Self-Regulation and School Achievement in Contexts : Aspects of Gender, Parenting, and Culture

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Self-Regulation and School Achievement in Contexts:

Aspects of Gender, Parenting, and Culture

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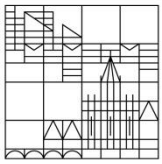

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Second referee: Dr. Frank Wieber

Para Chile y su gente

Dedicated to Chile and its people

"Noche, nieve y arena hacen la forma

de mi delgada patria.

Todo el silencio está en su larga línea,

toda la espuma sale de su barba marina,

todo el carbón la llena de misteriosos besos."

Night, snow, and sand make up the form

of my narrow country.

All the silence is in its long line,

all the foam rises from its sea beard,

all the coal fills it with mysterious kisses.

—Neruda, 1981, p. 49

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Author Note

In the case of Study 1, the nature and extent of my contribution to the study and respective publication "Gender differences in school achievement: The role of self-regulation" was the following: Literature review, conceptualization of research question, assistance in data collection, data analysis and interpretation, preparation of written manuscript. The initial idea of the research question of Study 1 was part of my diploma thesis. As a doctoral student, I conducted subsequent statistical analyses, included further variables, did an extended literature review, and additional interpretations. These subsequent steps resulted in an extension of the preliminary work and in the preparation of the present manuscript for my dissertation thesis. The preparation of the written manuscript was part of my dissertation thesis. The following persons contributed to the publication as co-authors. Dr. Tobias Heikamp: Development of study design and selection of instruments, responsible for data collection, general input, review of manuscript, statistical advice. Prof. Dr. Gisela Trommsdorff: Principal investigator of the project "Developmental Conditions of Intentionality and its Limits" at the University of Konstanz, development of study design and selection of instruments, conceptual input, general supervisory input, review of manuscript.

In the case of Study 2, the nature and extent of my contribution to the study was the following: Principal investigator of the research project in Chile, development of study design and selection of instruments for the study in Chile, literature review, conceptualization of research question, responsible for data collection of the Chilean sample, data analysis and interpretation, preparation of written manuscript. I am grateful for contributions by Prof. Dr. Gisela Trommsdorff, Dr. Tobias Heikamp, and Lorena Muñoz. Prof. Dr. Gisela Trommsdorff: Principal investigator of the research project in Germany, development of study design and selection of instruments for the German study, conceptual input, general supervisory input, review of manuscript. Dr. Tobias Heikamp: Development of study design and selection of instruments for the German study, responsible for data collection of the German sample, review of manuscript. Lorena Muñoz: Assistance in the organization of the research project in Chile, assistance in adaptation of instruments to the Chilean sample, assistance in data collection of the Chilean sample, review of manuscript.

In the case of Study 3, the nature and extent of my contribution to the study was the following: Principal investigator of the research project, development of study design and selection of instruments, literature review, conceptualization of research question, responsible

for data collection, data analysis and interpretation, preparation of written manuscript. I am grateful for contributions by Prof. Dr. Gisela Trommsdorff, Lorena Muñoz, and Dr. Frank Wieber. Prof. Dr. Gisela Trommsdorff: Conceptual input, general supervisory input, review of manuscript. Lorena Muñoz: Assistance in the organization of the research project, assistance in adaptation of instruments to the Chilean sample, assistance in data collection of the Chilean sample, review of manuscript. Dr. Frank Wieber: General supervisory input and review of manuscript.

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Summary

Scholars from multiple disciplines claim that self-regulation is an essential skill and motivation for positive developmental outcomes (e.g., Mischel, 2014; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). More specifically, self-regulation might play a central role for children's school achievement (e.g., Blair, Ursache, Greenberg, Vernon-Feagans, & Investigators, 2015; McClelland et al., 2007; McClelland & Cameron, 2011; Suchodoletz, Trommsdorff, Heikamp, Wieber, & Gollwitzer, 2009). In spite of numerous studies on self-regulation in North America and Europe, relations between self-regulation and school achievement rarely have been studied in diverse contexts, taking into account the aspects of gender, parenting, and culture. Specifically, past research mostly neglected to study the development of self-regulation in diverse cultural contexts (Trommsdorff, 2012; Trommsdorff & Cole, 2011). In Latin American contexts, relations between self-regulation and school achievement have rarely been studied. Moreover, there is a lack of studies on socialization conditions for children's self-regulation and school achievement by taking into account the role of cultural and intra-cultural contexts. Further, past research mostly investigated behavior regulation as predictor for school achievement without considering a wider conceptualization of self-regulation including the aspects behavior and emotion regulation.

In three studies, the present dissertation investigated relations between different aspects of self-regulation (i.e., behavior regulation, emotion regulation) and school achievement in contexts by taking into consideration the aspects gender, parenting, and culture. While the first study focused on the role of gender for self-regulation and school achievement, the second study included socialization conditions (i.e., parenting) for children's development of self-regulation and adaptation to the school context in diverse cultural contexts (Germany, Chile). The third study examined effects of intra-cultural differences in mothers' level of education on children's self-regulation and school achievement in Chile.

The first study of the present dissertation addressed gender differences in self-regulation and school achievement by taking into account different aspects of self-regulation, namely behavior and emotion regulation. This study examined whether gender differences in school achievement favoring girls can be explained by self-regulation. Self-regulation (i.e., behavior and emotion regulation) of 53 German fifth grade students was assessed by teachers' and children's ratings. School achievement (i.e., language and mathematics achievement) was measured using formal academic performance tests as well as grades for language and mathematics. Results revealed that girls' higher language achievement was partly explained

by gender differences in behavior regulation. Regarding mathematics achievement, the results showed a suppression effect of behavior regulation. Thus, boys' mathematics achievement was underestimated when the analyses did not control for behavior regulation.

The second study expanded the research question of the first study by examining relations between parenting, children's self-regulation and school achievement in two diverse cultural contexts. Specifically, this study investigated relations between maternal restrictive control, children's self-regulation (i.e., behavior and emotion regulation), and school achievement in Germany and Chile. The samples consisted of 76 German and 167 Chilean fourth grade students, their mothers, and their teachers. While maternal restrictive control was rated by mothers, self-regulation was rated by children, mothers, and teachers. School achievement was measured by grades for language and mathematics. This study showed that behavior regulation and anger-oriented emotion regulation were higher for German children than for Chilean children. Chilean mothers were found to use more restrictive control than German mothers. Further, results revealed positive relations between children's behavior regulation and school achievement as well as negative relations between maternal restrictive control and children's self-regulation in both cultural contexts. Thus, the second study showed cultural mean differences in parenting and children's self-regulation but no cultural differences in the relations among the variables.

The third study took a closer look on intra-cultural differences in Chile by examining the relation between mothers' level of education and children's school achievement. The study investigated whether this relation can be explained by socialization conditions (mothers' values, parenting) and children's behavior regulation. The behavior regulation of 167 Chilean fourth grade students was measured by mothers', teachers', and children's ratings. Mothers' values (self-transcendence values) and parenting practices (maternal restrictive control) were evaluated by mothers. School achievement was measured by grades for language and mathematics. Results revealed positive relations between mothers' level of education and children's school achievement. Further, the study showed that these relations were partly explained by mothers' values (self-transcendence values), parenting practices (maternal restrictive control), and children's behavior regulation. Moreover, children's behavior regulation was shown to be of central importance to explain relations between mothers' level of education and children's school achievement.

In sum, the present dissertation contributes to the understanding of developmental conditions and outcomes of self-regulation in contexts. By showing positive relations between children's behavior regulation and school achievement, when taking into account gender,

parenting practices as well as diverse cultural contexts, this dissertation highlights the central function of behavior regulation for school achievement in contexts. Moreover, the dissertation underlines the importance of considering the roles of gender, parenting, intra-cultural differences, and diverse cultural contexts when studying developmental conditions and outcomes of self-regulation. The results of this dissertation are discussed within the theoretical framework of developmental conditions and outcomes of self-regulation in diverse contexts. Moreover, implications for the development of context adapted intervention programs to promote self-regulation are addressed.

Zusammenfassung

Forscher verschiedener Disziplinen betonen, dass die Fähigkeit und Motivation zur Selbstregulation eine wichtige Bedingung für positive Entwicklungsergebnisse darstellt (z. B. Mischel, 2014; Moffitt et al., 2011; Tangney, Baumeister, & Boone, 2004). Insbesondere scheint die Selbstregulation eine wichtige Rolle für die Schulleistungen von Kindern zu spielen (z. B. Blair, Ursache, Greenberg, Vernon-Feagans, & Investigators, 2015; McClelland et al., 2007; McClelland & Cameron, 2011; Suchodoletz, Trommsdorff, Heikamp, Wieber, & Gollwitzer, 2009). Obwohl es eine große Anzahl von Studien zur Selbstregulation in Nordamerika und Europa gibt, wurden Zusammenhänge zwischen der Selbstregulation und Schulleistungen bisher kaum in verschiedenen Kontexten, unter Berücksichtigung der Aspekte Geschlecht, elterliche Erziehung und Kultur, untersucht. Insbesondere vernachlässigte die bisherige Forschung die Entwicklung der Selbstregulation in verschiedenen kulturellen Kontexten zu untersuchen (Trommsdorff, 2012; Trommsdorff & Cole, 2011). In lateinamerikanischen Kontexten wurden Zusammenhänge zwischen der Selbstregulation und Schulleistungen bisher kaum untersucht. Außerdem mangelt es an Studien zu Sozialisationsbedingungen der Selbstregulation und Schulleistungen von Kindern unter Berücksichtigung der Rolle kultureller und intrakultureller Kontexte. Zudem wurde in der bisherigen Forschung meist die Verhaltensregulation als Prädiktor für Schulleistungen untersucht, ohne der umfassenderen Konzeptualisierung von Selbstregulation mit den Aspekten Verhaltens- und Emotionsregulation gerecht zu werden.

Die vorliegende Dissertation untersuchte in drei Studien Zusammenhänge zwischen verschiedenen Aspekten der Selbstregulation (d. h. Verhaltens- und Emotionsregulation) und Schulleistungen in verschiedenen Kontexten unter Berücksichtigung der Aspekte Geschlecht, elterliche Erziehung und Kultur. Während die erste Studie insbesondere auf die Rolle von Geschlechtsunterschieden in der Selbstregulation und den Schulleistungen eingeht, bezieht die zweite Studie die Rolle von Sozialisationsbedingungen (z. B. elterliche Erziehung) für die Entwicklung der Selbstregulation des Kindes und die Anpassung an den Schulkontext in verschiedenen kulturellen Kontexten (Deutschland, Chile) mit ein. Die dritte Studie untersuchte Effekte von intrakulturellen Unterschieden des mütterlichen Bildungsniveaus auf die kindliche Selbstregulation und Schulleistungen in Chile.

Die erste Studie der vorliegenden Dissertation behandelt Geschlechtsunterschiede in der Selbstregulation und den Schulleistungen unter Berücksichtigung verschiedener Aspekte der Selbstregulation, und zwar Verhaltens- und Emotionsregulation. Diese Studie untersuchte,

ob die besseren Schulleistungen von Mädchen durch die Selbstregulation erklärt werden können. Die Selbstregulation (d. h. Verhaltens- und Emotionsregulation) von 53 deutschen Fünftklässlern wurde durch Lehrer- und Kinderbeurteilungen erfasst. Die Schulleistungen (d. h. Sprach- und Mathematikleistungen) wurden durch standardisierte Schulleistungstests sowie durch Sprach- und Mathematiknoten gemessen. Die Ergebnisse zeigten, dass die höheren Sprachleistungen von Mädchen teilweise durch Geschlechtsunterschiede in der Verhaltens-regulation erklärt werden konnten. Bezüglich der Mathematikleistungen zeigten die Ergebnisse einen Unterdrückungseffekt der Verhaltensregulation. Demnach wurden die Mathematikleistungen von Jungen unterschätzt, wenn die Analysen nicht für Verhaltens-regulation kontrollierten.

Die zweite Studie erweiterte die Forschungsfrage der ersten Studie, indem sie Zusammenhänge zwischen der elterlichen Erziehung, der kindlichen Selbstregulation und Schulleistungen in zwei verschiedenen kulturellen Kontexten untersuchte. Insbesondere untersuchte diese Studie Zusammenhänge zwischen mütterlicher restriktiver Kontrolle, kindlicher Selbstregulation (d. h. Verhaltens- und Emotionsregulation) und Schulleistungen in Deutschland und Chile. Die Stichproben bestanden aus 76 deutschen und 167 chilenischen Viertklässlern, deren Müttern und Lehrern[1]. Während die mütterliche restriktive Kontrolle von den Müttern beurteilt wurde, wurde die Selbstregulation von den Kindern, Müttern und Lehrern eingeschätzt. Die Schulleistungen wurden durch Sprach- und Mathematiknoten gemessen. Diese Studie zeigte, dass die Verhaltensregulation sowie die ärgerorientierte Emotionsregulation bei deutschen Kindern höher ausgeprägt waren als bei chilenischen Kindern. Chilenische Mütter verwendeten mehr restriktive Kontrolle als deutsche Mütter. Außerdem ergaben die Ergebnisse positive Zusammenhänge zwischen der kindlichen Verhaltensregulation und den Schulleistungen sowie negative Zusammenhänge zwischen der mütterlichen restriktiven Kontrolle und der kindlichen Selbstregulation in beiden kulturellen Kontexten. Somit zeigte die zweite Studie kulturelle Mittelwertsunterschiede in der elterlichen Erziehung und in der kindlichen Selbstregulation aber keine Kulturunterschiede in den Zusammenhängen zwischen den Variablen.

Die dritte Studie ging genauer auf intrakulturelle Unterschiede in Chile ein, indem sie den Zusammenhang zwischen dem mütterlichen Bildungsniveau und den kindlichen Schulleistungen untersuchte. Die Studie prüfte, ob dieser Zusammenhang durch Sozialisationsbedingungen (mütterliche Werte, elterliche Erziehung) sowie durch die

[1] Da die korrekte Nennung beider Geschlechter (z. B. Lehrer und Lehrerinnen) nicht sehr leserfreundlich ist, wurde in der deutschen Zusammenfassung der Dissertation nur die männliche Form verwendet. Damit sind hier sowohl männliche als auch weibliche Teilnehmer und Teilnehmerinnen gemeint.

kindliche Verhaltensregulation erklärt werden kann. Die Verhaltensregulation von 167 chilenischen Viertklässlern wurde durch Beurteilungen von Müttern, Lehrern und Kindern gemessen. Mütterliche Werte (Selbsttranszendenz Werte) und elterliches Erziehungsverhalten (mütterliche restriktive Kontrolle) wurden durch die Mütter eingeschätzt. Die Schulleistungen wurden durch Sprach- und Mathematiknoten gemessen. Die Ergebnisse ergaben positive Zusammenhänge zwischen dem mütterlichen Bildungsniveau und den kindlichen Schulleistungen. Zudem zeigte die Studie, dass diese Zusammenhänge teilweise durch die mütterlichen Werte (Selbsttranszendenz Werte), das elterliche Erziehungsverhalten (mütterliche restriktive Kontrolle) und die kindliche Verhaltensregulation erklärt wurden. Außerdem wurde gezeigt, dass die kindliche Verhaltensregulation von besonders großer Bedeutung ist, um Zusammenhänge zwischen dem mütterlichen Bildungsniveau und den kindlichen Schulleistungen zu erklären.

Insgesamt trägt die vorliegende Dissertation zu einem besseren Verständnis der Entwicklungsbedingungen und Entwicklungsergebnisse von Selbstregulation in verschiedenen Kontexten bei. Es wurden positive Zusammenhänge zwischen der kindlichen Verhaltensregulation und Schulleistungen, unter Berücksichtigung von Geschlechts-unterschieden, elterlichem Erziehungsverhalten sowie verschiedenen kulturellen Kontexten, aufgezeigt. Somit verdeutlicht diese Dissertation die wichtige Bedeutung der Verhaltens-regulation für die Schulleistungen in verschiedenen Kontexten. Außerdem betont die Dissertation, dass es wichtig ist den Einfluss von Geschlecht, elterlicher Erziehung, intrakulturellen Unterschieden und verschiedenen kulturellen Kontexten bei der Untersuchung von Entwicklungsbedingungen und Entwicklungsergebnissen der Selbstregulation zu berücksichtigen. Die Ergebnisse dieser Dissertation werden im theoretischen Rahmen von Entwicklungsbedingungen und Entwicklungsergebnissen von Selbstregulation in verschiedenen Kontexten diskutiert. Außerdem werden Implikationen für die Entwicklung von kontextangemessenen Interventionsprogrammen zur Förderung der Selbstregulation angesprochen.

1 General Introduction and Overview

What makes children successful in life? Currently, a German newspaper illustrated self-regulation as the key to success (Bund & Rudzio, 2014, November 6). A scientific paper called self-regulation "a vital component of success in a child's life" (McClelland & Cameron, 2011, p. 30). Self-regulation has become one of the most central constructs in psychology (Vohs & Baumeister, 2011). Several studies from distinct disciplines have shown the important function of self-regulation for positive developmental outcomes (e.g., Mischel, 2014; Moffitt et al., 2011; Tangney et al., 2004). A famous example of a study which showed that self-regulation can predict success in later life is "The Marshmallow Test" from Walter Mischel (e.g., Mischel, 2014). "The Marshmallow Test" is a delay of gratification paradigm which tests children's ability to resist a small immediate reward (e.g., one marshmallow) in order to obtain a larger delayed reward (e.g., two marshmallows). Mischel's research showed that the longer preschoolers wait for the delayed marshmallow, the better are their school achievement, their social competences, and their coping abilities as adolescents (e.g., Shoda, Mischel, & Peake, 1990). The higher preschoolers' ability to delay gratifications, which is an aspect of self-regulation, the more successful they are in later life. A large-scale study in New Zealand from Moffitt et al. (2011) followed a cohort of 1,000 children from birth on for 32 years. This longitudinal study showed the important role of children's self-regulation for psychological and physical health as well as for general success in later life. Similarly, Tangney et al. (2004) showed with two large-scale studies with university students that self-regulation is important for many positive outcomes, ranging from less binge eating and alcohol abuse, better interpersonal skills to better school achievement. According to Röder and Rösler et al. (2014), self-regulation competences predict success in life, including school, job, relationships, parenting, and general living conditions.

School success is a milestone for later life success. As an important predictor for school success, apart from intelligence, recent research has identified self-regulation (e.g., Blair et al., 2015; McClelland et al., 2007; Suchodoletz et al., 2009). However, previous studies often did not consider the role of gender which has been shown to effect self-regulation and school achievement (Duckworth & Seligman, 2006). Moreover, most previous studies have been conducted in Northern American or European contexts, but neglected to study the role of cultural contexts on the development of self-regulation (Trommsdorff, 2012; Trommsdorff & Cole, 2011). The development of self-regulation and its relation to school achievement might differ cross-culturally due to culture-specific models of agency

(Trommsdorff, 2009). Cultural differences in self-regulation might be rooted in cultural variations in parenting (Trommsdorff, Cole, & Heikamp, 2012). According to Super and Harkness' (1997) framework of *the developmental niche*, parenting is one of the factors which mediate the influence of culture on children's development. In addition to cultural differences, there might be intra-cultural differences in the development and socialization of self-regulation, for instance differences depending on parents' level of education. In summation, previous research rarely considered aspects as gender, parenting, and culture as influential factors when studying relations between self-regulation and school achievement. The present dissertation aims to fill these gaps by investigating relations between self-regulation and school achievement by including the aspects gender, parenting, and culture. The following introduction sections (1.1 – 1.5) are structured by relevant theoretical aspects, beginning with the main focus on relations between self-regulation and school achievement (1.1). Subsequently, the roles of gender, parenting, cultural and intra-cultural contexts are presented (1.2 – 1.5).

1.1 Self-Regulation and School Achievement

Self-regulation plays an important role for children's positive developmental outcomes (e.g., social competences, school achievement, coping abilities, psychological and physical health; Mischel, 2014; Moffitt et al., 2011; Tangney et al., 2004). Moreover, self-regulation seems to be especially relevant for children's school achievement (McClelland & Cameron, 2011). As multiple disciplines study self-regulation, there is a high variation in terms and definitions of this construct. Here, self-regulation is defined as a skill and motivation to manage behavior and emotion with the purpose of goal-directed action to achieve individual needs in academic and social situations (Blair et al., 2015; Karoly, 1993; Kopp, 1982; McClelland et al., 2007; Trommsdorff, 2009). To capture the complex construct of self-regulation adequately, this dissertation adopts a broad perspective by including behavior and emotion regulation as distinguishable but interrelated aspects of self-regulation. Herewith, the present thesis adopts a complex perspective of self-regulation that takes into account the multidimensionality of this construct (e.g., Duckworth & Kern, 2011). Behavior regulation means to follow rules, resist temptation, and inhibit impulsive behavior to comply with environmental demands (Calkins, 2007; McClelland et al., 2007). Emotion regulation describes processes which initiate, inhibit, avoid, maintain, or modulate emotions in order to achieve individual goals (Eisenberg & Spinrad, 2004).

Behavior regulation and school achievement

Several longitudinal studies with children of different age groups (48 months – 15 years) have shown that self-regulation predicts later school achievement (e.g., Blair & Razza, 2007; Blair et al., 2015; Richland & Burchinal, 2013; Suchodoletz et al., 2009). For instance, Suchodoletz et al. (2009) found that preschoolers' behavior regulation, which was measured by two observational situations, predicted their school achievement as first graders one year later. Further, the study from Suchodoletz et al. (2009) with German first graders as well as a study from Duckworth and Seligman (2005) with US-American eighth graders showed that behavior regulation even accounts for more variance in school achievement than intelligence. According to McClelland and Cameron (2011), behavior regulation enables children to control their behavior, remember instructions, focus their attention, and complete tasks in classroom settings. Herewith, behavior regulation contributes to school success. An example of behavior regulation in the school context is to wait to be called on by the teacher, instead of impulsively shouting out an answer (McClelland & Cameron, 2011). Past studies have shown positive relations between behavior regulation and school competences in preschoolers and primary school children, even after controlling for intelligence (e.g., Blair et al., 2015; McClelland et al., 2007; Suchodoletz et al., 2009). Blair et al. (2015) specified as underlying mechanisms for the influence of behavior regulation on school achievement, the abilities to sustain attention, to organize complex information, and to inhibit impulsive responses.

However, previous research mostly investigated behavior regulation, but neglected to consider the wider conceptualization of self-regulation with its aspects behavior and emotion regulation. Both aspects of self-regulation, behavior and emotion regulation may be important for children's school achievement (Blair, 2002; Calkins, 2007; McClelland et al., 2007).

Emotion regulation and school achievement

To be successful in school, children have to regulate their emotions in the school context in an appropriate manner (Trommsdorff, in press). For instance, a high level of fear when facing exams can impede school achievement. According to Blair (2002), the underlying mechanisms for the influence of emotion regulation on school achievement might be cognitive processes. Adequate emotion regulation might facilitate cognitive processes as memory, attention, planning, and problem solving, which are necessary for scholastic learning (Blair, 2002). Further, adequate emotion regulation supports scholastic learning when facing cognitively challenging material by promoting persistence and inhibiting anxiety, boredom, and frustration (Blair et al., 2015). Eisenberg, Sadovsky, and Spinrad (2005) claim that

children's emotion regulation might influence school achievement via children's social competence. Past studies with preschoolers showed that an effective emotion regulation is positively related to school achievement (e.g., Graziano, Reavis, Keane, & Calkins, 2007; Howse, Calkins, Anastopoulos, Keane, & Shelton, 2003). For instance, Gumora and Arsenio (2002) showed in a study with sixth to eighth graders that students' self-rated emotion regulation, which was measured as task orientation ability, was positively related to school achievement even after controlling for cognitive variables.

