



Parental Predictors of Children's Math Learning Behaviours in Different Cultures

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Abstract

Research indicates that parental schoolwork involvement is beneficial for students' academic functioning when parents facilitate their children's autonomy and refrain from psychological controlling practices. However, effects of the quality of parental involvement on child learning outcomes may vary due to cross-cultural differences in children's appraisal and reaction towards these practices. The current study aimed to investigate the link between the quality of parental schoolwork involvement and children's learning-related behaviours in math, and the mediating role of mother-child conflict around math schoolwork in this link in three cultural groups (i.e., German-Turkish, Turkish and German families). Data were collected from 107 German-Turkish, 426 Turkish and 140 German mothers with children in fifth to eighth grades. After testing measurement invariance of the scales across groups, multi-group structural equation modelling was used to examine the direct and indirect paths between the quality of parental involvement, mother-child conflict and child learning-related behaviours. Results showed that the level of mother-child conflict mediated the link between mothers' psychologically controlling practices and children's learning-related behaviours in math in all three groups. No mediation was found for the link between maternal autonomy support and children's learning-related behaviours in any group. However, the direct path from mothers' autonomy support to children's learning-related behaviours was significant in the Turkish and German-Turkish samples. These results suggest that the role of different forms of parental schoolwork involvement in children's academic functioning is more similar than different across cultural groups.

Keywords Autonomy support · Psychological control · Parent involvement · Learning-related behaviour · Mother-child conflict · Cross-cultural comparison

Highlights

- The links between quality of involvement, mother-child conflict, and children's learning-related behaviours in math are investigated in German-Turkish, Turkish and German families.
- The quality of parent involvement is measured via mother's autonomy support and psychological control during schoolwork involvement.
- Results show that mother-child conflict mediates the link between maternal psychological control and children's learning-related behaviours in all three groups.
- Regarding maternal autonomy support only the direct positive paths to children's learning-related behaviours are significant in Turkish and German-Turkish families.

When parents get involved in their child's schooling, they mostly do so to facilitate their child's academic development. Despite this good intention, research suggests that children especially benefit from parental schoolwork-involvement when it supports their autonomy during the learning process (Dumont et al., 2014). Yet, when parents get involved in their child's schoolwork in a psychological controlling manner, by using threat or guilt, children's

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academic progress gets hampered (Ng et al., 2004). While the positive role of autonomy-supportive parental involvement for child academic development is mostly accepted across countries, the negative effect of psychological control during schoolwork-involvement is still debated; particularly for more collectivistic-orientated countries (Grusec et al., 2017). A potential reason for cross-cultural differences in the role of parental involvement is that the cultural context shapes children's appraisal of their parents' behaviours (Lansford et al., 2005). Since parental authority and obedience towards parents are more valued in more collectivistic-orientated cultures than in individualistic-orientated cultures (Grusec et al., 2017), it is possible that parental psychological control is less likely to increase tensions between the parent and the child and children are more likely to develop adaptive behaviours when confronted with controlling parental behaviours in more collectivistic-orientated contexts.

Germany and Turkey provide an interesting context to investigate cross-cultural similarities and differences, since the two countries differ in their value-orientations as well as common parental practices. That is, Turkish people are found to place more importance on collectivistic values such as conservatism, authority, and harmony compared to German people (Hofstede et al., 2010) and controlling parental practices are found to be more common in Turkey than in Germany (Toprak, 2008). Moreover, German-Turkish families have a history of migration from Turkey to Germany. This migrant experience might shape the parents' practices and children's appraisal of these practices. Thus, including German-Turkish families in the present study strengthens the study's cross-cultural approach. Additionally, since mothers are known to more frequently become involved in their child's schooling than fathers (Hsu et al., 2011; Kim, 2018) and parents' behaviours might get more psychologically controlling when math assignments get more challenging in higher grades, we decided to focus on mothers' involvement practices in math schoolwork of middle school students (i.e., fifth to eighth grade students). Thus, in the current study, we examine whether the level of schoolwork conflict between mother and child attending fifth to eighth grade mediates the relationship between maternal autonomy support and psychological control during math schoolwork-involvement and children's learning-related behaviour in math, as reported by mothers, in three cultural groups, namely German-Turkish, Turkish, and German families.

Parental Involvement Practices and Child Academic Functioning

Research indicates that not the quantity, but the quality of parents' involvement in schoolwork (i.e., autonomy

supportive or psychological controlling involvement) matters for children's academic development (Pomerantz et al., 2007). That is, when mothers become involved in their child's schooling in an autonomy-supportive way, in which they acknowledge the child's viewpoint and feelings, leave the lead to solve academic problems to the child, and explain their reasons for rule settings, then children show higher motivation, higher competence beliefs, and more adaptive learning-related behaviours (Dumont et al., 2014; Grolnick et al., 1991). Autonomy-supportive parenting helps the child to figure out the best way to solve academic problems on his/her own and make rules transparent for the child, so the child understands what is expected from him/her and why (Grolnick et al., 2014).

A theory which deals with the role of parental autonomy support for children's development is Self-Determination Theory (SDT; Deci & Ryan, 2000). SDT suggests that autonomy supportive practices are most suitable to satisfy the psychological needs of children (i.e., children's need for relatedness, competence and autonomy). Children whose needs are satisfied are more likely to strive and to develop adaptive beliefs and behaviours according to SDT (Deci & Ryan, 2000). The positive effect of parental autonomy support during schoolwork-involvement on students' academic functioning is mostly supported by studies from both individualistic-orientated (i.e., Germany, US, Canada) as well as collectivistic-orientated (i.e., China, Ghana) countries (Fung et al., 2017; Marbell & Grolnick, 2013; Marbell-Pierre et al., 2019; Ng et al., 2014; Silinskas & Kikas, 2017). For example, it has been shown that autonomy-supportive parental practices facilitate children's autonomous motivation to study and learn (i.e., engaging in a task because the child thinks it is valuable), increase their confidence in their academic competence, and willingness to approach academically challenging tasks (Dumont et al., 2012; Grolnick et al., 1991; 2014; Moroni et al., 2015; Pomerantz et al., 2005; 2007). Another critical form of parents' involvement in their child's schooling is psychological control. When parents get involved in a psychological controlling manner, they use threat or induce guilt in the child to pressure their child to study harder and comply with parental academic expectations (Barber, 1996; Pomerantz & Eaton, 2001). It is argued that when parents use psychological control, they intrude on the child's psychology by using manipulative strategies such as degrading or threatening the child, withdrawing their love or inducing guilt in the child, with negative consequences for the child's emotional and problem learning related behaviours (Kocak et al., 2017). According to SDT, infringing children's need satisfaction will hamper their development of autonomous motivation to get involved in schoolwork and might result in extrinsic motivation to get engaged in schoolwork (i.e., children getting involved in schoolwork because they fear

