



# The Role of Culture and Contextual Risk for Maternal Parenting and Children's Behavior Regulation in Chile and Germany

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## Abstract

Children's behavior regulation development takes place in diverse sociocultural settings. In this study, we take a multilayer ecological perspective and examine cross-cultural as well as intra-cultural similarities and differences in relations between different aspects of contextual risks (i.e., family and neighborhood risk), maternal restrictive control, and children's behavior regulation in Chile and Germany. One hundred sixty-seven mothers of primary school children in Chile and 109 mothers in Germany (total sample  $M$  (child age) = 10.01 years) completed questionnaires on family risk, parenting practices, and their child's behavior regulation. Mothers in Germany rated children's behavior regulation significantly higher than mothers in Chile. Further, in both cultural contexts (Chile, Germany), the higher the family risk, the higher was the use of maternal restrictive control and the lower the child's behavior regulation. In Chile, after including maternal restrictive control, the relation between family risk and children's behavior regulation remained significant. In Germany, in contrast, there was no direct significant relation between family risk and children's behavior regulation, instead we found a significant indirect pathway via maternal restrictive control. Further, we investigated the moderating role of neighborhood risk, as distal contextual risk, for the relation between family risk and maternal restrictive control as well as for the relation between maternal restrictive control and children's behavior regulation. We found no significant overall moderated mediation effect. However, findings in Chile and Germany revealed a conditional indirect effect indicating that family risk and behavior regulation were indirectly related via maternal restrictive control only when neighborhood risk was high. This underlines the need for an integrative consideration of the cultural context as well as family risk and neighborhood risk when investigating the role of maternal parenting for children's behavior regulation development.

**Keywords** Cultural contexts · contextual risk · behavior regulation · restrictive control · parenting

## Highlights

- This study takes an ecological perspective to investigate multilayer contextual aspects in relations between distal and proximal aspects of contextual risk, maternal parenting, and children's behavior regulation in Chile and Germany.
- In both cultural contexts studied, we found that the higher family risk was, the higher was the reported maternal restrictive control and the lower children's behavior regulation.
- In Chile, family risk and children's behavior regulation were related directly as well as indirectly via maternal restrictive control. In Germany, family risk and children's behavior regulation were not related directly but indirectly via maternal restrictive control.

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Children's behavior regulation is the ability and motivation to pay attention, to resist impulses, and to comply with rules and commands (Karreman et al., 2006). Behavior regulation is a crucial ability for social functioning as it allows a child to follow broader (inter-)personal goals instead of being driven by impulses (Bornstein and Cheah, 2006). According to the developmental perspective of ecological models, behavior regulation develops as part of a multidimensional and complex interaction of developmental systems. Among the most prominent models of children's development in context is the bioecological model by Bronfenbrenner and Morris (2007) that describes individual development to be embedded in a multilayer system of contextual influences. On the outer layer of the ecological model, Bronfenbrenner and Morris (2007) classify the cultural context as an indicator of prominent cultural values and socialization goals that builds an important foundation of childhood development. On more proximal layers, the model defines formal and informal social structures (e.g., neighborhood, local policies, social services; Mesosystem) as well as direct interactions with a child's family, peers, and school (Microsystem) to shape children's development. Critiques have argued that Bronfenbrenner and Morris' model does not acknowledge relations between different ecological layers but rather describes distal systems separately from proximal interactions (Vélez-Agosto et al., 2017). The family stress model as stated by Conger et al. (2010) may help to understand the missing link between Bronfenbrenner and Morris' ecological approach with proximal developmental processes. The family stress model (Conger et al., 2010) describes that contextual risk, like financial and personal hardship, can lead to family stress and thereby influences parent-child interactions, specifically parenting practices. In line with this, a study by Ashiabi and O'Neil (2015) has shown that the integration of the family stress model can contribute to uncover interactive mechanisms between contextual risk, parenting practices, and children's positive and negative social behavior. However, to our knowledge, studies have rarely included cross-cultural aspects, when investigating relations between distal and proximal contextual variables. Further, even though the model of Bronfenbrenner and Morris assumes differentiating effects between more proximal and distal contextual aspects within the social structure (Bronfenbrenner and Morris, 2007), studies on intra-cultural contextual risk mostly have not considered variations of the proximity of contextual risk aspects to developmental processes (Gerlach et al., 2022). Thus, in this study, we seek to fill this research gap by investigating relations between two aspects of contextual risk that differ in their proximity to a child's daily experience, that is family and neighborhood risk, maternal restrictive control, a parenting practice that describes a proximal process of interaction, and children's behavior

regulation as an individual ability in two different cultural contexts.

## Cross-Cultural Aspects of Behavior Regulation

Culture-specific developmental pathways of children's behavior regulation have gained increasing importance in research (e.g., Harkness and Super, 2002; Jaramillo et al., 2017; Lansford et al., 2018). According to Trommsdorff (2009), the development of behavior regulation is related to dominant cultural values, beliefs, and expectations. An important aspect of culturally embedded behavior regulation is the implicit model of agency (Markus and Kitayama, 2003; Trommsdorff, 2009). In cultural contexts prioritizing an independent self-construal, behavior regulation helps to seek individual autonomy. In contrast, in cultural contexts prioritizing an interdependent self-construal, successful behavior regulation may rather focus on maintaining relatedness and interpersonal harmony (Trommsdorff, 2009). These differences in behavior regulation motivation might be related to different patterns in behavior regulation development (Trommsdorff, 2009). To further understand cross-cultural similarities and differences, this study seeks to investigate the role of the cultural context for children's behavior regulation development in Chile and Germany.

In Chile, a high-income Latin American country, research reported combined patterns of interdependent and independent self-construal (Fernández et al., 2005; Kolstad and Horpestad, 2009). Traditional Latin-American cultural values like a strong interrelatedness of family members, the maintenance of interpersonal harmony, the avoidance of negative emotions as well as the enhancement of social responsibility co-exist with an increasing importance of typical independent self-construal values, like individual autonomy and self-determination (Bush and Peterson, 2014; Farkas and Vallotton, 2016; Germán et al., 2013; Halgunseth et al., 2006; United Nations Program for Development, 2009, 2002). A study by Torres (2017) found that while Chilean primary school children showed similar levels of behavior regulation compared to British children, psychological factors contributing to the expression of behavior regulation differed. Further, Santelices et al. (2021) suggested that lower levels of behavior regulation in Chilean children compared to US-American children might be related to a higher culture-specific acceptance of external regulation in Chilean children. In Germany, a European industrial country, an independent self-construal is prominent, and a strong focus is put on enhancing individual responsibility, independence, and autonomous behavior regulation (Keller and Lamm, 2005). Children's early development of autonomous behavior regulation is

expected to achieve individual goals (Friedlmeier et al., 2008). A previous cross-cultural comparison of primary school children suggested higher levels of behavior regulation in Germany compared to Chile (Weis et al., 2016).

In the cross-cultural study of children's behavior regulation, cultural samples have often been considered as relatively homogeneous groups, while intra-cultural contextual aspects that build a child's proximal learning and socialization environment have rarely been considered (Le et al., 2008). At the same time, studying intra-cultural diversities is of special interest when comparing children's behavior regulation development in Chile and Germany, as these two cultural contexts differ greatly in their intra-cultural equality in individuals' access to resources. Chile has been described as a highly segregated and unequal society concerning the distribution of financial, educational, and health resources. Germany, in comparison, has been evaluated as country with intermediate inequalities with a pronounced welfare system as well as free education (Hudson and Kühner, 2016; Hübenthal and Ifland, 2011). According to the bioecological model, the cultural context plays an important role as it structures the interplay of more proximal layers as well as interactional processes for children's development (Bronfenbrenner and Morris, 2007). Thus, the question arises how relations between contextual aspects and children's behavior regulation differ between Chile and Germany.

