual versus a socially complex classroom context. Despite these contextual differences, individual and classroom behavioral regulation seem to be overlapping constructs stemming from similar underlying processes including inhibitory control, attentional or cognitive flexibility, and working memory. Previous research has found moderate correlations between direct assessments of individual behavioral regulation and teacher-ratings of classroom behavioral regulation of about r = .30, suggesting a degree of shared variance (Matthews et al., 2009). Further, an examination of the items that teachers rate to

assess classroom behavioral regulation suggests that in addition to tapping individual behavioral regulation, they may also reflect a broader construct, akin to "approaches to learning" and "learning-related skills," including skills such as independence (Li-Grining, Votruba-Drzal, Maldonado-Carreno, & Haas, 2010). The unshared variance may reflect these differences, as well as differences in measurement sources (direct assessment versus teacher rating).

Extending Previous Analyses

The present study is an extension of a previous study examining the relation between behavioral regulation and academic achievement in the United States, Taiwan, South Korea, and China. Specifically, the previous study examined the relations between individual behavioral regulation and school readiness, controlling for gender (Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011). In the presence of other variables, gender was significantly related to math for children in the United States, but not to any other school readiness outcomes in Taiwan, South Korea, or China. Results showed a limited effect of gender on school readiness, but did not investigate the differences in boys' and girls' behavioral regulation or the differences in the extent to which behavioral regulation supports school readiness.

Questions about the role of gender in these relations were motivated by two issues. First, research by Matthews and colleagues (2009) documented girls' advantage in individual and classroom behavioral regulation in the United States. Second, in Asia, a study of Chinese children was recently published showing that boys had significantly higher externalizing problems than girls (Liu, Cheng, & Leung, 2011). Because externalizing problems have been related to earlier problems with behavioral regulation (Eisenberg et al., 2003), there is a need to examine the role of gender in behavioral regulation. If higher behavioral regulation is related to higher school readiness, as we showed in our previous study (Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011), it is important to determine whether boys and girls have similar behavioral regulation skills.

It is also important to document if behavioral regulation skills are equally related to later school readiness for boys and girls. Previous research has found that the positive effect of individual behavioral regulation is universal across children with multiple risk factors (such as low maternal education or family income; McClelland & Wanless, 2012) but differences by gender may be present, especially in Asia, given cultural differences in gender expectations (Best, 2010). For example, Asian societies tend to have relatively patriarchal values that teach girls that they should serve the needs of the family or group, with an emphasis on passivity and submission (Pyke & Johnson, 2003). As is true of all societies, however, there is variability in the degree to which families and teachers in a society subscribe to particular values.

Cultural Differences in Behavioral Regulation

The present study is situated in the field of cross-cultural psychology and aims to examine psychological research questions in samples that extend beyond the United States to include the "neglected 95%" of children who are often overlooked in psychological research (Arnett, 2008). Further, we investigate our research questions across four societies to provide evidence of whether findings are universal or culturally specific (Flynn & Rahbar, 1993). The study of gender, behavioral regulation, and school readiness is

particularly ripe for a cross-cultural approach because behavioral regulation and school readiness are influenced by early experiences, which vary by the child's gender and culture (Best, 2010; Rimm-Kaufman & Wanless, 2012).

Culture influences gender differences via the early experiences in which children are encouraged to participate (Stockard, 2006). Specifically, children are socialized into their gender when adults communicate expectations for children's behavior and play (Best, 2010). Girls' strong individual and classroom behavioral regulation, for example, may be a function of the type of play they engage in and culturally specific expectations of the most appropriate types of play for girls. For example, research suggests that in many societies, girls engage in significantly more sociodramatic play than boys (Edwards, 2000), although this finding has not been upheld in Taiwan (Pan, 1994). Gendered experiences in sociodramatic play are relevant because they provide children the opportunity to practice being in pretend roles that require high regulation, and this has been positively related to behavioral regulation development (Bodrova & Leong, 2006; Elias & Berk, 2002). Gendered differences in sociodramatic play in the United States, but not in Taiwan, suggest that gender differences in behavioral regulation may be more pronounced in the United States.

In early childhood, children are also afforded varying experiences to practice regulating themselves based on cultural expectations. In Asia, with the cultural focus on collectivism, adults model how to observe the behaviors of others and modify their behaviors to align optimally with them (Jian, 2009; Maccoby & Martin, 1983). For example, before sitting at a table that does not have enough chairs for everyone in the group, Asian teachers and parents may teach children to wait until enough chairs are available for everyone. In a more individualistic society like the United States, children are more likely to take a chair for themselves without regulating this action around the collective needs of the group. Regulating behaviors to fit the needs of the group is pervasive in Asian societies and teachers and parents particularly emphasize this when elderly or more respected adults are present (Hsieh, 2004). This example of culturally specific early experiences suggests that Asian children, regardless of gender, may practice regulating themselves often.

Although Taiwan, South Korea, and China are all collectivist societies, they have differences in some aspects of collectivism (Zhang, Lin, Nonaka, & Beom, 2005) which may influence the extent to which children in these societies have certain early experiences. For example, some Confucian values such as interpersonal harmony (i.e., solidarity with others, harmony with others) and relational hierarchy (i.e., ordering relationships by status) are more strongly endorsed in China than in Taiwan or South Korea. This difference may indicate, for example, that Chinese children may have more opportunities to regulate themselves in response to the needs of the group or to others that have superior status, such as teachers and parents (Zhang et al., 2005). Therefore, we examine Taiwan, South Korea, and China separately rather than as one Asian sample.

Gender Differences in Behavioral Regulation

Behavioral regulation is typically measured with direct assessments of individual behavioral regulation and teacher ratings of classroom behavioral regulation. Previous research in the United States, with both types of assessments, reveals considerable consistency in gender

differences (Beaman, Wheldall, & Kemp, 2006; Fergusson, Lloyd, & Horwood, 1991; Silverman, 2003). Girls have stronger individual behavioral regulation skills (Cameron Ponitz et al., 2008; Kochanska et al., 2001; Matthews et al., 2009) and classroom behavioral regulation (McClelland et al., 2000; Ready et al., 2005) compared to boys. Specifically, in individual and classroom contexts girls demonstrate stronger inhibitory control, persistence, and more adaptive behavior compared with boys (McCabe, Cunnington, & Brooks-Gunn, 2004; Taylor, Kuo, & Sullivan, 2002). These consistent findings across direct assessments and teacher ratings suggest that girls show strong regulation across settings, where demands and supports for regulation differ. Girls' persistent advantage in the United States is notable given that teacher ratings of other classroom skills have been found to vary systematically based on teacher characteristics (Mashburn, Hamre, Downer, & Pianta, 2006; Waterman, McDermott, Fantuzzo, & Gadsden, 2012) and student characteristics (Bennett, Gottesman, Rock, & Cerullo, 1993; Jones & Myhill, 2004).