they get in trouble if they refrain from it) (Deci & Ryan, 2000). When children do not internalize the value of learning at school (i.e., no autonomous motivation), but rely on external reasons such as parental pressure and control for getting involved in schoolwork (i.e., extrinsic motivation), it is likely that their engagement in schoolwork diminishes in the absence of an external reason (i.e., parental control) (Deci & Ryan, 2000). Regarding psychological controlling involvement-practices, findings differ across cultural contexts. Studies from more individualistic-orientated countries such as US and Germany highlight the negative role of psychological controlling parental involvement in children's education-related outcome such as a sense of helplessness regarding academic tasks, homework procrastination, academic task avoiding behaviours, and lower academic achievement (Dumont et al., 2014; Orkin et al., 2017). However, findings from more collectivistic-orientated countries such as China and Ghana are mixed. For example, a longitudinal study with seventh to eighth grade Chinese students found a negative association of parents' psychological control with the students' emotional functioning, but no association with the students' academic functioning (Wang et al., 2007). Additionally, in a longitudinal study with sixth to seventh grade students from China mothers' psychological control predicted the students' prosocial behaviours towards friends and strangers, but not their academic achievement (Fu & Zhang, 2020). Yet, another study conducted in China showed that increased parental psychological control reduced students' success on an academic task in laboratory setting (Cheung et al., 2016). Similarly, a study with Chinese high school students found negative associations between mothers' psychological control and the students' academic self-concept (Lu et al., 2017). Moreover, a study conducted in Ghana indicated that students who reported more exposure to parental control also reported higher levels of depression and lower levels of academic engagement (Marbell & Grolnick, 2013). These mixed findings lead to discussions on whether parental psychological control influences children's education-related outcomes similarly or differently across cultures.

Cultural Differences

Different reasons for cross-cultural differences in the link between parents' behaviours and children's academic functioning have been suggested in the literature. An underlying assumption of most arguments is that culture shapes which parental practices are employed and how children evaluate and react towards their parents' behaviours (Sorkhabi, 2012). Yet, researchers disagree on whether cross-cultural differences in the occurrence and

appraisal of parental practices would result in different child outcomes (Marbell-Pierre et al., 2019). Cultural relativists argue that collectivistic-oriented cultures are more hierarchical and parents are more likely to be perceived as authorities who should not be questioned. In such contexts, maternal psychological control might be functional to some extent and children might appraise parental psychological control as a sign of parental interest and care (Chao, 1994, Grusec et al., 2017). A more benign interpretation of psychologically controlling practices may reduce tension between the parent and the child and also children's tendency to react in an oppositional way towards maternal controlling behaviours (Lansford et al., 2005). On the other hand, more universal orientated researchers suggest that, since psychologically controlling practices are psychologically intruding and pressurize children, they are harmful to children's development regardless of cultural variation on its perception (Cheung et al., 2016). Following SDT, they propose that parental psychological control impedes the satisfaction of the psychological needs of children with adverse effects for their further development (Deci & Ryan, 2000). Moreover, Sorkhabi (2012) argues that psychological controlling practices violate the principle of reciprocity between the parent and the child and thus the child will perceive these practices as unfair and interfering. Therefore, these practices are likely to create tension and disconnection between parent and child, which is likely to hamper the child's positive development (Sorkhabi, 2012). More universal-orientated researchers suggest a universalism without uniformity, in which parental intrusion on children's thoughts and feelings result in negative consequences for children's healthy development across cultural settings, yet the process by which the effect takes place may differ cross-culturally (Cheung et al., 2016).

So far, studies examining the underlying mechanisms of how the quality of parental schoolwork-involvement is linked to students' academic development have mostly focused on students' motivational and competence beliefs (e.g., Gonida & Cortina, 2014; Pomerantz et al., 2005). Yet, children's motivational beliefs might not be able to sufficiently explain the cross-cultural differences in the link between parents' involvement practices and children's academic functioning. A possible construct that might capture this cross-cultural variability is the level of parent-child conflict as an indicator of the quality of the relationship. Several studies have shown that a positive and trusting parent-child relationship is the base for the development of children's well-adjusted behaviours (Morrison et al., 2003). Yet, a conflicting parent-child relationship is linked to maladjusted child outcomes such as internalizing and externalizing behaviours (Buist et al., 2011; 2017). Furthermore, if a parent-child conflict occurs, children may cope differently; they may either react with defiance or

negotiation (Smetana & Rote, 2019). How children react towards parent-child conflict is likely to be associated with the appraisal of the situation. Students coming from more collectivistic-orientated cultural contexts may interpret psychologically controlling maternal schoolwork-involvement as less intrusive and pressuring. Hence, in these contexts, the psychologically controlling involvement would be less likely to set off mother-child conflict, and foster students' disengagement from learning and studying. Simultaneously, maternal autonomy support may contribute to a positive parent-child relationship and thus, dampen mother-child conflict. Maternal autonomy support fosters a reciprocal relationship between a mother and child, which may promote children's adaptive school-related attitudes and behaviours, and thus might facilitate children's academic progress across cultural settings (Sorkhabi, 2012). This would be in line with findings from a vignette study by Van Petegem et al. (2017) showing that children reported less oppositional defiance and submission as well as more negotiation when parents request to study more was presented in an autonomy-supportive instead of controlling manner. As well as the finding that psychological controlling parental practices are accompanied by a more hostile parent-adolescent relationship in a diverse sample from the US (Sorkhabi & Middaugh, 2014).