### Contextual Risk in Chile and Germany

Contextual risk is defined as adverse characteristics of the formal and informal social structure, that go along with a higher probability of impaired development (Sameroff and Seifer, 1983). Traditionally, researchers conceptualized contextual risk as a global index measured by a single unique risk factor or a global cumulated risk score (Evans et al. 2013; Gach et al., 2018; Masarik and Conger, 2017). However, following the bioecological model, contextual aspects differ in their proximity to a child's daily experiences (Bronfenbrenner and Morris, 2007). Therefore, Gerlach et al. (2022) argued that contextual risk can occur as proximal or more distal aspects of everyday interactions. Proximal aspects of contextual risk include adverse socio-demographic characteristics of the family (family risk; e.g., low family income, low parental education) as they are temporally and spatially closer to every-day interactions than more distal aspects, like adverse sociodemographic characteristics of the neighborhood (neighborhood risk; e.g., reduced resources in the neighborhood). In line with this argument, a recent longitudinal study of British adolescent by Bignardi et al. (2021) found that contextual risk consisting of proximal aspects, specifically of family-centered sociodemographic factors, like parental

education, income, and parental employment, better predicted parent-rated behavior regulation problems than more distal contextual aspects, like neighborhood risk. Therefore, in the current study, we differentiate between two aspects of contextual risk to include deficiencies in the availability of social and financial resources within the family (family risk) as well as within the surrounding neighborhood (neighborhood risk) that are associated with the development of behavior regulation in children (Blair, 2010; German National Academy of Sciences Leopoldina, 2014; Hoff et al., 2002; Sektan et al., 2010).

For the conceptualization of family risk, we follow the suggestion by Duncan and Magnuson (2005) and include income, education, and family structure to account for cumulative family risk. Income measures the accessibility of consumer goods and services to an individual (Smeeding and Weinberg, 2001). To incorporate all cash and non-cash aspects of income as well as within-cultural social standing, this study uses perceived social class as approximation for income (Becker et al., 2017; Diemer et al., 2013; Operario et al., 2004; Tan et al., 2020). The measure of perceived social class has been used in the Chilean as well as in the German context and showed high associations with relative household income as well as cultural resources, particularly education access (Becker, et al., 2017; Iturra and Riffo, 2019). A cross-cultural accepted measure of education level is years of schooling, in particular, if a person has completed the mandatory years of schooling that is determined by educational law of the country (Biedinger, 2011; Ferreira and Litchfield, 1998). Regarding family structure, we found mother's young age at birth as well as a large number of children in the family to be relevant measures since they increase the risk for limited financial resources in both Chile and Germany (Badaracco et al., 2016; Ceballos et al., 2004; Cumsille and Ramírez, 1999; Eggen and Rupp, 2006; Fernández et al., 2013; Kruger et al., 2009; Trautmann-Villalba et al., 2004).

Finally, to determine this study's neighborhood risk index that goes along with a high likelihood of educational as well as social participation inequalities for their inhabitants (Leventhal and Brooks-Gunn, 2000), we identified culture-specific measures. In Chile, earlier studies have used the Human Development Index (HDI) as it is available not only on a general country-wide level but also on a neighborhood level. The HDI is an accumulated measure of education, financial resources, and health and serves as an approximation of disadvantages in the neighborhood's social structure (Contreras and Medrano, 2009). Various studies in Chile have found that a low neighborhood HDI goes along with lower education access as well as reduced cultural and social resources in the neighborhood (Contreras and Medrano, 2009; Larrañaga, and Sanhueza, 2007; McEwan, 2008). In Germany, the HDI is not available on a

neighborhood level. Earlier studies in the German context have used a neighborhood risk index based on statistical information (Deffaa et al., 2020; Stadt Mannheim, 2013; Springer and Böring, 2021). In line with the neighborhood risk index by Stadt Mannheim (2013), we included four statistical characteristics to determine neighborhood risk, that comprises the proportion of single-parent households with children, the proportion of children living in households in need of financial aid, the unemployment rate, and the number of young people with migration background. Research has found that this index is related to limited education, cultural, and social resources (Autorengruppe Bildungsberichterstattung, 2012; Stadt Mannheim, 2013).

### Contextual Risk and Children’s Behavior Regulation

In Chile as well as in Germany, studies showed that high levels of family risk (mostly conceptualized by low family income) are related to lower levels of children’s behavior regulation (Deffaa et al., 2020; Lohndorf et al., 2021; Ma et al., 2016; Pitzer et al., 2011). In line with recent contextual perspectives on children’s development, parenting has been described to explain the relation between contextual aspects and children’s development (e.g., Harkness and Super, 2002; Jaramillo et al., 2017; McClelland and Wanless, 2015; Trommsdorff and Cole, 2011; Lamm et al., 2017). Correspondingly, a British study on the specificity of contextual risk for proximal processes for adolescent’s development found that the most powerful predictor for high behavior regulation included a combination of family risk factors (i.e., low parental sociodemographic risk and good mental health) as well as low levels of harsh parenting (Bignardi et al., 2021).

From a theoretical and transactional approach, the family stress model by Conger et al. (2010) describes that increased family risk leads to high parental stress, which in turn results in reduced parental capacities and thereby affects children’s development. In line with this, we seek to incorporate parenting as an interface between contextual risk (i.e., family risk) and children’s behavior regulation into our study model. Without explicitly considering parental stress as stated in Conger’s model, we assume that high family risk might lead to an alteration of maternal parenting behavior and thereby affects children’s behavior regulation in both Chile and Germany (Kohen et al., 2008; Masarik and Conger, 2017; McLanahan and Percheski, 2008). In the present study, we focus on maternal parenting, as mothers are more likely to be the main caregiver of children in primary school age in both cultural contexts of this study (Casas and Herrera, 2012; OECD, 2017).

Extending the understanding of contextual risk by including the more distal contextual aspect of neighborhood risk, some studies have found that children in high risk

neighborhoods showed more problem behavior and less behavior regulation than children in low risk neighborhoods (Humphrey and Root, 2017; Kohen et al., 2008; Supplee et al., 2007; Sharp et al., 2021). However, it remains unclear, whether neighborhood risk might contribute to the stress-related adversities in family risk contexts. The goal of the present study is therefore to include several aspects of contextual risk as well as the cultural context when studying relations between maternal parenting and children’s behavior regulation development.