Few studies have investigated gender differences in behavioral regulation in Asian countries. In one study in China, girls had higher internal control than boys did, as evidenced by more focused and independent efforts to clean up toys in a videotaped laboratory setting (Chen, Li, & Chien, 2003). This gender gap favoring girls was also present when using teacher ratings of classroom behavioral regulation in Japan (Olson & Kashiwagi, 2000). Although few studies have compared Asian boys and girls on direct assessments, one study found that Chinese and American girls performed better on a number on regulatory tasks compared to boys (Sabbagh, Xu, Carlson, Moses, & Lee, 2006). In sum, there is some research showing that girls in Asia perform better in individual and classroom behavioral regulation. None of this research, however, was conducted in Taiwan or South Korea. Based on this limited research, we expect that girls' advantage over boys may be universal across the United States and Asia, but it was unclear if the advantage in Asia would be consistently large across contexts.

Gender Differences by Culture in the Relation between Behavioral Regulation and School Readiness

Although research on the relation between individual and classroom behavioral regulation and school readiness is well established in the United States and some research is present in Asian samples, gender differences have not been as thoroughly examined. In one recent U.S. study examining teacher- and parent-rated approaches to learning (including attention, persistence, flexibility, independence, self-control, eagerness to learn), Li-Grining and colleagues (2010) found that children's approaches to learning were more beneficial for U.S. girls than boys in math, but was more beneficial for boys than girls in literacy. The authors suggest that the gender difference found in their research may indicate that approaches to learning help children in the academic domain in which they are typically less engaged (Mecce, Glienke, & Burg, 2006). Although composite measures of behavioral regulation, such as was used in the Li-Grining and colleagues study are ideal for increasing validity, their use makes it impossible to tease apart how findings may vary for individual and classroom behavioral regulation.

Although approach to learning is a more broadly defined construct than behavioral regulation, aspects of the construct (i.e., attention and self-control) are closely linked to individual and classroom behavioral regulation (McClelland,

Cameron, Wanless, et al., 2007; Rimm-Kaufman & Wanless, 2012). Specifically, this construct also tapped children's eagerness to learn, creativity, level of interest, and their emotion regulation particularly during interactions with peers (Li-Grining, et al., 2010). Based on Li-Grining and colleagues' study, however, it seems possible that behavioral regulation may be more beneficial for boys' early literacy and girls' math school readiness skills in the United States.

Based on Asian research, a study of Chinese first and second graders, for example, found that the relation between teacher-rated classroom attention and children's problem behaviors was stronger for girls than for boys (Eisenberg et al., 2007). In Korean preschoolers, however, the relation between children's behavioral regulation and their early reading was stronger for boys (Son, Lee, Sung, in press). Overall, however, research is limited and it remains unclear whether behavioral regulation is equally important for school readiness for both boys and girls in Asian countries.

Goals of the Present Study

The present study used multiple measures of behavioral regulation across four societies to examine the universal and culturally specific aspects of the gender gap in behavioral regulation. Specifically, we assessed individual and classroom behavioral regulation for girls and boys (3-6 years old) in the United States, Taiwan, South Korea, and China. All analyses were conducted separately within each society to allow for unique patterns of relations between all covariates and the outcome to be visible. This approach limits ethnocentrism and aligns with the tenets of cross-cultural psychology (Keith, 2011). Further, conducting separate analyses differs from previous research that has combined data across societies, included an interaction term with society, and assumed that all other covariates would have equal effects across societies (Wanless, Larsen, & Son, 2011). Similarly, within each society, analyses were conducted separately within each gender to allow for gender-specific patterns of relations.

There were two research questions: 1) Are there gender differences in individual and classroom behavioral regulation in the United States and three Asian societies? 2) Does behavioral regulation relate to school readiness (mathematics, vocabulary, and early literacy) equally for girls and boys within each society? Consistent with previous research, we hypothesized that girls would have higher individual and classroom behavioral regulation than boys in the United States and Asia (Matthews et al., 2009; Ready et al., 2005; Sabbagh et al., 2006). There is less research available on gender differences in the relation between behavioral regulation and school readiness (Li-Grining, et al., 2010), making it difficult to predict if gender differences in the different samples would emerge.

Method

Participants

We collected data from participants in the United States, China, South Korea, and Taiwan. A total of 814 children and their families participated in the study, and the children's teachers (N = 73). Children ranged in age from 3.12 to 6.50 years old; however, the majority of children (n=741, 91%) were either four or five years old. Preschools in all four samples met a certain level of quality based on being accredited by the National Association for the Education of Young Children (NAEYC) in the United States, or meeting national preschool standards in the Asian societies.

United States. There were 310 children from 40 preschool and kindergarten classrooms in the U.S sample. Classrooms were located in Michigan and Oregon (see Cameron Ponitz et al., 2009 for a description of each site). The children ranged in age from 4.14 to 6.24 years old (M = 5.48, SD = .33), and about half of the children (51%, n=159) were girls. Seventy-four percent of the children were Caucasian, 7% were Asian, 6% were Hispanic, and 13% were biracial or another ethnicity. Mothers had an average level of education of some college. A small portion of the children (4%, n=13) spoke Spanish as their first language, and received all assessments in Spanish. The Spanish-speakers were all from the Oregon sample.

Taiwan. There were 158 children from ten preschool classrooms in the Taiwanese sample. Classrooms were located in Taipei, the capital city of Taiwan. The children ranged in age from 3.89 to 5.00 years old (M = 4.56, SD = .29; see Table 1), and about half of the children (48%, n=76) were girls. The majority of the children's parents originated from Taiwan (100% of fathers, 77% of mothers), and the remaining mothers were born in China (4%), Vietnam (4%), Indonesia (1%), or the Philippines (1%). Mothers had an average level of education between high school and college.

