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Co- and self-regulation in the caregiver-child dyad: Parental expectations, children's compliance, and parental practices during early years

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Abstract

Self-regulation skills develop in early childhood and seem to be highly predictive of success in different areas of adult life. The present report explores how (a) parental expectations (beliefs, goals) regarding children's self-regulation, (b) children's self-regulation and compliance, and (c) parental co-regulation practices are related to each other. To assess these aspects, a new questionnaire (IMMA: Pauen et al. 2014) has been filled out by *N* = 132 parents of 1- to 6-year-old children. Our data revealed that parental self-regulation expectations increased with a child's age, as did children's self-regulation and compliance, as reported by parents. However, parental co-regulative strategies did not change with the age of the child and were not correlated with parents' expectations. Nevertheless, we did find specific associations between children's self- and parental co-regulation: Parents who described their child as arguing a lot, or showing only directed compliance also reported to use negative co-regulation strategies more often than parents who experienced their child as being more compliant. Furthermore, parents who perceived their child as ignoring external requests tended to withdraw more easily in situations involving a conflict of interests than parents reporting less child ignorance. In sum, these findings suggest that parental expectations, children's self-regulation skills, and parental co-regulation strategies are related in systematic ways. Future studies using a longitudinal design should explore the causal nature of these relations in more detail.

Keywords

self-regulation; co-regulation; caregiver-child dyad; parenting

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Co- and self-regulation in the caregiver-child dyad: Parental expectations, children's compliance, and parental practices during early years

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1 Introduction

Self-regulation refers to a process of changing cognitive, emotional, or motivational states in order to adapt to a given situation (e.g. Hofmann et al. 2012; McClelland 2010; Pauen et al. 2016). In comparison to children with poor self-regulation skills, children who have learned to regulate their inner states and to control their behavior reveal more social skills (Eisenberg et al. 2011; Müller et al. 2012), better school performance (Blair/Peters Razza 2007; Valiente et al. 2013), higher reasoning capacities (Richland/Burchinal 2013), and better health as adults (Drechsel 2007; Moffitt et al. 2011).

Existing evidence shows that self-regulation skills improve dramatically during early childhood (Carlson et al. 2005; Garon et al. 2014; Johansson et al. 2015; Miller/Marcovitch 2015; Zelazo et al. 2003; for a review see Diamond 2013; Garon et al. 2008). Infants and toddlers still strongly depend on other people to regulate their inner states (e.g. Kochanska et al. 2000; Lewis/Carpendale 2009; Posner/Rothbart 2000). Parental co-regulation is not only required to meet children's basic needs (e.g. being fed), but also to manage their emotional states, to guide their behavior, and to teach them about social rules.

Situations requiring compliance of the child provide a major learning field for developing self-regulation in social situations. Since caregivers' co-regulation seems to provide a fundamental basis for explaining the development of self-regulation (Fox/Calkins 2003; Holodynski/Friedlmeier 2006; Kiss et al. 2014), more studies are needed that examine the interplay between self- and co-regulation in the parent-child dyad (Kiss et al. 2014; Morris et al. 2007), especially during early years of life. The present report addresses this issue.

1.1 How do caregivers shape self-regulation development in young children?

Social experiences are a central determinant of self-regulation development. According to some authors, toddlers gradually internalize caregivers' co-regulation strategies (Cierpka/Cierpka 2012; Holodynski/Friedlmeier 2006; Kopp 1982). Empirical evidence supports the idea that parental behavior has an important impact on self-regulation development (e.g. Kim-Spoon et al. 2012; Lengua et al. 2007; Otterpohl et al. 2012). Many studies along these lines focus on the impact of parental control (Karreman et al. 2006). While "positive parental control" is characterized by teaching and encouraging behaviors, "negative parental control"

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comprises criticism, harshness, and even physical interventions. A meta-analysis by Karreman et al. (2006) revealed that positive parental control is associated with better self-regulation in the child, whereas negative parental control is associated with poor self-regulation.