### Contextual Risk and Maternal Parenting Practices in Cultural Contexts

A number of studies in Europe and the United States have shown that mothers with high family risk use more restrictive control, a parenting practice that combines harsh, intrusive, and power-assertive parenting, and implies high external control by the caregiver without explaining or justifying parental actions, than mothers with low family risk (Bradley and Corwyn, 2002; Flouri and Midouhas, 2016; Karreman et al., 2006; Weis et al., 2016). In line with Karreman’s et al. (2006) definition, maternal restrictive control is characterized by harshness, criticism, and verbal and/or physical control that hinders the internalization of autonomous behavior regulation. Similarly, studies in Chile found that parents with high family risk (measured by low household income and low education level) use more restrictive control than Chilean parents in settings with low family risk (Coddington et al., 2014; Martínez et al., 2014; Schenck-Fontaine et al., 2020; Ugarte et al., 2020; Vidal et al., 2017). Regarding the interplay of distal and proximal contextual aspects, research in the US suggests that living in neighborhoods of risk might alter the way how family risk and maternal parenting interact (Humphrey and Root, 2017). This leads to the question whether the relation between family risk and maternal restrictive control might be stronger in high risk neighborhoods as neighborhood risk increments parental stress and might lead to restrictive and controlling parenting. In addition, the cultural context might affect the interplay between contextual aspects, maternal parenting and children’s behavior regulation. A strong sense of inter-relatedness and belonging to a community, which is prominent in the Latin-American culture, could lead to higher influences of neighborhood risk on the relation between family risk and maternal parenting (Ma and Klein, 2018).

According to the bioecological model (Bronfenbrenner and Morris, 2007), the meaning of maternal restrictive control for children’s behavior regulation development might differ depending on the cultural context. Studies in Latin-American contexts suggest that maternal restrictive control might not show negative associations with children’s behavior regulation. Researchers argued that in

Latin-American contexts, higher levels of maternal control with an emphasis on respect and obedience are normative and thus might have less adverse effect on children's development compared to European contexts (Calzada et al., 2010; Germán et al., 2013; Jabaghourian et al., 2014; Kağıtçıbaşı et al., 2010; Park and Bauer, 2002). In contrast, several studies in US-American and European contexts revealed a negative relation between maternal restrictive control and children's behavior regulation (Baron and Malmberg, 2017; Kaiser et al., 2017; Kochanska et al., 2001; Weis et al., 2021). Thus, German children experiencing high restrictive control might lack opportunities to practice internal control and regulation strategies. In line with this, higher levels of maternal restrictive control might restrain children's development towards autonomous behavior regulation and lead to lower levels of behavior regulation in Germany (Weis et al., 2016). Moreover, maternal restrictive control might be more effective in high risk neighborhoods (Jarrett, 1999). Thus, relations between maternal restrictive control and children's behavior regulation might vary not only between cultural contexts but also because of neighborhood risk. Therefore, an integrative approach on interplays between cultural contexts, contextual aspects, and parenting practices is needed for investigating children's behavior regulation development.

### Aim of the Current Study

In line with the bioecological model by Bronfenbrenner and Morris (2007), in this study we seek to identify how the cultural context affects relations between different aspects of contextual risk (i.e., family and neighborhood risk), maternal restrictive control, and children's behavior regulation. Developmental research has identified middle childhood, that is considered as the developmental period between seven and thirteen years of age, to be a particularly sensitive period for environmental influences (Ackerman et al., 2004). During this period, children build more relationships outside of the family context. Thus, we study our hypotheses in a sample of children in the age between seven and thirteen years and their parents in Chile and Germany.

On a cross-cultural level, we investigate whether there are differences in children's behavior regulation between the Chilean and German contexts. In line with earlier studies (e.g., Weis et al., 2016), we expect culture-specific differences in the level of behavior regulation with German children showing higher levels of behavior regulation than Chilean children (hypothesis 1). Further, we expect Chilean mothers to report higher levels of maternal restrictive control than German mothers (hypothesis 2). To understand how proximal contextual and individual aspects are related, we hypothesize that in both cultural contexts (Chile, Germany) family risk and behavior regulation show negative relations

(hypothesis 3). Further, we expect a positive relation between family risk and maternal restrictive control in both countries (hypothesis 4). We hypothesize that maternal restrictive control is related negatively with children's behavior regulation in both Chile and Germany (hypothesis 5). Moreover, in line with the family stress model (Conger et al., 2010), we investigate if the relation between family risk and children's behavior regulation is mediated by maternal restrictive control (hypothesis 6). Finally, regarding the interplay of proximal and distal contextual risk aspects, we suggest that in Chile and Germany the positive relation between family risk and maternal restrictive control as well as the negative relation between maternal restrictive control and children's behavior regulation is stronger when neighborhood risk is high (hypothesis 7).

## Methods

### Participants

In total, 280 mothers of fourth graders in the age of seven to 13 years participated in the present study in Chile and Germany. We excluded four participants from the data analyses due to incomplete data or because their children did not meet the age criteria. The Chilean sample consisted of 167 mothers. The mean age of mothers in Chile was 38.70 years ( $SD = 6.95$ ), 56 of them were mothers of boys (33.5 %), and 111 were mothers of girls (66.5 %). The mean age of children in Chile was 10.15 years ( $SD = 0.42$ ). In the Chilean sample, 20 mothers (12.1%) completed the first 8 years of schooling or less (educación básica). Forty-eight mothers completed 12 years of schooling (educación media; 28.7 %) and ninety-nine mothers (58.2%) entered a technical college or university studies. Two mothers (1.2%) obtained a non-specified high-school degree.

In Germany, 109 mothers participated in the study. The mean age of mothers in Germany was 41.51 years ( $SD = 5.54$ ). Of the participants in Germany, 45 were mothers of boys (41.3%) and 64 were mothers of girls (58.7%). The mean age of children in Germany was 10.03 years ( $SD = 0.90$ ). In the German sample, 22 mothers (20.2%) completed the first 9 years of schooling or less (Hauptschulabschluss). Twenty-six mothers completed ten years of schooling (Realschulabschluss; 23.9%) and fifty-seven mothers (52.3%) were qualified to enter technical college or university ((Fach-)hochschulreife). Four mothers (3.7%) obtained a non-specified high-school degree.

### Procedure

In Chile, we invited school principals of public and private schools in the capital Santiago de Chile to collaborate in the



**Table 1** Definitions and cut-off values of contextual risk factors for family risk and neighborhood risk in Chile and Germany

Risk Indices	Cut-Off Values	
	Chile	Germany
Family Risk		
Risk factors		
Mother's age at birth		Risk = Being 21 years or younger at birth of child. No Risk = Being older than 21 years at birth.
Mother's education level	Risk = Having less than 12 years of school completed. No Risk = Having completed at least 12 years of school (mandatory in Chile (Gobierno de Chile, 2003)).	Risk = Having less than 10 years of schooling. No Risk = Having completed at least 10 years of school (mandatory in Germany (Vossenkuhl, 2010)).
Number of children		Risk = Having more than four children. No Risk = Having three or less children.
Perceived social class		Risk = Reported perceived social status lower than middle class. No Risk = Reported perceived social status middle class or higher.
Neighborhood Risk		
Neighborhood Characteristics		
	Risk = Human Development Index of 0.75 (lower middle) or lower (De Mattos, 2004).	Risk = Neighborhood Risk Score 3 or higher.
	No Risk = Human Development Index higher than 0.75 (De Mattos, 2004).	No Risk = Neighborhood Risk Score 2 or less.

study. Two Chilean public schools and two Chilean private schools sent letters to parents of fourth graders inviting them to participate in this study. In Germany, recruitment took place in two cities in the southwest. One city is a small university city, where four public primary schools collaborated and sent invitations to participate to parents of fourth graders. In the second German city, a larger and industrial city, mothers were contacted through social workers of public schools or neighborhood centers in five different city districts.