South Korea. There were 227 children from 16 preschool classrooms and three childcare centers in the South Korean sample. Centers were located in Seoul, the capital city of South Korea, and its suburbs, the Kyonggi province. The children ranged in age from 3.58 to 6.50 years old (M = 5.05, SD = .85), and slightly less than half of the children (40%, n=91) were girls. All of the children in the South Korean sample were originally from South Korea. Mothers had an average level of education between high school and college.

China. There were 119 children from seven preschool classrooms in the Chinese sample. Classrooms were located in Beijing, the capital city of China. The children ranged in age from 3.12 to 6.45 years old (M = 5.03, SD = .62), and about half of the children (46%, n=55) were girls. All of the children in this sample originated from China but data on maternal education level was not available.

Procedure

In all samples, we collected behavioral regulation data from teachers and children. Parents completed demographic questionnaires. Tests in early mathematics, early literacy, and vocabulary assessed academic skills. These three tests were chosen individually for each society, and are each relevant for school readiness in that society. Children in the Chinese sample did not receive a vocabulary assessment, and children in the Taiwanese sample did not receive an early literacy assessment. A direct measure (the Head-Toes-Knees-Shoulders task, HTKS) and teachers' reports assessed individual and classroom behavioral regulation, respectively. We collected information about children's families from parents in three of the samples (the U.S, South Korea, and Taiwan). A research assistant assessed children in a separate, quiet space in their school in two sessions, each lasting 15 to 40 minutes.

Measures

Professors and graduate students who were native speakers of the language where the assessment was given and also fluent in English translated and back-translated measures that had not been used before in each society. Native speakers with expertise in early childhood development examined all back-translations to determine their accuracy and face validity. Moreover, accumulating evidence suggests that these

measures of individual and classroom behavioral regulation demonstrate reliability and validity across cultures (Lan et al., 2011; Mähler, Schuchardt, Piekny, von Goldammer, & Grube, 2012; von Suchodoletz et al., 2013; Wanless, McClelland, Tominey, & Acock, 2011). A small number of children at the Oregon site spoke Spanish as their first language, as identified by their teachers. A Spanish professor and bilingual research assistants translated and back translated assessments not previously translated to Spanish. Native Spanish-speaking research assistants administered these measures to children.

Demographic Information. In all samples except China, (United States, South Korea, and Taiwan), we collected background demographic information including children's age, gender, ethnicity, prior childcare experience, and parents' education level.

Behavioral Regulation Measures.

Direct Assessment of Individual Behavioral Regulation. In all samples, we used the Head-Toes-Knees-Shoulders task (HTKS) to measure children's individual behavioral regulation, which taps attentional flexibility, working memory, and inhibitory control (Mähler et al., 2012; McClelland & Cameron Ponitz, 2012; McClelland et al., 2010). In previous research, HTKS scores have been significantly positively correlated with attentional flexibility tasks (.23 to .26), working memory tasks (.26 to .49), and inhibitory control tasks (.35) (Lan et al., 2011; Mähler et al., 2012). Previous research has also established the predictive validity of the HTKS task across societies based on significant positive relations with academic outcomes (Cameron Ponitz, McClelland, Matthews, & Morrison, 2009; Matthews et al., 2009; von Suchodoletz et al., 2013).

The HTKS requires children to touch the "opposite" body part from what they are instructed to touch. For example, children are to touch their toes when told to touch their head, or touch their knees when told to touch their shoulders. The HTKS is scored on a 0 to 2 scale, with 0 indicating an incorrect response, 1 indicating that the child gave an incorrect response and then corrected the response, and 2 indicating a correct response. There are 20 items on the HTKS, resulting in total scores ranging from 0 to 40. The HTKS has two forms: Form A begins with head-toes commands and Form B begins with knees-shoulders commands (items 1-10). Items 11-20 consist of commands to touch all four body parts. There were no significant differences in the United States, Taiwan, and China between scores on the two forms when controlling for age ($p > .05$), which has also been shown in previous work in the United States (Cameron Ponitz et al., 2009; Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011). Only Form A was used for the South Korean sample.

Strong stability over time (Mähler et al., 2012; Wanless, McClelland, Tominey, et al., 2011) and inter-rater reliability has been demonstrated for the HTKS in multiple societies across the United States, Asia, and Europe (Cameron Ponitz et al., 2009; Connor et al., 2010; McClelland, Cameron, Connor, et al., 2007; McClelland & Cameron Ponitz, 2012; von Suchodoletz et al., 2013; Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011; Wanless, McClelland, Acock, Chen, et al., 2011). Specifically, results with multiple samples of children, across multiple societies have shown no significant differences among examiners when controlling for child age and school. In the present samples, there were also no significant differences between examiners in children's scores after controlling for age in the United States, *F*

(141, 299) = 1.25, $p > .05$, in Taiwan F (40, 155) = 1.08, $p > .05$, and in China F (28, 114) = 1.28, $p > .05$. Further, in the South Korean sample, two research assistants rated the same children for a subsample of participants (n = 72) and had good consistency on each item (ICC = .71, $p < .001$).

Teacher Ratings of Classroom Behavioral Regulation. We used teacher ratings to assess children's classroom behavioral regulation using the Child Behavior Rating Scale (CBRS; Bronson, Tivnan, & Seppannen, 1995). Teachers rated children's typical behaviors when using class materials, interacting with classmates, and completing tasks using a scale of 1 (never) to 5 (usually/always). To determine whether a classroom behavioral regulation factor was present in each of the four societies examined in the present study, we analyzed CBRS scores using principal axis factor analysis with a promax rotation. In each sample, the same 10-item classroom behavioral regulation factor emerged that was found in previous research in the United States (α = .94 - .95; Cameron Ponitz et al., 2009; Matthews et al., 2009) and Taiwan (α = .94; Wanless, McClelland, Acock, Chen, et al., 2011). This factor included items such as "Concentrates when working on a task; is not easily distracted by surrounding activities," and "Completes learning tasks involving two or more steps (e.g., cutting and pasting) in an organized way." The mean score on this factor ranged from 1 to 5, with higher scores indicating higher levels of classroom behavioral regulation. The CBRS factor had strong inter-item reliability in the United States (α = .94), Taiwan (α = .94), South Korea (α = .94), and China (α = .95). Previous research has found that this 10-item factor and the HTKS both measure similar aspects of behavioral regulation in the United States (Cameron Ponitz et al., 2009; Matthews et al., 2009), but have mixed relations in Asia (Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011). In the present samples, correlations between the CBRS and the HTKS ranged from .03 and .33 (see Table 1). Further information about the variability in these correlations can be found in a previous study (see Wanless, McClelland, Acock, Cameron Ponitz, et al., 2011).