More specifically, negative co-regulation behaviors (e.g. anger, physical, and verbal control expressed by the caregiver) have been found to go along with poor physical and emotional self-regulation of a child (Calkins et al. 1998). If children's needs and feelings are not sufficiently addressed during infancy and early toddlerhood, this may lead to affective dysregulation and negative cognitive, social, and behavioral outcomes later in childhood (NICHD 2004). Children who are neglected in social and emotional terms may even show severe physical and mental deficits (The St. Petersburg – USA Orphanage Research Team 2008); see also van der Horst/van der Veer 2008).

In contrast, positive co-regulation (e.g. supportive reactions, encouragement, scaffolding) seems to support the development of self-regulation in early childhood (Gunzenhauser et al. 2014; Hammond et al. 2012; von Suchodoletz et al. 2011). Positive co-regulation is most beneficial when it is well-adapted to the current needs of a child (Bibok et al. 2009; Maccoby/Martin 1983). Supporting this view, consistent positive responsiveness has been shown to promote social and cognitive development (Landry et al. 2001).

In sum, existing evidence suggests that negative parenting strategies have a negative impact on children's self-regulation development while positive parenting strategies have a positive impact. Nonetheless, a number of important questions regarding the specific mechanisms and dynamics of parental influence on children's self-regulation still remain to be answered, as illustrated by the following examples:

Regarding the mechanisms that might explain the impact of parental co-regulation in children's self-regulation development, Darling and Steinberg (1993) emphasize the role of parental values, attitudes, and goals associated with self-regulation. Several studies seem to support this view (Hastings/Grusec 1998; Kuczynski 1984; Leerkes 2010; Miguel et al. 2012; Richman/Mandara 2013; Rowe/Casillas 2011), while others failed to show corresponding relations (e.g. Bornstein et al. 2001). Hence, more studies are needed to explore the specific relation between parental expectations (beliefs, parenting goals) regarding self-regulation of children and parental co-regulative practices in interactions with their child.

Apart from questions related to parental influences we may also ask how children's self-regulation competencies affect parental co-regulation. Given the fact that interactions are per definition bi-directional in nature, it seems not only important to know how parents affect the self-regulation of their children, but equally important to explore how children influence the co-regulative behavior of their parents.

1.2 How do children shape their parents' co-regulation?

From early on, children differ in their temperament and their mental capacities (e.g. Calkins/Fox 2002; Rothbart 1986; Thomas/Chess 1977), thus triggering different response tendencies in caregivers. A "difficult temperament" (i.e. negative emotionality, less positivity, higher irritability and activity, see Thomas/Chess 1977) has often been found to influence parenting practices. For example, it has been shown that mothers' well-being can be negatively

influenced by children showing low levels of positivity and high levels of negativity (Sidor et al. 2013), thus leading to less positive affection of the mother towards her child and more self-reported parental control behaviors (Laukkanen et al. 2014). Pointing in the same direction, numerous studies reveal that a difficult temperament of the child induces feelings of helplessness and stress in parents (Gelfand et al. 1992; Oestberg/Hagekull 2000), which may in turn promote negative co-regulation strategies (see also Papoušek 2004). It should be noted, though, that existing evidence on how child temperament influences parental behavior is mixed (Paulussen-Hoogeboom et al. 2007), presumably due to differences in context variables and methodological approaches.

Further evidence for the impact of individual child characteristics on parenting behavior comes from studies showing differential treatment of siblings. Not only families of children with disabilities (Quittner/Opipari 1994) but also families with normally developing children reveal differential parental behavior towards their children (even twins; see Deater-Deckard et al. 2001). Younger siblings and children with difficult temperament typically receive more attention by their mother than older and less difficult ones. However, the more negative affect the children show, the more parental negativity they receive (Jenkins et al. 2003; Quittner/Opipari 1994).