In Chile as well as in the smaller German city, the present study was part of a larger research project. In the larger German city, mothers answered only the questionnaires relevant for the present study. For this study, mothers in Chile and Germany answered questionnaires in paper-pencil format at home. The average time to complete the questionnaire was one hour. The questionnaire included questions on the socio-demographic background, the use of maternal restrictive control, and the child's behavior regulation. Mothers with more than one child were asked to answer all child-related questions for one child that met the age criteria of this study.

To meet ethical research criteria, the methods and procedure of the present study were reviewed by the ethical committee of the University of Konstanz. Mothers provided written informed consent prior to completing the questionnaire. All data were handled anonymously.

**Materials**

**Assessment of Behavior Regulation**

To evaluate the child's behavior regulation, we applied the Strengths and Difficulties Questionnaire (SDQ) by Goodman (1997). In the SDQ, mothers are asked to rate the typical behavior of their child on a three-point scale (1 = not true to 3 = certainly true). For the present study, the scale "hyperactivity" of the SDQ was used and afterwards recoded to measure behavior regulation. The scale consists of five items regarding the child's behavior regulation ("Thinks things out before acting", "Can resist behavior impulses", "Can control his/her level of activity", "Is able to stay still for a longer period", "Sees tasks through to the end, good attention span"). The recoded hyperactivity scale of the SDQ has been used to operationalize behavior regulation in several earlier studies (e.g., Blake et al., 2015; Weis et al., 2016). Cronbach's Alpha for the Chilean sample was 0.81, the German sample reached a Cronbach's Alpha of 0.80.

**Assessment of Contextual Risk**

To measure the two aspects of contextual risk, that is family and neighborhood risk, we calculated two separate risk

indices, one for family risk and one for neighborhood risk. For the calculation of family risk, we included maternal sociodemographic characteristics, which were provided by the participants in a sociodemographic background questionnaire. We combined mother's age at child's birth, education level, number of children, and perceived social class to a family risk index. Cut-off values for each risk factor are shown in Table 1. Each risk factor was rated as either 0 for "no risk" or 1 for "risk" according to the cut-off values. All risk information was added and summarized by a single family risk index for each mother that ranged from zero (low family risk) to four (high family risk). For neighborhood risk in Chile, we used the Human Development Index of each neighborhood. For the neighborhoods in Germany, we conducted a neighborhood risk index as used by Deffaa et al. (2020).

In Chile, the family risk index as well as the neighborhood risk index showed no significant relation to the mother's migration background, or single-parent-household. However, we found that family risk as well as neighborhood risk were significantly related to being of ethnic minority in Chile (family risk:  $t = 0.21$ ;  $p = 0.01$ ; neighborhood risk:  $t = 0.17$ ;  $p = 0.03$ ). In Germany, the family risk index was not significantly related to the mother's migration background or living in a single-parent household. Neighborhood risk showed a significant relation to mother's migration background ( $t = 0.21$ ;  $p = 0.03$ ) but no significant relation to living in a single-parent household. Data on ethnic minority is not available for Germany in this study sample (we only included German speaking participants).

### Assessment of Maternal Restrictive Control

To measure the use of maternal restrictive control, we administered the Parenting Practice Questionnaire (PPQ) by Robinson et al. (1995). In its original version, the PPQ consists of 72 items and 11 scales measuring different parenting behaviors. The questions describe everyday situations and possible parenting behaviors. Participants are asked to indicate the frequency of certain parenting behaviors when interacting with their child on a scale from one (never) to five (always). The scale "maternal restrictive control" as used in this study is an additional scale, which was developed by Weis et al. (2016) as a measure of parenting behavior, which includes direct control over the child by punishment and compliance without reasoning. The scale consists of eight items of the PPQ (Robinson et al., 1995), that cover different aspects of restrictive control (e.g., "I use threats as punishment with little or no justification", or "I get angry and scream if my child misbehaves"). In the Chilean sample, a Cronbach's Alpha of 0.76 was achieved. For the German sample, Cronbach's Alpha was 0.77.

### Cultural Equivalence of Measures

In the first step, we checked the presented material for available country specific validated translations. In Chile, we adopted the Spanish version of the PPQ (Robinson et al., 1995) as translated by Calzada and Eyberg (2002) to the Chilean context. For Germany, we translated the original English version of the PPQ and back-translated it. Our adapted versions of the PPQ in Spanish and German were carefully reviewed by native researchers to fit the Chilean and German cultural contexts of the participants. We administered the German version of the SDQ by Woerner et al. (2004) in Germany. For Chile, we used the Spanish version of the Strength and Difficulties Questionnaire (SDQ) by García et al. (2000). The general questionnaire on family risk information was originally developed in German language for this study and then translated and back-translated into Spanish by native researchers.

We tested for statistical factor congruence of the cross-cultural comparison between Chile and Germany by calculating Tucker's Phi coefficients (He and van de Vijver, 2012). A value above 0.95 is considered as evidence for structure similarity (Van de Vijver and Leung, 1997). The analyses revealed a Tucker's Phi of 1.00 for the mother's evaluation of the child's behavior regulation. For the assessment of maternal restrictive control, Tucker's Phi reached a value of 0.99. This indicates a satisfactory structural equivalence of the scales "maternal restrictive control" and "behavior regulation of the child" in the Chilean and German samples (Berry, 2002).

### Data Analysis

Research suggests differences in behavior regulation between boys and girls, with girls being more likely to show higher levels of behavior regulation than boys (Matthews et al., 2009; Raffaelli et al., 2005; Weis et al., 2013). This might lead to a distortion of results if not considering gender as possible covariable. We therefore included child's gender as control variable into our data analyses. Further, prior to hypotheses testing, we performed an analysis of missing values. Little's Missing Completely At Random (MCAR) indicated for the assessment of the child's behavior regulation ( $\chi^2 = 279.83$ ,  $p = 0.33$ ) and the assessment of maternal restrictive control ( $\chi^2 = 642.82$ ,  $p = 0.04$ ) all missing values being at random. We imputed missing values using the Expectation Maximization Technique (EM; Jeličić et al., 2009).

We computed Pearson correlations to examine relations between the child's age, the child's gender, family and neighborhood risk, maternal restrictive control, and behavior regulation of the child. To test for cross-cultural as well as age differences in mean values, we calculated analyses of variance (ANOVAs) for family risk, neighborhood risk,

**Table 2** Descriptive statistics and Pearson correlations for all variables in the total sample

Variable	Mean (SD)	1	2	3	4	5
1) Child's Age	10.10 (0.65)	1				
2) Child's Gender	0.63 (0.48)	−0.04	1			
3) Family Risk	0.58 (0.80)	−0.04	0.03	1		
4) Neighborhood Risk	0.58 (0.50)	−0.11	0.09	0.45**	1	
5) Maternal Restrictive Control	2.19 (0.64)	−0.07	−0.12*	0.26**	0.20**	1
6) Child's Behavior Regulation of Child	2.24 (0.53)	0.06	0.03	−0.26**	−0.23**	−0.41**

*N* = 276. Child's gender: 0 = boy; 1 = girl. Neighborhood Risk: 0 = low; 1 = high. Original (non-ipsatized) values

\* $p < 0.05$ . \*\* $p < 0.01$

maternal restrictive control, and children's behavior regulation with the child's age as well as the cultural contexts as factor (young vs. old children; Chilean vs. German group). As tests of cultural mean differences require scalar equivalence, we standardized the scores using ipsatization to account for cultural differences in response styles (Fischer and Milfont, 2010). Thereby, the individual's ipsatized score indicates a person's position on the relevant score in comparison to other variables. Additionally, the ipsatized score is adjusted for differences in the variation of answers around the mean (Fischer, 2004; Ten Berge, 1999). Recently, the use of ipsatized values for group comparisons has been criticized by some scholars as it might remove a substantial amount of variance from the scores (Hoessler, 2008). We therefore additionally included results of original (non-ipsatized) values and reported when ipsatized and non-ipsatized results differed significantly.