School Readiness Measures.

United States. We used the Woodcock-Johnson Psycho-Educational Battery-III Tests of Achievement (WJ-III; Woodcock & Mather, 2000) or the Batería Woodcock-Muñoz-R (Batería-R; Woodcock & Muñoz-Sandoval, 1996) to assess children mathematics, early literacy, and vocabulary skills. The Applied Problems subtest measured early math skills, which includes questions about quantity, time, money, and word problems. The Letter-Word Identification subtest, which involves children naming letters and reading words, assessed early literacy skills. The Picture Vocabulary subtest, using pictures to assess expressive vocabulary, assessed vocabulary. To account for children's age at the time of assessment and allow for comparison of children's scores across a range of ages, we used W-scores. The inter-rater reliability of these subtests is reported at greater than .85 (Woodcock & Mather, 2000).

Taiwan. We used previously translated measures to assess children's school readiness skills. The Test of Early Mathematics Ability-2 (TEMA-2) measured children's early mathematics ability, including relative magnitude, counting, calculation, and enumeration (Ginsburg & Baroody, 1990). The TEMA-2 has demonstrated high internal consistency (.89-.90) and test-retest reliabilities (.91-.94) in previous research in Taiwan (Hsu, 2000; Ou, 1998). The Peabody Picture Vocabulary Test-Revised (PPVT-R) assessed children's

vocabulary by asking children to point to pictures named by a research assistant. Previous research in Taiwan using the PPVT-R has demonstrated split-half reliabilities ranging from .90 to .97 (Lu & Liu, 1998).

South Korea. We assessed children's early mathematics skills and vocabulary using subtests of the Korean-Wechsler Preschool and Primary Scale of Intelligence (K-WPPSI; Park, Kwak, & Park, 1989). The mathematics subtest included questions about relative magnitude, counting, and calculation. This subtest has a split-half reliability of .82-.87 and a test-retest reliability of .68 for children age four to six (Park et al., 1989). The vocabulary subtest required children to identify pictured objects and define words. This subtest has a split-half reliability of .78-.86 and a test-retest reliability of .63 for children age four to six (Park et al., 1989). The Test of Hangul Word Reading assessed early literacy skills. This test requests children to decode two-syllable Korean words and pseudo-words, and has an internal consistency of .99, split-half-reliability of .98-.99, and test-retest reliability of .93-.97 (Choi & Yi, 2007).

China. We assessed children's mathematics skills using the Zareki-KP task (von Aster, 2001), which was previously translated to Simple Chinese (Liu, 2007). We administered two subtests, counting and calculation, and created a composite score by adding the two scores. Scores on the subtests were significantly positively correlated (r = .44, p <.001). The counting test had a reliability of .84 and the calculation test had a reliability of .87, and both were correlated with teacher reports and cognitive tasks in Chinese samples (Liu, 2007). We assessed children's early literacy skills with the Character Recognition task (Chow, McBride-Chang, Cheung, & Chow, 2008). For this task, children read aloud traditional characters that had been translated into simplified Chinese.

Results

Analysis Strategy

Individual and classroom behavioral regulation and school readiness had less than 2% missing data for the United States, Taiwan, and China. South Korea had 34% missing data for school readiness outcomes. We used logistic regression to check for relations between each variable and the missingness of other variables, and results indicated that the missing data were likely missing at random. Thus, before our analyses, we used multiple imputation with 10 imputations and auxiliary variables within each society using Stata (Acock, 2005; Meng, 1995; Rubin, 1996; StataCorp, 2007). Auxiliary variables varied by society but included the amount of experience in preschool and family income. Descriptive statistics for the original and imputed data were very similar so all analyses presented are based on the imputed data.

After imputation, we examined descriptive statistics such as skewness and intraclass correlation coefficients (ICCs) (see Table 1). We also used multilevel modeling (children at level 1, classrooms at level 2) in *MPlus* (Muthén & Muthén, 2010) to address both research questions to ensure that significant findings were not a function of the lack of statistical independence of children in the same classroom. Our sample sizes were sufficient for multi-level analyses, particularly since there were no covariates included at level 2. In addition, to address the second research question, we conducted multigroup multilevel analyses to examine gender differences in the influence of individual and classroom behavioral regulation on school readiness. Multigroup analyses executed the same model once for each group (gender in this case) and tested

for statistical differences between the findings in each group. In this case, we estimated the effect of child age, mother's education, behavioral regulation (individual or classroom), and site of data collection (only in the United States) on school readiness once for girls and once for boys. A Wald test determined whether the differences between girls' and boys' coefficients for behavioral regulation and school readiness were significant. In other words, the Wald test allowed us to statistically compare the results for girls and the results for boys on individual behavioral regulation and to compare the results for girls and boys on the classroom behavioral regulation. Wald tests could not be used to statistically compare results between measures of behavioral regulation, only between genders.

Although this approach is somewhat akin to testing an interaction between gender and behavioral regulation on school readiness, multigroup analyses allow for the effects of all of the covariates in the model to have unique effects on outcomes for girls and boys (Allen & Walsh, 2000; Wanless, Larsen, et al., 2011). Multigroup analyses reflected the properties of our data more accurately than interaction analyses because, as can be seen in Tables 3 and 4, the relations between covariates and outcomes for girls and boys were not always similar.

Research Question 1: Gender Differences in Individual and Classroom Behavioral Regulation

Descriptive statistics of each type of behavioral regulation highlighted a few patterns by gender (see Table 1). First, there were more boys than girls who scored the lowest possible score on the individual behavioral regulation task (the HTKS), but for classroom behavioral regulation, teachers did not use the bottom of the rating scale for either boys or girls. Further, there were generally more girls than boys who earned the highest possible score on both types of assessments.