Parent Involvement and school systems in Germany and Turkey

German people endorse individualistic value-orientations such as independence and personal goals more strongly than Turkish people (Hofstede et al., 2010). This also reflects in recent parental practices. While in the 1950s and 1960s in Germany parents would place more emphasis on conformity and obedience, since the 1970s parental practices have become more and more democratic and non-violent in Germany (Reuband, 1997). So that since year 2000, by law, non-violent parenting is requested from German parents (Walper et al., 2018). Currently German parents tend to foster higher autonomy, individualism, self-actualisation, and competency in their children (Otyakmaz, 2007; Toprak, 2008). Yet, even though Turkey has been stated to be a collectivistic-orientated country, recent research indicates that Turkish people combine collectivistic (i.e., conservatism, hierarchy, harmony) and individualistic (i.e., autonomy, egalitarianism, mastery) value-orientations (Marcus et al., 2016). Additionally, socio-demographic changes have been transforming family structures to more urban and smaller families (Kagitcibasi, 2007). However, Kagitcibasi (2007) predicted that relatedness among family members will continue to play an important role in Turkish families. The emotional interdependencies among family

members in Turkey are typically accompanied by a high level of parental intrusion in children's life choices (e.g., school, career) (Gülseven et al., 2018). Additionally, Turkish parents are found to simultaneously express an elevated level of parental warmth as well as power-assertive practices such as obedience-demanding (Kagitcibasi, 2007; Yagmurlu & Sanson, 2009).

Moreover, studies on Turkish immigrants living in Europe indicate that in general German-Turkish immigrants show a strong orientation towards the Turkish culture, which expresses itself in a strong wish to transmit the values and beliefs of their heritage culture to their offspring (Phalet & Schönpluf, 2001). Additionally, while in non-immigrant German families, autonomy and self-reliance in children is highly valued; in German-Turkish families, more emphasis is placed on obedience and respect from children towards authorities and older people such as parents and teachers (Durgel et al., 2009; Phalet & Schönpluf, 2001). These findings suggest that German-Turkish parents are more likely to endorse parental practices associated with their heritage culture and collectivistic value-orientations. However, there is very limited knowledge about how German-Turkish mothers get involved in their children's schooling and how it influences their children's learning-related outcomes.

The Turkish and German school systems differ from each other. In Germany students get selected into different school tracks with varying academic requirements after four or in some regions six years of primary schooling. German students may finish school with a diploma after 9 to 10 or 12 to 13 years of schooling. Only when students obtain their diploma (Abitur) after 12 to 13 years they are entitled to apply for college. If they finish school after 9 to 10 years of schooling they may apply for vocational training. In Turkey, students attend different school levels (primary, middle and high school) for four years each. At the end of middle school a centralised exam takes place and students may apply to high schools based on their scores from this centralised exam. After high school students may take part in another nationwide centralised exam to apply for college. This study focuses on students attending fifth to eighth grade either in a middle school in Turkey or a secondary school in Germany.

Present Study

Research highlights that how parents are involved in their children's schoolwork matters for academic development (Pomerantz et al., 2007). However, the effects of parental involvement practices on child outcomes may differ due to cross-cultural differences in children's appraisal of these practices (Ng et al., 2014). To test for cross-cultural

Table 1 Descriptive statistics

Variable	German-Turkish					Turkish					German				
	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>	<i>M</i>	<i>SD</i>	Min	Max	<i>n</i>
Child learning-related behaviour	3.13	0.63	1.33	4	107	3.07	0.67	1.22	4	424	3.07	0.62	1.22	4	136
Maternal autonomy support	5.23	0.98	2	7	106	5.09	0.95	1.40	7	424	5.23	0.84	2.91	6.91	140
Maternal psychological control	2.53	1.21	1	5.75	106	2.71	0.91	1	6.38	425	1.70	0.79	1	4	140
Mother-child conflict	1.63	0.70	1	3.5	105	1.66	0.79	1	4	426	1.72	0.85	1	4	139
Quantity of involvement	4.06	0.71	1.33	5	102	3.94	0.82	1	5	420	3.80	0.71	1.67	5	137
Maternal education	3.11	1.44	0	5	101	2.31	1.23	0	5	381	3.71	1.23	1	5	118
Child grade level	6.98	1.02	5	8	107	7.23	0.94	5	8	426	7.26	1.00	5	8	140
Child math scores	4.51	1.01	2	6	101	5.00	1.14	1	6	381	4.79	0.96	2	6	118

Table 2 Gender of child, education level of mothers and child grade level across groups (%)

	German-Turkish	Turkish	German
Child's gender (female)	59.4	53.5	54.3
Maternal education			
No diploma	3	5.2	0
High school diploma or less	48.6	76.5	36.7
Diploma beyond high school	48.6	18.2	63.3
Child grade level			
5th grade	40.2	27.0	26.4
6th grade	33.6	30.8	34.3
7th grade	14.2	34.3	26.4
8th grade	12.2	8.0	12.9

variations, the current study examined whether mother-child conflict around math schoolwork mediates the link between maternal autonomy support and psychological control and children's learning-related behaviours in math in German-Turkish immigrant, Turkish and German families. Based on the reviewed literature, we expected cross-cultural variation in the role of maternal psychological control, but no cross-cultural variation in the role of maternal autonomy support for mother-child conflict and children's learning-related behaviours in math across groups. We expected that maternal psychological control during math schoolwork-involvement is less likely to steer of conflict and oppositional behaviours (i.e., decreased learning-related behaviours) in children who grow up in more collectivistic-oriented compared to children who grow up in more individualistic-oriented settings. Due to the finding that Turkish immigrant parents living in Europe mainly aim to maintain their heritage culture for their children, we hypothesized that German-Turkish families are more similar in their value-orientations and practices to Turkish than non-migrant German families. Furthermore, we expected that maternal autonomy support would function as a protective

factor across cultural settings. That is, we expected that autonomy supportive involvement practices of mothers would add to an improved mother-child relationship by reducing the level of tension over math schoolwork between mother and child and therefore, would promote children's learning-related behaviours in math in all three groups similarly.