We tested relations between family risk, maternal restrictive control, and children's behavior regulation with mediation models using the bootstrapping method (Process model 4) by Hayes (2013). Further, we used this method to test for moderated mediations to investigate moderation effects of neighborhood risk for relations between family risk and maternal restrictive control as well as between maternal restrictive control and children's behavior regulation within the mediation model (Hayes, 2013; Process model 58). In contrast to other tests, bootstrapping is applicable for small sample sizes as it does not require a normal distribution of the data (Hayes, 2013). In the present study, 5000 subsamples were drawn without replacement for estimating points. For the indirect effects, a 95% confidence interval was defined. As recommended by Fischer and Milfont (2010), we conducted moderation and mediation analyses with original scores to avoid statistical distortion.

## Results

Descriptive statistics and correlations between child's age, child's gender, family risk, neighborhood risk, maternal

restrictive control, and the child's behavior regulation are shown in Table 2. Family risk and neighborhood risk showed a significant positive relation. Family and neighborhood risk were positively related to maternal restrictive control and negatively related to the behavior regulation of the child. We found a significant negative relation between the child's gender and maternal restrictive control. We did not observe significant relations between the child's age, child's gender, and behavior regulation. Further, as the age range of children is relatively large in our sample, we built two age groups, each including three years of age, and tested for mean value differences of the variables between children in the age of seven to nine years ( $n = 96$ ) and children in the age of 10 to 13 years ( $n = 180$ ) for each country. We found a significant age effect for neighborhood risk, with younger children experiencing higher levels of neighborhood risk. For family risk, maternal restrictive control, and children's behavior regulation we found no significant age differences in the mean values (see Table 3). The Chilean sample showed a significantly higher level of family and neighborhood risk than the German sample.

## Cross- and Intra-Cultural Differences and Similarities in Means and Relations

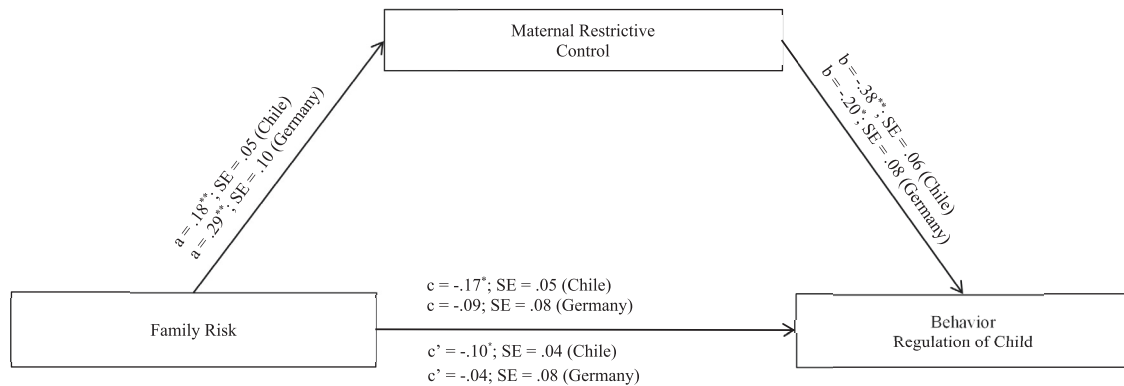
In one-way ANOVAs, we investigated the effect of the cultural contexts (Chile vs. Germany) on the level of family risk, neighborhood risk, maternal restrictive control, and child's behavior regulation with ipsatized and non-ipsatized scores. Chilean participants reported significantly higher levels of family and neighborhood risk. Further, Chilean participants reported lower levels of children's behavior regulation than the German participants with both ipsatized and non-ipsatized values (hypothesis 1; Chile:  $M = 1.38$ ,  $SD = 0.58$ ; Germany:  $M = 1.59$ ,  $SD = 0.49$ ;  $F(1, 276) = 8.71$ ,  $p < 0.01$ ; original values: Chile:  $M = 2.17$ ,  $SD = 0.55$ ; Germany:  $M = 2.35$ ,  $SD = 0.48$ ;  $F(1, 276) = 8.16$ ,  $p < 0.01$ ). Contrary to our hypothesis, we found no difference in the level of maternal restrictive control between Germany and Chile (hypothesis 2; Chile:  $M = 1.51$ ,



**Table 3** Descriptive statistics and mean value comparisons between age groups and country groups

Variable	Younger children (age 7–9)		Older children (age 10–13)		F-Value of group comparisons	p value
	Chile	Germany	Chile	Germany		
Family risk	$M = 0.74$ ; $SD = 0.90$	$M = 0.36$ ; $SD = 0.62$	$M = 0.73$ ; $SD = 0.89$	$M = 0.33$ ; $SD = 0.56$	Country: 15.00** Age: 0.05	Country: <0.01 Age: 0.82
	$M = 0.70$ ; $SD = 0.46$	$M = 0.60$ ; $SD = 0.50$	$M = 0.64$ ; $SD = 0.48$	$M = 0.36$ ; $SD = 0.48$	Country*Age: 0.01 Country: 9.82** Age: 6.02*	Country*Age: 0.95 Country: <0.01 Age: 0.02
Maternal Restrictive Control	$M = 1.46$ ; $SD = 0.29$	$M = 1.52$ ; $SD = 0.35$	$M = 1.53$ ; $SD = 0.35$	$M = 1.48$ ; $SD = 0.26$	Country*Age: 1.90 Country: 0.01 Age: 0.12	Country*Age: 0.17 Country: 0.93 Age: 0.73
	$(M = 2.20$ ; $SD = 0.55)$	$(M = 2.22$ ; $SD = 0.72)$	$(M = 2.25$ ; $SD = 0.69)$	$(M = 2.07$ ; $SD = 0.54)$	Country*Age: 2.18 (Country: 0.94 Age: 0.28	Country*Age: 0.14 (Country: 0.33 Age: 0.60
Behavior Regulation of Child	$M = 1.34$ ; $SD = 0.52$	$M = 1.51$ ; $SD = 0.49$	$M = 1.41$ ; $SD = 0.60$	$M = 1.64$ ; $SD = 0.48$	Country*Age: 1.62) Country: 8.71** Age: 1.85	Country*Age: 0.20) Country: <0.01 Age: 0.18
	$(M = 2.11$ ; $SD = 0.51)$	$(M = 2.31$ ; $SD = 0.48)$	$(M = 2.20$ ; $SD = 0.57)$	$(M = 2.38$ ; $SD = 0.49)$	Country*Age: 0.12 (Country: 8.16** Age: 1.47	Country*Age: 0.18 (Country: 0.01 Age: 0.23
					Country*Age: 0.01)	Country*Age: 0.94)