Since negative and positive parenting practices both affect children's self-regulation development (Calkins et al. 1998; Gunzenhauser et al. 2014; Hammond et al. 2012; NICHD 2004; von Suchodoletz et al. 2011), disadvantageous differentiation could have negative consequences. Indeed, receiving more positive maternal control in comparison to one's sibling is associated with less problematic child behaviors like negativity and non-compliance and with higher levels of responsiveness to one's mother (Deater-Deckard et al. 2001). Of course, no final causal conclusions can be drawn from such correlations. The effective direction remains to be clarified in longitudinal studies.

1.3 Combining both perspectives

As demonstrated so far, child characteristics have an important impact on parental co-regulation, and parental co-regulation influences children's self-regulation development. This interactive view is widely accepted today (Blair et al. 2014; Fox/Calkins 2003; Kiss et al. 2014; Putnam et al. 2002). Hence, modern models take both aspects into account. For example, the Tripartite model by Morris et al. (2007) assumes that caregiver characteristics have an indirect impact on children's self-regulation development, mediated by variables like family climate, parenting practices, and a caregiver's own self-regulation. These mediating variables are in turn influenced by child characteristics. Supporting evidence for this multi-level approach has been provided recently (e.g. Gunzenhauser et al. 2014; Meyer et al. 2014; Otterpohl et al. 2012).

Interactive models also raise the important question of stability in the dynamics of the relation between co- and self-regulation. Children's needs and abilities change with age. Hence, one would expect parents to adjust their co-regulative strategies to the developmental status of their child (e.g. Bernier et al. 2010; Holodynski et al. 2013). Studies highlighting the impact of child characteristics on parental co-regulation suggest some flexibility in parental

behavior. On the other hand, a long tradition of research on parenting suggests that caregivers have their individual "style" of handling children, thus suggesting some stability in co-regulative strategies over time (e.g. Baumrind 1966). This raises the interesting question whether and how co-regulation practices vary with the age of the child (Darling/Steinberg 1993). In the existing literature, parents are reported to show moderate to high stability in their parenting behaviors over time while the absolute mean-values of individual behaviors may change with the child's age (e.g. Dallaire/Weinraub 2005; Holden/Miller 1999).

1.4 Goals of the present study

As we have argued so far, parental values, goals and attitudes towards self-regulation, children's characteristics (especially when they are related to self-regulation skills), and parental co-regulation practices might jointly predict the functioning of caregiver-child interactions and the development of self-regulation in early years. At the same time, studies that take into account all these aspects are still rare, presumably because instruments that allow for a combined assessment are still missing. The present study provides a first step to fill this gap by reporting inter-correlations between the scales of a newly developed caregiver questionnaire (IMMA 1-6: IMpulse Management: Pauen et al. 2014). This questionnaire assesses (a) caregivers' expectations (beliefs and goals regarding children's self-regulation), (b) children's self-regulation in situations that require coping with frustration, and dealing with parental demands or prohibitions; as well as (c) caregivers' co-regulation practices in corresponding situations.

IMMA focuses on parent-child interactions in situations when the caregiver asks the child to show compliance (i.e. by making a request or by prohibiting a specific action). Such situations often induce a conflict and require both sides to mutually regulate their responses. In the case of a request, the child needs to follow the goal of the caregiver. This requires the ability to remember the instruction, and to shift attention away from the present activity in order to be compliant. In the case of a prohibition, the child needs to refrain from a specific action, and to inhibit a predominant response. Hence, responses to requests and prohibitions clearly require self-regulation capacities, induced by the caregiver. On the other hand, the caregiver needs to deal with the emotions, motivations, and cognitive processes induced by the child's reaction to the request or prohibition.

In addition, IMMA also refers to situations in which the child needs to deal with a personal failure when trying to achieve a goal, and parental attempts to co-regulate potential frustration. Differing from existing inventories, IMMA thus takes a closer look at how children deal with external and internal demands, thereby considering both sides (child and parent) during interactions requiring self-regulation of the child.