In the present dissertation, the focus is on strategies of emotion regulation for coping with negative emotions which may be relevant for children's school achievement. In their transactional model of stress and coping, Lazarus and Folkman (1984) differentiate between problem-oriented and emotion-oriented strategies. While problem-oriented strategies aim to change the cause of negative emotions actively, emotion-oriented strategies aim to regulate the experience of negative emotions (e.g., avoidance of the problem, relieving tension) (Lohaus, Eschenbeck, Kohlmann, & Klein-Heßling, 2006). Previous studies showed that problem-oriented strategies might be related positively to school achievement, while emotion-oriented strategies (e.g., avoidance) might be associated negatively with school achievement (e.g., Brdar, Rijavec, & Loncaric, 2006; Cohen, Ben-Zur, & Rosenfeld, 2008; Mantzicopoulos, 1990). Thus, problem-oriented strategies might be more adaptive than emotion-oriented strategies to regulate negative emotions in the school context. An example is that students who adopt problem-oriented strategies engage in the preparation and planning of their school work, whereas students who adopt emotion-oriented strategies do not actively cope with future school examinations (Zeidner, 1995). This dissertation takes into account problem- as well as emotion-oriented strategies. In regards to emotion-oriented strategies, Lohaus et al. (2006) distinguish between avoidant, palliative, and anger-oriented strategies. The present studies focused on avoidant and anger-oriented strategies because those are supposed to have a meaningful negative impact on school achievement. While avoidance strategies include behavioral and cognitive avoidance (Study 1; Lohaus et al., 2006; Skinner & Zimmer-Gembeck, 2007), anger-oriented strategies are instrumental to relieve the tension of anger (Study 2; Feldman, Dollberg, & Nadam, 2011).

Thus, both behavior and emotion regulation may be relevant for children's school achievement. However, past research related either behavior regulation or emotion regulation with children's school achievement. Research which assesses self-regulation as a broad construct with both aspects behavior and emotion regulation is scarce. One aim of the present research is to study relations between different aspects of self-regulation (i.e., behavior

regulation, emotion regulation) and school achievement. The following paragraph addresses the roles of behavior and emotion regulation for gender differences in school achievement.

1.2 Gender Differences in Self-Regulation and School Achievement

Past research pointed out that there might be gender differences in self-regulation (e.g., Silverman, 2003). According to parental investment theory, males and females differ in their self-regulation due to different evolutionary pressures (e.g., Bjorklund & Kipp, 1996). This theory states that there were greater selection pressures on prehistoric females to inhibit behavior than on males because females invest more in the creation and rearing of their offspring than males. Bjorklund and Kipp (1996) argue that women evolved higher self-regulation competences than men because of a greater necessity of women to control their behavior and emotions in social situations in the course of evolution. Further, socialization experiences might lead to gender differences in self-regulation. According to Davis (1995), girls are more strongly expected to act according to social rules than boys. Therefore, girls might have more practice in self-regulation and thus develop better abilities to regulate their behavior and emotions than boys. Meta-analytic studies confirmed the assumption of a female advantage in behavior regulation (Cross, Copping, & Campbell, 2011; Silverman, 2003; Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). Regarding emotion regulation strategies, there also have been reported gender differences. For instance, a study with German third to eighth graders showed that girls use problem-oriented strategies more often than boys, whereas boys apply emotion-oriented strategies more often than girls (Eschenbeck, Kohlmann, & Lohaus, 2007).

Regarding gender differences in school achievement, past research found girls to outperform boys (e.g., Cole, 1997; Duckworth & Seligman, 2006). The reason for these gender differences in school achievement is yet unclear. Recently, gender stereotypes according to which girls are perceived as academically superior (Hartley & Sutton, 2013) and girls' higher level of self-perceived abilities (Wach, Spengler, Gottschling, & Spinath, 2015) have been shown to contribute to gender differences in school achievement. Further, specific components of self-regulation (behavior regulation, self-regulated learning) have been found to partly explain gender differences in school achievement (Duckworth & Seligman, 2006; Kuhl & Hannover, 2012). Although several variables might be of relevance to explain girls' better school achievement, self-regulation might be of special importance as past research has shown that behavior regulation accounts for more variance in school achievement than

intelligence (Duckworth & Seligman, 2005; Suchodoletz et al., 2009). However, previous studies which studied the role of self-regulation for gender differences in school achievement, neglected to take into account behavior and emotion regulation as aspects of self-regulation. Moreover, previous research showed inconsistent findings regarding gender differences in different domains of school achievement (language and mathematics achievement). While past studies consistently revealed higher language achievement by girls in comparison to boys, mixed results concerning gender differences in mathematics achievement were found (e.g., Hannover & Kessels, 2011; Stanat & Kunter, 2003; Stanat, Pant, Böhme, & Richter, 2012). A reason for the better mathematics achievement of boys in some of the studies might be negative stereotypes which disrupt girls' mathematics performance (e.g. Keller & Dauenheimer, 2003). Thus, it is important to include different domains of school achievement (language and mathematics achievement) when studying gender differences in school achievement.

Past research showed gender differences in self-regulation (e.g., Duckworth & Seligman, 2006; Hosseini-Kamkar & Morton, 2014; Silverman, 2003) as well as gender differences in school achievement (e.g., Duckworth & Seligman, 2006; Hannover & Kessels, 2011). Hence, one may ask whether gender differences in school achievement can be explained by self-regulation. The present work studied whether self-regulation mediates effects of gender on school achievement by including different aspects of self-regulation (behavior and emotion regulation) as well as school achievement in different domains (language and mathematics achievement).

Research on relations between self-regulation and school achievement often neglected to consider the role of gender carefully. The present dissertation deals with gender differences in self-regulation and school achievement in detail (Study 1) and considers gender as a possible influencing factor (as a control variable) when investigating relations between self-regulation and school achievement (Study 2, Study 3). The next paragraph deals with the socialization of self-regulation as well as with relations between parenting, children's self-regulation, and school achievement.

1.3 Parenting, Self-Regulation, and School Achievement

According to Kopp's (1982) developmental perspective, self-regulation develops gradually from external to internal regulation. In the first months of life, children's behavior and emotions are regulated mostly by caretakers. In the course of development, with

increasing age, children acquire regulation strategies which allow them to regulate their emotions and behavior by themselves and adapted to specific situations. From the age of 36 months onwards, children are able to regulate their behavior and emotions in the absence of caregivers and adapted to specific situations (Kopp, 1982).

Parenting practices influence the development of children's self-regulation by affecting the shift from external to internal regulation (internalization). Hereby, parental control might be of central importance (Kopp, 1982). Parental positive control means to guide the child by communicating limits, instructions, and encouragements. This positive form of control is a supportive parenting practice, which allows for the experience of autonomy and therefore facilitates children's internalization of self-regulation (Karreman, van Tuijl, van Aken, Marcel, & Dekovic, 2006; Ryan & Deci, 2000). In contrast, parental "restrictive" control means strict, aggressive, and critical parenting behavior which includes anger and harshness (Karreman et al., 2006). Parental restrictive control, as a form of high external control with excessive external pressure, may undermine children's internalization of self-regulation (Deci & Ryan, 1985; Grolnick & Ryan, 1989; Karreman et al., 2006; Ryan & Deci, 2000). Thus, while parental positive control may support the development of children's self-regulation, parental restrictive control may rather hinder children's internalization of self-regulation (Grolnick & Ryan, 1989; Karreman et al., 2006). Past research showed that parental restrictive control is negatively associated with children's behavior regulation, but positively related to children's anger-oriented emotion regulation (Karreman et al., 2006; Feldman et al., 2011). In addition, parental warmth, responsiveness, and autonomy support may promote the internalization process of children's self-regulation (Davidov & Grusec, 2006; Deci & Ryan, 1985; Röder & Rösler et al., 2014; Suchodoletz, Trommsdorff, & Heikamp, 2011; Weis, Trommsdorff, Heikamp, & Muñoz, 2014).[2] For instance, parental warmth creates contexts of mutual reciprocity which motivate children to regulate themselves to meet parental standards (MacDonald, 1992). Further, warm parents praise and scaffold children's efforts of regulating themselves (Jennings et al., 2008; Karreman et al., 2006).

Moreover, past research suggests that parenting practices affect children's school achievement. While positive parental control has been shown to be positively associated with children's school achievement, parental restrictive control has been shown to be associated negatively with school achievement (e.g., Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987; Grolnick & Ryan, 1989). To sum up, on the one hand relations between self-regulation

[2] Due to space limitations, the present dissertation focused on the parenting practice maternal restrictive control. However, work conducted within this dissertation project also investigated relations between maternal warmth and self-regulation (e.g., Weis et al., 2014).

(behavior and emotion regulation) and school achievement are expected. On the other hand it is proposed that parenting practices influence both children's self-regulation (behavior and emotion regulation) and school achievement. Therefore, the present research examines whether relations between parenting practices and school achievement are mediated by self-regulation. A study with US-American adolescents showed that behavior regulation partly explains the relation between parenting practices and school achievement (Wong, 2008). However, relations between parenting practices, self-regulation, and school achievement mostly have been studied in Northern American or European contexts. The role of cultural contexts has been mostly neglected in previous studies. It is of central importance to study the role of culture on these relations because self-regulation develops in culturally influenced socialization conditions and according to cultural values (Trommsdorff, 2009, 2012, in press). The present research aims to investigate relations between parenting practices, self-regulation (behavior and emotion regulation), and school achievement in diverse cultural and intra-cultural contexts to gain insights about the conditions and outcomes of self-regulation in contexts (Study 2, Study 3). The roles of culture and parenting in cultural contexts for the development of self-regulation are described in the following section.

1.4 Self-Regulation in Cultural Contexts

The development of self-regulation is embedded in cultural contexts (Trommsdorff, 2012). In general, the child develops within several proximal and distal contexts (micro-, meso-, exo-, macro-, and chronosystem) which interact with each other and with the developing individual (Bronfenbrenner, 1979). While the macrosystem represents the cultural context and its' values, the microsystem refers to interactions and activities in the child's immediate surroundings. Parents and their parenting practices are a central part of the microsystem. Considering Bronfenbrenners' (1979) ecological systems theory, it is essential to take into account several contexts when investigating the developmental outcomes of a child. In the present dissertation, aspects of the macrosystem (diverse cultural contexts, mothers' level of education) as well as aspects of the microsystem (parenting) were included.

Super and Harkness' (1997) describe in their theoretical framework of *the developmental niche* three subsystems which influence the development of the individual: physical and social settings, cultural customs of parenting practices, and psychological characteristics of caretakers. These subsystems mediate the relations between the cultural environment and the individual development of the child (Super & Harkness, 1997). Hence,

socio-demographic aspects, parental values as well as parenting practices mediate the influence of culture on children's development. Parenting practices which are part of the microsystem and represent an important direct influence on the developing child are essential when investigating the development of self-regulation in cultural contexts.

According to Trommsdorff (2009), the development of self-regulation is based on culture-specific models of agency. Hence, self-regulation develops successfully when conforming to dominant cultural values. Markus and Kitayama (1991) proposed a useful model which specifies the influence of cultural values (in terms of construals of the self, others, and the interdependence of the two) on psychological processes. According to this theoretical model, the independent construal which is characterized by the conception of the self as autonomous and independent from others is prevalent in Northern American and Western European cultures. The interdependent construal which emphasizes the connectedness and relatedness to others is prevalent in Asian, African, Latin-American, and Southern European cultures. However, independent and interdependent construals should not be seen as dichotomous dimensions, but as general tendencies of cultures regarded as a whole. In every culture, individuals vary in their construal of the self (Markus & Kitayama, 1991). Cultures should not be seen as homogenous or static, but as complex, dynamic, and changing (Matsumoto, 2000; Trommsdorff & Mayer, 2012). Trommsdorff's (2009) *cultural model of agency and self-regulation* differentiates between independent and interdependent models of agency. In the independent model of agency, the motivation for individual autonomy (e.g., achieve own goals) induces self-regulation. In the interdependent model of agency, relatedness (e.g., maintain interpersonal harmony by adjusting goals to expectations of others) motivates self-regulation. Cultural values do not influence the development of self-regulation directly, but through other variables as for example parenting practices (Trommsdorff, 2009). Thus, the development of self-regulation is embedded in culturally influenced socialization conditions such as parental values and parenting practices (Trommsdorff, 2012; in press).

In a longitudinal study with Cameroonian, Greek, and Costa Rican mothers and infants, Keller et al. (2004) found cultural differences in parenting practices which were related to cultural differences in infants' development of self-regulation. Infants of Cameroonian farmers who experience proximal parenting practices developed self-regulation earlier than infants of Greek urban middle-class families who experience distal parenting practices. Infants of Costa Rican middle-class families who experience a combination of distal and proximal parenting practices, lay between the other two groups. The authors associate proximal parenting practices with interdependent values and distal parenting practices with

independent values. Thus, the study of Keller et al. (2004) indicates that cultural values are related to parenting practices which in turn influence the development of children's self-regulation.

However, studies investigating developmental conditions and outcomes of self-regulation in cultural contexts are still scarce (Trommsdorff, 2012; Trommsdorff & Cole, 2011). Specifically, relations between parenting, self-regulation, and school achievement have rarely been studied in Latin American contexts. The present dissertation extends previous research by investigating relations between parenting, self-regulation, and school achievement in Germany (a European context) and in Chile (a Latin American context) (Study 2). Moreover, as not only cultural differences, but also intra-cultural differences may affect developmental conditions and outcomes of self-regulation, the present research investigated the role of differences in mothers' level of education and values for children's self-regulation and school achievement in Chile (Study 3). The next two paragraphs describe the German and the Chilean cultural contexts.

Germany as cultural context

Germany is a European context and belongs to the most industrialized and economically successful countries of the world (Keller, 2006). The Prussian state as well as Protestantism influenced norms and values in Germany. The values individual responsibility, freedom, and inwardness developed from Protestantism and laid ground for individualism as a major cultural value (Keller, 2006). Germany is typically described as an independent sociocultural context, characterized by high independence and low interdependence values (e.g., Hofstede, 2001). Hence, motivation for individual autonomy and individualist values are typical in Germany (Trommsdorff, 2009). In independent contexts, parents aim to support the development of children's personal autonomy. Thus, parents aim to promote autonomous self-regulation of their children with their parenting practices (e.g., Keller, Borke, Lamm, Lohaus, & Yovsi, 2011).

Chile as cultural context

Chile is a Latin American context with the history of Spanish colonization, the recovery of a military regime, and an extraordinary economic growth since the early 1990s (Donoso-Maluf, 2006). Formerly, Chile was described as a typical interdependent cultural context (e.g., Hofstede, 1980) with a strong emphasis on the extended family (Donoso-Maluf, 2006). Interdependent cultural contexts are characterized by a focus on maintaining

interpersonal harmony, a motivation for relatedness, and social orientations (e.g., Trommsdorff, 2009). However, recent studies showed high independence and high interdependence values in Chile (Kolstad & Horpestad, 2009; Schwinn, 2011). Hence, independent and interdependent values may exist simultaneously in this country of cultural change. The combination of independent and interdependent values is typical in rapidly and extensively changing countries (e.g., Trommsdorff & Kornadt, 2003). Chile has been undergoing major political (the fall of the dictatorship and the re-democratization in 1990) and economic changes (the fast economic growth) in the last two decades (Martínez, Cumsille, & Thibaut, 2006). Martínez et al. (2006) claim that the political and economic changes have led to a rejection of authoritarian values in Chile. Further, they assume that these changes in parental values led to changes in parenting practices (i.e., a decline in authoritarian and power-assertive parenting practices). Although there was a structural transition from extended to nuclear families, extended traditional families and relatedness between family members still are of major importance in Chile (Donoso-Maluf, 2006).

The present dissertation aims to gain new insights on developmental conditions and outcomes of self-regulation in contexts by investigating parenting, self-regulation, and school achievement in this context of cultural change (Chile) as well as in a typical independent context (Germany) (Study 2). Moreover, in spite of the strong economic growth, there is a high socio-economic segregation in Chile's educational system (Bellei, 2013; Donoso-Maluf, 2006). Hence, it is of importance to investigate intra-cultural differences in Chile. Therefore, the present dissertation studies the effects of parents' level of education, parent's values, and parenting practices on children's self-regulation and school achievement in Chile (Study 3). The next paragraph addresses the influence of parents' level of education on children's school achievement via parent's values, parenting practices, and children's self-regulation.

1.5 Mothers' Level of Education, Values, Parenting, Children's Self-Regulation and School Achievement

Considering the theoretical framework of *the developmental niche* from Super and Harkness (1997), socio-demographic aspects, parental values, and parenting practices might be subsystems which mediate the relation between the cultural environment and the individual development of the child. Cultural values influence the development of self-regulation indirectly via parenting practices (Trommsdorff, 2009). Hence, intra-cultural differences in self-regulation might be transmitted via parental values and parenting practices, too. Mothers'

level of education and mothers' values may represent important intra-cultural differences affecting children's self-regulation and school achievement.

Numerous studies across countries showed that mothers' level of education predicts children's school achievement (Magnuson, 2007). However, the underlying processes which explain the relation between mothers' level of education and children's school achievement have not yet been clarified. Davis-Kean (2005) showed in a sample of US-American primary school children and their parents that parenting practices mediate the relation between mothers' level of education and children's school achievement. Further, Darling and Steinbergs' (1993) model assumes that parental values influence children's developmental outcomes through parenting practices. Hence, the present dissertation investigates whether mothers' values and parenting practices function as mediators between mothers' level of education and children's outcomes. Specifically, this dissertation focused on self-transcendence values and the parenting practice maternal restrictive control. According to Schwartz (1992), values can be defined as desirable goals which serve as guiding principles in life. Schwartz' (1992) theory of basic human values comprises ten basic values which imply motivational goals: Power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, and security. The higher order value self-transcendence includes universalism and benevolence values (Schwartz, 1992). While universalism values are defined as understanding, appreciating, and protecting the welfare of other people and nature, benevolence values mean to care for ingroup members by being helpful, forgiving, and responsible. Universalism and benevolence values can be aggregated into self-transcendence values which include the concern for the welfare of others, altruism, tolerance, and the transcendence of selfish interests (Schwartz, 1992). A cross-cultural large-scale study found that people who attend university have higher universalism values (Schwartz, 2007). University education might imply higher self-transcendence values because of a broadening of horizon. Thus, self-transcendence values and level of education might be positively related. Further, a study with university students showed that self-transcendence values and autocratic behavior are negatively related (Schwartz et al., 2001). As autocratic behavior, which is described as manipulative, controlling, and aggressive behavior (Schwartz et al., 2001), might be comparable to maternal restrictive control, mothers' self-transcendence values and maternal restrictive control might be negatively related. As noted above, the parental practice maternal restrictive control as a form of external control may hinder the development of children's self-regulation (e.g., Grolnick & Ryan, 1989; Karreman et al., 2006).

Moreover, children's self-regulation might play an important role in explaining relations between mothers' level of education and children's school achievement. As noted above, behavior regulation, as specific aspect of self-regulation, has been shown to be essential for children's school achievement, even beyond the influence of intelligence (e.g., Blair et al., 2015; McClelland et al., 2007; Suchodoletz et al., 2009). Further, positive relations between mothers' level of education and children's behavior regulation have been shown (e.g., Sektnan, McClelland, Acock, & Morrison, 2010; Wanless et al., 2011). Therefore, behavior regulation might partly explain the relation between mothers' education and children's school achievement. Recent research showed that children's behavior regulation may mediate the relation between mothers' education and children's school achievement (Sektnan et al., 2010; Størksen, Ellingsen, Wanless, & McClelland, 2014). However, these recent studies neglected to study the influence of mothers' values and parenting practices. This dissertation aims to fill this gap by adopting a socialization perspective, investigating the roles of mothers' values (self-transcendence values), parenting practices (maternal restrictive control), and children's behavior regulation for the relation between mothers' education and children's school achievement (Study 3).

1.6 Overview of the Three Studies

The central aim of this dissertation is to study developmental conditions and outcomes of self-regulation in diverse contexts. In three studies (Studies 1, 2, and 3), the present dissertation investigates relations between self-regulation and school achievement, taking into account the aspects of gender, parenting, and culture. While the first study focuses on gender differences in self-regulation and school achievement in a German sample, the second study broadens the perspective by including parenting practices and cultural contexts (Germany and Chile) when investigating self-regulation and school achievement. Finally, the third study focuses on intra-cultural differences in Chile by studying the roles of mothers' values, parenting practices, and children's behavior regulation for the relation between mothers' level of education and children's school achievement. Thus, this dissertation considers the roles of relevant aspects of socialization for the development of self-regulation and school achievement in Germany and Chile. In sum, the dissertation aims to improve the understanding of the roles of gender, parenting, and culture for the development of children's self-regulation and school achievement. The following three sections (1.6.1 – 1.6.3) give an overview of the three studies. Subsequently, the three complete studies are presented (2 – 4).

1.6.1 Gender, Self-Regulation, and School Achievement (Study 1)

The first study deals with gender differences in self-regulation and school achievement in a German sample of fifth graders. As outlined above, girls seem to outperform boys in school achievement (e.g., Cole, 1997; Duckworth & Seligman, 2006). Further, there was shown a female advantage in self-regulation (e.g., Hosseini-Kamkar & Morton, 2014; Silverman, 2003). Previous research found a higher behavior regulation in girls than in boys (Cross et al., 2011; Silverman, 2003; Else-Quest et al., 2006) as well as a more frequent use of problem-oriented strategies and a less frequent use of emotion-oriented strategies in girls than in boys (Eschenbeck et al., 2007). Moreover, self-regulation is supposed to play a crucial role for children's school achievement (e.g., Blair et al., 2015; McClelland & Cameron, 2011; Suchodoletz et al., 2009). Thereby, both aspects of self-regulation, behavior and emotion regulation are expected to be of central relevance for children's school achievement (Blair, 2002; Calkins, 2007; McClelland et al., 2007). Behavior regulation enables children to inhibit impulsive responses and to organize complex information in the school context (Blair et al., 2015). Past studies have shown the function of behavior regulation for school achievement above and beyond the influence of intelligence (Duckworth & Seligman, 2005; Suchodoletz et al., 2009). Further, previous research found positive relations between problem-oriented strategies and school achievement as well as negative relations between emotion-oriented strategies and school achievement (e.g., Brdar et al., 2006; Mantzicopoulos, 1990).

Recently, behavior regulation and self-regulated learning, as components of self-regulation, have been shown to account for gender differences in school achievement (Duckworth & Seligman, 2006; Kuhl & Hannover, 2012). The present study adopts a wider conceptualization of self-regulation by including behavior and emotion regulation as aspects of self-regulation. In sum, the first study of this dissertation investigates whether gender differences in school achievement can be explained by gender differences in self-regulation. Thereby, the study includes different aspects of self-regulation (behavior and emotion regulation) as well as school achievement in different domains (language and mathematics achievement). However, this study did not take into account the influence of socialization conditions in different contexts (as parenting and culture) on the development of self-regulation and school achievement. As a continuation and extension of the first study, the subsequent study (Study 2) includes parenting and culture when investigating relations between self-regulation and school achievement.

1.6.2 Parenting, Children's Self-Regulation, and School Achievement in Cultural Contexts (Study 2)

The second study of the present dissertation broadens the perspective of examining relations between self-regulation and school achievement by including the aspects parenting and culture. As outlined above, research on socialization conditions for children's self-regulation and school competences by taking into account diverse cultural contexts is still lacking. The second study aims to contribute to fill this gap by examining relations between children's self-regulation and school achievement in two cultural contexts (Germany, Chile). Moreover, this study considers the role of parenting practices which may mediate the influence of culture on children's developmental outcomes (self-regulation and school achievement) (Super & Harkness, 1997; Trommsdorff, 2009). Specifically, the study focuses on the parenting aspect maternal restrictive control because this specific parenting practice might have a crucial negative impact on children's development of self-regulation (Barber, 1996; Karreman et al., 2006; Kopp, 1982). As noted above, maternal restrictive control may hinder the internalization process of children's self-regulation (Grolnick & Ryan, 1989; Karreman et al., 2006; Ryan & Deci, 2000). Further, this second study includes emotion and behavior regulation as components of self-regulation adopting the wider conceptualization of self-regulation. Hereby, negative relations between maternal restrictive control and children's behavior regulation as well as positive relations between maternal restrictive control and children's anger-oriented emotion regulation are expected (Karreman et al., 2006; Feldman et al., 2011).