*N* (Chile younger children) = 54; *N* (Germany younger children) = 42; *N* (Chile older children) = 113; *N* (Germany older children) = 67. *Df* = 276. Ipsatized values for maternal restrictive control and behavior regulation of child; for more clarity a constant of 2 was added. Original values for maternal restrictive control and behavior regulation of child in parentheses. \*\* $p < 0.05$ . \*\*\* $p < 0.01$



**Fig. 1** Mediation model of the relations between family risk, maternal restrictive control, and child's behavior regulation.  $n$  (Chile) = 167;  $n$  (Germany) = 109.  $a$ ,  $b$ ,  $c$ : unstandardized regression coefficients, controlled for child's gender.  $c$ : total effect, controlled for child's

gender.  $c'$ : direct effect, controlled for child's gender. Models were tested separately for the German and Chilean samples. PROCESS Bootstrap-analysis 5000 Model 4 (Hayes, 2013) with original (non-ipsatized) values.  $*p < 0.05$ .  $**p < 0.01$

$SD = 0.34$ ; Germany:  $M = 1.50$ ,  $SD = 0.30$ ;  $F(1, 276) = 0.94$ ,  $p = 0.33$ ; original values: Chile:  $M = 2.24$ ,  $SD = 0.65$ ; Germany:  $M = 2.13$ ,  $SD = 0.62$ ;  $F(1, 276) = 0.01$ ,  $p = 0.92$ ).

Regarding relations between family risk and children's behavior regulation (hypothesis 3), we found a significant negative relation between family risk and children's behavior regulation in Chile (Chile:  $b = -0.10$ ,  $SE = 0.04$ ,  $t = -2.431$ ,  $p < 0.05$ ). For Germany, we found no significant relation between family risk and children's behavior regulation (Germany:  $b = -0.04$ ,  $SE = 0.08$ ,  $t = -0.45$ ,  $p = 0.65$ ). Further, in Chile, family risk and maternal restrictive control showed a significant positive relation ( $b = 0.18$ ,  $SE = 0.05$ ,  $t = 3.20$ ,  $p < 0.01$ ). In Germany, family risk and maternal restrictive control were positively related as well ( $b = 0.29$ ,  $SE = 0.10$ ,  $t = 2.94$ ,  $p < 0.01$ ; hypothesis 4). Finally, maternal restrictive control and children's behavior regulation showed significant negative relations in both Chile and Germany (Chile:  $b = -0.38$ ,  $SE = 0.06$ ,  $t = -6.35$ ,  $p < 0.01$ ; Germany:  $b = -0.20$ ,  $SE = 0.08$ ,  $t = -2.56$ ,  $p < 0.05$ ; hypothesis 5).

### Maternal Restrictive Control as Mediator

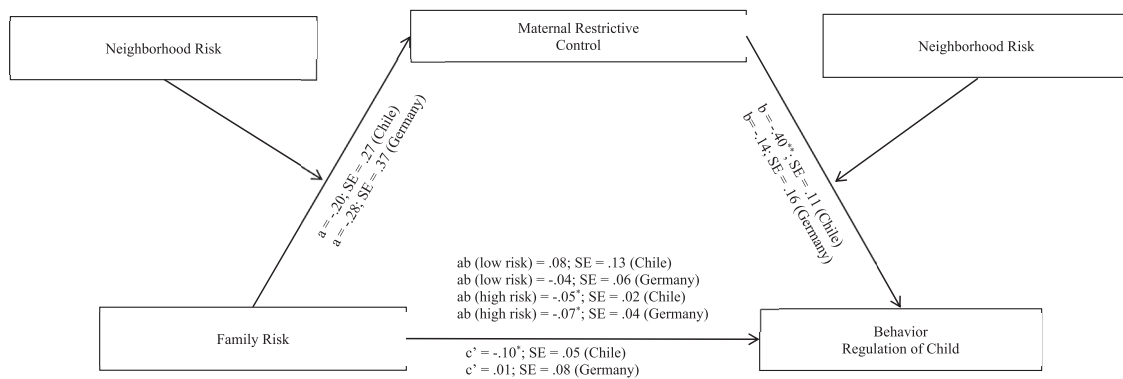
To test if maternal restrictive control affects the relation between family risk and the child's behavior regulation, we conducted mediation analyses for each cultural context (hypothesis 6). Our models included family risk as independent variable, maternal restrictive control as mediator variable, and the child's behavior regulation as dependent variable and were controlled for the child's gender. In the Chilean model, family risk and maternal restrictive control

were related positively. Maternal restrictive control showed a negative relation with the child's behavior regulation. After including maternal restrictive control as a mediator, the total effect of the relation between family risk and child's behavior regulation decreased but remained significant ( $c'$  path; see Fig. 1). Thus, in Chile, family risk showed a direct relation with the child's behavior regulation as well as an indirectly relation via maternal restrictive control (indirect effect =  $-0.07$ ,  $SE = 0.02$ , 95% CI [ $-0.11$ ;  $-0.03$ ]).

In the German model, a positive relation between family risk and maternal restrictive control was revealed, too. Like in the Chilean model, maternal restrictive control was negatively related to the child's behavior regulation in Germany. However, in contrast to the Chilean model, family risk and children's behavior regulation did not show a significant direct relation in the German model. Also, after including maternal restrictive control as a mediator, the total effect of the relation between family risk and behavior regulation did not reach significance ( $c'$  path; see Fig. 1). In contrary to the significant direct and total effect of family risk on children's behavior regulation in Chile, we found only an indirect effect of family risk on children's behavior regulation via maternal restrictive control in Germany (indirect effect =  $-0.06$ ,  $SE = 0.03$ , 95% CI [ $-0.13$ ;  $-0.01$ ]).

### Moderating Effects of Neighborhood Risk on the Mediation Model

In a second model, we tested the moderating role of neighborhood risk on relations between family risk and



**Fig. 2** Moderated mediation model of the relations between family risk and maternal restrictive control, and child's behavior regulation moderated by neighborhood risk.  $n$  (Chile) = 167;  $n$  (Germany) = 109. a, b, c: unstandardized regression coefficients, controlled for child's gender. ab: conditional indirect effect on levels of

neighborhood risk being high (1) or low (0). c: total effect, controlled for child's gender. c': direct effect, controlled for child's gender. Models were tested separately for the German and Chilean samples. PROCESS Bootstrap-analysis 5000 Model 58 (Hayes, 2013) with original (non-ipsatized) values. \* $p < 0.05$ . \*\* $p < 0.01$

maternal restrictive control as well as maternal restrictive control and children's behavior regulation in the mediation model. The models included family risk as independent variable, maternal restrictive control as mediator variable, neighborhood risk as moderator on the relation between family risk and maternal restrictive control and on the relation between maternal restrictive control and children's behavior regulation, child's behavior regulation as dependent variable, and child's gender as a control variable. In the Chilean model, we found no significant overall moderated mediation effect for neighborhood risk on the relation between family risk and maternal restrictive control or on the relation between maternal restrictive control and children's behavior regulation (Index of moderated mediation =  $-0.13$ ,  $SE = 0.13$ , 95% CI [ $-0.43$ ;  $0.11$ ]). In line with Preacher et al. (2007), a significant overall index of moderated mediation is not a prerequisite for examining conditional indirect effects. Thus, we further investigated conditional indirect effects of family risk on behavior regulation via maternal restrictive control. We found that within the moderated mediation model, the relation between family risk and maternal restrictive control was only significant under the condition that neighborhood risk was high (conditional indirect effect for high neighborhood risk =  $-0.05$ ,  $SE = 0.02$ , 95% CI [ $-0.10$ ;  $-0.01$ ]; conditional indirect effect for low neighborhood risk =  $0.08$ ,  $SE = 0.13$ , 95% CI [ $-0.16$ ;  $0.38$ ]; ab path; see Fig. 2). Likewise, in the German model, there was neither a significant overall moderated mediation effect for neighborhood risk on the relation between family risk and maternal restrictive control nor on the relation between maternal restrictive control and children's behavior regulation (Index of moderated mediation =  $-0.03$ ,  $SE = 0.07$ , 95% CI [ $-0.15$ ;  $0.14$ ]). However, we found that the relation between family risk and maternal restrictive control was only significant under the condition