Method

Participants

Participants were 107 German-Turkish ($M_{\text{age}} = 40.65$ years, $SD = 4.96$), 426 Turkish ($M_{\text{age}} = 40.56$ years, $SD = 5.79$), and 140 German ($M_{\text{age}} = 44.83$ years, $SD = 5.13$) mothers with children attending fifth to eighth grade. German-Turkish mothers were residing in Germany, and either themselves ($n = 65$) or at least one of their parents ($n = 42$) were born in Turkey. German mothers and their parents were born in Germany. Turkish mothers and their parents were born in Turkey. Sample sizes between groups were mostly due to convenience sampling. Instead of excluding eligible cases from the analysis to get a closer distribution across groups (e.g., by random selection or matching of cases), we decided to include all cases to have higher statistical power and more precise standard errors.

The gender distributions of children across groups were similar, as indicated by a non-significant χ^2 -test of difference, $\chi^2(2, 672) = 1.21, p = 0.55$ (Table 2). The three groups differed in their level of maternal education, $F(2, 665) = 68.81, p < 0.001$; for measurement of maternal education see page 11). Pairwise comparisons indicated that education level of German-Turkish mothers was higher than Turkish mothers, but lower than German mothers (Tables 1, 2). There were also group differences in children's average attended grade, $F(2, 670) = 3.25, p < 0.05$ and math scores, $F(2, 670) = 3.25, p < 0.05$. Pairwise comparisons showed that this difference was significant between German-Turkish and Turkish

children. On average German-Turkish children were attending lower grades compared to Turkish children; and German-Turkish children on average obtained lower math scores than Turkish children (Table 2). No significant differences in grade attendance and math scores emerged between German-Turkish and German children.

Procedure

Data were collected after obtaining the approval from the University Institutional Review Board and permission from the relevant state or school authorities. Participants were recruited from public schools in urban neighbourhoods mostly resided by low to middle-class families, in two cities in Germany (i.e., Berlin and Cologne) and one city in Turkey (i.e., Istanbul). Teachers at schools distributed the questionnaires in an envelope to their students. Students passed on the envelope to their mothers and brought them back to school. Mothers provided written informed consent and could choose between German or Turkish questionnaires.

Measures

Originally, the measures were either in English or German. We used translation and back-translation procedure (Brislin, 1980) for translating the scales into German and Turkish.

Children's learning-related behaviours

Children's learning-related behaviours were measured with all 10 items adopted from the Educational Processes, Competence Development, and Selection Decisions in Preschool- and School-Age Study (BIKS-3-10; Weinert et al., 2013). The scale has been previously used to collect data from children as young as 3 years and as old as 16 years in other large-scale studies in Germany (Blossfeld & von Maurice, 2011). The scale taps into three learning-related behaviours in children, namely self-reliance (e.g., 'My child needs a lot of support with math schoolwork. (reverse coded)' 3 items), the joy of learning (e.g., 'My child likes his/her math classes.' 3 items), and persistence during math schoolwork (e.g., 'My child makes an effort when math tasks are difficult.' 4 items). Mothers rated the items on a 4-point Likert scale (1 = does not apply at all; 4 = applies completely) to indicate how much these behaviours applied to their child. Scores for the dimensions were obtained by averaging the relevant items, with higher scores indicating higher engagement levels of children in math. All sub-scales had acceptable internal consistency values across groups ($0.62 < \alpha < 0.89$), with one exception: The α -reliability of the self-reliance in the Turkish sample was somewhat lower ($\alpha = 0.58$). Previous studies found that different

aspects of learning-related behaviours are correlated and combined them into a latent variable (Niehues et al., 2021). Following the same approach, we created a latent variable for children's learning related behaviours estimated from the children's self-reliance, joy of learning, and persistence during math schoolwork scores.

Quality of maternal schoolwork-involvement

The quality of mothers' involvement in their children's math schoolwork was measured with 18 items adopted from the 24 item Perceived Parental Autonomy Support Scale (P-PASS; Mageau et al., 2015). Mothers' autonomy support was measured with 10 items tapping into the mothers' tendency to provide choice (e.g., 'I give my child many opportunities to make his/her own decision, how he/she studies for his/her math classes. '), acknowledgement of child's feeling (e.g., 'I listen to my child's opinion and point of view when he/she disagrees with me about his/her math schoolwork'), and providing explanation for rules and demands (e.g., 'When I ask my child to do something for his/her math classes, I explain why I want my child to do it.'). Mothers' psychological control was measured with 8 items tapping mothers' usage of threat (e.g., 'When my child refuses to do something for his/her math schoolwork, I threaten to punish him/her. ') and guilt induction (e.g., 'When I want that my child studies more for math, I make my child feel guilty.'). The items were rated on a 7-point Likert scale (1 = do not agree at all, 7 = very strongly agree). Scores for maternal autonomy support and psychological control were obtained by averaging the scores from relevant items, with higher scores indicating higher maternal engagement in the respective behaviours. Reliabilities across groups were good for both sub-scales ($0.73 < \alpha < 0.88$).

Mother-child conflict

Mother-child conflict about math schoolwork was measured with all four items adopted from the Parental Homework Involvement Questionnaire (Dumont et al., 2012). On a 4-point Likert scale (1 = completely disagree, 4 = completely agree), mothers rated the degree of conflict with their child arising from math schoolwork (e.g., 'I often argue with my child about his/her math schoolwork.'). Scores were obtained by averaging the items, with higher scores indicating higher levels of conflict. The scale had good reliability across groups ($0.82 < \alpha < 0.95$).

Covariates

Quantity of involvement Mothers' quantity of involvement in math schoolwork was assessed with all three items

from the Parent Involvement Questionnaire (Hoover-Dempsey et al., 2005). On a 4-point Likert scale (1 = never; 4 = often), mothers reported how often they help their child with math schoolwork (e.g., 'I help my child to study for math tests.'). Higher scores indicated more frequent involvement at home. The scale had acceptable reliability across all groups ($0.65 < \alpha < 0.69$).