Using IMMA, we asked (1) how parental expectations, children's self-regulation, and parental co-regulation practices vary with the age of the child, (2) how children's self-regulation and parental co-regulation are related to each other, and (3) how parental expectations are related to their co-regulative behaviors.

(1) We predicted that caregivers' expectations (beliefs and goals) regarding children's ability to self-regulate would become more ambitious with the age of the child, as this would

reflect the natural course of development (Bernier et al. 2010; Carlson 2005; Diamond 2013; Garon et al. 2014). We also assumed that children's self-regulation skills (as reported by parents) would improve between one and six years of age. More specifically, older children should show better emotion regulation when failing to reach a personal goal and their compliance should increase when facing parental requests or prohibitions. Finally, we checked whether co-regulation practices of parents vary with the child's age. As mentioned previously, evidence regarding this relation is mixed, with some researchers referring to "parenting style" suggesting stability (Baumrind 1966), and work highlighting the adaptability of parental behavior to the age of the child suggesting otherwise (e.g. Dallaire/Weinraub 2005; Holden/Miller 1999). If parents adapt their parental strategies to the age of the child, we would expect parents of older children to score lower on co-regulation scales and to request more self-regulation than parents of younger children.

(2) Regarding potential associations between co- and self-regulation, previous work indicates that negative parental control has a negative impact on children's self-regulation skills (see Karreman et al. 2006 for a corresponding meta-analysis), and that positive co-regulation has a positive impact on children's self-regulation development (Calkins et al. 1998; Gunzenhauser et al. 2014; Hammond et al. 2012; von Suchodoletz et al. 2011). At the same time, highly self-regulated children may trigger more positive parenting behavior than children with poor self-regulation, because they are less difficult to handle (Jenkins et al. 2003; Quittner/Opipari 1994). Hence, we expected negative control strategies to correlate with increased negative affect in the child when failing to reach a personal goal, as well as with increased protest and only directed compliance in situations requiring responses to parental requests or prohibitions. In addition, we predicted high scores of positive co-regulation strategies in parents to be related to higher scores of self-regulation skills in children.

(3) Finally, we were interested in exploring how beliefs and goals influence parenting practices. Many studies seem to suggest that parental goals and practices are related (Hastings/Grusec 1998; Kuczynski 1984; Leerkes 2010; Miguel et al. 2012; Richman/Mandara 2013; Rowe/Casillas 2011), but evidence regarding the specific associations between goals regarding children's self-regulation and parental practices in co-regulation are still sparse. Different scenarios seem plausible: Parents who assume that children at the same age as their child have already developed high self-regulatory skills might score lower on scales indicating co-regulation practices, simply because they do not see any need to co-regulate their child. But they may also show increased efforts to assist their child in reaching assumed age standards, thus showing enhanced co-regulation. Similarly, parents with high goals regarding self-regulation of their child may show less co-regulation in order to leave room for the child to develop self-regulation more rapidly, or they may show increased efforts to support their child in developing corresponding skills, thus scoring higher on co-regulation scales. The present study took an explorative look at the empirical relations between parental beliefs and goals regarding self-regulation of their child, and their parental co-regulation behaviors.

It is important to note that we used a non-experimental, cross-sectional study design. Hence, we will not be able to draw any conclusions regarding the causal relations between parental and children's behavior. Rather, it was our goal to check whether the IMMA questionnaire is suitable to discover systematic relations between parental expectations, a child's self-regulation, and parental co-regulation.

2 Method

2.1 Participants

Data collection took part in two different locations: Cologne, a large town in the Midwest of Germany, and Heidelberg, a smaller town in the South of Germany. Parents in both places came from a largely academic background. They either filled out the questionnaire at home (Cologne sample), or they completed the questionnaire during a visit at the lab (Heidelberg). The entire sample consisted of $N = 267$ parent-child dyads. Because the age distribution of children was very unequal and only part of the children visited a daycare center, we used semi-randomizing procedures to create a sample with equalized age groups, showing a similar distribution of daycare conditions and a balanced gender distribution.