that neighborhood risk was high (conditional indirect effect for high neighborhood risk =  $-0.07$ ,  $SE = 0.04$ , 95% CI [ $-0.12$ ;  $-0.01$ ]; conditional indirect effect for low neighborhood risk =  $-0.04$ ,  $SE = 0.06$ , 95% CI [ $-0.2$ ;  $0.03$ ]; ab path; see Fig. 2).

## Discussion

### Behavior Regulation in Chile and Germany

With this study, we contribute to current literature by taking a multilayer ecological approach on children's behavior regulation development in Chile and Germany. To broaden the understanding of children's development in context, we integrate the investigation of cross-cultural similarities and differences for relations between different aspects of contextual risk (i.e., family and neighborhood risk), maternal restrictive control, and children's behavior regulation. As hypothesized, our findings reveal that children's behavior regulation was rated significantly higher in Germany than in Chile. A broad body of cross-cultural research has discussed the role of culture-specific expectations, which can lead to higher levels of children's behavior regulation in certain cultural contexts (Heikamp et al., 2013). In line with this, parents in Germany might expect autonomous behavior regulation of children from an early age on. In Chile, on the other hand, parents might provide guidance through rules and interdependent regulation. Indeed, a study by Darling et al. (2005) found that adolescents in Chile reported more parental rules and involvement, granting less autonomous regulation compared to US-American adolescents.

A different explanation for the finding of lower behavior regulation of children in Chile might be that cross-cultural differences affect the development of the regulatory focus

that shapes the meaning and nature of behavior regulation. Behavior regulation might either focus on the promotion of goals and aspiration towards ideals (promotion focus) or the prevention of social conflicts, including the avoidance of losses and the fulfillment of obligations (prevention focus; Lee et al., 2000). In cultural contexts with a prioritized interdependent self-construal, the prevention focus might be more prominent as it is concurrent with cultural values such as maintaining interpersonal harmony (Trommsdorff, 2012). On the other hand, in cultural contexts with a high independent self-construal, the promotion focus might foster the achievement of personal goals and individuality (Trommsdorff, 2012). In this study, we measured behavior regulation with a questionnaire that mainly reflects promotion oriented aspects of behavior regulation (e.g., concentration and endurance on tasks in order to perform well; regulation of motoric activities; Goodman, 1997). It remains unclear whether the differences we found between the Chilean and German sample are related to variations in the preference of the regulatory focus. Further, contrary to our hypothesis, we did not find culture-specific differences in the level of maternal restrictive control. This underlines the importance of considering maternal parenting within its embedded context to understand the use of maternal restrictive control.

### **Family Risk, Maternal Restrictive Control, and Behavior Regulation**

Within each cultural context, we examined the interplay of family risk, maternal parenting, and children's behavior regulation. High family risk was directly related to lower levels of children's behavior regulation in Chile but not in Germany. This finding reveals cross-cultural differences in the importance of family risk. The significant relation between family risk and children's behavior regulation that we found in our Chilean sample is in line with other studies which relate family risk to children's outcomes (Bignardi et al., 2021; Ugarte et al., 2020; Ungar, 2015). Even though some studies in Germany have found strong relations between family risk and behavior regulation in children (e.g., Deffaa et al., 2020; Pitzer et al., 2011), other studies point out effects of more distal contextual aspects that might be relevant for children's development in Germany. Some studies revealed that children in Germany with high family risk profit highly from childcare enrollment, which is subsidized in the German social-welfare system, so that it is affordable for everybody (Hermes et al., 2021; Hübenal and Iffland, 2011). As we contacted our participants in Germany through schools and social workers, participating families were in contact with social workers already and thus they might have been integrated into a social support system that might have buffered the effect of a high family risk.

In this study, we included maternal restrictive control as parenting practice to (partly) bridge the gap between aspects of contextual risk and children's development. In line with our hypothesis, we found that family risk was significantly related to maternal restrictive control in both Chile and Germany. Independent from the culture-specific meaning of family risk, the consistent finding of negative relations between family risk and maternal parenting might implicate a shared mechanism across cultural contexts with comparable contextual risk, as earlier studies showed (e.g., Lengua et al., 2007; Manrique Millones et al., 2014). In both Chile and Germany, maternal restrictive control was significantly and negatively related to children's behavior regulation, verifying previous studies (Weis et al., 2016). Further, we found a significant indirect mediation effect of maternal restrictive control for the relation between family risk and children's behavior regulation in both Chile and Germany. In both cultural contexts, our findings showed that the higher the family risk was, the more mothers exerted maternal restrictive control, and the lower was the child's behavior regulation. This might be a general mechanism across different cultural contexts. Similar results were obtained in the US-American context (Cadima et al., 2015; Lengua et al., 2007; Størksen et al., 2015). This is in line with the family stress model by Conger et al. (2010) that states that regardless of the cultural context, mothers living in settings with high family risk have limited access to important parenting resources (e.g., financial, and social resources; Sherman and Harris, 2012) and thus experience more psychological stress, which in turn results in adverse parenting. It is important to mention, that we did not include maternal stress into the multilayer model of children's behavior regulation development. Thus, mechanisms behind the relation between family risk and maternal restrictive control remain subject of future empirical studies.

At the same time, we found some cross-cultural differences in our mediation models. For Chile, we found that family risk and children's behavior regulation showed a significant negative relation over and above the mediating effect of maternal restrictive control. In contrast, in the German sample, the relation between family risk and children's behavior regulation did not reach significance. However, our mediation model revealed an indirect effect of family risk on children's behavior regulation via maternal restrictive control. These differences may be due to the culture-specific meaning of the family context for children's behavior regulation development. The Chilean cultural context has been described more family-oriented than the German cultural context with rather independent values (Bush and Peterson, 2014; Keller and Lamm, 2005). In Chile, family-oriented norms and expectations with unintended relations to family risk might remain important regardless of maternal parenting. In Germany, children are

expected to develop more independently from their family with extended contacts and influences outside of the family context. Thus, family risk might not affect children's development directly but rather indirectly via more prominent parenting practices within families with high risk in Germany. Regarding the remaining significant relation over and above the effect of maternal restrictive control in Chile, other contextual and individual factors might have an impact on the relation between family risk and children's behavior regulation, too. One of these factors might be the biological stress of the child (Blair, 2010) that may be of special importance in Chile, a highly segregated country, with high social inequality. Thus, high family risk might imply a severe threat to children's well-being that goes along with high stress exposure in children (United Nations, 2009).