To sum up, the second study examines relations between maternal restrictive control, children's self-regulation and school achievement in a German and in a Chilean sample. However, the question arises why some mothers use more restrictive control than other mothers. This question leads to the third study which investigates mothers' level of education and mothers' values as possible predictors for maternal restrictive control. Moreover, studying cultural differences in parenting, self-regulation, and school achievement in Study 2, leads to the question of intra-cultural differences. Specifically, regarding the Chilean context with its' high socio-economic segregation in the educational system, gives rise to the question how mothers' level of education is related to children's self-regulation and school achievement.

1.6.3 Mothers' Level of Education, Children's Behavior Regulation, and School Achievement (Study 3)

The third study addresses the second study's research question on relations between maternal restrictive control, children's self-regulation and school achievement, but extends it by including mothers' level of education and mothers' values. Mothers' level of education as well as mothers' values might be related to maternal restrictive control, children's self-regulation, and school achievement. As noted above, the predictive effect of mothers' level of education on children's school achievement has been well documented (Magnuson, 2007), but the underlying processes are still unclear. There is some evidence that children's behavior regulation might explain the relation between mothers' level of education and children's school achievement (Sektnan et al., 2010; Størksen et al., 2014). Further, parenting practices may mediate the effect of mothers' level of education on children's school achievement (e.g., Davis-Kean, 2005). Moreover, mothers' values may affect children's self-regulation and school achievement indirectly via parenting practices (Darling & Steinberg, 1993). This third study puts all these pieces together by investigating the roles of mothers' values, parenting practices, and children's behavior regulation for the relation between mothers' education and children's school achievement. First, the study examines whether children's behavior regulation mediates the relation between mothers' level of education and children's school achievement. Second, this study investigates whether the effect of mother's level of education on children's behavior regulation is mediated by mothers' values and parenting practices. Specifically, mother's self-transcendence values and maternal restrictive control were regarded. As described above, self-transcendence values might be related positively to a higher level of education and negatively to maternal restrictive control. Maternal restrictive control, in turn, might impair the development of children's self-regulation. Last but not least, the study examines whether mother's level of education impacts children's school achievement through mothers' values, parenting behavior, and children's behavior regulation.

In sum, the third study takes a closer look on intra-cultural differences in Chile by investigating the relation between mothers' level of education and children's school achievement. This study seeks to understand if this relation can be explained by socialization aspects (mothers' values, maternal restrictive control) as well as by children's behavior regulation. It is of special relevance to examine the underlying processes of the relation between mothers' level of education and children's school achievement in Chile, because of the high socio-economic segregation in Chile's educational system.

2 Gender Differences in School Achievement: The Role of Self-Regulation[3] (Study 1)

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Abstract

This study examined whether different aspects of self-regulation (i.e., emotion and behavior regulation) account for gender differences in German and mathematics achievement. Specifically, we investigated whether higher school achievement by girls in comparison to boys can be explained by self-regulation. German and mathematics achievement were assessed in a sample of 53 German fifth graders (19 boys, 34 girls) using formal academic performance tests (i.e., reading, writing, mathematics) and teachers' ratings (i.e., grades in German and mathematics). Moreover, teachers rated children's behavior regulation using the Self-Control Scale (SCS-K-D). Children's self-reported strategies of emotion regulation were assessed with the Questionnaire for the Measurement of Stress and Coping in Children and Adolescents (SSKJ 3-8). Age and intelligence (CFT 20-R) were included as control variables. Analyses of mean differences showed that girls outperformed boys in German achievement and behavior regulation. Regression analyses, using a bootstrapping method, revealed that relations between gender and German achievement were mediated by behavior regulation. Furthermore, we found a suppression effect of behavior regulation on the relation between gender and mathematics achievement: boys' mathematics achievement was underestimated when the analyses did not control for behavior regulation. We discuss these results from a developmental perspective and within the theoretical framework of self-regulation and achievement.

2.1 Introduction

Currently, both scientific literature and German mass media are discussing the discrepancy in school achievement between boys and girls, going so far as to call boys the new losers of the educational system (Spiewak, 2010, August 5). Several studies have found significant gender differences in school achievement favoring girls over boys (Cole, 1997; Duckworth & Seligman, 2006). According to the German census, there are more girls than boys in higher secondary schools, whereas more boys than girls attend lower secondary schools. As a consequence, more girls achieve the general qualification for university entrance, whereas more boys complete the certificate of lower secondary school (Statistisches Bundesamt, 2011).

The reasons for these gender differences in school achievement have not been clarified yet. Past research has shown that besides cognitive abilities (e.g., intelligence; Deary, Strand, Smith, & Fernandes, 2007; Spinath, Freudenthaler, & Neubauer, 2010) the motivation and ability to self-regulate is positively associated with school achievement (Duckworth & Seligman, 2005; Suchodoletz et al., 2009). In line with these findings, previous studies have indicated that specific components of self-regulation—behavioral regulation or self-regulated learning—could contribute to gender differences in school achievement (Duckworth & Seligman, 2006; Kuhl & Hannover, 2012). However, by only investigating behavior regulation, these previous studies neglected the wider conceptualization of self-regulation. The concept of self-regulation includes both behavior regulation and emotion regulation, and both aspects of self-regulation may be related to children's school achievement (Blair, 2002; Calkins, 2007; McClelland et al., 2007). Therefore, it is important to understand the contribution of behavior and emotion regulation to gender differences in school achievement.

In the present study, we investigated in a sample of German fifth graders who had just transitioned from primary school to secondary school whether self-regulation mediates effects of gender on school achievement. In particular, we studied the relations between different aspects of self-regulation (i.e., behavior regulation, emotion regulation) and school achievement in different domains (i.e., German and mathematics achievement).

2.1.1 Gender Differences in School Achievement

Past research suggested that girls are in general more successful in school than boys. Hartley and Sutton (2013) have recently reported that especially boys develop gender stereotypes according to which girls are perceived as academically superior with regard to motivation, ability, performance, and self-regulation. However, previous studies revealed rather inconsistent results concerning gender differences in different domains of school achievement. In the present study, we focused on achievement in German and mathematics because performance in these subjects is seen as an important aspect of school achievement (Schrader & Helmke, 2008). Previous large-scale studies revealed higher German achievement by girls in comparison to boys (Stanat & Kunter, 2003; Stanat et al., 2012). However, the picture of gender differences in mathematics achievement is less clear (Hannover & Kessels, 2011; Stanat et al., 2012). While in some studies boys exceeded girls in mathematics achievement, in other studies no gender differences in mathematics achievement were found (Hannover & Kessels, 2011). For instance, Machin and Pekkarinen (2008) argued

that mixed evidence for gender differences in school achievement could be explained in part by a higher variance of boys' in comparison to girls' school achievement.

As Hyde (1990) pointed out, meta-analyses have consistently shown that there are no significant gender differences in general cognitive abilities. Thus, although cognitive abilities are significantly and positively related to school achievement, they cannot explain gender differences in school achievement (Spinath et al., 2010). Therefore, further "non-cognitive" variables have been examined in an attempt to explain gender differences in school achievement. For instance, Spinath et al. (2010) highlighted the importance of personality and motivation for gender differences in school achievement. They found that a higher level of extraversion was associated with higher grades for girls but lower grades for boys. Pomerantz, Altermatt, and Saxon (2002) noted that girls want to please adults to a higher degree than do boys, which leads to girls' higher school grades. Furthermore, stereotypes are an important influence on school achievement in that negative stereotypes disrupt girls' mathematics performance (e.g. Keller & Dauenheimer, 2003). However, a rarely considered explanation for gender differences in school achievement from a developmental point of view is *self-regulation* (Duckworth & Seligman, 2006).

2.1.2 Self-Regulation and School Achievement

Various terms and definitions have been used to conceptualize self-regulation and its components (McClelland, Ponitz, Messersmith, & Tominey, 2010). Here, self-regulation is understood as the motivation and ability to maintain goal-directed actions over time and across several situational contexts in order to achieve desired goals (Karoly, 1993). Although relatively stable differences exist between individuals with regard to the motivation and ability to self-regulate (Raffaelli, Crockett, and Shen, 2005), there is situation specific variance in self-regulation within individuals depending on domain-specific temptation (Tsukayama, Duckworth, & Kim, 2012). Self-regulation is conceived as a broad construct which includes the more specific components behavior regulation and emotion regulation. Behavior regulation includes the motivation and ability to pay attention, to follow rules, to resist temptation, and to inhibit inappropriate actions (e.g., Heikamp, Trommsdorff, & Fäsche, 2013; McClelland et al., 2007). In contrast, emotion regulation is a process that serves to initiate, to inhibit, to maintain, or to modulate the experiences of emotions in order to achieve social adaptation or individual goals (Eisenberg & Spinrad, 2004). In the present study, we focused on strategies of emotion regulation that aim to change the experience of negative

emotions (Cole, Martin, & Dennis, 2004). According to the transactional model of stress and coping, problem-oriented and emotion-oriented strategies can be distinguished (Lazarus & Folkman, 1984). Problem-oriented strategies are directed to the context and aim to change a situation that elicited negative emotions. In contrast, emotion-oriented strategies aim to regulate emotional experiences by changing the appraisal of a situation. Whereas problem-oriented strategies include instrumental actions that aim to change the cause of the negative emotional experience, emotion-oriented strategies involve the behavioral and cognitive avoidance of the problem (Lohaus et al., 2006; Skinner & Zimmer-Gembeck, 2007). Behavior regulation and emotion regulation can be seen as two distinct components of self-regulation. Even though behavior and emotion regulation are distinguishable concepts, they are interrelated during the course of development (Raffaelli et al., 2005). Considering the broad conceptualization of self-regulation and taking into account that self-regulation is a multidimensional construct (e.g., Duckworth & Kern, 2011), it is important to take a more nuanced perspective on self-regulation by viewing behavior regulation and emotion regulation as interrelated but separate aspects of self-regulation.

The transition from elementary to secondary school is associated with increasing demands such as self-organization, homework, and exam preparation in various subjects. Hence, children need to adopt self-regulated learning strategies (through goal-setting, strategy use, and self-monitoring) to be successful in school (Blair, 2002). Students have to develop self-regulation strategies, which include goal oriented processes that aim to regulate emotions and behavior in order to adapt successfully to school (Schunk & Zimmerman, 1997; Suchodoletz et al., 2009; Zimmerman, 1990). Self-regulation, with its components behavior regulation and emotion regulation, is positively associated with school achievement (Calkins, 2007; McClelland et al., 2007). According to Zimmerman and Schunk (2011) self-regulated students are effective in school because they set learning goals, apply effective learning strategies, monitor their own goal progress, establish a productive learning environment, and develop self-efficacy beliefs for learning.

Behavior regulation enables one to remember and follow instructions and to concentrate on tasks without getting distracted. Therefore, behavior regulation is positively related to the development of positive classroom behavior and academic achievement (McClelland et al., 2007). Most notably, behavior regulation accounts for additional variance in school achievement above and beyond the variance that is explained by intelligence (e.g., Duckworth & Seligman, 2005; Suchodoletz et al., 2009).

Blair (2002) argued that adequate emotion regulation in the classroom facilitates cognitive processes (e.g., memory, attention, planning, problem solving), which are necessary for scholastic learning. In the school context, emotions have to be regulated to allow for the child's appropriate achievement behavior (Trommsdorff, in press). In general, both problem-oriented and emotion-oriented strategies can be adaptive strategies to regulate emotions. It depends on the situation which strategy brings higher benefits (Lohaus et al., 2006). Adaptive emotion regulation means to adopt strategies flexible depending on the situation (Lohaus et al., 2006; Skinner & Zimmer-Gembeck, 2007). Regarding strategies which are used to regulate negative emotions in the school context, studies have shown that problem-oriented strategies have positive effects whereas emotion-oriented strategies (e.g., avoidance, distraction) have negative effects on school achievement (e.g., Brdar et al., 2006; Cohen et al., 2008). This effect can be seen in individual differences in preparing for examinations and in different relations with achievement in the school context. For instance, students who are more likely to use problem-oriented strategies prepare for examinations and plan their work, whereas students who use emotion-oriented strategies do not actively cope with the future examination and thus do not take enough time to study (Zeidner, 1995). Whereas problem-oriented strategies might be more effective for school achievement, emotion-oriented strategies might be adaptive in order to regulate emotions in the short term (e.g., to feel good) but may have negative consequences regarding school achievement in the long run.

2.1.3 Gender, Self-Regulation, and School Achievement

Bjorklund and Kipp (1996) argue that a greater evolutionary necessity of women to control their emotional and behavioral reactions in social situations has led to women's higher self-regulation abilities. Davis (1995) suggested that girls are more expected than boys to act according to social rules, which induces girls having more practice and therefore a better ability to regulate their behaviors and emotions. In line with this view, meta-analytic studies have shown that girls have a higher motivation and ability to engage in behavior regulation than boys (e.g., Cross et al., 2011; Else-Quest et al., 2006; Silverman, 2003). Gender differences have also been reported with regard to the habitual use of emotion regulation strategies. For instance, girls tend to use strategies that aim to solve a problem in order to feel better (i.e., problem-oriented strategies) more often than do boys. In contrast, boys tend to emotionally disengage from stressful situations (i.e., emotion-oriented strategies) more often than do girls (Eschenbeck et al., 2007).

Because (a) there is evidence for greater school achievement and self-regulation by girls and (b) self-regulation is positively related to school achievement, one may ask whether self-regulation accounts for gender differences in school achievement. In a sample of US-American eighth graders, Duckworth and Seligman (2006) found that girls' higher school achievement can be explained in part by behavior regulation. Kuhl and Hannover (2012) showed that in a sample of German fourth graders, teachers' ratings of children's self-regulated learning could partly explain gender differences in school achievement. Here, we examined both behavior regulation and emotion regulation as aspects of self-regulation. We investigated whether the relation between gender and school achievement (German and mathematics) is mediated by self-regulation (behavior regulation and emotion regulation). Further, we extended the mediation models by controlling for age and intelligence.

2.1.4 Study Aims

The present research aimed to test if gender differences in school achievement can be explained by gender differences in self-regulation. Therefore, two mediation models were tested to investigate whether behavior regulation and emotion regulation mediate the association between gender and school achievement in German and mathematics. In line with previous findings (e.g., Cole, 1997; Duckworth & Seligman, 2006), we hypothesized that girls have greater school achievement than do boys. Building on past research on gender-differences in behavior regulation (e.g., Cross et al., 2011; Else-Quest et al., 2006; Silverman, 2003), we expected that girls show a higher motivation and ability for behavior regulation than boys. Regarding gender differences in emotion regulation, we hypothesized that girls show problem-oriented strategies more often than boys, whereas boys show emotion-oriented strategies more often than girls (Eschenbeck et al., 2007). In order to extend the scope of previous studies, we examined whether different aspects of self-regulation (i.e., emotion and behavior regulation) account for gender differences in school achievement. Based on past findings, we expected that the relations between gender and school achievement are mediated by behavior regulation (Duckworth & Seligman, 2006; Kuhl & Hannover, 2012). In extension of past research, we investigated whether there is an indirect effect of gender on school achievement mediated by children's use of emotion regulation strategies (i.e., problem-oriented strategies, emotion-oriented strategies).

2.2 Material and Methods

2.2.1 Participants

Fifty-seven children participated in the study in summer 2010. The children attended 22 different fifth grade classes in seven different schools in a town in Southern Germany. The class teachers of the 22 fifth grade classes were asked to complete questionnaires about those children of their class who took part in the study. Number of students for whom each class teacher provided reports of grades and behavior regulation ranged from 1 to 5. Four children were excluded from data analysis because of incomplete data sets. Hence, the sample consisted of 53 fifth graders (34 girls) and their class teachers. Children's mean age was 11.23 years (*SD* = .54). Twenty-two (100%) class teachers (16 female, 6 male) completed questionnaires about the school achievement (i.e., grades) and behavior regulation of those students who attended their class. Thirty-nine (74%) mothers completed questionnaires on their highest school graduation. Of the mothers, 2 (4%) had a lower secondary school certificate (= 1), 11 (21%) had a middle secondary school certificate (= 2), 3 (6%) had a qualification for university of applied sciences (= 3) and 23 (43%) had a general qualification for university entrance (= 4). Thus, mother's mean level of education was 3.21 (*SD* = 1.03). Parents of child participants provided written informed consent prior to participation. Children who participated received a 15 € gift card, teachers received a 2.50 € gift card for every child they evaluated (15 € maximum), and mothers who answered the questionnaire received a 7 € gift card.

2.2.2 Procedure

In summer of 2010, fifth graders participated at two group-sessions (up to 10 children) in rooms of the university. Each session lasted about 2 h and consisted of two parts (computer lab and seminar room) separated by a 10 min break. Questionnaires and standardized tests were administered in group sessions, limited to 10 children per session. The first session included the nonverbal intelligence test, the mathematics achievement test, and questionnaires. In the second session, reading and writing skills and further questionnaires were administered because the present study was part of a larger project on the relations between self-regulation and school achievement. Teachers and mothers answered paper-and-pencil questionnaires at home.

2.2.3 Materials

Assessment of school achievement

In order to measure school achievement, grades as well as standardized reading, writing, and mathematics tests were assessed. German and mathematics grades were assessed by teachers' reports. Grades were based on children's classroom work and grades of class examinations in the first half of fifth grade (i.e., fifth grade midterm report). School grades were recoded in a way such that a higher score indicated higher school achievement (i.e., 1 = not sufficient/fail to 6 = very good). According to the German curriculum, German grades reflect, besides reading and writing skills, language proficiency (e.g., understanding the meaning of texts and reflection of language use) as well as communication and speech competencies (e.g., presentation of texts, written and oral expression; e.g., Ministerium für Kultus, Jugend und Sport Baden-Württemberg, 2004). Basic reading skills were assessed by measuring reading speed using the *Salzburger Reading-Screening for 5th to 8th graders* (Auer, Gruber, Mayringer, & Wimmer, 2008). Writing skills were measured with the *Hamburger Writing Test* (May, 2007), which consists of a text with mistakes to be corrected. This test assesses the number of corrected words and punctuation marks and provides an individual profile of orthography strategies. The mathematics subtests *numerical comprehension*, *calculation*, and *quantities* from the *Hamburger school achievement test for 4th and 5th graders* (Mietzel & Willenberg, 2000) was used in order to assess children's mathematics performance. To avoid influences of confounding variables (e.g., stereotype threat) reading, writing, and mathematics tests were conducted in a standardized manner, following the instructions of the manuals. As aggregated measures combining grades and standardized school achievement tests are more valid measures than separate measures (e.g., teachers' perceptions of children's characteristics can be related with school grades; Mullola et al., 2010), correlations were computed to test whether grades and test scores are significantly related. Pearson correlations showed significantly positive correlations of German grades to reading skills ($r = .33$, $p < .05$) and to writing skills ($r = .37$, $p < .01$) and between test performance in mathematics and mathematics grades ($r = .48$, $p < .01$). Test scores and school grades were standardized by computing z-scores and mean scores were computed for German and mathematics achievement. Accordingly, reading and writing skills and German grades were averaged into a German achievement score. Mathematics test performance and mathematics grades were averaged into a mathematics achievement score.

Assessment of self-regulation

In order to assess individual differences in behavior regulation, the German version of the widely used, reliable and valid *Self-Control Scale* (Tangney et al., 2004) from Bertrams and Dickhäuser (2009) was administered. Class teachers answered the 13 items on a 5-point scale (1 = *not at all* to 5 = *very much*), e.g., "The child has a hard time breaking bad habits.". Reliability analysis revealed a Cronbach's α of .94 in the present study.

Strategies of emotion regulation (i.e., problem- and emotion-oriented strategies) were measured using the *Questionnaire for the Measurement of Stress and Coping in Children and Adolescents* (SSKJ 3-8) (Lohaus et al., 2006). In this questionnaire, children are asked to think of a situation in which they have problems doing their homework. Children answered the items on a 5-point rating scale (from 1 = *never* to 5 = *always*) by indicating how often they use problem-oriented strategies (6 items; e.g., "I try to think of different ways to solve it.") and emotion-oriented strategies (6 items, e.g., "I tell myself it doesn't matter.") to cope with their emotions. Reliability analyses revealed a Cronbach's α of .80 for problem-oriented strategies and a Cronbach's α of .75 for emotion-oriented strategies.

Assessment of intelligence

In order to assess nonverbal intelligence, the short version of the *CFT 20-R* (Weiß, 2006) was administered. Sum scores were transformed into age-standardized IQ scores.

2.2.4 Data Analysis

Pearson correlations were computed to investigate associations of intelligence, age, and mother's level of education with self-regulation (i.e., behavior regulation, emotion regulation) and school achievement (i.e., German and mathematics achievement). Multivariate analyses of covariance (MANCOVAs) were computed in order to test gender differences in school achievement (i.e., German and mathematics achievement) and self-regulation (i.e., emotion and behavior regulation). Mediation models were tested by using the bootstrapping method by Preacher and Hayes (2008). Besides the fact that a bootstrapping approach is especially suitable for small sample sizes, this procedure has two strengths compared to conventional methods of mediation tests. First, multiple mediators are tested in the same model at the same time. Second, using bootstrapping avoids the assumption of a normal distribution of the indirect effects. For estimating point estimates, 5000 bootstrap samples were drawn and, for the indirect effects, 95% confidence intervals were used. A *post-*

hoc power analysis was conducted to analyze, if the sample size was big enough to detect significant mediation effects (Faul, Erdfelder, Lang, & Buchner, 2007).[4]

2.3 Results

Descriptive statistics are shown in Table 1. In general, boys and girls in the sample had good school achievement, as shown by their grades as well as standardized reading, writing, and mathematics tests. On average, teachers rated children's behavior regulation as high. Overall, boys and girls rated themselves as using problem-oriented strategies more often than emotion-oriented strategies. Children's nonverbal intelligence and mothers' level of education were slightly above average.

Pearson correlations revealed that age was significantly negatively correlated with intelligence and German achievement. Perhaps older children had lower nonverbal IQ and academic abilities because they already had to repeat school grades. Nonverbal intelligence correlated significantly and positively with German and mathematics achievement. No significant relations were found between mother's level of education and self-regulation (i.e., behavior regulation, problem- and emotion-oriented strategies of emotion regulation) or school-achievement variables (i.e., German and mathematics achievement) (see Table 2). Consequently, age and intelligence were entered as control variables in further analyses.

Separate MANCOVAs were conducted to test gender differences in school achievement (i.e., German and mathematics achievement) and in self-regulation (i.e., behavior regulation, problem- and emotion-oriented strategies of emotion regulation). In both MANCOVAs age and intelligence were included as covariates. Using a Bonferroni adjusted alpha level of .025, the MANCOVA revealed significant gender differences in German achievement favoring girls, $F(1,49) = 5.90$, $p = .019$, $\eta^2 = .11$, but no significant gender differences in mathematics achievement $F(1,49) = 1.16$, $p = .287$, $\eta^2 = .02$. The MANCOVA regarding gender differences in self-regulation (i.e., behavior regulation, problem- and emotion-oriented strategies of emotion regulation) using a Bonferroni adjusted alpha level of .017, revealed a significant gender effect for behavior regulation favoring girls, $F(1,49) = 6.65$, $p = .013$, $\eta^2 = .12$. However, there were no significant gender effects with

[4] For the statistical power analyses the sample size of 53, the number of predictors of 6, the alpha level of $p < .05$, and Cohen's (1988) criteria of effect sizes (small [$f^2 = .02$], medium [$f^2 = .15$], and large [$f^2 = .35$]) were used. The *post-hoc* analyses revealed that the statistical power for the mediation analyses was .09 and .47 to detect small and medium effects, whereas it was .87 for detecting large effects. Hence, there was a high power at the high effect size level, but a low power at the medium and small effect size level.

regard to problem-oriented strategies, $F(1,49) = .14$, $p = .706$, $\eta^2 = .00$ or emotion-oriented strategies, $F(1,49) = .01$, $p = .918$, $\eta^2 = .00$. The means and standard deviations for school achievement and the self-regulation variables are shown in Table 3.