Mother and child characteristics Prior studies provide evidence that parents' schoolwork-involvement correlates with poorer academic performance of children, children's attended grade and maternal education (Dumont et al., 2014; Patall et al., 2008). Therefore, in all analyses children's grade level, math scores, and maternal education level were controlled for. Mothers reported which grade between fifth and eighth grade their child was attending. Mothers also stated their children's math scores on the last report card. In order to convert the different national scales for math scores into a 6-point numerical scale with higher scores indicating higher child math performance, the responses from mothers residing in Germany were reversed coded. Since mothers residing in Turkey reported their children math scores from 0 to 100, equal interval cut-offs were created to reach a comparable 6-point numerical scale. A 6-point scale was also used to assess mothers' education level: 0 = no diploma; 1 = primary education; 2 = lower secondary education; 3 = upper secondary education; 4 = vocational or tertiary education until Bachelor; 5 = tertiary education beyond Bachelor. This scale was converted to have three categories while describing the sample: 1 = no diploma; 2 = high school diploma or less; 3 = diploma beyond high school.

Plan of Analysis

We conducted five sets of analyses. First, we conducted an a priori power analyses to detect the needed sample size.

Second, we examined the measurement invariance of the scales across groups. Using Mplus 7.4, invariance was assessed by comparing the change in CFI and RMSEA indices from metric and scalar variance models; with one model being the constrained and the second model being the unconstrained model (Chen, 2007). Models with CFI values above 0.90 and RMSEA values below 0.08 were considered to have acceptable fit to data (Hu & Bentler, 1999). Changes in CFI below 0.01 and RMSEA below 0.015 were taken as evidence for invariance (Chen, 2007). Establishing invariance is a prerequisite to assess relationships between study variables across groups. The metric model tests whether each item contributes similarly to the latent factor across groups. The scalar model tests whether intercepts of factors are similar across groups. If scalar invariance is established, mean difference of study variables

across groups can be examined. Partial scalar invariance can also be established by freeing some intercepts across groups, yet this requires that mean comparisons across groups should be treated with cautions.

Third, we assessed the differences and similarities in the means of study variables across groups via regression analyses. Since preliminary analysis indicated that study groups differed in terms of students' grade level, math scores, and maternal education, all analyses were controlled for these characteristics, and child gender. Separate regressions for each study variable with study variables as dependent variables, control variables as predictors, and group-membership entered as two dummy-coded predictors with German-Turkish or Turkish mothers serving as the reference category, were estimated.

Fourth, we examined associations between study variables. We present a set of zero-order correlations as well as partial correlations controlling for child gender, grade level, math scores as well as maternal education.

The goal of the main analysis was to examine the mediational role of math schoolwork-related mother-child conflict in the link between maternal involvement and children's learning-related behaviours and to assess whether the paths in our hypothesized model were similar across groups. Thus, we estimated a mediation model with a multiple-group approach. Maximum Likelihood Robust (MLR) estimation method was used to estimate standard errors more accurately. In this structural equation model (SEM), group membership was used as the grouping variable. Child's learning-related behaviours were entered as a latent variable estimated from the sum-scores on children's self-reliance, joy of learning, and persistence during math schoolwork; the quality of maternal involvement and mother-child conflict were entered as observed sum scores. The quantity of mothers' involvement, children's grade level, math scores, gender, and mothers' education level were controlled for. As the test of significance for indirect effects, 95% bootstrapped confidence limits were computed (Kisbu-Sakarya et al., 2014).

Results

Power Analysis

To determine the needed sample size an a priori power analysis for a linear multiple regression with an alpha level of 0.05 and an effect size of 0.31 using G*Power was conducted (Faul et al., 2009). The effect size was chosen based on the findings from Moroni et al., 2015 for the link between parental intrusive schoolwork involvement and students' academic achievement from fourth to ninth graders. Results showed that a total sample size of 553 participants is needed to achieve a power of 0.80.

Table 3 Correlations and partial correlations

German-Turkish (<i>n</i> = 107)	1	2	3	4
1. Child learning-related behaviours	–	0.24*	–0.26*	–0.42***
2. Maternal autonomy support	0.28**	–	0.26*	–0.06
3. Maternal psychological control	–0.28**	0.19*	–	0.37***
4. Mother-child conflict	–0.54***	–0.13	0.36***	–
Turkish (<i>n</i> = 426)				
1. Child learning-related behaviours	–	0.13*	–0.14**	–0.37***
2. Maternal autonomy support	0.22***	–	0.16**	0.05
3. Maternal psychological control	–0.17***	0.10*	–	0.34***
4. Mother-child conflict	–0.46***	–0.04	0.36***	–
German (<i>n</i> = 140)				
1. Child learning-related behaviours	–	0.11	–0.16	–0.47***
2. Maternal autonomy support	0.21*	–	–0.29**	–0.18
3. Maternal psychological control	–0.28**	–0.33***	–	0.37***
4. Mother-child conflict	–0.61***	–0.26**	0.44***	–

Zero-order correlations are presented below the diagonal. Partial correlations adjusted for child gender, grade level, math scores, and mother education are presented above the diagonal