### Neighborhood Risk, Family Risk, Maternal Restrictive Control, and Children's Behavior Regulation

Extending current knowledge about contextual risk, we investigated culture-specifics in the moderating role of neighborhood risk for relations between family risk and maternal restrictive control as well as for relations between maternal restrictive control and children's behavior regulation. The overall moderated mediation effects for neighborhood risk on the relation between family risk and maternal restrictive control as well as on the relation between maternal restrictive control and children's behavior regulation in the mediation model did not reach significance neither in Chile nor Germany. One reason for the missing significance might be the dichotomous nature of the moderator (low or high neighborhood risk) and high inter-relatedness with family risk and maternal restrictive control. This might lead to an inability of the moderator to produce a differential overall effect. According to Preacher et al. (2007) even when the overall index of moderated mediation is insignificant, conditional indirect effects might offer more insights into the mechanisms behind the relations. In line with this, we found indirect significant conditional effects in both countries. High family risk was related to higher levels of maternal restrictive control only when neighborhood risk was high. Further, higher levels of maternal restrictive control were related to lower levels of behavior regulation only when neighborhood risk was high. This indicates that when mothers face multiple contextual risks, like the combination of family risk and neighborhood risk, they are more likely to use maternal restrictive control, which in turn leads to lower levels of behavior regulation. The higher use of maternal restrictive control in settings with high family and neighborhood risk in both Chile and Germany may be related to strategies to protect the child from adverse peer

effects and other contextual risk influences of the neighborhood (Bendezú et al., 2016; Skinner et al., 2014). Parental motivation to protect children from adverse peer influences might activate the protection-domain of interaction, which might lead to restrictive and controlling parenting practices in Chile as well as in Germany (Grusec and Davidov, 2010).

### Strengths and Limitations

This study is one of the first to consider multiple contextual aspects for the development of children's behavior regulation taking a culture-sensitive approach. However, some limitations and methodological restrictions for interpreting the results should be considered. To adjust for cultural differences in response styles, we calculated our analyses of cross-cultural mean differences of children's behavior regulation and maternal restrictive control with ipsatized as well as original scores. As ipsatized values account for potential systematic response tendencies (Mayer and Sigenthaler, 2017), we decided to consider ipsatized group comparison results for further discussions of our findings. Further, in this study, we used cross-sectional data, not allowing conclusions about directions of the relations. Earlier studies have revealed bidirectional effects of the relations between maternal restrictive control and children's behavior regulation (Baron and Malmberg, 2017). This underlines the need for longitudinal designs to investigate causal directions of culture-specific functional relations between different aspects of contextual risk, maternal parenting, and the development of children's behavior regulation. Additionally, family risk, parenting, and behavior regulation of the child were reported by the mothers only. To avoid response biases, future studies should include ratings by other sources like teachers, fathers, or the child as well as experimental measures. Sample sizes differed between the cultural contexts, with the German sample ( $n = 109$ ) being significantly smaller than the Chilean sample ( $n = 167$ ). Even though we checked for variance homogeneity, some comparisons might have been distorted due to differences in sample sizes and small mean variations in variances. This is of special importance when interpreting cross-cultural differences in the mediating role of maternal restrictive control for the relation between family risk and children's behavior regulation. It is possible that this cross-cultural difference might be related to differences in sample sizes. In a larger sample a stronger relation between family risk and children's behavior regulation may occur over and above the mediation of maternal restrictive control for the German sample. Future studies should use a larger sample size to avoid ambiguities in interpreting the results. Finally, as mentioned above, the behavior regulation assessment of this study included mainly promotion-oriented behavior



regulation which might not account for culture-specific meanings of behavior regulation. Thus, future research should include also prevention-oriented behavior regulation that focus on the avoidance of social conflicts and the fulfillment of responsibilities (e.g., suppress own interests in favor of group interests, withhold own unpopular opinions).

### Theoretical and Practical Implications

Behavior regulation has been shown to be of great relevance for various aspects of children’s successful development (Robson et al., 2020). For children growing up in high contextual risk, a high motivation and ability to regulate one’s behavior is considered a protective factor for children’s adjustment to social contexts (Lengua, 2002; Masten and Coatsworth, 1998). In line with Bronfenbrenner and Morris’ bioecological model (2007), our results indicate that it is important to take a multilayered contextual perspective when investigating the development of behavior regulation in middle childhood. Our data showed that the cultural context can shape the interplay of contextual and interactional aspects for the development of children’s behavior regulation development. It is therefore important to address in more detail the culture-sensitive meaning of behavior regulation in future research as well as for practical implementations.

Additionally, besides cultural specifics, aspects of contextual risk can alter proximal processes that enable children’s behavior regulation development. In line with the family stress model (Conger et al., 2010), our findings revealed cross-cultural similarities in the mediating role of maternal restrictive control for the relation between family risk and children’s behavior regulation. In both Chile and Germany, the higher family risk, the higher was the use of maternal restrictive control and the lower children’s behavior regulation. However, the meaning of maternal parenting for relations between family risk and children’s behavior regulation appears to differ between the Chilean and German cultural context. While the indirect effect of maternal restrictive control was evident in both Chile and Germany, the direct relation between family risk and children’s behavior regulation existed only in Chile and remained significant over and above the effect of maternal restrictive control. In Germany, there was no direct effect of family risk on children’s behavior regulation. This finding hints at culture-specific meanings of maternal restrictive control as well as family risk as proximal contextual aspect. Furthermore, this study is among the first to differentiate between proximal and distal contextual risk aspects and shows that relations between the proximal context and children’s development might vary depending on the presence of more distal contextual risk (e.g., neighborhood risk). To further improve the understanding of children’s

behavior regulation from an ecological perspective, subsequent studies should take into account differentiations between distal and proximal contextual aspects of children’s developmental environments, e.g., parental psychopathology, social cohesion in the neighborhood, and psychological stress of parents and children.

Whilst granting new insights into multilayer aspects of cross- and intra-cultural developmental mechanisms, our findings may help to further improve preventive and therapeutic strategies for children’s adaptive behavior regulation development in line with contextual characteristics. As Ungar et al. (2013; p. 361) pointed out, “interventions [...] are most effective when they reflect the complexity of a multisystemic view”. Our study identifies a cumulative factor of family risk that goes along with impaired children’s behavior regulation. Further, neighborhood risk might strengthen this adverse contextual effect. Cumulative contextual risk indices could help to identify potential beneficiaries of early preventive programs to foster children’s behavior regulation. Moreover, our findings suggest that a systemic approach in preventive interventions can help to account for multilayer contextual aspects, for example by integrating parental as well as child focused aspects in preventive programs. Thereby, culture-specific meanings of parental and individual aspects need to be considered as they might differ depending on the cultural context (see e.g., Trommsdorff and Kornadt, 2003). As our results show, fostering less restrictive and controlling parenting practices might improve children’s behavior regulation development in Chile and Germany. In conclusion, it is important to consider the complexity of multilayered sociocultural contexts for children’s behavior regulation as it brings us closer to understanding and fostering children’s development in diverse developmental settings.

### Data Availability

The datasets for this manuscript are not publicly available because of ongoing data analyses in preparation for publication. Requests to access the datasets should be directed to the first author.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Consent to participate** Informed consent was obtained from all individual participants included in the study.

**Ethics approval** Approval of this study design was obtained from the ethics committee of University of Konstanz. The procedures used in this study adhere to the tenets of the Declaration of Helsinki.

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