Table 1 *Descriptive Statistics (Study 1)*

Measure	*Boys*				*Girls*			
	Min	*Max*	*M*	*SD*	*Min*	*Max*	*M*	*SD*
School achievement								
German grade	2.00	5.10	3.97	.80	3.00	6.00	4.48	.72
Mathematics grade	3.00	6.00	4.63	.73	2.00	5.80	4.44	.74
Reading (SLS 5 – 8)	70.00	135.00	98.79	19.39	70.00	139.00	105.85	15.19
Writing (HSP 5 – 9)	0.00	69.00	47.37	16.58	23.00	70.00	53.00	9.75
Mathematics (HST 4/5)	15.00	99.00	66.21	23.68	8.00	96.00	56.65	25.29
Behavior regulation								
Behavior regulation (SCS-K-D)	1.38	4.38	3.03	.86	1.23	4.92	3.64	.79
Emotion regulation (SSKJ)								
Problem-oriented strategies	2.00	5.00	3.68	.88	1.33	5.00	3.60	.85
Emotion-oriented strategies	1.00	3.50	2.02	.65	1.00	4.17	2.00	.85
Covariates								
Intelligence (CFT 20-R)	86.00	139.00	110.00	12.81	84.00	139.00	107.94	14.80
Education mother	2.00	4.00	3.80	.63	1.00	4.00	3.00	1.07

Note. $N = 53$, N (boys) = 19, N (girls) = 34, N (Education mother) = 39; German and mathematics grades were recoded: 1 = *not sufficient/fail* to 6 = *very good*. SLS 5–8 = Salzburger Reading-Screening for 5th to 8th graders; reading quotient score with $M = 100$, $SD = 15$. HSP 5–9 = Hamburger Writing-Test; *T*-values standardized for 5th graders. HST 4/5 = mathematics subtests of the Hamburger school achievement test for 4th and 5th graders; percentile ranks. SCS-K-D = German adaptation of the short version of the Self-Control Scale. SSKJ = Questionnaire for the measurement of stress and coping in children and adolescents. Intelligence = nonverbal intelligence; CFT 20-R = Basic Intelligence Scale; age-standardized IQ scores. Education mother = mother's level of education.

Table 2 *Pearson Correlation Matrix (Study 1)*

	1	2	3	4	5	6	7	8
1. Age	–	-.45**	-.21	-.18	-.03	.00	-.32*	-.12
2. Intelligence		–	.37*	.14	-.04	-.04	.29*	.44**
3. Education mother			–	.07	-.02	.02	.06	.19
4. Behavior regulation				–	.05	-.25^{+}	.58**	.35*
5. Problem-oriented strategies					–	-.36**	.02	-.08
6. Emotion-oriented strategies						–	-.36**	-.06
7. German achievement							–	.53**
8. Mathematics achievement								–

Note. $N = 53$, N (Education mother) = 39; $^{+}p < .10$; $^{*}p < .05$; $^{**}p < .01$.

Table 3 *Summary Statistics for School Achievement and Self-Regulation (Study 1)*

	Boys		Girls	
Variable	*M*	*SD*	*M*	*SD*
German achievement	-.32	.83	.18	.67
Mathematics achievement	.21	.83	-.12	.86
Behavior regulation	3.03	.86	3.64	.79
Problem-oriented strategies	3.68	.88	3.60	.85
Emotion-oriented strategies	2.02	.65	2.00	.85

Note. $N = 53$; German and mathematics achievement are *z*-standardized scores; scaling behavior regulation (SCS-K-D): 5-point scale (1 = *not at all* to 5 = *very much*); scaling problem-oriented strategies and emotion-oriented strategies (SSKJ): 5-point scale (1 = *never* to 5 = *always*).

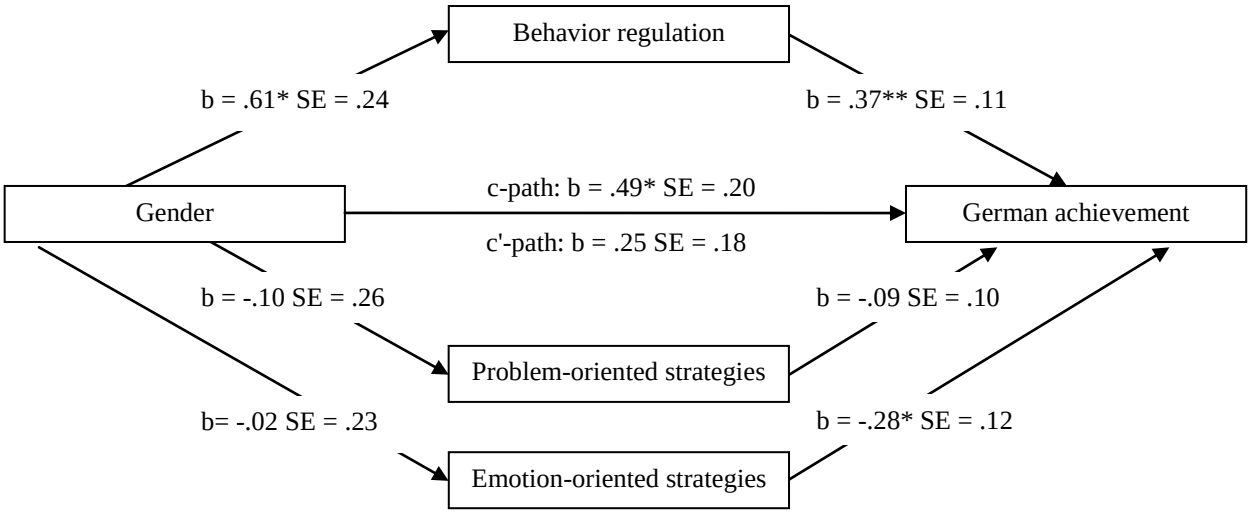
Further, we tested whether gender differences in children's school achievement were mediated by self-regulation (i.e., behavior regulation, problem- and emotion-oriented strategies of emotion regulation). Therefore, two multiple mediation models were tested separately. In one model, German achievement was regarded as a dependent variable and, in the other model, mathematics achievement was regarded as a dependent variable. In both models, age and intelligence were included as control variables. Indirect effects are

unstandardized coefficients, which are significant when the 95% confident interval does not contain zero.

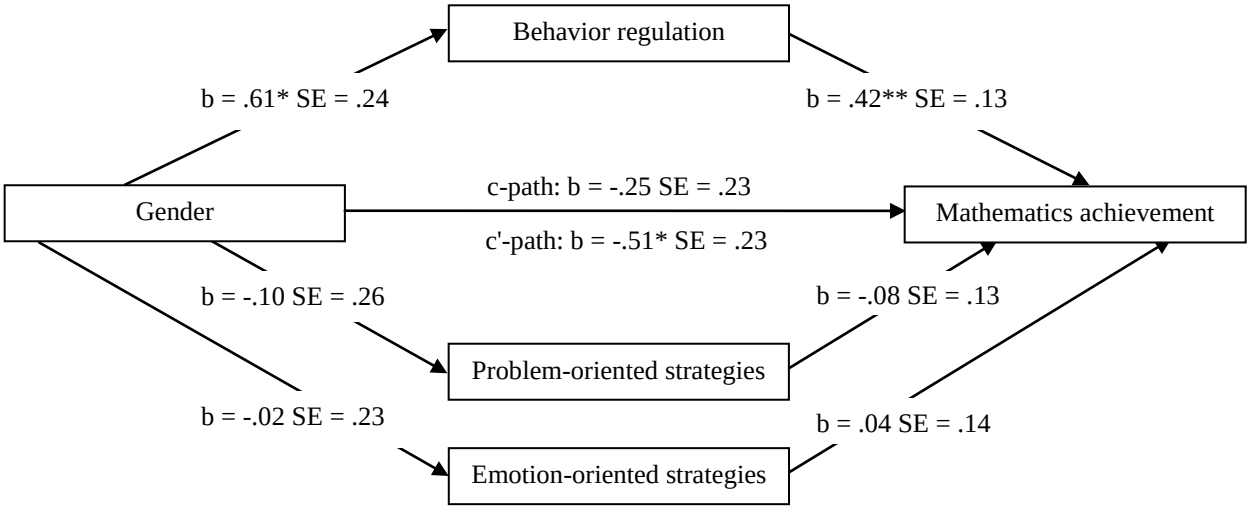
The relations between gender, self-regulation (i.e., behavior regulation, problem- and emotion-oriented strategies of emotion regulation), and school achievement, controlled for age and intelligence, are presented in Figure 1. Behavior regulation was significantly and positively related to German and mathematics achievement. Problem-oriented strategies were neither significantly associated with German achievement nor mathematics achievement. Emotion-oriented strategies were significantly and negatively related to German achievement but not significantly associated with mathematics achievement.

Figure 1 **(A)** shows the results of the mediation model with gender as an independent variable; behavior regulation, problem-oriented strategies, and emotion-oriented strategies as mediator variables; German achievement as the dependent variable; and age and intelligence as covariates. The total effect *c* was significant, while the direct effect *c'* was non-significant. Behavior regulation significantly mediated the relation between gender and German achievement (indirect effect = .226, *SE* = .116, 95% CI [.056, .541]). Behavior regulation was a significant mediator because its 95% confidence interval did not contain zero. Neither problem-oriented strategies nor emotion-oriented strategies were significant mediators (for problem-oriented strategies: indirect effect = .009, *SE* = .036, 95% CI [-.037, .126]; for emotion-oriented strategies: indirect effect = .007, *SE* = .063, 95% CI [-.119, .144]; see Figure 1A).

Figure 1 **(B)** shows the results of the mediation model with gender as an independent variable; behavior regulation, problem-oriented strategies and emotion-oriented strategies as mediator variables; mathematics achievement as the dependent variable; and age and intelligence as covariates. The total effect *c* was not significant, whereas the direct effect *c'* was significantly negative. This means, there was no significant gender difference in mathematics achievement (total effect *c*) but, when self-regulation variables were entered in the model, there was a significant direct effect (*c'*) of gender on mathematics favoring boys. Thereby, there was a significant indirect effect of gender on mathematics achievement through behavior regulation (indirect effect = .258, *SE* = .142, 95% CI [.057, .611]). Hence, there was a suppression effect of behavior regulation on the relation between gender and mathematics achievement. Neither the indirect effect of problem-oriented strategies nor the indirect effect of emotion-oriented strategies were significant (for problem-oriented strategies: indirect effect = .008, *SE* = .010, 95% CI [-.051, .130]; for emotion-oriented strategies: indirect effect = -.001, *SE* = .026, 95% CI [-.079, .038]; see Figure 1B).



(A) Multiple mediation model with German achievement as the dependent variable



(B) Multiple mediation model with mathematics achievement as the dependent variable

Figure 1. Multiple mediation tests of the relations of gender to German and mathematics achievement mediated by behavior regulation and strategies of emotion regulation. (Study 1) Multiple mediation test of the relation between gender and German achievement mediated by behavior regulation, problem-oriented strategies, and emotion-oriented strategies **(A)**. Multiple mediation test of the relation between gender and mathematics achievement mediated by behavior regulation, problem-oriented strategies, and emotion-oriented strategies **(B)**.
N = 53; b = unstandardized regression coefficient, controlled for age and intelligence; **p* < .05; ***p* < .01.

2.4 Discussion

As hypothesized, the present study revealed that German achievement was higher for girls than for boys. There were no gender differences in mathematics achievement. These results are consistent with the results of some studies in the literature, which have also found higher achievement in German or in other language subjects (e.g., English) by girls but no significant gender differences in mathematics achievement (e.g., Kuhl & Hannover, 2012; Spinath et al., 2010). Extending previous research, we investigated gender differences in German and mathematics achievement taking children's motivation and ability for emotion and behavior regulation into account.

The results of the present study revealed that gender differences in German achievement were explained by gender differences in behavior regulation. This finding emphasizes the central function of behavior regulation for German achievement in general as well as the function of behavior regulation for gender differences in German achievement. The interpretation of the results regarding mathematics achievement is more complicated. There was no conventional mediation effect of behavior regulation on the relation between gender and mathematics achievement. Surprisingly, an interesting suppression effect occurred. There was a significant indirect effect of behavior regulation by gender on mathematics achievement. This means that the mathematics achievement of boys is underestimated when analyses do not control for behavior regulation.

The suppression effect could be a reason for the inconsistent findings regarding gender differences in mathematics achievement. The gender difference in mathematics achievement favoring boys is not found when analyses do not control for behavior regulation because girls' higher behavior regulation and the positive effect of behavior regulation on mathematics achievement cancel each other out. This finding could explain why some studies find gender differences in mathematics achievement whereas others do not, as shown in the overview by Hannover and Kessels (2011). There might be other variables that moderate the indirect effect of gender on mathematics achievement. For instance, if girls are confronted with negative stereotypes about females' mathematics achievement, their mathematics achievement worsens (e.g., Keller & Dauenheimer, 2003). A recent study by Galdi, Cadinu, and Tomasetto (2014) has shown that even when girls are not aware of the mathematics-gender stereotype, automatic associations consistent with the stereotype may hinder girls' mathematics achievement. Hence, for girls with strong negative stereotypes about their mathematics achievement or with the presence of stereotype-consistent automatic associations, behavior regulation might be less strongly related to girls' mathematics achievement in comparison to

girls with less negative gender stereotypes. In this case, gender differences in mathematics achievement, favoring boys can be found. Without the presence of stereotypes or stereotype-consistent automatic associations, no gender differences in mathematics achievement would be found because of the suppression effect of behavior regulation. In contrast to former studies, in addition to behavior regulation, we examined the role of emotion regulation on gender differences in school achievement. The present study revealed that strategies of emotion regulation (i.e., problem- and emotion oriented strategies of emotion regulation) did not mediate the relation between gender and school achievement. As *post-hoc* power analyses revealed low power for detecting small and medium effects, future studies with larger samples and higher power may find significant mediation effects of emotion regulation strategies. Nevertheless, the present study revealed a significant and negative relation between the use of emotion-oriented strategies of emotion regulation and German achievement. This result suggests that children who tend to engage in active coping are more likely to show higher German achievement than children who tend to disengage mentally and behaviorally from stressful school-related situations (e.g., a lot of homework).

2.4.1 Strengths and Limitations

Although the sample size was rather small and children came from a rather homogeneous middle-class socio-economic background, analyses revealed significant gender differences in behavior regulation and German achievement. For instance, gender accounted for a substantial amount of variance in behavior regulation (12%) and German achievement (11%). However, future research using larger and more diverse samples is desirable in order to be able to generalize the findings of the present study to larger populations. Furthermore, emotion regulation was assessed by children's self-reports only. Further studies should include a direct measure of emotion regulation as well as a multiple-measure strategy that takes also other strategies of emotion regulation into account (e.g., reappraisal; Gross & Thompson, 2007). In addition, the present study relied on class teachers' reports for the assessment of children's behavior regulation. Ideally, to measure behavior regulation, direct and multiple-measure strategies should be used. It should also be noted that school grades are teacher evaluations, too. In order to take these limitations into account school achievement was assessed by school grades (i.e., mid-term report grades in German and mathematics) and by standardized achievement tests. Moreover, children's self-regulation (i.e., behavior regulation, emotion regulation) was assessed by teacher report and a self-report measure.

2.4.2 Theoretical Implications

In line with previous results, the present study revealed that German achievement and the motivation and ability for behavior regulation was higher for girls than for boys. Moreover, indirect effects of gender on German and mathematics achievement were mediated by children's behavior regulation, but not by strategies of emotion regulation. Furthermore, mediation analyses indicated that mathematics achievement was higher for boys than for girls. However, gender differences in mathematics achievement were canceled out because of girls' higher motivation and ability for behavior regulation that was positively associated with mathematics achievement. Hence, further studies analyzing gender differences in mathematics achievement should consider the possibility that the mathematics achievement of boys may be underestimated when not controlling for behavior regulation. Further studies should investigate whether variables such as stereotype threat moderate relations between gender, behavior regulation, and mathematics achievement. Moreover, as culture influences the development of self-regulation (Heikamp et al., 2013; Trommsdorff, 2009), longitudinal studies are needed to draw causal conclusions concerning the effect of socialization in different contexts (e.g., culture, family, school) on the development of gender differences in self-regulation and school achievement.

2.5 Acknowledgments

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3 Children's Self-Regulation and School Achievement in Cultural Contexts: The Role of Maternal Restrictive Control (Study 2)

Abstract

This study examined relations among maternal restrictive control, self-regulation (i.e., behavior and emotion regulation), and school achievement in Germany and Chile. 76 German and 167 Chilean fourth graders, their mothers, and their teachers participated. Mothers and teachers rated children's behavior regulation with the Strengths and Difficulties Questionnaire. Children reported their use of emotion regulation strategies on the Questionnaire for the Measurement of Stress and Coping. Maternal restrictive control was rated by mothers with the Parenting Practice Questionnaire. School achievement was assessed by grades for language and mathematics. Results showed higher behavior regulation and anger-oriented emotion regulation of German children in comparison to Chilean children. Chilean mothers used more restrictive control than German mothers. Regression analyses revealed positive relations between children's behavior regulation and school achievement in Germany and in Chile. Further, in both cultural contexts, maternal restrictive control was related negatively to behavior regulation and positively to anger-oriented emotion regulation.

3.1 Introduction

Self-regulation has become one of the most important and most frequently studied constructs in the whole field of psychology (Duckworth, 2011; Vohs & Baumeister, 2011). There is a wide range of studies regarding the important function of self-regulation for positive developmental outcomes (e.g., Moffitt et al., 2011; Tangney et al., 2004). School achievement is one of the main issues that have been related to self-regulation. In spite of numerous studies on self-regulation, the role of cultural contexts on the development of self-regulation has been largely ignored (Trommsdorff, 2012; Trommsdorff & Cole, 2011), since most of the studies have been conducted in Northern American or European contexts. Specifically, relations between self-regulation and school achievement have rarely been studied in Latin American contexts. Furthermore, insights into socialization conditions for children's development of self-regulation and adaptation to the school context by taking into account diverse cultural contexts are still lacking.

Parental responsiveness, autonomy support, and parental control have been investigated as parenting aspects related to the development of self-regulation (Grolnick & Ryan, 1989; Karreman et al., 2006). We decided to focus on maternal restrictive control since this parenting aspect might have a crucial negative impact on children's development of autonomy and self-regulation (Barber, 1996; Kopp, 1982). Moreover, previous studies mostly investigated behavior regulation (or self-control) but largely neglected a wider conceptualization of self-regulation including behavior and emotion regulation. The present study aims to contribute to fill these gaps by investigating relations between maternal restrictive control, different aspects of self-regulation (i.e., behavior regulation, emotion regulation) and school achievement in Germany and Chile, two diverse cultural contexts differing in socio-economic and cultural factors. We structured the present article beginning with its main focus on the importance of self-regulation for school achievement; then we present the role of maternal restrictive control for self-regulation and school achievement.

3.1.1 Self-Regulation and School Achievement

Self-regulation is conceived of as an important skill helping children to be successful in school (Blair, 2002). Past research has shown a positive relation of self-regulation with academic achievement (e.g., Calkins, 2007; McClelland et al., 2007). However, a more nuanced conceptualization of self-regulation, including its interrelated but separate aspects of behavior and emotion regulation (e.g., Raffaelli et al., 2005), has been largely ignored in previous studies.

We understand self-regulation as a skill and motivation for goal-directed behavior necessary to achieve individual needs in academic and social situations (Karoly, 1993; Kopp, 1982; Trommsdorff, 2009). To capture this complex construct adequately, we include behavior and emotion regulation in our research. Behavior regulation means to pay attention, follow rules, resist temptation, and inhibit impulsive behavioral reactions to comply with environmental demands (e.g., Calkins, 2007; McClelland et al., 2007). Emotion regulation, on the other hand, describes the processes which initiate, inhibit, avoid, maintain, or modulate emotions in order to achieve individual goals (Eisenberg & Spinrad, 2004). Here, we focused on emotion regulation strategies for coping with negative emotions. Lazarus and Folkman's transactional model of stress and coping distinguishes between emotion-oriented and problem-oriented strategies in coping with negative emotions (e.g., Lazarus & Folkman, 1984). While emotion-oriented strategies aim to reduce the negative emotional experience

directly (e.g., relieving tension), problem-oriented strategies aim to change the situation which elicited the negative emotions (Lohaus et al., 2006). Thus, problem-oriented strategies include instrumental actions to solve the problem actively. In the present study, we included problem- as well as emotion-oriented strategies. Regarding emotion-oriented strategies, we focused on anger-oriented strategies which are instrumental to relieve the tension of anger, an "intense adaptive approach emotion that requires the mastery of efficient regulatory strategies for proper functioning" (Feldman et al., 2011, p. 310). Furthermore, anger regulation has been shown to differ among cultural contexts depending on the respective cultural values (Cole, Tamang, & Shrestha, 2006; Trommsdorff & Cole, 2011).

Behavior regulation is necessary to remember and follow instructions and to concentrate on tasks without getting distracted. Thus, behavior regulation is essential to be successful in school (McClelland et al., 2007). Past studies in European and North American countries focusing on diverse age groups (preschoolers to high school students) already showed positive relations between behavior regulation and school achievement (e.g., McClelland et al., 2007; Weis, Heikamp, & Trommsdorff, 2013). Furthermore, behavior regulation even accounts for variance in school achievement beyond the variance that is explained by intelligence (Duckworth & Seligman, 2005; Suchodoletz et al., 2009).

Besides behavior regulation, children have to regulate their emotions to engage in school-related activities. Adequate emotion regulation in the classroom improves several cognitive processes (e.g., memory, attention, planning, problem solving), which are essential for scholastic learning (Blair, 2002). Several studies in European and North American countries showed positive links between effective emotion regulation and school achievement in preschoolers (e.g., Graziano et al., 2007). As adaptive emotion regulation means to adopt strategies depending on the situation, problem- as well as emotion-oriented strategies may be effective in different situations (Lohaus et al., 2006). However, in the school context, a study with fourth to sixth graders (Mantzicopoulos, 1990) showed that problem-oriented strategies are more effective for school achievement than emotion-oriented strategies. Relations between anger-oriented strategies and school achievement have rarely been investigated in previous studies. In the present study, we focused on relations between anger-oriented strategies, problem-oriented strategies, and school achievement.

3.1.2 Restrictive Control and Self-Regulation

Self-regulation with its components behavior and emotion regulation develops from external to internal regulation (Kopp, 1982). Infants' behavior and emotions are regulated mostly by parents (external). With increasing age, children acquire a set of regulation strategies which allows them to regulate their emotions and behavior in the absence of their caregivers (internal). Hence, it is evident that parenting plays a crucial role for the development of self-regulation. Previous studies have shown several relevant parenting aspects for the development of self-regulation, e.g., parental warmth, responsiveness, autonomy support, and parental control (Davidov & Grusec, 2006; Grolnick & Ryan, 1989; Karreman et al., 2006; Suchodoletz et al., 2011). Referring to Kopp's (1982) theory on the development of self-regulation, parental control with its' aspects positive and "negative" control plays an important role. In the present study, we focused on "negative" control, labeled here as "restrictive" control. Restrictive control is defined as aggressive, strict, and critical parenting behavior, typically including anger, harshness, and intrusive control (Karreman et al., 2006). While positive control (i.e., guiding the child's behavior by limit-setting, instructing, and encouraging) may foster the development of self-regulation, restrictive control may undermine the child's internalization of autonomous regulation processes and therefore could negatively influence the development of self-regulation (Grolnick & Ryan, 1989; Karreman et al., 2006). In the present study, we have focused on restrictive control which has been shown in socialization research to be predictive of less autonomy and more internalizing problems in children (Barber, 1996). Previous studies also revealed that maternal restrictive control is negatively related to children's behavior regulation (see Karreman et al., 2006) and positively to anger-oriented emotion regulation (Feldman et al., 2011).

3.1.3 Restrictive Control, Self-Regulation, and School Achievement

Further, maternal restrictive control has been shown to be associated negatively with school achievement (Grolnick & Ryan, 1989; Dornbusch et al., 1987). There is evidence that maternal restrictive control negatively influences both self-regulation and school achievement. Wong (2008) showed in a study with US-American adolescents that behavior regulation can mediate the link between parenting and school achievement. Therefore, we investigated whether the relation between maternal restrictive control and school achievement is mediated by both behavior and emotion regulation as aspects of self-regulation. Moreover,

we extended the mediation models by controlling for intelligence, age, and gender. Further, we tested these mediation models in samples of German and Chilean fourth graders, to gain insights about the conditions and outcomes of self-regulation in cultural contexts.