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$

Measurement Invariance

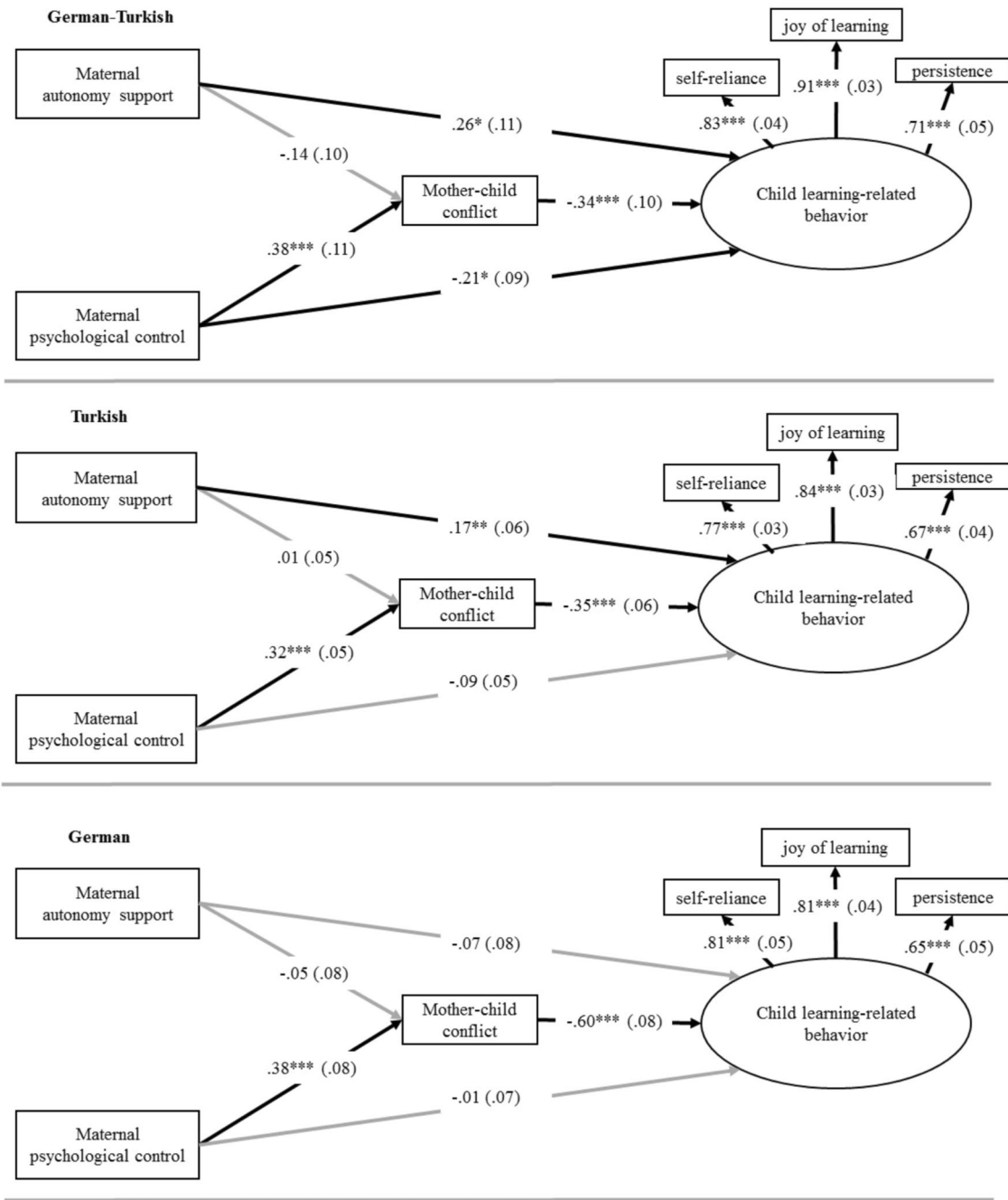
A set of models were run to assess measurement invariance across groups. The first model examined measurement invariance for the quality of mothers' schoolwork-involvement with a two-factor structure distinguishing between autonomy-supportive and psychologically controlling maternal practices. These analyses resulted in a somewhat acceptable final fit to our data, scalar model: $\chi^2(430) = 1053.96$, $p < 0.001$, RMSEA = 0.08, CFI = 0.80; metric model compared to configural model: $\Delta\text{RMSEA}_{\text{metric}} < 0.001$, $\Delta\text{CFI}_{\text{metric}} = 0.014$; scalar model compared to metric model: $\Delta\text{RMSEA}_{\text{scalar}} < 0.001$, $\Delta\text{CFI}_{\text{scalar}} = 0.013$, with a fully established metric invariance, but only a partial scalar invariance with the freeing of five item means out of 18 items. The CFI in this model was somewhat lower, yet since the CFI is sensitive to sample size this is possible (Shi et al., 2019).

Measurement invariances of the 'quantity of involvement', 'mother-child conflict' and 'child learning-related behaviours' variables were assessed in a second model. The three scales were combined in one model, since two of the three scales had only three indicators which would have resulted in non-interpretable fit indices (i.e., fully saturated models) when assessed in separated models. Analysis for the second model resulted in an acceptable fit to our data, scalar model: $\chi^2_{\text{scalar}}(90) = 153.48$, $p < 0.001$, RMSEA = 0.06, CFI = 0.97; metric model compared to configural model: $\Delta\text{RMSEA}_{\text{metric}} = 0.012$, $\Delta\text{CFI}_{\text{metric}} = 0.013$; scalar model compared to metric model: $\Delta\text{RMSEA}_{\text{scalar}} = 0.003$, $\Delta\text{CFI}_{\text{scalar}} = 0.005$, with a fully established metric invariance, but only a partial scalar invariance with the freeing of one item mean on each of the three scales. Since we could

establish partial scalar invariance in our measurement models, the comparison of relations between study variables across groups is unproblematic; yet, a comparison of means across groups should be treated cautiously.

Mean Comparisons

Overall in our sample, mothers rated their children's learning-related behaviours and their autonomy support for their child's math schoolwork as high (Table 1). Moreover, mothers on average rated their conflict over schoolwork with their child as moderate and their psychologically controlling involvement during math schoolwork as low. Comparisons of means, with German-Turkish mothers or Turkish mothers as the reference category in regression analyses and controlling for child's gender, grade level, math scores, and maternal education, indicated that German-Turkish, Turkish and German mothers did not differ in the quality of their involvement and the level of mother-child conflict, with two exceptions: German mothers used less psychological control during their involvement ($B_{\text{German-Turkish vs. German}} = -0.78$, $SE = 0.13$, $\beta = -0.30$, $p < 0.001$; $B_{\text{Turkish vs. German}} = -0.93$, $SE = 0.11$, $\beta = -0.37$, $p < 0.001$), as compared to German-Turkish and Turkish mothers. Moreover, German-Turkish and German mothers reported higher learning-related behaviours for their children than Turkish mothers ($B_{\text{German-Turkish vs. Turkish}} = 0.20$, $SE = 0.07$, $\beta = 0.15$, $p < 0.01$; $B_{\text{German vs. Turkish}} = 0.13$, $SE = 0.07$, $\beta = 0.08$, $p < 0.05$), yet German-Turkish and German mothers did not differ from each other in the reported learning-related behaviours of their children.