This final sample consisted of $N = 132$ data sets, provided by parents (87% female) with children ranging between one and seven years of age ($M = 47.81$ months, $SD = 19.90$ months, *Range* = 12-82 months), split into six different age groups, each consisting of $n = 22$ children (Group 1: < 24 months, Group 2: 24-35 months, Group 3: 36-47 months, Group 4: 48-59 months, Group 5: 60-71 months, and Group 6: 72-82 months).

2.2 Procedure

IMMA 1-6 Questionnaire (Pauen et al. 2014). To examine caregiver's expectations, children's self-regulation, and parental co-regulation practices, we developed an item pool based on theoretical considerations and existing parenting inventories (EFB, Naumann et al. 2010; PSDQ, Robinson et al. 1995). This item pool was divided into three main parts.

Part I asked caregivers about their beliefs regarding the self-regulation skills of children matching the age of their offspring. More specifically, caregivers rated how well children of the same age as their own child were able to regulate their impulses, and to respond to a caregiver's requests and prohibitions. In addition, we asked parents about their goals regarding the self-regulation development of their own child. They rated how important it was to them at the child's given age that he/she learns to deal with corresponding situations in a self-regulated way.

Part II focused on the self-regulation attempts of the child in three different situational contexts: when being (a) unable to achieve a personal goal, (b) asked to follow a parental request, and (c) asked to stop a given activity (i.e. following a prohibition).

In Part III, caregivers were asked how they typically respond to their child's behavior in corresponding situations. A broad range of parental practices was described, including positive and negative co-regulation behaviors, as well as withdrawal (for a more detailed description see Table 1 and Appendix A). All items were written in German and could be answered

on a 6-point Likert scale (Part I: 1 = applies not at all, 6 = fully applies; Parts II and III: never – rarely – rather rarely – rather frequently – frequently – always).

Scales for each part were formed based on results of a principal axis analysis: Part I (Parents' beliefs and goals concerning their children's coping with impulses) consisted of three scales: Parents' beliefs and goals concerning children's internal self-regulation, Parents' beliefs about children's coping with external demands, and Parenting goals regarding children's coping with external demands. Part II (Children's reactions to internal impulses and external demands and limitations) comprised eight scales: Ignorance, Compliance, Directed compliance (requests), Directed compliance (prohibitions), Directed compliance (physical pressure), Discussion behavior, Negative emotion expression & aggression, and Goal-orientation. Part III (Parenting practices in reaction to the child) contained seven scales: Withdrawal, Request for self-regulation, Negative co-regulation, Positive co-regulation, Democratic parenting behaviors, Appreciation, and Use of rewards (for more details see Appendix A).

Table 1: Scale structure and internal consistencies.

Scale	Number of items	Internal consistency
Parents' beliefs and goals concerning their children's coping with impulses		
Parents' beliefs and goals concerning children's internal self-regulation	8	.88
Parents' beliefs about children's coping with external demands	5	.84
Parenting goals regarding children's coping with external demands	5	.89
Children's reactions to internal impulses and external demands and limitations		
Ignorance	3	.63
Compliance	5	.49
Directed compliance (requests)	4	.85
Directed compliance (prohibitions)	5	.85
Directed compliance (physical pressure)	2	$r = .60^{\Delta}$
Discussion behavior	3	.81
Negative emotion expression & aggression	5	.80
Goal-orientation	3	.78
Parenting practices in reaction to the child		
Withdrawal	3	.62
Request for self-regulation	2	$r = .30^{\Delta}$
Negative co-regulation	9	.84
Positive co-regulation	6	.72
Democratic parenting behaviors	2	$r = .33^{\Delta}$
Appreciation	2	$r = .60^{\Delta}$
Use of rewards	2	$r = .46^{\Delta}$

Note. In this table and the following ones we did not use the factor order resulting from the factor analysis, but arranged the scales mainly by levels of pressure, either shown by the child or by the parents to make their child comply.
Δ If a scale consists only of two items, Pearson's correlation is reported.