3.1.4 Restrictive Control, Self-Regulation, and School Achievement in Cultural Contexts

According to Trommsdorff's (2009) cultural model of agency, self-regulation develops successfully when conforming to dominant cultural values. Thus, self-regulation processes might differ cross-culturally due to culture-specific models of agency. Whereas, the independent model of agency implies self-regulation behavior based on its underlying motivation for individual autonomy (e.g., achieve own goals), the interdependent model of agency implies self-regulation behavior based on relatedness (e.g., maintain interpersonal harmony by adjusting goals to expectations of others).

One reason for cultural differences in self-regulation might be cultural variations in parenting (Trommsdorff et al., 2012). According to the theoretical framework of *the developmental niche* from Super and Harkness (1997), parenting is one of the factors which mediate the influence of culture on children's development. Keller et al. (2004) found in their study with samples of Cameroonian, Greek and Costa Rican mothers and infants cultural differences in parenting which were related to cultural differences in infants' self-regulation development.

Relations between parenting and school achievement may also differ cross-culturally. Previous literature showed that restrictive control may have different effects on children's school achievement depending on the cultural context. In contrast to European and North-American contexts, restrictive control might be related to positive school achievement in Asian, African, or Latin American contexts (Dornbusch et al., 1987; Spera, 2005). However, studies investigating relations between restrictive control and developmental outcomes in Latin American contexts are still scarce. Bush and Peterson (2014) emphasize in their review on parenting studies in Chile, a need for cross-cultural research on parenting and child development with adequate measurement of variables. Further, there are few Latin American and even fewer Chilean studies regarding self-regulation and school achievement so far. Recently, studies with Mexican high school students discovered indirect relations of self-regulation on school achievement through resilience (e.g., Romero, Lugo, Guedea, & Villa, 2013). Muñoz (2013, October) showed in a study with Chilean second graders positive

relations between behavior regulation and school achievement. The present study investigated, whether maternal restrictive control is related to children's self-regulation and school achievement in Germany (a European context) and in Chile (a Latin American context) in similar or in different ways.

3.1.5 Germany and Chile as Cultural Contexts

Germany has been described as an independent sociocultural context, characterized by high independence and low interdependence values. For instance, Hofstede (1980, 2001) ranked Germany as a country with high individualist values. In independent contexts, individualist values and a motivation for individual autonomy are typical (Trommsdorff, 2009). Parenting is directed to support the development of personal autonomy and self-reliance. Consequently, from infancy on, parents aim to foster autonomous self-regulation of their children, for instance by encouraging their children to sleep alone (Keller et al., 2011).

In contrast to Germany, Chile cannot be classified clearly as an independent or interdependent sociocultural context. In interdependent contexts, social orientations and a motivation for relatedness are typical (Trommsdorff, 2009). Hofstede (1980) characterized Chile as one of the most collectivistic countries. However, several more recent studies showed very high values of Chileans on both, independence and interdependence (Georgas, Berry, van de Vijver, Kağitçibaşi, & Poortinga, 2006; Kolstad & Horpestad, 2009; Schwinn, 2011). In countries undergoing rapid and extensive transformations, independent and interdependent values can combine (e.g., Trommsdorff & Kornadt, 2003). In Chile, political changes (the fall of the dictatorship and the re-democratization in 1990) in combination with the fast economic growth have led to a liberalization of social norms and to a rejection of authoritarian values (Martínez et al., 2006). This in turn is related to changes in parenting. It was found that today's Chilean parents report to be less authoritarian and to apply less power-assertive techniques than did their own parents (Martínez et al., 2006). Moreover, previous literature identified specific Latin American values, namely *simpatía* (respecting and sharing other's feelings), *familismo* (strong family ties, commitment to the family), and *respeto* (avoidance of negative behaviors), which might underlie a motivation for interpersonal harmony in Chile (Halgunseth, Ispa, & Rudy, 2006; Triandis, Marín, Lisansky, & Betancourt, 1984). Thus, we could not be sure about the dominant psychological cultural values in Chile nor about their influence on cultural-specific parenting. Hence, the present study seeks to provide new

insights by investigating relations between maternal restrictive control, self-regulation, and school achievement of Chilean children.

3.1.6 Study Aims and Hypotheses

The present study aims to contribute to a better understanding of the role of self-regulation (i.e., behavior and emotion regulation) for children's school achievement as well as the role of maternal restrictive control for the development of self-regulation and school achievement in diverse cultural contexts. In this study, higher self-regulation was conceptualized as (a) higher behavior regulation, (b) lower usage of anger-oriented emotion regulation strategies, and (c) higher usage of problem-oriented emotion regulation strategies. In our cross-cultural analyses we focused on mean differences as well as on the comparison of relations between maternal restrictive control, self-regulation, and school achievement in a Chilean and a German sample.

Concerning cross-cultural differences, clear hypotheses could not be formulated. As we stated above, there is not sufficient literature regarding cultural values in Chile available, so far. Hence, we formulated exploratory research questions. First, we analyzed if German and Chilean children differ in their self-regulation (research question 1). Second, we explored whether German and Chilean mothers differ in their restrictive control behavior towards their children (research question 2).

In line with past research, we hypothesized that the higher children’s self-regulation, the higher is their school achievement (hypothesis 1). Based on previous findings, we expected that the more restrictive control mothers show, the lower is their children’s self-regulation (hypothesis 2). Furthermore, we hypothesized that the more restrictive control the mothers show, the lower is their children’s school achievement (hypothesis 3). Moreover, we expected that the relations between mothers’ restrictive control and children’s school achievement are mediated by children’s self-regulation (hypothesis 4).

Finally, we explored whether there are cultural differences in the relations between maternal restrictive control, children’s self-regulation, and school achievement (research question 3).

3.2 Methods

3.2.1 Participants

The sample consisted of 76 German (31 boys, 45 girls) and 167 Chilean (56 boys, 111 girls) fourth graders, their mothers, and teachers. The mean age of the children was 10.21 years (*SD* = .44) in Germany and 10.16 years (*SD* = .42) in Chile. German children attended seven different fourth grade classes in four primary schools in a medium-sized town in Southern Germany. Chilean students attended nine different fourth grade classes in four primary schools (two public, two private) in a large city in Central Chile. The Chilean Sample was recruited in public and private schools to represent different socio-economic conditions of the Chilean educational system. To indicate mother's level of education, ISCED-97 classification (Organization for Economic Co-operation and Development, 1999) was used. In the German sample, five mothers (6.6%) had completed lower secondary level of education (= 2), ten (13.2%) upper secondary level (= 3), 23 (30.3%) post-secondary (= 4), and 38 (50%) had completed first stage of tertiary education (= 5). In Chile, three (1.8%) mothers had completed no school leaving certificate (= 0), 17 mothers (10.2 %) primary level of education (= 1), 49 (29.3%) lower secondary level of education (= 2), 48 (28.7%) upper secondary level of education (= 3), and 50 (29.9%) had completed first stage of tertiary education (= 5). The meaning of level of education is not simply comparable as variance and education system in the two cultural contexts differ considerably. Mothers and teachers of those children who participated in the study completed questionnaires for the assessment of maternal restrictive control, behavior regulation, and school achievement.

3.2.2 Procedure

In Germany, the present study was part of a larger project which included for each child a group session at school which lasted about 1 hour as well as a group session in rooms at the university lasting about 1.5 hours. In Chile, children participated in group sessions at school which lasted about 1.5 hours. In Germany and in Chile, group sessions included a nonverbal intelligence test and an emotion regulation questionnaire. Mothers and teachers answered paper-and-pencil questionnaires at home. Parents provided written informed consent prior to participation of their children. Feedback of main results was provided to teachers and mothers who participated.

3.2.3 Measures

Assessment of self-regulation

To assess behavior regulation, the *Strengths and Difficulties Questionnaire* (SDQ) from Goodman (1997) was administered. Teachers and mothers evaluated children's behavior regulation answering five items on a 3-point scale (1 = *not true* to 3 = *certainly true*), e.g., "Thinks things out before acting". Reliability analyses revealed a Cronbach's α of .83 for mothers' evaluation and a Cronbach's α of .76 for teachers' evaluation in the German sample. In the Chilean sample, for mothers Cronbach's α was .81 and for teachers Cronbach's α was .90. To increase validity of the behavior regulation measure, mothers' and teachers' evaluations were used. Pearson correlations revealed that mothers' and teachers' evaluations of children's behavior regulation were significantly positively correlated in the German (r = .51, p < .01) as well as in the Chilean (r = .44, p < .01) sample. Accordingly, mothers' and teachers' evaluations of children's behavior regulation were averaged in each sample.

Children reported the use of emotion regulation strategies on the *Questionnaire for the Measurement of Stress and Coping in Children and Adolescents* (SSKJ 3-8) (Lohaus et al., 2006). Children were asked to imagine that they are in a stressful situation (problems with homework). Then they indicated how often (from 1 = *never* to 5 = *always*) they use anger-oriented strategies (six items; e.g. "I get mad and break something") and problem-oriented strategies (six items; e.g., "I try to think of different ways to solve it") to regulate their emotions. Reliability tests revealed satisfying results for anger-oriented strategies (Cronbach's α = .87 in the German sample; Cronbach's α = .73 in the Chilean sample) and for problem-oriented strategies (Cronbach's α = .80 in the German sample; Cronbach's α = .83 in the Chilean sample).

Assessment of school achievement

School achievement was assessed by language (German/Spanish) and mathematics grades. Grades were assessed by teachers' reports of the fourth grade midterm reports. In the German sample, grades were originally coded according to the German grade system ranging from 1 (= very good) to 6 (= not sufficient/fail). To facilitate the interpretation of the results, grades were recoded such that a higher score indicated higher school achievement. In the Chilean sample, grades were originally coded according to the Chilean grade system ranging from 1 (= not sufficient/fail) to 7 (= very good). To facilitate the comparability between the Chilean and the German sample, grades were z-standardized within both samples.

Assessment of maternal restrictive control

Maternal restrictive control was rated by mothers with the *Parenting Practice Questionnaire* (PPQ) by Robinson, Mandleco, Olsen, and Hart (1995). Mothers answered items, indicating from 1 (= *never*) to 5 (= *always*), how often they show certain behaviors when interacting with their children. A scale with eight items was generated to assess maternal restrictive control (see Appendix A). Maternal restrictive control items implied direct parental control characterized by punishment and compliance without reasoning, e.g., "I use threats as punishment with little or no justification". Reliability analyses revealed a Cronbach's α of .76 in the German sample and a Cronbach's α of .76 in the Chilean sample.

Assessment of intelligence

In order to assess nonverbal intelligence, the short version of the *CFT 20-R* (Weiß, 2006) was administered in the German sample. In the Chilean sample, the *Raven's Progressive Matrices* (Raven, 1957) were administered. Nonverbal intelligence sum scores were z-standardized separately within the German and the Chilean samples, to facilitate comparability between samples.

Cultural equivalence of measures

To ensure comparability of the data from different cultures (i.e., Germany, Chile), the equivalence of instruments was maximized by a careful adaptation of instruments to the Chilean Sample. Furthermore, to test construct equivalence of instruments across the two cultural groups (Germany, Chile), factor congruence was evaluated by computing Tucker's phi coefficients (van de Vijver & Leung, 1997). Analyses of equivalence revealed a Tucker's phi coefficient of 1.00 for mothers' evaluation of children's behavior regulation and 1.00 for teachers' evaluation. Regarding emotion regulation, equivalence analyses revealed a Tucker's phi value of .98 for anger-oriented strategies and a Tucker's phi value of .95 for problem-solving strategies. The Tucker's phi value for maternal restrictive control was .97. Thus, in the present study the measures met the criteria of structural equivalence across cultures, as values above .95 are regarded as evidence for the similarity of factor structures (van de Vijver & Leung, 1997).

3.2.4 Data Analysis

In order to test cultural mean differences in self-regulation (i.e., behavior and emotion regulation) and maternal restrictive control, analyses of covariance (ANCOVAs) were conducted. Before conducting the ANCOVAs, scores were standardized using the so called ipsatization procedure to avoid cross-cultural differences due to response bias (Fischer, 2004; van de Vijver & Leung, 1997). For each individual means across all variables were computed and subtracted from each individual's raw score. Thus, the ipsatized score represents the person's position on this score in relation to the other variables. Furthermore, the resulting score was divided by each individual's standard deviation across all variables. Herewith, scores were adjusted for differences in the variation of answers around the mean (Fischer, 2004). As properties of ipsatized scores can distort statistical techniques involving correlations (Fischer, 2004), the ipsatized values were used for the ANCOVAs only.

To test relations between maternal restrictive control, self-regulation (i.e., behavior and emotion regulation), and school achievement as well as to test if relations between maternal restrictive control and children's school achievement are mediated by self-regulation, mediation models were tested by using the bootstrapping method INDIRECT recommended by Preacher and Hayes (2008). Furthermore, PROCESS bootstrapping method by Hayes (2013) was used for moderator analyses to test whether relations were moderated by culture. Indirect effects, based on 95% confidence intervals (CI) derived from 5000 bootstrap samples, are significant when the CI values do not cross zero. Unstandardized coefficients (b) are reported for each regression equation.

3.3 Results

Cultural mean differences

To test cultural mean differences in self-regulation (i.e., behavior and emotion regulation) and maternal restrictive control (research questions 1 and 2), ANCOVAs with ipsatized values were computed. All ANCOVAs included intelligence and age as covariates and gender as predictor variable. Means, standard deviations, and cultural mean differences of all variables under study are presented in Table 4. ANCOVAs revealed that the behavior regulation of German children was rated significantly higher by mothers and teachers than the behavior regulation of Chilean children. Regarding cultural differences in anger-oriented emotion regulation, the ANCOVA revealed more anger-oriented emotion regulation strategies in German children in comparison to Chilean children. Regarding problem-oriented emotion

regulation strategies, no significant effect for culture occurred. With respect to maternal restrictive control, ANCOVAs showed that Chilean mothers reported to use significantly more restrictive control than German mothers.

Table 4 *Means, Standard Deviations, and Cultural Mean Differences (Study 2)*

	Germany		Chile			
Variable	*M*	*SD*	*M*	*SD*	*F*(1,237)	η^2
Behavior regulation (M)	1.84	.43	1.61	.50	15.08**	.06
Behavior regulation (T)	3.64	.90	2.69	1.10	48.28**	.17
Anger-oriented regulation	1.46	.60	1.32	.48	4.23*	.02
Problem-oriented regulation	2.76	.59	2.64	.56	1.43	.01
Maternal restrictive control	1.55	.30	1.70	.36	10.95**	.04

Note. $N = 243$, N (Germany) = 76, N (Chile) = 167; for reasons of clarity, a constant of 2.00 was added to all ipsatized values. (M) = mothers' evaluations; (T) = teachers' evaluations; *$p < .05$; **$p < .01$.

Relations between Restrictive Control, Self-Regulation, and School Achievement in Cultural Contexts

We tested hypotheses 1 to 4 by computing mediation models with maternal restrictive control as independent variable, school achievement (i.e., language and mathematics grades) as dependent variable, and self-regulation (i.e., behavior regulation, anger- and problem-oriented emotion regulation) as mediator variable. Intelligence, age, and gender were included as control variables. Mediation models were tested with the INDIRECT method, separately for the German and the Chilean samples and in each sample separately with language grade and mathematic grade as dependent variables.

The relations between maternal restrictive control, self-regulation, and school achievement are presented in Figure 2 (for language grades) and Figure 3 (for mathematics grades). In the German and in the Chilean sample, behavior regulation was significantly and positively related to language and mathematics grades. Emotion regulation strategies (i.e., anger- and problem-oriented emotion regulation) were not significantly related to language or mathematics grades, neither in Germany nor in Chile. In Germany as well as in Chile, we found negative relations between maternal restrictive control and behavior regulation and positive relations between restrictive control and anger-oriented emotion regulation. No significant relations between maternal restrictive control and problem-oriented emotion regulation occurred, neither in Germany nor in Chile. In Germany, restrictive control was not

significantly associated with grades in language or mathematics. In Chile, maternal restrictive control was significantly and negatively related to language and mathematics grades.

In the German sample, significant indirect and negative effects of behavior regulation on the relations between restrictive control and school achievement (i.e., language and mathematics grades) occurred. Although neither the total effects *c*, nor the direct effects *c'* were significant, behavior regulation indirectly effected the relations between restrictive control and school achievement (language grade: indirect effect = -.24, *SE* = .143, 95% CI [-.60, -.02]; mathematics grade: indirect effect = -.17, *SE* = .109, 95% CI [-.45, -.01]). In the Chilean sample, behavior regulation significantly mediated the relations between maternal restrictive control and school achievement (i.e., language and mathematics grades). The total effects *c* were significant, while the direct effects *c'* were non-significant. Thus, behavior regulation was a significant mediator (language grade: indirect effect = -.311, *SE* = .07, 95% CI [-.47, -.18]; mathematics grade: indirect effect = -.35, *SE* = .07, 95% CI [-.51, -.22]).

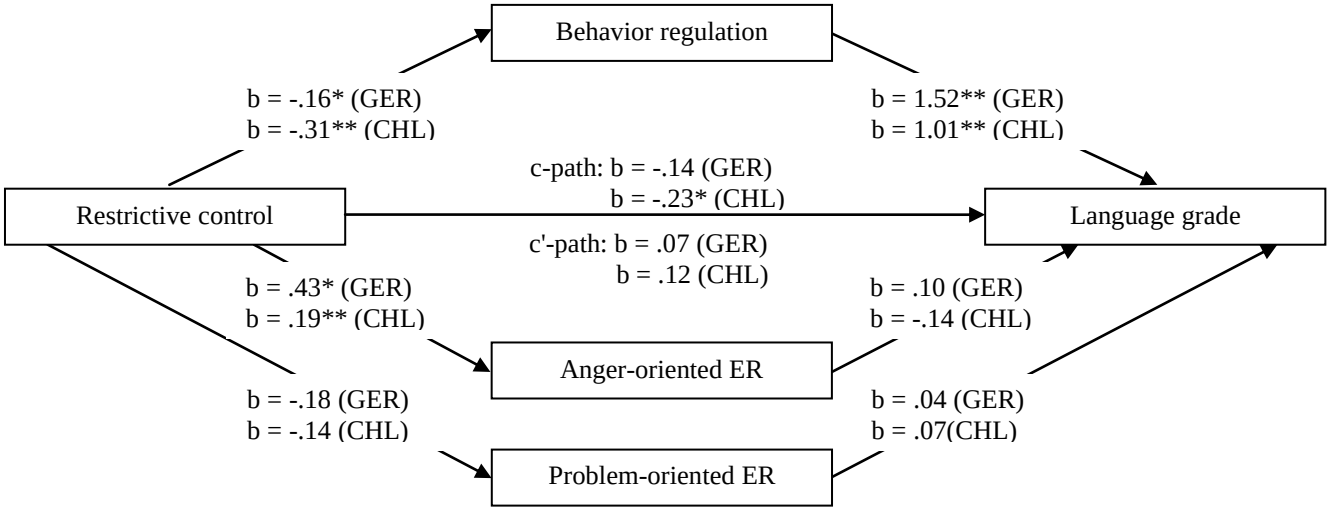

Figure 2. Multiple mediation test of the relation between maternal restrictive control and language grade mediated by behavior regulation, anger- and problem-oriented emotion regulation. (Study 2)
Models were tested separately for the German and the Chilean samples.
N (Germany) = 76; *N* (Chile) = 167; b = unstandardized regression coefficient, controlled for intelligence, age, and gender; GER = German sample, CHL = Chilean sample; ER = emotion regulation; **p* < .05; ***p* < .01.

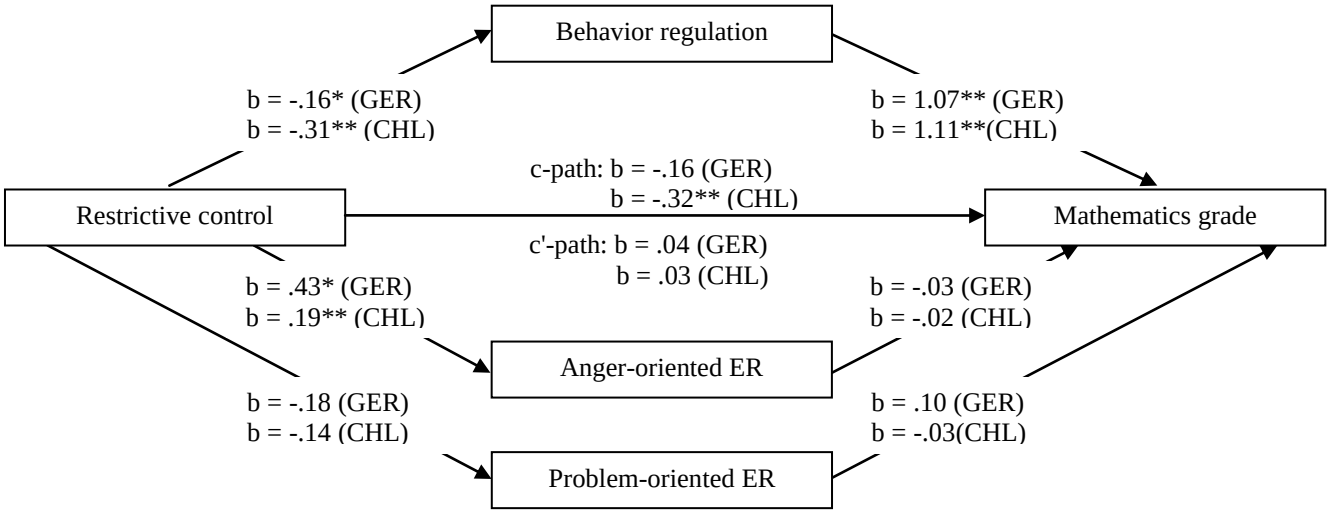

Figure 3. Multiple mediation test of the relation between maternal restrictive control and mathematics grade mediated by behavior regulation, anger- and problem-oriented emotion regulation. (Study 2)
Models were tested separately for the German and the Chilean samples.
N (Germany) = 76; *N* (Chile) = 167; b = unstandardized regression coefficient, controlled for intelligence, age, and gender; GER = German sample, CHL = Chilean sample; ER = emotion regulation; **p* < .05; ***p* < .01.

To test whether the relations were moderated by culture (research question 3) moderated mediation models were conducted with the whole sample with the PROCESS method. Here, maternal restrictive control was included as independent variable, school achievement (i.e., language and mathematics grades) as dependent variable, self-regulation (i.e., behavior regulation, anger- and problem-oriented emotion regulation) as mediator variable, and culture (i.e., Germany, Chile) as moderator variable. Intelligence, age, and gender were included as control variables. Results of the moderated mediation models revealed no significant moderation of culture on the relations of the model (see Appendix B). Thus, relations between variables did not differ significantly between the German and the Chilean sample.

3.4 Discussion

The present study revealed that behavior regulation and anger-oriented emotion regulation were higher for German children than for Chilean children. Chilean mothers used more restrictive control than German mothers. In both cultural contexts, children's behavior regulation and school achievement were related positively. Maternal restrictive control was related negatively to behavior regulation and positively to anger-oriented emotion regulation.

Indirect negative effects of behavior regulation on relations between restrictive control and school achievement were found. Overall, the study confirmed the hypotheses that maternal restrictive control is related negatively to children's self-regulation and that behavior regulation is related positively to school achievement. Regarding our research questions on cross-cultural differences, we found cultural mean differences but no cultural differences in the relations among the variables.

One reason for the higher behavior regulation of German children might be their socialization in an independence-oriented context. As the development of personal autonomy is central for socialization in independence-oriented contexts, German parents aim to support the development of behavior regulation from an early age on (e.g., Keller et al., 2011). Due to lacking literature, no clear conclusions about socialization conditions in Chile can be drawn. As there might exist independence as well as interdependence values in Chile (Georgas et al., 2006; Kolstad & Horpestad, 2009; Schwinn, 2011), both might influence behavior regulation in different ways or might even be contradictory. This might be a reason for the lower behavior regulation in Chilean children.