Note. N = 595; n_{German-Turkish} = 100, n_{Turkish} = 377, n_{German} = 118. Standardized path coefficients (with standard error in parentheses). Significant paths in bold. Correlations between exogenous variables and estimates of control variables (i.e., child grade level, gender, math scores, mother education, quantity of involvement at home) on structural variables (i.e., maternal autonomy support, maternal psychological control, mother-child conflict, and child learning-related behavior) for sake of clarity omitted. $\chi^2(57) = 140.48, p < .001, RMSEA = .09, CFI = .94$
 *** $p < .001$; ** $p < .01$; * $p < .05$.

Fig. 1 Multiple-group model predicting children’s learning-related behaviour via mother-child conflict

Relations between Study Variables

To examine the associations among study variables, partial correlations controlling for child’s gender, grade level, math scores, and maternal education were computed (Table 3). In

all three groups, children’s learning-related behaviours negatively correlated with mother-child conflict. Positive correlations were found between the degree of mother-child conflict and the usage of maternal psychological control. Furthermore, in the German-Turkish and Turkish samples,

children's learning-related behaviours were positively correlated with mothers' autonomy support and negatively correlated with mothers' controlling behaviour.

Direct and Indirect Effects

To test whether the level of mother-child conflict mediates the link between the quality of mothers' involvement and children's learning-related behaviours, we estimated a model with indirect effects (Fig. 1). Standardized indirect effects indicated that in all three samples mother-child conflict mediated the link between mothers' psychological control and children's learning-related behaviours, German-Turkish: $\beta_{\text{indirect}} = -0.13$, 95% CI [-0.22, -0.03]; Turkish: $\beta_{\text{indirect}} = -0.11$, 95% CI [-0.17, -0.06]; German: $\beta_{\text{indirect}} = -0.22$, 95% CI [-0.34, -0.11]. That is, in all three samples, mothers' psychological controlling practices predicted an increase in mother-child conflict, which in turn predicted a decrease in children's learning-related behaviours in math. The negative association between mother-child conflict and children's learning-related behaviours was nearly twice as strong in the German compared to the German-Turkish and Turkish group. Moreover, only in the German-Turkish group, a direct association between mothers' psychological control and child learning-related behaviours was detected, German-Turkish: $\beta_{\text{direct}} = -0.21$, 95% CI [-0.40, -0.03]; Turkish: $\beta_{\text{direct}} = -0.09$, 95% CI [-0.18, 0.01]; German: $\beta_{\text{direct}} = -0.01$, 95% CI [-0.15, 0.14].

However, no significant indirect effects for the link between mothers' autonomy support and children's learning-related behaviours via mother-child conflict was found, German-Turkish: $\beta_{\text{indirect}} = 0.05$, 95% CI [-0.03, 0.13]; Turkish: $\beta_{\text{indirect}} = -0.01$, 95% CI [-0.04, 0.03]; German: $\beta_{\text{indirect}} = 0.03$, 95% CI [-0.07, 0.12]. Thus, the positive association between mothers' autonomy support during math schoolwork and children's learning-related behaviours in math was not mediated by a reduced mother-child-conflict. While a significant positive direct path between mothers' autonomy support and child learning-related behaviours was found in Turkish, $\beta_{\text{direct}} = 0.17$, 95% CI [0.06, 0.28], and German-Turkish, $\beta_{\text{direct}} = 0.26$, 95% CI [0.05, 0.48] families, this link was not significant in German families, $\beta_{\text{direct}} = -0.07$, 95% CI [-0.24, 0.10].

Discussion

Some researchers argue that, since controlling parental practices are more common and accepted in more collectivistic-orientated cultural contexts, they will be less harmful to children's educational functioning in these contexts (Chao & Aque, 2009; Grusec et al., 2017). Thus,

we hypothesized that in the Turkish and German-Turkish families' maternal psychological control would be less likely to be associated with an increase in mother-child conflict and a decrease in children's learning-related behaviours. Yet, our findings support a more universal orientated account (Cheung et al., 2016; Marbell-Pierre et al., 2019). In our study, across German-Turkish, Turkish and German families, mother-child conflict around schoolwork mediated the association between maternal psychological control and children's learning-related behaviours in math. In this mediation, the magnitude of the negative link between mother-child conflict and children's learning-related behaviours was higher for German compared to German-Turkish and Turkish families. These results point towards a universalism without uniformity in which psychologically controlling maternal involvement similarly increases tensions between the mother and the child across cultural groups, yet, German children seem to react more adversely to this increased tension by refraining to engage in math schoolwork.

The finding that mothers' induction of guilt and threatening practices are negatively associated with the child's education-related and general outcomes is in line with a growing body of evidence from the US and Europe (including Germany) and adds to a growing body of evidence that psychologically controlling practices are also harmful for students' education-related outcomes in more collectivistic-orientated countries such as China, Ghana and Turkey (Cheung et al., 2016; Dumont et al., 2012, 2014; Moroni et al., 2015; Mouratidis et al., 2019; Pomerantz & Wang, 2009; Selcuk et al., 2021). That is, Turkish adolescent students were less likely to procrastinate in math when parental psychological control was lower (Selcuk et al., 2021). Additionally, young Turkish adolescents were found to show more antisocial behaviours and less altruistic behaviours when mothers were more psychological controlling and had fewer knowledge about their children (Mouratidis et al., 2019). Yet, to our knowledge, our study is the first to demonstrate the underlying mechanism of the mother-child relationship quality by showing that the negative association between maternal psychological controlling practices and children's learning-related behaviours is mediated by mother-child conflict. A possible explanation for the mediating role of mother-child conflict is offered by Sorkhabi (2012). Sorkhabi (2012) argues that parental psychological control violates children's sense of reciprocity and disconnects the child from the parent. This may result in conflict between the parent and child and pave the way for less optimal child behaviours (Sorkhabi, 2012). Moreover, in line with propositions by SDT, another possible reason might be that the intrusive practices of mothers infringed children's satisfaction of their psychological needs (i.e., the need to feel autonomous, competent and

related to their parent); which may foster oppositional behaviour in the child (e.g., refraining from schoolwork engagement) (Deci & Ryan, 2000). Furthermore, study results correspond with findings showing that older children who grew up in more collectivistic-orientated cultures such as China, also perceive parental psychological practices as negative and intrusive and thus, they might act oppositional towards it when they are in middle school (Helwig et al., 2014). However, it should be noted that some studies in the Chinese context did not find a negative association between parents' use of psychological control during schoolwork-involvement and students' academic functioning (Chen et al., 2016; Cheung et al., 2016). A reason might be that, since in the Chinese context much attention is placed on academic success, other parental factors such as filial piety may be significantly contributing to Chinese students' academic achievement (Pomerantz et al., 2014).