Source: Own representation.

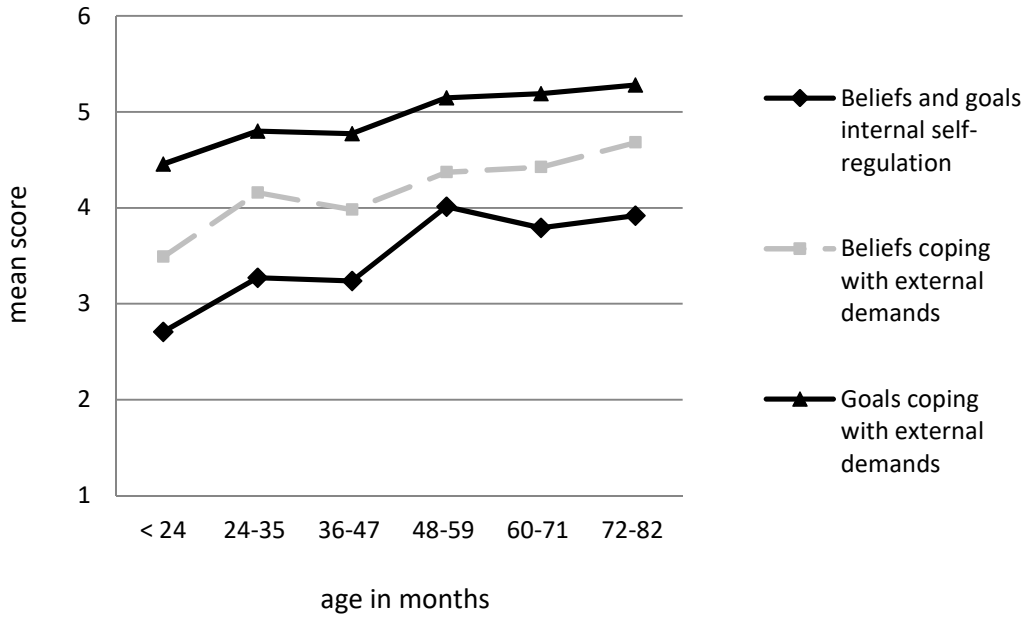
Internal consistencies for individual scales of all three parts varied from $\alpha = .49$ (Compliance) to $\alpha = .89$ (Parenting goals regarding children's coping with external demands). Thus, most scales showed acceptable to very good internal consistencies (see Table 1).

2.3 Results

All following *p*-values have been Bonferroni-corrected.

(1) Age-related differences in parental expectations, children's self-regulation, and parental co-regulation practices. Univariate tests indicated that parental beliefs and goals regarding children's internal self-regulation (i.e. dealing with the inability to achieve a personal goal) increased with age ($F(5, 118) = 9.56$ $p < .001$, $\eta^2 = .29$), with major changes occurring after the third year of life (*Tukey-T* = -0.77, $p = .04$). The same general increase with age was found for parental beliefs regarding children's capacities to cope with external demands ($F(5, 124) = 5.44$, $p < .001$, $\eta^2 = .18$). Parental goals regarding children's adaptation to external demands (requests and prohibitions) increased gradually with age, even though this trend was only marginally significant ($F(5, 124) = 2.87$, $p = .05$, $\eta^2 = .10$). Figure 1 depicts the means for each aspect over all age groups. These findings largely confirm our initial hypothesis that parental expectations regarding children's self-regulation increase with the age of the child.

Figure 1: Parents' self-regulation expectations, mean values over all age groups.