The higher usage of anger-oriented strategies in German children in comparison to Chilean children is in line with the notion that the expression of frustration and anger differs depending on the respective cultural values of interdependence and independence (Cole et al., 2006; Trommsdorff, 2009; 2012; Trommsdorff & Cole, 2011). The cultural model of independence allows for the expression of anger and frustration as this can be instrumental to assert individual goals. In contrast, the cultural model of interdependence reinforces an endorsement of interpersonal harmony and discourages the expression of anger (Trommsdorff, 2009; 2012). Thus, German children might use anger-oriented strategies more often than children from interdependent contexts because of their socialization experiences encouraging self-assertion. For instance, previous studies comparing German and Japanese or German and Indian preschool children also showed higher anger expression of German children (see Trommsdorff, 2009; 2012; Trommsdorff & Cole, 2011). In Chile, the development of anger-oriented emotion regulation might be influenced by values of interdependence. Moreover, Latin American specific values as *simpatía* and *respeto* might play an additional role in striving for interpersonal harmony and avoiding negative emotional expressions as anger (Halgunseth et al., 2006; Triandis et al., 1984). This might be another reason why Chilean children used less anger-oriented strategies than German children in the present study.

Chilean mothers used more restrictive control than German mothers. This finding confirms previous studies which found Latino parents to use more restrictive control than European-American parents (for a review see Halgunseth et al., 2006). Recent literature argued that political and economic changes in Chile have led to a decline of parental restrictive control (Martínez et al., 2006). Based on our results it seems that even if today's Chilean mothers use less restrictive control than their own mothers (Martínez et al., 2006), they still use more restrictive control than German mothers do.

As hypothesized, behavior regulation was positively associated with school achievement (i.e., language and mathematics grades) in both samples. This result underlines the central function of behavior regulation for academic competences. However, contrary to our hypotheses, no relations between emotion regulation strategies and school achievement were shown, neither in Germany nor in Chile. This finding brings up the question if behavior regulation is more relevant for school achievement than emotion regulation. Future studies with multiple measures of emotion and behavior regulation and a wider scope of school adaption are needed.

Furthermore, in line with our hypotheses, maternal restrictive control was related negatively to behavior regulation and positively to anger-oriented emotion regulation, both in Germany and in Chile. These results fit with the theoretical assumption that maternal restrictive control may undermine children's internalization of adequate self-regulation processes.

As hypothesized, we found negative relations between maternal restrictive control and school achievement (i.e., language and mathematics grades) in Chile. However, these relations were not found for the German sample. This result is in contrast to previous assumptions (e.g., Dornbusch et al., 1987) about positive relations between parental restrictive control and school achievement in Latinos. The present study revealed that maternal restrictive control was associated negatively with children's self-regulation as well as with school achievement in a Latin American context (i.e., Chile).

To conclude, the present study revealed cross-cultural differences as well as cross-cultural similarities. There were cross-cultural mean differences in maternal restrictive control and children's self-regulation (i.e., behavior regulation, anger-oriented emotion regulation). Further, relations between maternal restrictive control, children's self-regulation, and school achievement did not differ between cultures. The similarity of the relations was shown by moderated mediation models which revealed no significant interactions of culture. Thus, the present study underlines the importance to distinguish among level-oriented analyses of

cultural mean differences and structure-oriented analyses of cross-cultural similarities and differences in relations among variables (van de Vijver, 2009). In this study, although level-oriented analyses showed cultural mean differences, structure-oriented analyses revealed no cultural differences. Both types of analyses are valuable and complement each other.

3.4.1 Strengths and Limitations

This study revealed negative relations between maternal restrictive control and children's self-regulation in diverse cultural contexts. However, it should be considered that these relations could be bidirectional. That is, maternal restrictive control might induce lower behavior regulation in children; however children's behavior regulation may also influence maternal restrictive control. Previous literature argued that parents' restrictive control might be a consequence of children's low behavior regulation (Karreman et al., 2006). Moreover, there might be cross-cultural differences in the bidirectionality of parent-child relations (Trommsdorff & Kornadt, 2003). Thus, future cross-cultural research, using longitudinal designs and observational measures, is needed to distinguish parenting effects from children's characteristics regarding maternal restrictive control and self-regulation.

Furthermore, teacher's evaluation of children's school achievement could influence their rating of children's behavior regulation. Moreover, school system and scholastic learning could influence self-regulation. Therefore, mothers', teachers', and children's evaluation of children's self-regulation (i.e., behavior and emotion regulation) were included. Accordingly, a strength but also a limitation of the study was the measurement of children's self-regulation by using multiple sources (children, mothers, and teachers). This could lead to artifacts because of different data sources and makes it more difficult to draw conclusions. Future studies should include direct as well as multiple-measures strategies to assess behavior and emotion regulation.

3.4.2 Conclusions

To get deeper insights into the underlying constructs of cross-cultural differences and similarities, future studies should investigate the occurrence of cultural values and their consequences in Chile. Previous studies suggest a coexistence of independent and interdependent values due to cultural change in Chile. This brings up the question about the consequences of this coexistence of independent and interdependent values. Moreover, our

findings indicate that restrictive control and behavior regulation might play a crucial role for school achievement in a European as well as in a Latin American context.

4 Mothers' Level of Education and Children's School Achievement in Chile: The Role of Behavior Regulation (Study 3)

Abstract

The present study investigated the relation between mothers' level of education and children's school achievement in Chile. Further, the study examined, whether this relation can be explained by mothers' values, maternal restrictive control, and children's behavior regulation. The sample consisted of 167 Chilean fourth graders, their mothers, and their teachers. Mothers' values and maternal restrictive control were rated by mothers. Mothers, teachers, and children evaluated children's behavior regulation. School achievement was assessed as grades for language and mathematics. Regression analyses revealed positive relations between mothers' level of education and children's school achievement after controlling for intelligence, age, and gender. Analyses using a bootstrapping method revealed that these relations were partly explained by mothers' values, maternal restrictive control, and children's behavior regulation. Children's behavior regulation played an especially important role to explain relations between mothers' level of education and children's school achievement. Results are discussed within the theoretical framework of developmental conditions and outcomes of behavior regulation in cultural contexts.

4.1 Introduction

The importance of mothers' level of education for children's school achievement has been well documented. Several studies consistently showed positive relations between mothers' educational level and children's school achievement (e.g., Davis-Kean, 2005; Magnuson, 2007). However, little is known about the processes through which mothers' level of education influences children's school achievement. Recent studies suggest that children's behavior regulation could play a role in explaining relations between mothers' education and children's school achievement (Sektnan et al., 2010; Størksen et al., 2014). However, by solely investigating relations between mothers' level of education, children's behavior regulation and school achievement, these studies neglected to examine developmental conditions for children's behavior regulation and school achievement. In the present study, we were interested to find out which role mothers' values and parenting practices as well as children's behavior regulation play for the effect of mother's education on children's school

achievement. Thus, the present study expands the scope of previous research by adopting a socialization perspective and taking into account mothers' values and parenting practices as developmental conditions. Moreover, most of previous studies have been conducted in Northern American or European contexts and neglected to study the role of cultural contexts. We conducted the present study in Chile, a country with high segregation in its educational system, in order to contribute to a better understanding of intra-cultural differences in children's school achievement in Chile. In sum, we investigated whether relations between mothers' level of education and children's school achievement can be explained by mothers' values, parenting practices, and children's behavior regulation in Chile.

4.1.1 Mothers' Level of Education, Children's Behavior Regulation, and School Achievement

Although the predictive role of mothers' level of education on children's school achievement has been clearly demonstrated across countries and even belongs to the most replicated results from developmental studies (Magnuson, 2007), it has not been clarified yet by which underlying processes these relations can be explained. In the literature, several factors have been discussed, amongst others, school variables (e.g., Martins & Veiga, 2010), the quality of home environment (e.g., Magnuson, 2007), and the stimulation of reading (e.g., Herrera, De Gregori, & Garbarini, 2005).

Current research indicated that children's behavior regulation could contribute to explain relations between mothers' education and children's school achievement (Sektnan et al., 2010; Størksen et al., 2014). Behavior regulation is the behavioral aspect of the broad concept self-regulation. Self-regulation is defined as management of behavior and emotion with the purpose of goal-directed action (Blair et al., 2015; McClelland et al., 2007). Behavior regulation, which is a component of self-regulation, is understood as the motivation and ability to pay attention, follow rules, resist temptation, and inhibit impulsive behavior (e.g., Calkins, 2007; McClelland et al., 2007). As these skills are necessary to follow instructions and to concentrate on tasks, behavior regulation is necessary for school success. Past research has shown the important role of behavior regulation for school achievement in preschoolers and primary school children, even after controlling for intelligence (e.g., Blair et al., 2015; McClelland et al., 2007; Suchodoletz et al., 2009; Weis et al., 2013). Recent research specified the abilities to sustain attention, to organize complex information, and to inhibit

impulsive responses as underlying mechanisms for the influence of behavior regulation on school achievement (Blair et al., 2015).

Further, previous studies showed positive relations between mothers' level of education and children's behavior regulation (e.g., Sektnan et al., 2010; Wanless et al., 2011). Because there is evidence that (a) mothers' level of education impacts children's behavior regulation and school achievement, and (b) behavior regulation is positively related to school achievement, we argue that children's behavior regulation could be one of the factors that explain the relation between mothers' education and children's school achievement. Størksen et al. (2014) showed in a study with five year old children in Norway that parental socio-economic background impacts children's school achievement, and that this relation may partly be mediated through behavior regulation. Similarly, Sektnan et al. (2010) showed with a longitudinal study that low maternal education had significant negative effects on school achievement in first graders. They found indirect effects of maternal education, through 54-month and kindergarten behavior regulation to first-grade school achievement. The authors underline the importance of behavioral regulation for school success especially for children of mothers with low level of education. However, these previous studies leave the question unanswered how mothers' level of education influences child outcomes (including behavior regulation and school achievement). In the present study, we investigated whether relations between mothers' education and children's school achievement are mediated by behavior regulation. Further, we extended previous research by adopting a socialization perspective including mothers' values and parenting practices as developmental conditions for children's behavior regulation and school achievement. The relevance of mothers' values and parenting practices for relations between mothers' educational level and children's outcomes is addressed in the following section.

4.1.2 The Role of Mothers' Values and Maternal Restrictive Control for Relations between Mothers' Level of Education and Child Outcomes

In general, it can be assumed that the development of individuals is embedded in several contexts (micro-, meso-, exo-, macro-, and chronosystem; Bronfenbrenner, 1979). Applying Bronfenbrenners' (1979) ecological systems theory, mothers' level of education is part of the macrosystem and as such a distal factor influencing the child's development. The influence of mothers' level of education as a distal factor might be mediated by more proximal factors of the microsystem as for instance by parenting practices. Kağitçibasi (1996)

claims that the socio-economic and cultural context influences parental values, which in turn affect parenting practices. According to Trommsdorff (2012; in press), the development of behavior regulation is embedded in culturally influenced socialization conditions such as parents' values and parenting practices. Parents' values influence parenting practices and thereby the development of behavior regulation and school achievement (Trommsdorff, in press). Davis-Kean (2005) found, in a study with eight to twelve year old children and their parents in the US, that the influence of mothers' level of education on children's school achievement was mediated by parenting practices. In the present study, we investigated the role of mothers' values as well as the role of mothers' parenting practices for relations between mothers' educational level and children's outcomes (behavior regulation, school achievement).

We understand values, according to Schwartz' (1992) definition, as desirable goals which serve as guiding principles in life. Schwartz (1992) has developed a theory of basic human values which describes ten basic values (power, achievement, hedonism, stimulation, self-direction, universalism, benevolence, tradition, conformity, security) with distinct motivational goals. Because there is little published research about relations between values, level of education, and parenting practices, we chose an explorative approach to find out which of the ten values are relevant. Our explorative analyses (see Appendix C) revealed that only the values universalism and benevolence are related to both, mothers' level of education and parenting practices. Thus, in the present study, we focused on universalism and benevolence values. Universalism means to understand, appreciate, tolerate, and protect the welfare of all people and nature. Benevolence is defined as caring for ingroup members by being helpful, honest, forgiving, loyal, and responsible. According to Schwartz' (1992) model, we aggregated universalism and benevolence values into the higher order value self-transcendence. Self-transcendence values, which include universalism and benevolence, are concerned with the enhancement of others and the transcendence of selfish interests (Schwartz, 1992). Hence, people who value self-transcendence highly, value altruism, unselfishness, and tolerance.

Educational experiences can influence people's values. A higher formal education goes along with intellectual openness, flexibility, and breadth of perspective (Kohn & Schooler, 1983). Schwartz' (2007) large-scale study in 20 countries showed that universalism values are higher among people who attend university. He argues that university education leads to a broadening of horizons and therewith to higher universalism values. Further, persons with high universalism values might tend to seek higher education (Schwartz, 2007).

Hence, we expected positive relations between mothers' level of education and self-transcendence values.

According to Darling and Steinbergs' (1993) model, parental values influence parenting practices which in turn have a direct effect on children's developmental outcomes. Hence, parenting practices can be seen as a mechanism through which parental values affect the child (Darling & Steinberg, 1993). Thus, mother's values may affect children's behavior regulation and school achievement indirectly through maternal behavior. To our knowledge, there is little published research about relations between self-transcendence values and parenting practices in particular. In general, people who value self-transcendence highly show little autocratic interpersonal behavior (i.e., manipulative, controlling, dominating, and aggressive behavior) (Schwartz et al., 2001). Schwartz et al. (2001) found in a study with Israeli university students negative relations between self-transcendence values and autocratic behavior. Autocratic interpersonal behavior might be comparable to the parenting practice "restrictive control" (e.g., to punish child without explanation). "Restrictive control" is understood as aggressive, strict, and critical parenting behavior, typically including anger, harshness, and intrusive control (Karreman et al., 2006). As described above, self-transcendence values include caring for the welfare of others, responding to their needs, and supporting them (Schwartz, 1992). Mothers who value self-transcendence highly aim to understand, appreciate, and tolerate others. They want to be helpful, forgiving, and loyal with close others. Therefore, due to their values, they might show little restrictive control towards their children. Thus, we assume negative relations between mothers' self-transcendence values and maternal restrictive control.

Maternal restrictive control, in turn, directly effects children's developmental outcomes. Past research has shown negative relations of maternal restrictive control with children's behavior regulation (e.g., Karreman et al., 2006) as well as with school achievement (Grolnick & Ryan, 1989; Dornbusch et al., 1987). Further, evidence shows that behavior regulation mediates the link between parenting (e.g., restrictive control) and school achievement (Wong, 2008). The negative influence of maternal restrictive control on children's behavior regulation might be rooted in development processes. Behavior regulation develops from external to internal regulation. While infants are regulated mostly by caretakers (external), children learn with increasing age to regulate their behavior on their own (internal) (Kopp, 1982). This shift from external to internal regulation (internalization) is promoted by supportive parenting. Parents foster the internalization of children's behavior regulation by autonomy support, warmth, responsiveness, and positive control (Davidov & Grusec, 2006;

Deci & Ryan, 1985; Grolnick & Ryan, 1989; Röder & Rösler et al., 2014; Suchodoletz et al., 2011). In contrast, high maternal restrictive control may impede the development of children's internal behavior regulation because of high external regulation. It is important to distinguish between different forms of parental control. While positive control (i.e., communication of clear expectations and limits, instructions, and encouragements) may promote the development of behavior regulation, restrictive control may undermine the child's internalization of autonomous behavior regulation processes (Grolnick & Ryan, 1989; Karreman et al., 2006). Deci and Ryan's (1985) self-determination theory substantiates the assumption that maternal restrictive control influences children's behavior regulation negatively. According to self-determination theory, external control encourages defiance or compliance but hinders the internalization of behavior regulation (Deci & Ryan, 1985). The internalization of behavior regulation is facilitated by the experience of autonomy, a sense of choice, volition, and freedom from excessive external pressure (Ryan & Deci, 2000). Thus, maternal restrictive control, involving punishments without explanations, strict, and critical parenting behavior can be understood as a form of external control which hinders the internalization of children's behavior regulation. Consequently, we assume negative relations between maternal restrictive control and children's behavior regulation. Further, we assume that mothers' values and parenting practices (restrictive control) function as mediators between mothers' level of education and children's outcomes.

4.1.3 Chile as Cultural Context

Most studies on parenting and behavior regulation have been conducted in the northern hemisphere, but neglected to take into account the role of cultural contexts for the development of behavior regulation (Trommsdorff, 2009). Thus, it is important to explore theoretical models on behavior regulation in other cultural contexts, particularly in South America. Therefore, we conducted the present study in Chile. Chile is a country with a high level of school segregation at the international level (Bellei, 2013). Valenzuela (2008) found with data from PISA 2006 that Chile belongs to the OECD countries with the highest segregation indices regarding parents' socio-economic level (including mothers' level of education) and children's school achievement. In Chile, children whose parents have a low socio-economic status study in public schools which have a low budget, while children from families with high socio-economic status study in private schools which have a higher budget because of parents' payment. This socio-economic segregation entails intra-cultural

differences as well as differences in academic outcomes (Bellei, 2013; Cornejo & Redondo, 2007). Similar to studies in Europe and the US (e.g., Davis-Kean, 2005; Magnuson, 2007), studies in Chile showed positive relations between mothers' level of education and children's school achievement (e.g., Herrera et al., 2005). As Chile is a country with high inequalities in its educational system, it is of particular importance to investigate underlying processes of the influence of mothers' education on children's school achievement in this country. Therefore, we investigated the roles of mothers' values, parenting practices, and children's behavior regulation for relations between mothers' level of education and children's school achievement in Chile.

It is important to consider that political and economic changes of the last two decades might have led to changes in values and parenting practices in Chile. Political changes (the fall of the dictatorship and the re-democratization in 1990) in combination with the fast economic growth might have resulted in a rejection of authoritarian values (Martínez et al., 2006). Changes in values in turn might have changed parental practices of the Chileans. Martínez et al. (2006) found that today's Chilean parents do not like to enforce rules, and they report to use less restrictive control than did their own parents. However, political and economic changes might not have affected all individuals in the same way. As Chile's high income inequality indicates (GINI index = 50.8; World Bank, 2014), only parts of the population benefited from the country's economic growth. Thus, changes in values and parenting practices might differ depending on individuals' socio-economic level. Therefore, we were interested in the influence of mothers' level of education (as aspect of socio-economic status) on values and parenting practices. Hence, we investigated relations between mothers' level of education, mothers' values, and maternal restrictive control in Chile.

4.1.4 Study Aims and Hypotheses

In the present study, we firstly investigated the role of children's behavior regulation for the relation between mothers' level of education and children's school achievement. Secondly, we proposed that due to socialization processes, mother's level of education impacts children's behavior regulation through mothers' values and parenting behavior. Thirdly, the present research examined whether mothers' level of education affects children's school achievement indirectly through mothers' values, parenting behavior, and children's behavior regulation.

Mothers' level of education, children's behavior regulation, and school achievement. Based on previous findings, we hypothesized that the higher mothers' level of education, the higher is children's school achievement (Hypothesis 1). In line with past research, we expected that the higher children's behavior regulation, the higher is their school achievement (Hypothesis 2). Further, we expected that the relation between mothers' level of education and children's school achievement is mediated by children's behavior regulation (Hypothesis 3).

Mothers' level of education, values, restrictive control, and children's behavior regulation. In addition, we examined relations between mothers' level of education and self-transcendence values (Research Question 1) as well as between mother's self-transcendence values and maternal restrictive control (Research Questions 2). Based on previous findings, we hypothesized that in case of less restrictive control of mothers, children's behavior regulation is higher (Hypothesis 4). Moreover, we hypothesized that the relation between mothers' level of education and children's behavior regulation is mediated by mothers' self-transcendence values and maternal restrictive control (Hypothesis 5). In addition, we examined the differential contribution of mothers' level of education, self-transcendence values, and restrictive control for children's behavior regulation (Research Question 3).

Mothers' level of education, values, restrictive control, children's behavior regulation, and school achievement (complete model). To test the complete model, we further investigated whether the association between mothers' level of education and children's school achievement is mediated by mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation (Hypothesis 6). Finally, we analyzed the differential contribution of mothers' level of education, self-transcendence values, restrictive control, and children's behavior regulation for children's school achievement (Research Question 4).

4.2 Methods

4.2.1 Participants

Data for this study derive from 167 Chilean (56 boys, 111 girls) fourth graders, their mothers, and teachers who participated in the study in 2013. Children's mean age was 10.16 years (*SD* = .42). Students attended nine different fourth grade classes in four schools in a large city in Central Chile. The sample was recruited in two public and in two private schools to represent the socio-economic segregation of the Chilean education system.

4.2.2 Procedure

Prior to participation of the children in the study, parents and teachers provided written informed consent. Children participated in group sessions at school which lasted about 1.5 hours. The group sessions included a nonverbal intelligence test and a behavior regulation questionnaire. Mothers and teachers answered paper-and-pencil questionnaires at home. The mothers' questionnaire included questions on mothers' level of education, values (e.g., self-transcendence values), parenting practices (e.g., restrictive control) as well as on children's behavior regulation, age, and gender. Teachers provided information about children's behavior regulation and school achievement (language and mathematics grades). All teachers and mothers who participated in the study received feedback of the main results.

4.2.3 Measures

Assessment of level of education

To measure mothers' level of education, a scale on educational qualification, adapted to the Chilean education system, was used (see Appendix D). Mothers reported their highest level of education on the scale, ranging from 1 (= *incomplete primary education*) to 9 (= *postgraduate studies*). Mothers' mean level of education was 5.58 (*SD* = 2.17). For the frequency distribution of mothers' level of education see Appendix D.

Assessment of values

To assess mothers' self-transcendence values, the *Portraits Value Questionnaire* (PVQ) from Schwartz et al. (2001) was used. Verbal portraits of five people that point to the importance of universalism, e.g. "She thinks it is important that every person in the world

should be treated equally. She believes everyone should have equal opportunities in life." and benevolence, e.g., "It's very important to her to help the people around her. She wants to care for their well-being." were given. Mothers answered on a 6-point scale (1 = *not like me at all* to 6 = *very much like me*) how much these portrayed persons are like them. As Schwartz et al. (2001) suggest that scale use differences can distort findings, each individual's mean score across all 21 items of the whole questionnaire was computed (MRAT) and subtracted from each value to correct for scale use. The higher order value self-transcendence was calculated as a mean of the values universalism and benevolence. Reliability analyses revealed a Cronbach's α of .63 for self-transcendence.

Assessment of maternal restrictive control

To assess maternal restrictive control, the *Parenting Practice Questionnaire* (PPQ) from Robinson et al. (1995) was used. Mothers reported how often they show certain behaviors when interacting with their children by answering items on a 5-point rating scale (from 1 = *never* to 5 = *always*). A maternal restrictive control scale with eight items was generated (see Appendix A). Maternal restrictive control items implied direct parental control characterized by punishment and compliance without reasoning, e.g., "I use threats as punishment with little or no justification". Reliability analyses revealed a Cronbach's α of .76.

Assessment of behavior regulation

In order to measure behavior regulation, the short version of the *Self-Control Scale* (SCS) from Tangney et al. (2004) was administered. Teachers and mothers evaluated children's behavior regulation answering 13 items on a 5-point scale (1 = *not at all* to 3 = *very much*). Moreover, the same items were answered by children as self-report; e.g., "I am able to work effectively toward long-term goals". Reliability analyses revealed a Cronbach's α of .93 for teachers' evaluation, a Cronbach's α of .81 for mothers' evaluation, and a Cronbach's α of .72 for children's self-evaluation. Pearson correlations revealed that mothers' and teachers' evaluations of children's behavior regulation were significantly positively correlated (r = .38, p < .01). Further, children's self-evaluation were significantly positively correlated with mothers' (r = .35, p < .01) and teachers' evaluations (r = .35, p < .01). Accordingly, mothers', teachers', and children's evaluations of behavior regulation were averaged to increase the validity of the behavior regulation measure.