Regarding autonomy support, we hypothesized that maternal autonomy support during math schoolwork would reduce mother-child conflict and, in turn, increase adaptive learning-related behaviours of children across groups. However, study results indicated a direct positive link between mothers' autonomy support during math schoolwork and children's learning-related behaviours in math, only in the German-Turkish and Turkish families. Thus, mothers' autonomy-supportive involvement is not likely to prevent conflict around schoolwork between mother and child. The findings on the direct link align with previous studies from the US and Europe showing that responsive schoolwork involvement facilitates students' academic functioning in the reading domain and vice versa in German students (Dumont et al., 2014) as well as higher persistence during math schoolwork of Estonian students when parents were more supportive in their schoolwork involvement (Silinskas & Kikas, 2017). Yet, the lack of a positive association between maternal autonomy support and children's learning-related behaviours in the German sample was surprising and contradictory to other studies from Germany which showed the beneficial role of supportive parental schoolwork-involvement (Dumont et al., 2012; 2014). A possible explanation for this non-significant finding in our study might be the differences in the measurement of autonomy support across studies (i.e., student versus parent report) or the investigated subject domain (i.e., reading versus math; Dumont et al., 2014). Another reason might be that autonomy-supportive parental practice is very typical in German parents, thus, making it harder to detect significant result in the German sample.

Also, contrary to our expectations, in none of the three samples did maternal autonomy support dampen mother-child conflict around math schoolwork. Thus, the positive association between mothers' autonomy-supportive involvement and children's engagement in math schoolwork in

the Turkish and German-Turkish groups are due to a different reason. As studies based in Self-Determination Theory (Deci & Ryan, 2000) suggest, a possible pathway may be children's motivational and competence beliefs since previous studies found that maternal autonomy support facilitates children's motivational and competence beliefs, which, in turn, fosters children's academic functioning (Gonida & Cortina, 2014; Grolnick et al., 1991). Additionally, it is possible that a positive mother-child relationship is needed for autonomy support to unfold its beneficial implications. Thus, future studies should employ a measure of a positive mother-child relationship such as a closeness and trust, instead of tapping into the absence of a problematic mother-child relationship. Lastly, it is possible that the association between maternal autonomy support and children's active engagement in schoolwork is direct. A reason for this direct link might be that autonomy supportive parents leave the lead to solve academic problems to the child (Silinskas & Kikas, 2017). This might result in more learning opportunities for the child and foster child's adaptive learning-related behaviours.

The results of the current study should be evaluated considering some limitations. First, the study is cross-sectional. Thus, no inference about causality can be made. There may be reciprocal relations between, for instance, maternal psychological control and mother-child conflict. To test this possibility, future longitudinal studies are needed. Second, only partial scalar invariance could be established and the groups were unequal in sample size, so the statistical comparisons of means across groups should be interpreted with caution (Chen, 2007). Third, to prevent a possible confounding of socio-economic status with the migration background, participants were sampled from neighbourhoods mostly resided by low- to middle-class families (Kristen & Granato, 2007). Yet, preliminary analyses indicated differences in maternal education levels across groups. Thus, maternal education was controlled for in all analyses, yet future studies may either ensure no socio-economic differences between the samples or include further measures of socio-economic status. Fourth, since we cannot identify siblings within our data, it is possible that mothers with children in the same school and target grades may have participated more than once in our study, possibly inflating the Type I error rates. Yet, we can assume the number of those cases to be low. Finally, all measures were mother reports, thus relations might be amplified due to the same informant bias. Information from fathers in the current study is omitted. Yet, since fathers might get involved in children's schoolwork in different ways than mothers, they might reinforce or buffer the effects of maternal parental practices. Thus, future studies may include additional informants such as fathers.

Besides these limitations, the present study also has several strengths. With its cross-cultural approach and including the largest immigrant group in Germany (i.e.,

German-Turks), the current study provides the much-needed information about education-related maternal practices and the related child outcomes in these groups. Additionally, the study advances the cross-cultural validity of the detrimental implications of maternal psychological control during math schoolwork-involvement. By focusing on a specific subject domain (i.e., mathematics), age group (i.e., middle school students), and by controlling for the quantity of maternal involvement, children's gender, previous achievement level, and mothers' education level, the present study has employed a conservative test of its hypothesis.

To conclude, study results suggest that children in collectivistic-orientated family contexts, such as Turkish or German-Turkish, benefit from their mothers' autonomy-supportive behaviour during math schoolwork by developing more adaptive learning-related behaviours. Additionally, results support a universalism without uniformity across countries regarding the negative implications of maternal psychological control, since across groups maternal psychological controlling involvement practices were similarly likely to increase tensions between mother and child, yet, these tensions were more prone to reflect negatively on children's learning-related behaviours in the German than in the German-Turkish and Turkish groups. Overall, study results emphasize that parents should be activated to intensify their autonomy support and refrain from psychologically controlling practices during math schoolwork-involvement. Furthermore, previous studies that focussed on the quantity of parental schoolwork involvement found negative relations with children's academic achievement (Hill & Tyson, 2009). Yet, our study results underscore that not the quantity but the quality of maternal schoolwork involvement matters for children's academic engagement. Thus, from an applied perspective, interventions which aim to foster academic achievement in middle school through parents should not consult parents to refrain from schoolwork involvement. Rather these interventions should focus on improving parents' quality of involvement besides other factors such as academic socialisation and parent-school relationships (Hill & Tyson, 2009). Since we find more similarities than differences across cultural groups, results are not only important for interventions developed for more individualistic-orientated but also for more collectivistic-orientated as well as migrant family context.

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Compliance with Ethical Standards

Conflict of interest The authors declare no competing interests.

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