Second, we calculated intraclass correlation coefficients (ICC) for individual and classroom behavioral regulation for each gender in each society. An ICC reflects the average correlation of the scores within a classroom. A smaller ICC indicates that the children's scores within a classroom are virtually unrelated to one another, and thus the clustering of children in classroom is less of an issue. The size of the ICCs ranged from very small (0.06%; indicating that children within the same classroom had scores that were virtually independent of one another) to somewhat large (60.41%; indicating that children within the same classroom had scores that were highly related to one another). For classroom behavioral regulation, the ICC was larger for girls than boys, suggesting that a relatively greater portion of the variance in girls' classroom behavioral regulation was due to their classroom membership. In other words, teachers were more likely to rate girls differently across classrooms but to rate boys similarly. This pattern, though present in all societies, was particularly pronounced in the United States. In China, however, teachers rated boys and girls differently across classrooms, with the ICCs being somewhat large and highly similar across genders (67.12% and 60.41% for girls and boys respectively).

For directly assessed behavioral regulation on the HTKS, ICCs were relatively low and did not differ greatly between boys and girls in each Asian society. In the United States, however, differences between girls' and boys' ICCs were more pronounced with classroom means differing the most for boys in the United States. This pattern for individual behavioral regulation in the United States was the opposite of the pattern found for

classroom behavioral regulation in the United States. In other words, in the United States, differences across classroom means were greater for boys on the direct assessment and differences in classroom means were greater for girls on the teacher ratings. Overall, there were substantial difference in the magnitude and pattern of ICCs, possibly suggesting a stronger rater effect in instances with low independence of scores (higher ICCs) within a classroom.

Multilevel models of behavioral regulation regressed on gender, controlling for child age, mother's education level, and site of data collection (only in the United States) were conducted within each society for each type of behavioral regulation (see Table 2). Multilevel regression results indicated that girls' individual behavioral regulation was significantly higher than boys' only in the United States but not in any of the three Asian societies. Girls' classroom behavioral regulation, however, was significantly higher than boys' in the United States, Taiwan, and South Korea. There was not a statistically significant difference by gender in China, although China had the smallest sample size of all societies and the magnitude of the standardized coefficients for gender in China suggested a substantive difference. In sum, individual behavioral regulation pointed to culturally specific gender differences, with girls having higher scores than boys in the United States. Classroom behavioral regulation, had more of a universal pattern with girls showing substantively higher scores than boys in China and statistically higher scores than boys in the United States, Taiwan, and South Korea.

Research Question 2: Gender Differences in the Relation between Individual and Classroom Behavioral Regulation and School Readiness

Multilevel, multigroup analyses were used to examine the effect of individual and classroom behavioral regulation on school readiness controlling for child age, mother's education, and site of data collection (for the U.S. sample only). Gender was the grouping variable to obtain unique coefficient estimates for the relation between each covariate and the outcomes for girls and boys within each society (see Tables 3-6). Models of individual behavioral regulation consistently accounted for more variance in the school readiness of girls and boys across societies than in the models including classroom behavioral regulation. This finding suggests that individual behavioral regulation was consistently a stronger predictor of school readiness than classroom behavioral regulation, regardless of gender or society.

Overall, however, there was considerable consistency between genders in the relation between behavioral regulation and school readiness, regardless of the type of behavioral regulation. Although differences in the magnitude of coefficients within each society suggested some substantive gender differences in how much behavioral regulation related to domains of school readiness, none of the differences between genders were statistically significant according to a Wald test. In other words, based on either individual behavioral regulation or classroom behavioral regulation, there were no statistically significant differences between the relations between behavioral regulation and school readiness for girls and boys in any society. Behavioral regulation universally supported some aspect of school readiness in each society, and there were no differences in this effect by gender.

Discussion

The present study contributed to the literature on universal and culturally specific

aspects of behavioral regulation in the United States, Taiwan, South Korea, and China. Overall, results of this study indicated that girls universally had stronger classroom behavioral regulation than boys across societies, but this was only true in the United States for individual behavioral regulation, assessed by the HTKS. In the Asian societies, there were no significant gender differences in individual behavioral regulation, showing a culturally specific gender difference for this aspect of behavioral regulation. Moreover, there were no statistically significant gender differences detected in the relation between individual behavioral regulation (directly assessed) or classroom behavioral regulation (teacher ratings) and school readiness in any society. These findings suggest that behavioral regulation has a similar relation to school readiness for girls and boys, in the United States and Asia.

Research Question 1: Gender Differences in Individual and Classroom Behavioral Regulation

Based on previous research, we expected girls to have higher individual and classroom behavioral regulation in the United States and our findings supported this hypothesis (Cameron Ponitz et al., 2008; Kochanska et al., 2001; Matthews et al., 2009). We also found this pattern in the Taiwanese and South Korean samples for classroom behavioral regulation, but not for individual behavioral regulation. Finally, Chinese girls performed somewhat better than boys on classroom behavioral regulation, but this difference did not reach statistical significance, which may have been due to the smaller sample size in China. In other words, although girls had somewhat higher means than boys did on classroom behavioral regulation in all four societies, this gender difference was only present in the United States for individual behavioral regulation. There are a number of possible reasons for this finding.

First, there are conceptual differences in the direct assessment (individual behavioral regulation) and teacher-rated (classroom behavioral regulation) measures and they may account for the discrepant findings in Asia. For example, the direct assessment measures children's ability to regulate their behavior in response to adult instructions in a one-on-one setting. Teacher ratings, however, take into account a child's overall ability to regulate their behavior in response to peer behaviors and requests that frequently occur in classrooms. Our findings may suggest that girls and boys in Asia are equally able to regulate their behaviors in response to adults (direct assessment) but that girls may be more skilled than boys at regulating in response to peers or the overall more complex classroom setting (teacher rating). Moreover, regulating in response to situations in the classroom may require social skills in addition to individual behavioral regulation, and Asian girls generally develop social skills more rapidly than boys (Chen & French, 2008). Therefore, it is possible that the teacher-rated measure tapped peer-related aspects of behavioral regulation (classroom behavioral regulation) that highlighted girls' strengths more so than the direct assessment of their individual behavioral regulation.