Assessment of school achievement

School achievement was assessed by language (Spanish) and mathematics grades. Grades were assessed by teachers' reports of the fourth grade midterm reports. Grades were coded according to the Chilean grade system ranging from 1 (= not sufficient/fail) to 7 (= very good). Pearson correlations revealed that language and mathematics grades were significantly positively correlated (r = .72, p < .01). Accordingly, language and mathematics grades were averaged into a school achievement score.

Assessment of intelligence

To measure children's nonverbal intelligence, the *Raven's Progressive Matrices* (Raven, 1957) were administered.

4.2.4 Data Analysis

To investigate relations of children's age, gender, and intelligence with mothers' variables (level of education, self-transcendence values, restrictive control) and children's outcomes (behavior regulation, school achievement), Pearson correlations were computed. In order to test relations among mothers' level of education, self-transcendence values, maternal restrictive control, children's behavior regulation and school achievement as well as to test for mediation, mediation models were tested by using the bootstrapping method PROCESS by Hayes (2013). Five thousand bootstrap samples were drawn. Indirect effects, based on 95% confidence intervals (CI), are significant when the CI values do not cross zero. Unstandardized coefficients (b) are reported for each regression equation. Further, multiple regression analyses were conducted to specify the differential contribution of predictor and mediator variables for children's outcomes (behavior regulation, school achievement).

4.3 Results

Pearson correlations revealed positive relations of control variables (gender, intelligence) with mothers' level of education and children's outcomes (behavior regulation, school achievement) (see Table 5).

Table 5 *Pearson Correlation Matrix (Study 3)*

	1	2	3	4	5	6	7	8
1. Mother's Level of Education	–	.25**	-.31**	.21**	.36**	-.03	-.01	.18*
2. Mother's Self-Transcendence		–	-.33**	.17*	.16*	-.15	-.07	.04
3. Maternal Restrictive Control			–	-.47**	-.21**	.03	-.13	-.03
4. Child's Behavior Regulation				–	.53**	.09	.21**	.11
5. Child's School Achievement					–	-.06	.05	.42**
6. Child's Age						–	-.05	.04
7. Child's Gender							–	-.18*
8. Child's Intelligence								–

$N = 167$; $^{*}p < .05$; $^{**}p < .01$.

We computed multiple mediation models to test relations between variables as well as to test for mediation effects. Three mediation models were tested separately. In all models, mothers' level of education was regarded as an independent variable. In the first model, children's school achievement was included as a dependent variable and children's behavior regulation as a mediator variable. In the second model, behavior regulation was regarded as a dependent variable and, mothers' self-transcendence values and maternal restrictive control were entered as mediator variables. In the third model, school achievement was entered as a dependent variable, while mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation were included as mediator variables. In all models, children's age, gender, and intelligence were included as control variables.

Figure 4 shows the results of the first mediation model with mothers' level of education as an independent, children's behavior regulation as a mediator, and children's school achievement as a dependent variable. The mediation model showed that mothers' level of education was significantly and positively related to children's school achievement. Further, behavior regulation was significantly and positively related to children's school achievement. We found positive relations between mothers' level of education and children's behavior regulation. The mediation analyses revealed a significant positive indirect effect of mothers' level of education on children's school achievement through children's behavior regulation (indirect effect = .027, *SE* = .011, 95% CI [.007, .052]).

Figure 5 shows the results of the second mediation model with mothers' level of education as an independent and children's behavior regulation as a dependent variable. Mothers' self-transcendence values and maternal restrictive control were entered as mediator variables, in this order. The mediation model showed positive relations between mothers' level of education and mothers' self-transcendence values. Mothers' self-transcendence values were significantly and negatively related to maternal restrictive control. Maternal restrictive control was significantly negatively associated with children's behavior regulation. Moreover, mothers' self-transcendence values and maternal restrictive control significantly mediated the association among mothers' level of education and children's behavior regulation as the total effect *c* was significant, while the direct effect *c'* was non-significant (indirect effect = .008, *SE* = .004, 95% CI [.002, .019]).

To determine the differential contribution of predictor and mediator variables for children's behavior regulation, multiple regression analyses were computed. In step 1, mothers' level of education and control variables (children's age, gender, and intelligence) were entered in the regression analyses. Next, in step 2, mothers' self-transcendence values were entered as a predictor and in step 3 maternal restrictive control was entered as additional predictor. Table 6 shows the results of the regression analyses with behavior regulation as dependent variable. Model 1 with mothers' level of education and control variables as predictors was significant and accounted for 11% of the variance. The inclusion of mothers' self-transcendence values into model 2 resulted in an additional 2% of variance explained, which was significant. Model 3 included maternal restrictive control which resulted in an additional 14% of variance explained. The increase in explained variance was significant. This final model accounted for 25% of the variance (Adjusted R^2 = .25).

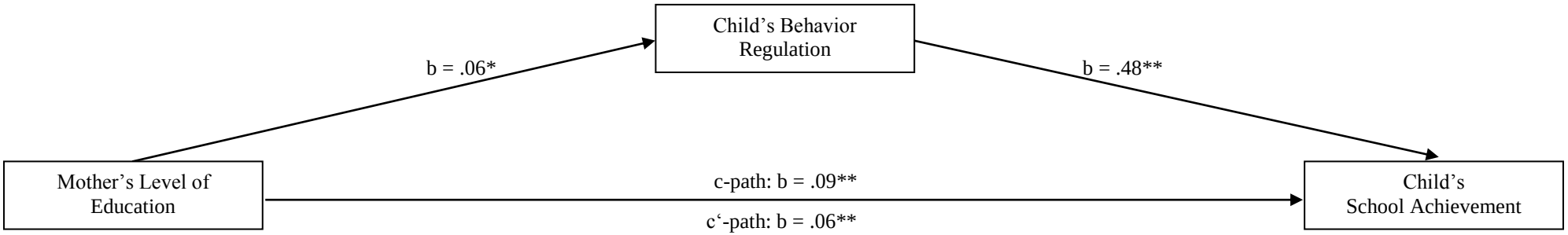

Figure 4. Multiple mediation test of the relation between mother's level of education and child's school achievement mediated by child's behavior regulation. (Study 3)
N = 167; b = unstandardized regression coefficient, controlled for child's age, gender, and intelligence; **p* < .05; ***p* < .01.

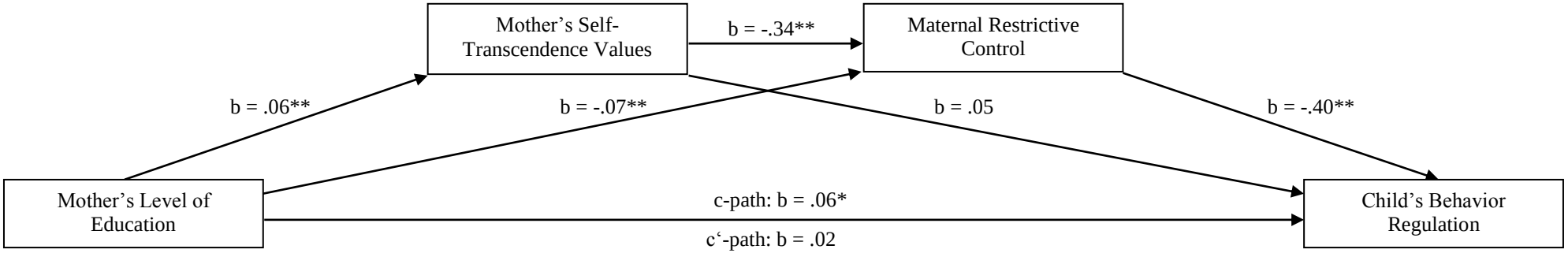

Figure 5. Multiple mediation test of the relation between mother's level of education and child's behavior regulation mediated by mother's self-transcendence values and maternal restrictive control. (Study 3)
N = 167; b = unstandardized regression coefficient, controlled for child's age, gender, and intelligence; **p* < .05; ***p* < .01.

Table 6 *Regression Analysis to predict Child's Behavior Regulation (Study 3)*

	Child's Behavior Regulation			
	ΔR²	*B*	*SE B*	*β*
Step 1	.11**			
Mother's Level of Educational		.06	.02	.20*
Child's Age		.15	.11	.10
Child's Gender		.31	.10	.23**
Child's Intelligence		.02	.02	.11
Step 2	.02*			
Mother's Level of Educational		.05	.02	.16*
Child's Age		.19	.11	.12
Child's Gender		.32	.10	.24**
Child's Intelligence		.02	.02	.11
Mother's Self-Transcendence		.18	.09	.16*
Step 3	.14**			
Mother's Level of Educational		.02	.02	.06
Child's Age		.17	.10	.11
Child's Gender		.24	.09	.18*
Child's Intelligence		.02	.01	.12
Mother's Self-Transcendence		.05	.08	.04
Maternal Restrictive Control		-.40	.07	-.41**

$N = 167$; *$p < .05$; **$p < .01$.

Figure 6 shows the results of the third mediation model with mothers' level of education as an independent and children's school achievement as a dependent variable. Mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation were entered as mediator variables, in this order. The mediation analyses revealed significant positive indirect effects of mothers' level of education on children's school achievement through mothers' values, maternal restrictive control, and children's behavior regulation in serial (indirect effect = .004, *SE* = .002, 95% CI [.001, .010]).

Further, multiple regression analyses, with children's school achievement as dependent variable, were computed to quantify the relative contribution of each predictor and mediator variable for children's school achievement. The results of the regression analyses are presented in Table 7. Regression analyses revealed that model 1 with mothers' level of education and control variables as predictors was significant. Model 1 accounted for 28% of the variance of children's school achievement. The inclusion of mothers' self-transcendence values and maternal restrictive control in models 2 and 3 did not account for significant additional variance explained. The final model 4 included children's behavior regulation which resulted in an additional 19% of variance explained. This increase in explained variance was significant. The final model accounted for 45% of the variance (Adjusted R^2 = .45) of children's school achievement.

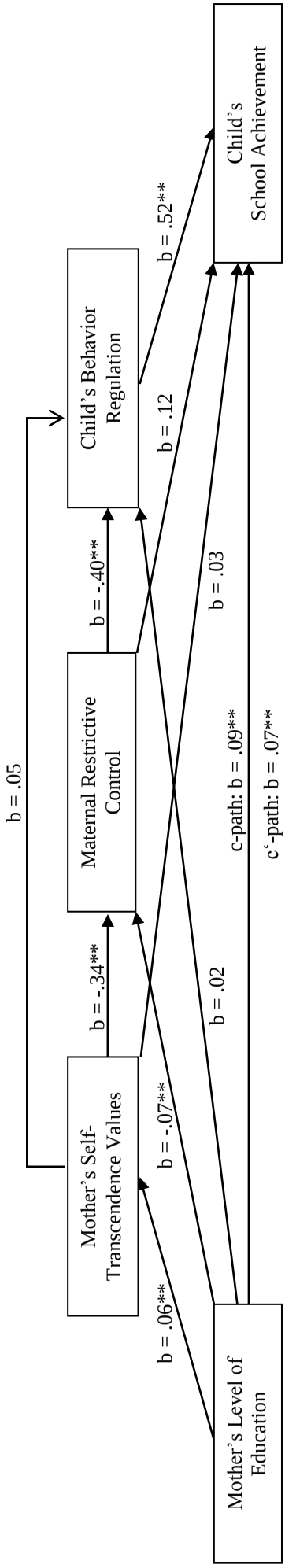

Figure 6. Multiple mediation test of the relation between mother's level of education and child's school achievement mediated by mother's self-transcendence values, maternal restrictive control, and child's behavior regulation. (Study 3)
N = 167; b = unstandardized regression coefficient, controlled for child's age, gender, and intelligence; **p* < .05; ***p* < .01.

Table 7 *Regression Analysis to predict Child's School Achievement (Study 3)*

	Child's School Achievement			
	ΔR²	*B*	*SE B*	*β*
Step 1	.28**			
Mother's Level of Educational		.09	.02	.29**
Child's Age		-.10	.10	-.06
Child's Gender		.16	.09	.12
Child's Intelligence		.08	.01	.39**
Step 2	.01			
Mother's Level of Educational		.08	.02	.27**
Child's Age		-.08	.11	-.05
Child's Gender		.17	.09	.12
Child's Intelligence		.08	.01	.39**
Mother's Self-Transcendence		.09	.08	.08
Step 3	.01			
Mother's Level of Educational		.07	.02	.25**
Child's Age		-.08	.11	-.05
Child's Gender		.15	.09	.11
Child's Intelligence		.08	.01	.39**
Mother's Self-Transcendence		.06	.09	.05
Maternal Restrictive Control		-.09	.07	-.09
Step 4	.19**			
Mother's Level of Educational		.07	.02	.22**
Child's Age		-.17	.09	-.11
Child's Gender		.02	.08	.02
Child's Intelligence		.07	.01	.33**
Mother's Self-Transcendence		.03	.07	.03
Maternal Restrictive Control		.12	.07	.12
Child's Behavior Regulation		.52	.07	.51**

$N = 167$; $*p < .05$; $**p < .01$.

4.4 Discussion

The present study revealed positive relations between mothers' level of education and children's school achievement in Chile. Extending previous research, the study showed that these relations were partly explained by mothers' values, maternal restrictive control, and children's behavior regulation. To predict differences in school achievement based on mothers' level of education, children's behavior regulation seems to play an especially important role. Moreover, mothers' values and maternal restrictive control play a central role explaining the relation between mothers' level of education and children's behavior regulation.

Mothers' level of education, children's behavior regulation, and school achievement. As hypothesized, mothers' level of education was positively related to children's school achievement (Hypothesis 1). This result is consistent with numerous studies, which showed positive relations between mothers' level of education and children's school achievement (e.g., Davis-Kean, 2005; Herrera et al., 2005; Magnuson, 2007). In order to get deeper insights about the processes through which mothers' level of education influences children's school achievement and based on previous theoretical and empirical research (e.g., Sektnan et al., 2010; Størksen et al., 2014), we first investigated whether children's behavior regulation explains the positive relation between mothers' education and children's school achievement. In line with our hypotheses, behavior regulation was positively related to school achievement (Hypothesis 2). The central function of behavior regulation for school achievement has been demonstrated in several studies in Western societies (e.g., Blair et al., 2015; McClelland et al., 2007; Suchodoletz et al., 2009; Weis et al., 2013) (for East Asian societies see Trommsdorff, in press). Hence, the replication of these results in a South American context strengthens the theoretical framework underlining the importance of behavior regulation for school achievement.

Moreover, the results of the present study revealed that behavior regulation partly explained relations between mothers' level of education and children's school achievement (Hypothesis 3). These results are in line with our expectations and previous studies, which have found that relations between mothers' education and children's school achievement were mediated by behavior regulation (Størksen et al., 2014; Sektnan et al., 2010). Next, to examine developmental conditions for children's behavior regulation and school achievement, we adopted a socialization perspective by taking into account mothers' values (self-transcendence values) and parenting practices (restrictive control).

Mothers' level of education, values, restrictive control, and children's behavior regulation. Mothers' level of education and mothers' self-transcendence values were positively related (Research Question 1). As self-transcendence values include universalism and benevolence values, this finding is in line with Schwartz' (2007) assumption about positive relations between level of education and universalism values. Mothers with high formal education might have broadened their horizon through education. Thus, they might value self-transcendence, i.e. altruism, unselfishness, and tolerance, to a greater extent due to their higher education.

Further, we found negative relations between mothers' self-transcendence values and maternal restrictive control (Research Question 2). As there is little previous research which investigated specific relations between values and parenting practices, the present study revealed new insights confirming our theoretical assumptions about negative links between self-transcendence values and restrictive control. Mothers who value self-transcendence highly might show little maternal restrictive control because they aim to be helpful, appreciating, and loyal with others. Further, this result fits with the study from Schwartz et al. (2001) which showed negative relations between self-transcendence values and autocratic behavior (i.e., controlling, dominating, and aggressive behavior), as autocratic behavior might be comparable to the aggressive, strict, and critical maternal restrictive control. Thus, mothers with a higher level of education value self-transcendence to a greater extent and use less restrictive control than mothers with a lower level of education.

Moreover, as we expected, maternal restrictive control was negatively associated with children's behavior regulation (Hypothesis 4). This result confirms our theoretical assumption about the undermining function of maternal restrictive control for the development of children's behavior regulation and is consistent with previous studies (e.g., Karreman et al., 2006). As maternal restrictive control is a parenting practice with high external regulation (e.g., involving punishments without explanations and strict parenting), it rather hinders children's internalization of behavior regulation.

Mothers' level of education, values, restrictive control, children's behavior regulation, and school achievement (complete model). Further, as hypothesized, the present study revealed that relations between mothers' level of education and children's school achievement were partly explained by mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation (Hypothesis 6).

Moreover, the present study explored the differential contribution of mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation on the relation between mothers' level of education and children's school achievement (Research Question 4). Considering interrelations among mothers' self-transcendence values, maternal restrictive control, and children's behavior regulation, our study shows that children's behavior regulation mostly explained the positive relation between mothers' level of education and children's school achievement. This finding emphasizes the central function of children's behavior regulation to predict differences in school achievement based on mothers' level of education. We explain the important role of children's behavior regulation for school achievement according to Blair et al. (2015), as based on the ability to sustain attention, to organize complex information, and to inhibit impulsive responses.

The results of the present study indicated that mothers' self-transcendence values and maternal restrictive control are of minor importance than children's behavior regulation to explain the positive relation between mothers' education and children's school achievement. However, the study showed that mothers' self-transcendence values and maternal restrictive control are of central importance to explain relations between mothers' level of education and children's behavior regulation (Hypothesis 5, Research Question 3). Herewith, our assumption that mothers' self-transcendence values and maternal restrictive control explain relations between mothers' level of education and children's outcomes was confirmed for children's behavior regulation (Hypothesis 5). This result underlines the need of adopting a socialization perspective including mothers' values and parenting practices to understand the development of behavior regulation. Regarding children's school achievement, behavior regulation intermediated the important roles of mothers' self-transcendence values and maternal restrictive control. Hence, this study shows that children's behavior regulation is of central relevance to detect effects of mothers' self-transcendence values and maternal restrictive control on relations between mothers' level of education and children's school achievement.

Interestingly, mothers' values were not related to children's behavior regulation directly, but indirectly through maternal restrictive control. This result is consistent with Darling and Steinbergs' (1993) model, which claims that parental values influence developmental outcomes of the child indirectly through parental practices which in turn directly affect child development. Our results indicate that maternal restrictive control might be a mechanism through which mothers' values influence children's behavior regulation and school achievement.

To conclude, the present study revealed that it is important to consider mothers' values, maternal restrictive control, and children's behavior regulation when investigating effects of mother's level of education on children's school achievement. While children's behavior regulation directly influences relations between mother's level of education and children's school achievement, mothers' values and maternal restrictive control indirectly influence the relations via children's behavior regulation. This result, in turn, further underlines the central function of children's behavior regulation. Besides the considerable direct impact of behavior regulation on school achievement, behavior regulation seems to have an important mediating function for the effect of mothers' level of education, values and restrictive control on children's school achievement. Hence, some effects of mothers' values and parenting practices on differences in children's school achievement based on mothers' level of education are only found via the child's behavior regulation.

Cultural changes regarding mother variables in Chile. Martínez et al. (2006) postulated that political changes and the fast economic growth in Chile resulted in a rejection of authoritarian values and less restrictive control in Chilean parents. However, our results indicate that these changes in values and restrictive control might differ depending on mothers' level of education. Individuals with low socio-economic (including low level of education), who did not benefit from economic growth, might rather stick to traditional values and parenting practices. The results of the present study showed negative relations between mothers' level of education and maternal restrictive control. Thus, mothers with lower level of education use more restrictive control than mothers with higher level of education. In turn, children of mothers who often use maternal restrictive control show lower behavior regulation and poorer school achievement.

4.4.1 Strengths and Limitations

The present study extended previous studies by considering mothers' values and restrictive control as well as children's behavior regulation to explain relations between mothers' level of education and children's school achievement. However, given the complexity of the relations and influences between mothers' education and children's school achievement, other variables might be of relevance. For instance, contextual school variables as effectiveness of teachers, school quality, and socio-economic background of peers could play a role (e.g., Martins & Veiga, 2010; Valenzuela, 2008). Future studies should include

contextual school variables in addition to psychological mother and child variables. Moreover, future research investigating the role of further parental values (e.g., conservation, culture-specific values) and aspects of parenting practices (e.g., autonomy support, warmth) is desirable.

A strength of this study is, that it was conducted in Chile, a country with high educational inequalities. The results contribute to a better understanding of intra-cultural differences in children's school achievement in Chile. However, as behavior regulation develops according to culture-specific models of agency (Trommsdorff, 2009), longitudinal studies in diverse cultural contexts are needed to draw causal conclusions concerning the influence of mothers' level of education, values, and parenting practices on the development of children's behavior regulation and school achievement.

A limitation of the present study is, that mothers' variables were solely assessed by questionnaire based self-reports. As differences based on mothers' levels of education might appear due to comprehension problems or response bias, future studies should include further measures as observation, interviews, or focus groups.

4.4.2 Conclusions

The present study showed the importance of behavior regulation for school achievement especially for children of mothers with low level of education. Thus, intervention programs which support the development of behavior regulation are necessary to promote school achievement of children who have mothers with low education (Röder & Rösler et al., 2014; Sektnan et al., 2010). For instance, the "Tools of the Mind" preschool intervention program has been shown to be effective in improving children's behavior regulation (Diamond, Barnett, Thomas, & Munro, 2007). According to Blair et al. (2015), effective interventions to promote behavior regulation include the establishment of learning environments that allow for structured, scaffolded, and self-directed learning opportunities. Further, the present study showed that maternal restrictive control might play an important role in restraining the development of children's behavior regulation. Hence, parenting programs which strengthen positive parenting practices (e.g., positive control instead of restrictive control) should be fruitful. However, as our results show that underlying parenting values influence parenting practices, parenting programs might not only focus on concrete parenting practices but also on parents' values. Finally, culture adequate intervention

programs should be established to promote children, and especially children of mothers with low education, in their behavior regulation.

5 General Discussion

Is self-regulation the key to children's school success? Which roles play gender, parenting, and culture? The present dissertation explored these questions in three studies on relations between self-regulation and school achievement by taking into consideration the aspects of gender, parenting, and culture. All three studies revealed that self-regulation indeed plays a crucial role for children's school achievement. Further, interesting effects of gender, parenting, and culture were discovered. Thus, this dissertation highlights the central importance of considering diverse contexts as well as individual differences in gender, parenting, and culture when studying relations between self-regulation and school achievement.

The first study focused on gender differences in self-regulation and school achievement in a German sample of fifth graders. The results showed that gender differences in language achievement favoring girls over boys can be explained by girls' higher behavior regulation. For gender differences in mathematics achievement an interesting suppression effect occurred which showed that boys' mathematics achievement is underestimated when analyses do not control for behavior regulation.

The second study examined relations between maternal restrictive control, children's self-regulation, and school achievement in two cultural contexts (Germany, Chile). Results revealed cultural mean differences in maternal restrictive control and children's self-regulation, but no cultural differences in the relations among the variables. In Germany and in Chile, there were found positive relations between children's behavior regulation and school achievement as well as negative relations between maternal restrictive control and children's behavior regulation.

The third study investigated the role of children's behavior regulation for relations between mothers' level of education and children's school achievement, exploring intra-cultural differences in Chile. Further, the roles of mothers' values and maternal restrictive control were taken into account. The results showed that relations between mothers' level of education and children's school achievement were partly explained by mothers' values, maternal restrictive control, and children's behavior regulation. In particular, children's behavior regulation was shown to play a central role to explain relations between mothers' level of education and children's school achievement.

The following three sections (5.1.1 – 5.1.3) summarize and discuss the results of the three studies separately. Subsequently, overall strengths and limitations as well as conclusions concerning all three studies are discussed (5.2 – 5.3).