Second, it is possible that individual and classroom behavioral regulation differentially detected gender differences in Asia due to rater effects. Specifically, when examining teacher ratings of classroom behavioral regulation, we found that in addition to the United States, significant gender differences emerged in two of the Asian societies (Taiwan and South Korea), which were consistent with previous research (Olson & Kashiwagi, 2000). Teacher ratings are, after all, based on

teacher and child behavior in the classroom, rather than children's directly measured individual behavioral regulation (Bennett et al., 1993; Mashburn et al., 2006; Waterman et al., 2012). Thus, teacher ratings appear to indicate an Asian gender gap that is not present when direct assessments are used. The present study found that Asian teachers varied more across classrooms in their ratings for girls than for boys, possibly reflecting an inconsistent standard. In fact, the intraclass correlation coefficients for the Asian teacher ratings were particularly high when they were rating girls, suggesting that classroom means of girls' teacher-rated classroom behavioral regulation varied greatly from classroom to classroom.

In sum, Asian teachers may have shown a response bias in their ratings of girls that was not evident for their ratings of boys or for the individual behavioral regulation scores. Further research is needed to see whether differences in conceptualizations of behavioral regulation or in rater response biases were driving the differences in gender gaps by measure. This variability in ratings of girls may be a function of changing gender roles in Asia (Bresnahan, Inoue, Liu, & Nishida, 2001; Inglehard & Baker, 2000). Younger teachers, specifically, may have more equitable expectations for girls and boys than teachers who were trained when Confucian-based Asian gender roles were more pronounced. The two types of assessments used in the present study conveyed different information about different aspects of children's behavioral regulation that are both useful for understanding the implications of behavioral regulation on school readiness. In future studies, researchers should consider using multiple sources of measurement to better understand the nuances in behavioral regulation of children.

Third, it is possible that girls' early learning activities may be a reason for their regulation advantage. One cultural norm in the United States is that girls dress up and engage in sociodramatic play more than boys do (Edwards, 2000), which may support their development of overall behavioral regulation (Bodrova & Leong, 2006). Specifically, sociodramatic play promotes behavioral regulation by allowing children to pretend to be in roles, such as an adult waiting in a long grocery line, that require more regulation than the children usually needs to enact. By practicing roles that are more demanding of behavioral regulation, children's skills are scaffolded to a higher level (Elias & Berk, 2002). Types of play encouraged by parents and teachers, such as sociodramatic play, reflect cultural norms and may vary across groups. For example, across cultures, girls consistently engage in more sociodramatic role-playing than boys (Early et al., 2010; Edwards, 2000) and this type of play has been related to increased behavioral regulation (Bodrova & Leong, 2006; Elias & Berk, 2002). Children typically role-play adults of the same gender, and cultural factors such as gender roles influence what activities children choose to imitate (Best, 2010). In Asia, gender differences in behavioral regulation have not been extensively examined, but previous research has found that girls performed better on direct assessments of individual behavioral regulation compared to boys (Sabbagh et al., 2006). In contrast, the present study did not find significant gender differences in a direct measure of individual behavioral regulation for children in the Asian societies.

Research Question 2: Gender Differences in the Relation between Individual and Classroom Behavioral Regulation and School Readiness

In general, both individual and classroom behavioral regulation were related to some aspects of school readiness and these relations did not statistically differ for boys and girls. This suggests that although there may be culturally specific relations between behavioral regulation and elements of school readiness, these relations are universally similar for girls and boys within a society. Although other research has found that approaches to learning, a construct related to classroom behavioral regulation, mattered more for each gender when they were involved in a less engaging academic subject, this finding was not supported in the present study (Li-Grining, et al., 2010). It is possible that approaches to learning captures a more emotion-based construct including engagement or anxiety, which may relate to school readiness skills in a more gender-specific manner.

It is important to note that the measures of school readiness varied across societies. Measures of school readiness were chosen to optimally represent early math, vocabulary, and literacy in each culture. These measures have been used in previous research in each society (Lan et al., 2011; Matthews et al., 2009; Wanless, McClelland, Acock, Chen, et al., 2011). The resulting differences among measures should be taken into account when interpreting findings. Despite these cultural nuances in assessments, the consistency of findings point to the universal lack of gender differences in the relations between behavioral regulation and school readiness. Overall, however, relations between individual and classroom behavioral regulation and school readiness were less significantly related than in previous research in the Asian societies, possibly due to the smaller sample sizes when boys and girls were analyzed separately. For further discussion of relations between behavioral regulation and school readiness, without distinction by gender, see Wanless, McClelland, Acock, Cameron, et al., 2011.

Practical Implications

Consistent gender differences in behavioral regulation in the United States, suggest that girls have a strong advantage over boys. This difference may underlie gender differences in school outcomes, and could be addressed with interventions that specifically target boys. In the Asian societies, however, it is less clear if gender differences in behavioral regulation were driven by measurement, actual differences in behavioral regulation, or conceptualization differences (individual versus classroom). For example, it is also possible that teachers in Asia may have biases favoring girls, and their teacher ratings reflect this bias. It is also possible that Asian boys struggle to regulate their behavior due to the pervasive distractions in preschool classrooms. Specifically, Asian boys may be struggling more than girls when they need to regulate their behaviors in response to peer demands in the classroom (teacher-rated measure) than in response to an adult (direct assessment). These boys may need more support from teachers and interventions that specifically target their on-site classroom behavioral regulation by approximating classroom interactions and dynamics (Beaman et al., 2006).

Overall, results of this study indicate that behavioral regulation has important relations to school readiness for girls and boys in the United States and Asia. Although the present study did not test causality, the lack of gender difference in this relation may suggest that behavioral regulation is an important avenue for strengthening and promoting school success for all children. Previous research points to multiple interventions that have been successful at improving behavioral regulation in young children (Bierman, Nix,

Greenberg, Blair, & Domitrovich, 2008; Raver et al., 2011; Tominey & McClelland, 2011). Although researchers have not studied these interventions in Asia, researchers may consider extending intervention work to Taiwan, South Korea, and China.