5.1 Summary of Results and Implications

5.1.1 Gender, Self-Regulation, and School Achievement (Study 1)

The first study investigated whether self-regulation accounts for gender differences in school achievement in a German sample of fifth graders. Extending previous research, the study approached self-regulation as a two-component concept with behavior and emotion regulation. The study revealed that girls outperformed boys in language achievement. For mathematics achievement, no gender differences were found. These results are consistent with previous studies (e.g., Spinath et al., 2010; Kuhl & Hannover, 2012). Further, the present study found a female advantage in behavior regulation. As hypothesized, behavior regulation was positively related to language and mathematics achievement.

Moreover, the results showed that gender differences in language achievement were partly explained by gender differences in behavior regulation. These results underline the central function of behavior regulation for school achievement. Further, the results emphasize the important role of behavior regulation for gender differences in language achievement. Regarding mathematics achievement, the present study revealed no gender differences. However, when behavior regulation was included, a gender difference in mathematics achievement favoring boys was found. Thus, this study found a suppression effect of behavior regulation on the relation between gender and mathematics achievement. Hence, when analyses do not control for behavior regulation, boys' mathematics achievement is underestimated. Herewith, the present study provides an explanation for inconsistent findings regarding gender differences in mathematics achievement in previous studies (see Hannover & Kessels, 2011). Girls' higher behavior regulation and the positive relation between behavior regulation and mathematics achievement cancel each other out. Therefore, future research on gender differences in school achievement should take into account the possibility that boys' mathematics achievement may be underestimated when analyses do not control for behavior regulation. Moreover, further studies should examine the role of other variables such as stereotype threat which may moderate relations between gender, behavior regulation, and school achievement. With respect to the role of emotion regulation on gender differences in school achievement, results revealed that emotion regulation strategies did not explain gender differences in school achievement. Future studies with larger and more diverse samples are needed to examine whether emotion regulation plays a minor role to explain gender differences in school achievement than behavior regulation or if the effect of emotion

regulation is moderated by other variables as for example by behavior regulation (McClelland & Cameron, 2011) or social competences (Eisenberg et al., 2005).

Another topic for future research is the investigation of gender differences in later life. Although girls outperform boys in school achievement, men achieve higher professional success than women later in life (e.g., Freeman, 2004). Diverse psychological, social, and cultural variables might cause this reversal of gender differences (Duckworth & Seligman, 2006). A recent review from Hosseini-Kamkar and Morton (2014) indicates that gender differences in self-regulation might decrease with age. The review found that gender differences in self-regulation are more consistently reported in children than in adolescents or adults. Thus, the decline of gender-differences in self-regulation might play a role for the disappearance of the female advantage in achievement in later life. Future developmental psychological research should investigate gender differences in self-regulation and achievement across the life span using longitudinal designs.

To sum up, the first study showed the important function of behavior regulation for children's school achievement as well as the central role of behavior regulation for gender differences in school achievement. However, open questions remained regarding the developmental conditions of self-regulation and school achievement in diverse cultural contexts. Self-regulation develops in cultural contexts and parenting may mediate the influence of culture on the development of self-regulation (Trommsdorff, 2012). The consideration of the roles of parenting and culture was not the focus in the first study. The second study included parenting as predictor for children's self-regulation and school achievement. Further, relations between parenting, self-regulation, and school achievement were studied in diverse cultural contexts, namely in Germany and in Chile.

5.1.2 Parenting, Children's Self-Regulation, and School Achievement in Cultural Contexts (Study 2)

The second study dealt with relations between self-regulation and school achievement and took into account the roles of parenting and culture. Socialization conditions for children's development of self-regulation and school competences have rarely been studied by taking into account diverse cultural contexts (Trommsdorff, 2012; Trommsdorff & Cole, 2011). Therefore, the second study examined relations between maternal restrictive control, children's self-regulation and school achievement in a German and in a Chilean sample of

fourth graders. As in the first study, emotion and behavior regulation were included as components of self-regulation.

This study revealed higher behavior regulation and higher anger-oriented emotion regulation for German than for Chilean children. These cultural mean differences in children's self-regulation might be rooted in differences of the cultural contexts. German children might have a higher behavior regulation due to their socialization in an independence-oriented context which fosters the development of behavior regulation from infancy on (e.g., Keller et al., 2011). Further, German children might use anger-oriented emotion regulation strategies more often because the cultural model of independence encourages the instrumental expression of anger to achieve individual goals. In contrast, interdependent values as well as Latin American specific values which endorse interpersonal harmony and discourage the expression of anger might influence Chilean children's emotion regulation strategies (Halgunseth et al., 2006; Triandis et al., 1984; Trommsdorff, 2009; 2012). Further, confirming previous studies with Latino parents (see Halgunseth et al., 2006), this study showed that maternal restrictive control was higher in Chilean than in German mothers.

Moreover, the second study showed that children's behavior regulation and school achievement were related positively in Germany and in Chile. Herewith, the study confirms the important role of behavior regulation for children's school achievement in two diverse cultural contexts. However, in both samples, no relations were found between emotion regulation strategies and school achievement. Future research should study whether emotion regulation effects school achievement indirectly via behavior regulation (McClelland & Cameron, 2011) or via social competences (Eisenberg et al., 2005). Moreover, as hypothesized, maternal restrictive control was related negatively to behavior regulation and positively to anger-oriented emotion regulation in both cultural contexts. These results are consistent with previous literature which claims that maternal restrictive control may hinder children's internalization of self-regulation (e.g., Deci & Ryan, 1985; Grolnick & Ryan, 1989; Karreman et al., 2006). However, relations between maternal restrictive control and children's self-regulation might be bidirectional. Previous longitudinal studies have shown that children's low behavior regulation might result in parental restrictive control which in turn negatively affects children's future behavior regulation (Eisenberg et al., 1999; Karreman et al., 2006). Further, bidirectional parent-child relations might differ cross-culturally (Trommsdorff & Kornadt, 2003). Future longitudinal studies should examine directions and underlying processes of relations between maternal restrictive control and self-regulation in diverse cultural and intra-cultural contexts.

In sum, the second study showed cross-cultural mean differences in maternal restrictive control and children's self-regulation (i.e., behavior regulation, anger-oriented emotion regulation). However, relations between maternal restrictive control, children's self-regulation, and school achievement did not differ between cultures. Herewith, the central function of behavior regulation for school achievement was shown. Further, the study underlined negative relations of maternal restrictive control on children's self-regulation and school achievement in diverse cultural contexts. These results and interpretations of this second study gave rise to the question why some mothers use more restrictive control than other mothers. Further, regarding the Chilean cultural context with its high socio-economic segregation in the educational system, the question of intra-cultural differences in maternal restrictive control, children's self-regulation, and school achievement arose. Therefore, the third study of this dissertation investigated mothers' level of education and mothers' values as possible predictors for maternal restrictive control, children's behavior regulation, and school achievement.

5.1.3 Mothers' Level of Education, Children's Behavior Regulation, and School Achievement (Study 3)

The third and last study of the present dissertation built on the findings on relations between maternal restrictive control, children's self-regulation and school achievement of the second study. In order to take into account the role of intra-cultural differences in Chile, this third study included mothers' level of education and mothers' values as predictors for maternal restrictive control, children's behavior regulation and school achievement. This study investigated in a Chilean sample of fourth graders, whether the relation between mothers' level of education and children's school achievement can be explained by mothers' values, maternal restrictive control, and children's behavior regulation.

In line with our hypotheses and numerous studies (e.g., Herrera et al., 2005; Magnuson, 2007), the results of this study showed that mothers' level of education was positively related to children's school achievement. Moreover, this study examined the processes through which mothers' level of education might influence children's school achievement. The results revealed that mothers' values (self-transcendence values) and parenting practices (restrictive control) as well as children's behavior regulation partly explained the positive effect of mothers' level of education on children's school achievement. Further, the differential contribution of mothers' self-transcendence values, maternal

restrictive control, and children's behavior regulation on the relation between mothers' level of education and children's school achievement was investigated. The study showed that children's behavior regulation mostly explained the relation between mothers' level of education and children's school achievement. Further, mothers' self-transcendence values and maternal restrictive control were of central importance to explain the relation between mothers' level of education and children's behavior regulation. Thus, behavior regulation intermediated the effects of mothers' self-transcendence values and maternal restrictive control on relations between mothers' level of education and children's school achievement. Herewith, children's behavior regulation has been shown to be a central variable: On the one hand children's behavior regulation is crucial for children's school achievement and on the other hand behavior regulation mediates the effect of mothers' values and restrictive control on children's school achievement. Hence, future studies on differences in children's school achievement based on mothers' level of education should consider that some effects of mothers' values and parenting practices might only be found via behavior regulation. Moreover, this study highlights the need to adopt a socialization perspective including mothers' values and parenting practices to understand the development of behavior regulation.

5.2 Strengths, Limitations and Perspectives for Future Research

The present dissertation contributes to the knowledge about developmental conditions and outcomes of self-regulation in contexts. A strength of this dissertation is that gender, parenting, and culture were taken into account to provide a comprehensive picture of self-regulation and school achievement in contexts. Another strength is that the studies included mothers', teachers', and children's evaluations of children's self-regulation. However, the measurement of children's self-regulation by using multiple sources is also a limitation of the studies, as different data sources might lead to artifacts and make it more difficult to draw conclusions. Therefore, further studies should incorporate questionnaire-based measures, direct assessments of self-regulation (behavior and emotion regulation), and multiple-measures strategies. A further strength of the present dissertation is that intelligence was included as a control variable in all three studies. Herewith, the dissertation showed the central function of behavior regulation for school achievement, even after controlling for intelligence. Further, it highlights the important roles of mothers' level of education, values

and parenting practices for children's self-regulation and school achievement beyond effects of intelligence.

A limitation of the study with fifth graders in Germany (Study 1) was that the sample size was rather small and participants' socio-economic background was rather homogeneous from middle-class. Nevertheless, analyses revealed significant effects in the German sample. However, future studies with larger and more diverse samples are desirable to be able to generalize the findings to the German population. In contrast, the Chilean sample was heterogeneous, representing the high socio-economic differences in the Chilean population. The heterogeneity in the socio-economic level of the Chilean sample was a strength of the study which allowed for the investigation of effects of mothers' level of education (Study 3). Herewith, the dissertation contributes to a better understanding of intra-cultural differences in children's self-regulation and school achievement in Chile.

As relations between mothers' values, parenting practices, and children's outcomes (self-regulation, school achievement) might be bidirectional (e.g., Eisenberg et al., 1999; Karreman et al., 2006), future longitudinal studies in diverse cultural contexts are needed to draw causal conclusions about the influence of mothers' values and parenting practices on the development of children's self-regulation and school achievement. These future studies should take into account children's active contribution in shaping socialization processes and should apply the principle of universalism without uniformity that was proposed by Soenens, Vansteenkiste, and Van Petegem (2014). For instance, even though negative relations between maternal restrictive control and children's outcomes are found in diverse contexts, the possibility of individual differences should be considered.

Another limitation of the present study is that maternal restrictive control was investigated as the only parenting practice. However, other parenting practices as parental warmth, responsiveness, autonomy support, and positive control may play an important role for the positive development of self-regulation (Davidov & Grusec, 2006; Röder & Rösler et al., 2014; Suchodoletz et al., 2011; Weis et al., 2014). For instance, parental positive control may foster children's internalization of self-regulation by setting limits and encouraging the child (Grolnick & Ryan, 1989; Karreman et al., 2006). Parental warmth may promote children's development of self-regulation because of positive mother-child-interactions and by rewarding (e.g., praising) children for behaving in a self-regulated manner (Jennings et al., 2008; Karreman et al., 2006; MacDonald, 1992; Weis et al., 2014). Moreover, recent research calls for the use of broad profiles of parenting behaviors which account for the complexity of relations across parenting domains (Heberle, Briggs-Gowan, & Carter, 2014). Thus, future

studies should include further parenting practices as well as broader profiles of parenting when examining relations between parenting, self-regulation, and school achievement in contexts.

Furthermore, this dissertation as well as other previous studies neglected to examine the role of fathers when investigating relations between parenting and children's self-regulation (see Karreman et al., 2006). Fathers' values and parenting practices (e.g., restrictive control) could have an additional or conflicting effect on relations between mothers' values, maternal restrictive control, and children's outcomes. Future studies should investigate the roles of fathers' values and parenting practices as well as their interaction with mothers' values and parenting practices for the development of children's self-regulation and school achievement. Furthermore, there might be cultural differences in the effects of fathers' values and parenting practices on children's developmental outcomes. In addition, cultural contexts might differ in the number and function of other persons apart from the parents who care for the child, such as grandparents, uncles and aunts as well as nannies. For instance, in Chile more persons from the extended family (which is of major importance; Donoso-Maluf, 2006) as well as nannies might influence the child's development than in Germany. These other persons might have diverse values and child rearing practices.

A strength of the present dissertation is the adoption of the wider conceptualization of self-regulation by including behavior and emotion regulation. Interestingly, results of Studies 2 and 3 revealed that behavior regulation may play a more important role for children's school achievement than emotion regulation strategies. Possible explanations for this result could be indirect relations between emotion regulation and school achievement via behavior regulation (McClelland & Cameron, 2011) or via social competences (Eisenberg et al., 2005). Thus, future studies should investigate whether behavior regulation and social competences are the keys for relations between emotion regulation strategies and school achievement.

Moreover, to be successful in life, not only school achievement, but also social competences are of central importance as positive developmental outcomes (Röder & Rösler et al., 2014). A study with German and Chilean fourth graders, their mothers, and teachers, has shown positive relations between self-regulation and social competences (prosocial behavior) as well as indirect positive effects of self-regulation on relations between parenting (maternal warmth) and prosocial behavior (Weis et al., 2014).[5] Thus, self-regulation might

[5] Due to space limitations, the present dissertation focused on the developmental outcome school achievement and on the parenting practice maternal restrictive control. However, the cited study which investigated relations between maternal warmth, self-regulation, and social competences was also part of this dissertation project (Weis et al., 2014).

play an important role for the development of social competences. Further research based on longitudinal designs is needed to examine the influence of self-regulation on social competences in diverse contexts, considering effects of gender, parenting, and culture.

Finally, it would be desirable to include further Latin American countries (e.g., Latin American countries with lower socio-economic segregation than in Chile). Future studies in several Latin American countries should differentiate between effects which originate from cultural values, effects that originate from socio-economic background (e.g. mothers' level of education), and the combination of both.

5.3 Conclusions

The complete dissertation provides a complex picture on relations between self-regulation and school achievement by taking into account the contexts gender, parenting, and culture. Hereby, this dissertation showed in three studies the central function of behavior regulation for school achievement. The first study highlighted that behavior regulation can explain gender differences in school achievement, but did not take into account the contexts parenting and culture. The second study extended the scope of the first study by including parenting and culture. This second study revealed that positive relations between behavior regulation and school achievement as well as negative relations between maternal restrictive control and children's behavior regulation can be found in two diverse cultural contexts (Germany and Chile). Moreover, the third study expanded these findings by showing that mothers' level of education and mothers' values play important roles for maternal restrictive control, children's behavior regulation, and school achievement. Further, the third study underlines the importance of adopting a socialization perspective including mothers' values and parenting practices to understand the development of behavior regulation.

An important theoretical implication of the present dissertation is that future studies should take into account behavior regulation when studying school achievement in the contexts of gender, parenting, and culture. The present studies showed that gender differences in mathematics achievement as well as effects of parenting (values, restrictive control) on relations between mothers' level of education and children's school achievement were only found when children's behavior regulation was included. Thus, future research on developmental conditions of school achievement in contexts should consider that some relations might only be found when behavior regulation is included.

An important practical implication of the present dissertation is that interventions to strengthen children's behavior regulation may be an effective way to promote children's school achievement. Hence, school curricula designed to improve children's behavior regulation (Blair & Razza, 2007) as well as intervention programs which have been shown to improve behavior regulation in school-age children (e.g., Diamond et al., 2007) might help children to succeed in school and, in the long run, to be successful in life in general. Moreover, this dissertation showed the relevance of gender, parenting (values, parenting practices), and culture for children's self-regulation and school achievement. Thus, intervention programs should be adapted to individuals' gender, culture, and educational background. In addition, interventions should include children as well as parents (values, parenting practices), and teachers. The final aim will be to strengthen children's behavior regulation and to improve equal opportunities for children's school and life success for children of diverse contexts (gender, culture, parent's level of education, parenting). This dissertation seeks to contribute to this aim by motivating further theoretical research on developmental conditions and outcomes of self-regulation in contexts as well as by encouraging the elaboration of context adapted intervention programs to promote self-regulation.

6 References

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7 Appendix

Appendices A−D: Appendices mentioned in Study 2 and Study 3

Appendix A: *Items of the Restrictive Control Scale (Study 2, Study 3)*

Appendix B: *Interaction Effects of Moderated Mediation Models with Culture as Moderator Variable (Study 2)*

Appendix C: *Pearson Correlation Matrix (Study 3)*

Appendix D: *Scale and Frequency Distribution of Mothers' Level of Education (Study 3)*

Appendices E−F: Additional Appendices (not mentioned before)

Appendix E: *Scale on Mother's Level of Education adapted to Chilean Sample (Study 2)*

Scale on Mother's Level of Education adapted to German Sample (Study 2)

Appendix F: *Pearson Correlation Matrix German Sample (Study 2)*

Pearson Correlation Matrix Chilean Sample (Study 2)

Appendix A

Items of the Restrictive Control Scale (Study 2, Study 3)

1. I guide my child by punishment more than by reason.
2. I punish by taking privileges away from my child with little if any explanation.
3. I yell or shout when my child misbehaves.
4. I scold and criticize to make my child improve.
5. I punish by putting my child off somewhere alone with little if any explanation.
6. I scold or criticize when my child's behavior doesn't meet my expectations.
7. I use threats as punishment with little or no justification.
8. When my child asks why he/she has to conform, I state: because I said so, or I am your parent and I want you to.

Note. This *Maternal Restrictive Control Scale* with eight items was generated for the present dissertation project. Items were derived from the *Parenting Practice Questionnaire* (PPQ) from Robinson et al. (1995). Mothers answered the items on a 5-point rating scale (from 1 = *never* to 5 = *always*).

Appendix B

Interaction Effects of Moderated Mediation Models with Culture as Moderator Variable (Study 2)

	Behavior regulation		Anger-oriented ER		Problem-oriented ER		Language grade		Mathematics grade	
	b	95% CI	b	95% CI	b	95% CI	b	95% CI	b	95% CI
Restrictive control × culture interaction	.15	-.05, .35	.23	-.17, .62	-.06	-.51, .39	-.06	-.48, .37	.01	-.37, .39
Behavior regulation × culture interaction	–	–	–	–	–	–	.24	-.33, .81	-.16	-.67, .36
Anger-oriented ER × culture interaction	–	–	–	–	–	–	.23	-.05, .50	-.01	-.26, .24
Problem-oriented ER × culture interaction	–	–	–	–	–	–	-.01	-.29, .26	.15	-.10, .40

Note. N = 243, N (Germany) = 76; N (Chile) = 167; ER = emotion regulation; b = unstandardized regression coefficient, controlled for intelligence, age, and gender.

Appendix C

Pearson Correlation Matrix (Study 3)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Education Mother	–	-.32**	.16*	-.06	.23**	-.12	-.25**	.00	-.18*	-.16*	.18*	.20*
2. Restrictive Control		–	-.06	.21**	-.24**	.19*	.14	.06	.12	-.09	-.08	-.32**
3. Self-Direction Value			–	-.20**	-.11	-.06	-.19*	.31**	-.24**	-.23**	.17*	-.11
4. Power Value				–	-.49**	.35**	-.10	.10	-.06	-.32**	.04	-.44**
5. Universalism Value					–	-.49**	-.08	-.26**	-.05	.14	-.19*	.47**
6. Achievement Value						–	.06	.01	-.16*	-.26**	.01	-.48**
7. Security Value							–	-.39**	.06	-.03	-.32**	-.07
8. Stimulation Value								–	-.33**	-.35**	.24**	-.22**
9. Conformity Value									–	.31**	-.44**	-.11
10. Tradition Value										–	-.43**	.13
11. Hedonism Value											–	-.02
12. Benevolence Value												–

$N = 167$; $^{*}p < .05$; $^{**}p < .01$.

Appendix D

Scale and Frequency Distribution of Mothers' Level of Education (Study 3)

What is your educational level?	¿Qué nivel educacional tiene usted?	*n*	%
1. Incomplete primary education	1. Educación básica incompleta	3	1.8
2. Completed primary education	2. Educación básica completa	4	2.4
3. Incomplete secondary school	3. Educación media incompleta	13	7.8
4. Completed secondary school	4. Educación media completa	49	29.3
5. Technical school certificate	5. Educación técnica	37	22.2
6. Baccalaureate	6. Bachillerato	–	–
7. Incomplete university education	7. Educación universitaria incompleta	11	6.6
8. Completed university education	8. Educación universitaria completa	27	16.2
9. Postgraduate studies	9. Estudios de postgrado	23	13.8

Note. N = 167. This *Scale on Mother's Level of Education* was adapted to the Chilean education system for the present dissertation project. The respective international scale was derived from the workgroup *Developmental and Cross-Cultural Psychology, University of Konstanz.*

Appendix E

Scale on Mother's Level of Education adapted to Chilean Sample (Study 2)

What is your educational level?

1. Incomplete primary education
2. Completed primary education
3. Incomplete secondary school
4. Completed secondary school
5. Technical school certificate
6. Baccalaureate
7. Incomplete university education
8. Completed university education

Note. This *Scale on Mother's Level of Education* was adapted to the Chilean education system for the present dissertation project. The respective international scale was derived from the workgroup *Developmental and Cross-Cultural Psychology, University of Konstanz*.

Scale on Mother's Level of Education adapted to German Sample (Study 2)

Welchen höchsten Schulabschluss haben Sie?

1. keinen Schulabschluss
2. Volks-/Hauptschulabschluss (8./9. Klasse POS)
3. Mittlere Reife, Realschulabschluss (10. Klasse POS)
4. Fachhochschulreife (Fachoberschule)
5. Abitur bzw. 12. Klasse EOS

Welchen höchsten Ausbildungsabschluss haben Sie?

1. keinen beruflichen Ausbildungsabschluss
2. Teilfacharbeiterabschluss
3. abgeschlossene Lehre
4. Fachschulabschluss
5. Berufsfachschulabschluss
6. Meister-/Techniker- oder gleichwertigen Abschluss
7. Fachhochschulabschluss
8. Hochschulabschluss

Note. This *Scale on Mother's Level of Education* was adapted to the German education system from the workgroup *Developmental and Cross-Cultural Psychology, University of Konstanz.*
To make mother's level of education of the Chilean and German samples comparable, ISCED-97 classification (Organization for Economic Co-operation and Development, 1999) was used.

Appendix F

Pearson Correlation Matrix German Sample (Study 2)

		1	2	3	4	5	6	7	8	9
1.	Restrictive Control	–	-.25*	.26*	-.12	-.12	-.11	.05	-.05	-.10
2.	Behavior Regulation		–	-.09	.13	.57**	.59**	.02	.37**	.11
3.	Anger-oriented regulation			–	-.19	-.07	.03	.07	.06	-.02
4.	Problem-oriented regulation				–	.14	.09	.17	.02	.10
5.	Mathematics grade					–	.66**	-.04	.42**	-.12
6.	Language grade						–	.01	.17	.19
7.	Age							–	-.16	.06
8.	Intelligence								–	-.12
9.	Gender									–

$N = 76$; $^{*}p < .05$; $^{**}p < .01$.

Pearson Correlation Matrix Chilean Sample (Study 2)

		1	2	3	4	5	6	7	8	9
1.	Restrictive Control	–	-.43**	.16*	-.08	-.21**	-.19*	.03	-.03	-.13
2.	Behavior Regulation		–	-.18*	.07	.57**	.55**	.05	.19*	.13
3.	Anger-oriented regulation			–	-.16*	-.14	-.23**	-.08	-.15	-.01
4.	Problem-oriented regulation				–	-.02	.08	.04	-.08	-.03
5.	Mathematics grade					–	.72**	-.09	.44**	-.09
6.	Language grade						–	-.03	.34**	.18*
7.	Age							–	.04	-.05
8.	Intelligence								–	-.18*
9.	Gender									–

$N = 167$; $^{*}p < .05$; $^{**}p < .01$.