Limitations and Future Research

This study presented culturally specific differences in how behavioral regulation type is related to gender gaps in behavioral regulation. There were however, a number of limitations to guide future research. First, the relatively small sample sizes in all four societies limited our ability to interpret substantive gender differences in the relation between behavioral regulation and school readiness. These differences often did not reach statistical significance. Descriptive differences, however, warrant further work and contribute to current discussions about gender gaps in behavioral regulation in the United States and Asia (United Nations Economic and Social Commission for Asia and the Pacific, 2011; Wetzstein, 2011). Second, observational measures were not used in the present study and limit our ability to interpret differences between findings using the direct assessment of individual behavioral regulation and teacher rating of classroom behavioral regulation. These differences may be due to the skills that are tapped when working in a one-on-one session with a researcher compared to being in a classroom with many distractions. These differences may also reflect previous research that teacher-ratings are influenced by teacher characteristics, student characteristics, and may therefore be biased (Bennett et al., 1993; Mashburn et al., 2006; Waterman et al., 2012). Future research using observations in classrooms would be free of the influences that affect teacher ratings but would reflect the classroom context and its complexities.

Third, the school readiness measures were not the same in each society. This inconsistency limits cross-cultural comparisons. Fourth, we presented some evidence to suggest that there were no significant differences between raters on the direct assessment of behavioral regulation, controlling for child age. Further information about reliability of this measure, however, should be established in future studies. Finally, data were not available to compare across societies in terms of cultural processes, socioeconomic statuses, teacher education levels, teacher age and gender, and other important mechanism variables. Without this data, it is difficult to make comparisons across societies due to possible omitted variable bias. For this reason, our study aimed to compare general patterns of results and not specific skill levels across samples. Future research is needed with more attention to controlling for mechanisms variables such as those mentioned, as well as teaching and parenting practices, and cultural factors. By understanding these culturally specific early experiences, research may be able to identify the specific pathways through which a gender gap in behavioral regulation does or does not develop.

Conclusion

This study highlighted the importance of using multiple measures and contexts to understand the nuances of behavioral regulation, which was especially evident in societies outside of the United States. Although girls had stronger individual and classroom behavioral regulation than boys in the United States, this consistency across measures was not present in Asia. In all Asian societies, there were no gender differences on a direct assessment of individual behavioral regulation, although there were some gender differences on teacher ratings of classroom

behavioral regulation. Thus, in Taiwan and South Korea, teachers rated girls as having higher classroom behavioral regulation than boys. Across all societies and both types of measures, however, behavioral regulation was equally related to school readiness for both genders.

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Table 1

Descriptive Statistics of Behavioral Regulation, by Gender

	United States				Taiwan				South Korea				China			
	Girls (*n*=159)		Boys (*n*=151)		Girls (*n*=76)		Boys (*n*=82)		Girls (*n*=91)		Boys (*n*=136)		Girls (*n*=55)		Boys (*n*=64)	
	H[a]	C[b]	H	C	H	C	H	C	H	C	H	C	H	C	H	C
Mean	27.98	4.15	24.50	3.84	16.59	4.08	15.05	3.72	24.51	4.00	23.65	3.59	32.60	3.98	31.06	3.56
SD	10.23	.67	11.56	.66	12.58	.62	13.58	.56	13.03	.55	12.87	.76	8.29	.74	9.11	.74
CV[c]	.37	.16	.47	.17	.76	.15	.90	.15	.53	.14	.54	.21	.25	.19	.29	.21
Skew	-1.21	-.78	-.74	-.29	.09	-.03	.28	-.07	-.63	-.35	-.70	-.16	-2.36	-.36	-1.86	.24
Kurtosis	3.53	4.35	2.36	2.61	1.68	2.31	1.67	2.65	1.96	2.94	2.13	2.50	9.25	2.26	6.17	2.05
ICC[d]	3.43	27.25	15.76	0.47	3.16	43.24	0.18	25.81	1.65	10.16	3.09	1.26	0.36	67.12	0.06	60.41
Ceiling[e]	.03	.08	.02	.02	.01	.15	.00	.01	.02	.04	.01	.02	.05	.09	.08	.00
Floor[e]	.01	.00	.05	.00	.18	.00	.27	.00	.07	.00	.12	.00	.04	.00	.03	.00
Correlation	.30		.23		.03		.13		.05		.33		.18		.04	

[a] H= Head-Toes-Knees-Shoulders (HTKS). [b]C = Child Behavior Rating Scale (CBRS). [c]Coefficient of Variation (CV) is the standard deviation divided by the mean. [d]Intraclass Correlation Coefficients (ICCs, %) were calculated controlling for age for comparison across societies. [e]The percent of children scoring at the highest and lowest score of the measure, respectively.

Table 2

Standardized Coefficients and Standard Errors from Models of Directly Assessed Individual Behavioral Regulation (HTKS) and Teacher-Rated Classroom Behavioral Regulation (CBRS)

	United States (*N*=310)		Taiwan (*N*=158)		South Korea (*N*=227)		China (*N* = 119)	
	HTKS[a]	CBRS[b]	HTKS	CBRS	HTKS	CBRS	HTKS	CBRS
R-sq	.08	.11	.05	.18	.26	.11	.02	.10
Age	.17**	.18*	.12	.25**	.47***	.17*	.07	.15
(years)	(1.90)	(.15)	(4.72)	(.14)	(1.75)	(.06)	(1.40)	(.10)
Gender[c]	-.34**	-.47**	-.16	-.66*	-.19[t]	-.60***	-.19	-.50
	(1.26)	(.10)	(2.15)	(.19)	(1.49)	(.10)	(1.64)	(.33)
Mom	.22**	.14	.28*	.10	.16*	-.00	---	---
Educ[d]	(.99)	(.08)	(1.80)	(.07)	(1.13)	(.05)		
Site[e]	.07	-.25[t]	---	---	---	---	---	---
	(1.66)	(.12)						

[a]Head-Toes-Knees-Shoulders (HTKS) directly assessed behavioral regulation. [b]Child Behavior Rating Scale (CBRS) teacher-rated classroom behavioral regulation. [c] Boy =1, girl = 0. [d]Mother's education is scored as 1 = 0-8 years; 2 = 9-12 years; 3 = 13-16 years; 4 = >16 years. [e]1=Michigan, 0= Oregon. All p-values are one-tailed, [t] $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Table 3

United States: Standardized Coefficients and Standard Errors from Multilevel Models of Early Mathematics, Vocabulary, and Early Literacy on Behavioral Regulation, by Gender (n=159 girls; n=151 boys)

	Individual Behavioral Regulation (HTKS)[a]						Classroom Behavioral Regulation (CBRS)[b]					
	Math		Vocab		Literacy		Math		Vocab		Literacy	
	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy
R-sq	.29	.32	.16	.21	.13	.12	.17	.18	.11	.14	.09	.12
Age (yrs)	.05	-.00	-.04	-.06	.06	.05	.13	.02	-.04	-.07	.13*	.06
	(3.15)	(3.46)	(2.88)	(3.25)	(6.76)	(8.42)	(3.63)	(4.80)	(3.03)	(3.76)	(7.59)	(8.72)
Mom	.37**	.21[t]	.39**	.32	.24*	.22*	.40**	.34*	.39*	.39***	.26*	.29**
Educ[c]	(1.48)	(2.18)	(1.91)	(1.68)	(3.34)	(3.76)	(1.60)	(2.59)	(2.05)	(1.84)	(3.15)	(3.42)
Behavioral	.43***	.54***	.26**	.33**	.28***	.30**	.24*	.33***	.11	.09	.17[t]	.26**
Regulation	(.12)	(.13)	(.10)	(.14)	(.21)	(.28)	(2.23)	(2.38)	(1.99)	(1.81)	(5.14)	(3.88)
Site[d]	-.48*	-.33*	-.27	.33*	-.41*	-.22	-.32	-.33[t]	-.21	.28[t]	-.29	-.19
	(.12)	(3.04)	(2.48)	(2.78)	(6.57)	(7.46)	(4.10)	(3.52)	(2.59)	(3.07)	(7.07)	(7.15)

[a]Head-Toes-Knees-Shoulders (HTKS) directly assessed behavioral regulation. [b]Child Behavior Rating Scale (CBRS) teacher-rated classroom behavioral regulation. [c]Mother's Education is scored as 1 = 0-8 years; 2 = 9-12 years; 3 = 13-16 years; 4 = >16 years. [d]MI = Michigan, OR = Oregon. All p-values are one-tailed, [t] $p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Table 4

Taiwan: Standardized Coefficients and Standard Errors from Multilevel Models of Early Mathematics and Vocabulary on Behavioral Regulation, by Gender (n=76 girls; n=82 boys)

	Individual Behavioral Regulation (HTKS)[a]				Classroom Behavioral Regulation (CBRS)[b]			
	Math		Vocab		Math		Vocab	
	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy
R-sq	.27	.09	.11	.08	.18	.17	.12	.11
Age (yrs)	.05	.19	.00	.33*	.05	.18**	.27**	.21***
	(23.30)	(10.57)	(8.29)	(3.51)	(6.86)	(1.82)	(5.11)	(2.99)
Mom Educ[c]	-.23	.26	.14	.28[t]	-.14	.30*	.36**	.34*
	(23.86)	(6.74)	(3.20)	(2.54)	(1.30)	(1.29)	(2.04)	(2.54)
Behavioral	.50	.13	.33*	.17[t]	.41***	.32**	-.01	.13
Regulation	(.73)	(.20)	(.24)	(.12)	(1.92)	(1.73)	(4.46)	(2.86)

[a]Head-Toes-Knees-Shoulders (HTKS) directly assessed behavioral regulation. [b]Child Behavior Rating Scale (CBRS) teacher-rated classroom behavioral regulation. [c]Mother's Education is scored as 1 = 0-8 years; 2 = 9-12 years; 3 = 13-16 years; 4 = >16 years. All p-values are one-tailed, [t] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 5

South Korea: Standardized Coefficients and Standard Errors from Multilevel Models of Early Mathematics and Vocabulary on Behavioral Regulation, by Gender (n=91 girls; n=136 boys)

	Individual Behavioral Regulation (HTKS)[a]						Classroom Behavioral Regulation (CBRS)[b]					
	Math		Vocab		Literacy		Math		Vocab		Literacy	
	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy
R-sq	.52	.41	.35	.21	.38	.23	.53	.38	.36	.21	.32	.11
Age (yrs)	.66***	.50^{t}	.53*	.43**	.57	.35	.68***	.51	.53***	.41**	.58	.14
	(.49)	(1.26)	(1.63)	(1.03)	(44.09)	(44.73)	(.84)	(1.84)	(1.10)	(1.08)	(35.07)	(15.81)
Mom	.22*	.20*	.22	.10	-.03	.14	.23*	.22^{t}	.23^{t}	.10	-.02	.17
Educ[c]	(.36)	(.39)	(1.13)	(.75)	(8.55)	(5.18)	(.47)	(.44)	(.86)	(.72)	(8.26)	(3.44)
Behavioral	.15	.29**	-.02	.08	.21	.25^{t}	.05	.22	.04	.12	.13	.33**
Regulation	(.04)	(.03)	(.08)	(.07)	(.53)	(.40)	(1.01)	(.74)	(1.75)	(.93)	(10.41)	(4.23)

[a]Head-Toes-Knees-Shoulders (HTKS) directly assessed behavioral regulation. [b]Child Behavior Rating Scale (CBRS) teacher-rated classroom behavioral regulation. [c]Mother's Education is scored as 1 = 0-8 years; 2 = 9-12 years; 3 = 13-16 years; 4 = >16 years. All p-values are one-tailed, $^{t}p < .10$; $*p < .05$; $**p < .01$; $***p < .001$.

Table 6

China: Standardized Coefficients and Standard Errors from Multilevel Models of Early Mathematics and Vocabulary on Behavioral Regulation, by Gender (n=55 girls; n=64 boys)

	Directly Assessed Individual Behavioral Regulation (HTKS)[a]				Teacher-Rated Classroom Behavioral Regulation (CBRS)[b]			
	Math		Literacy		Math		Literacy	
	Girl	Boy	Girl	Boy	Girl	Boy	Girl	Boy
R-sq	.32	.11	.08	.06	.18	.02	.05	.04
Age (yrs)	.42*	.03	.17	.09	.42[t]	.10	.20	.13
	.73	1.20	8.83	5.33	.98	1.15	12.95	5.53
Behavioral	.34**	.32**	.21[t]	.20[t]	.15	-.07	.09	.16
Regulation	(.03)	(.04)	(.30)	(.29)	(.90)	(1.52)	(3.75)	(3.51)

[a]Head-Toes-Knees-Shoulders (HTKS) directly assessed behavioral regulation. [b]Child Behavior Rating Scale (CBRS) teacher-rated classroom behavioral regulation. All p-values are one-tailed, [t] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.