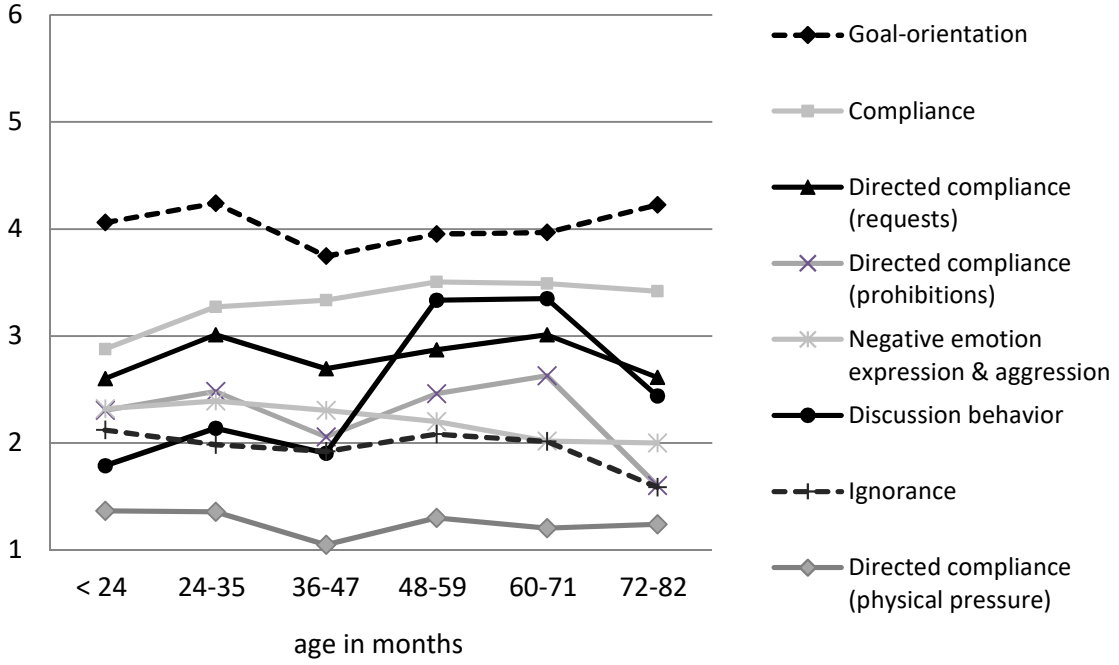
Source: Own representation.

Additional analysis revealed that parental goals regarding their child's ability to cope with external demands were significantly higher than their beliefs about the actual coping competences at a given age ($t(128) = -9.75$, $p < .001$, $d = 0.85$; goals: $M = 4.95$, $SD = 0.90$; beliefs: $M = 4.18$, $SD = 0.90$).

As expected, children's compliance tended to increase with age ($F(5, 121) = 3.34$, $p = .06$, $\eta^2 = .12$), with major changes occurring within the first two years of life (see Figure 2). Parents of older children needed less pressure to convince their child to accept a prohibition ($F(5, 122) = 4.90$, $p = .003$, $\eta^2 = .17$), showing a major decrease between five and six years when children in Germany enter their last preschool year in kindergarten (*Tukey-T* = -1.03, $p = .004$). Children's attempts to solve conflicts of interest by arguing increased ($F(5, 125) = 11.27$,

$p < .001$, $\eta^2 = .31$), especially between three and four years (*Tukey-T* = -1.43, $p < .001$), and seemed to decrease again between five and six years of age, although this effect was not statistically significant following Bonferroni correction (*Tukey-T* = -0.91, $p = .21$). We did not see an age-related decrease of negative emotions and aggressions ($F(5, 124) = 0.96$, $p = 1.00$, $\eta^2 = .04$).

Figure 2: Children's self-regulation, mean values of parents' reports over all age groups.



Source: Own representation.

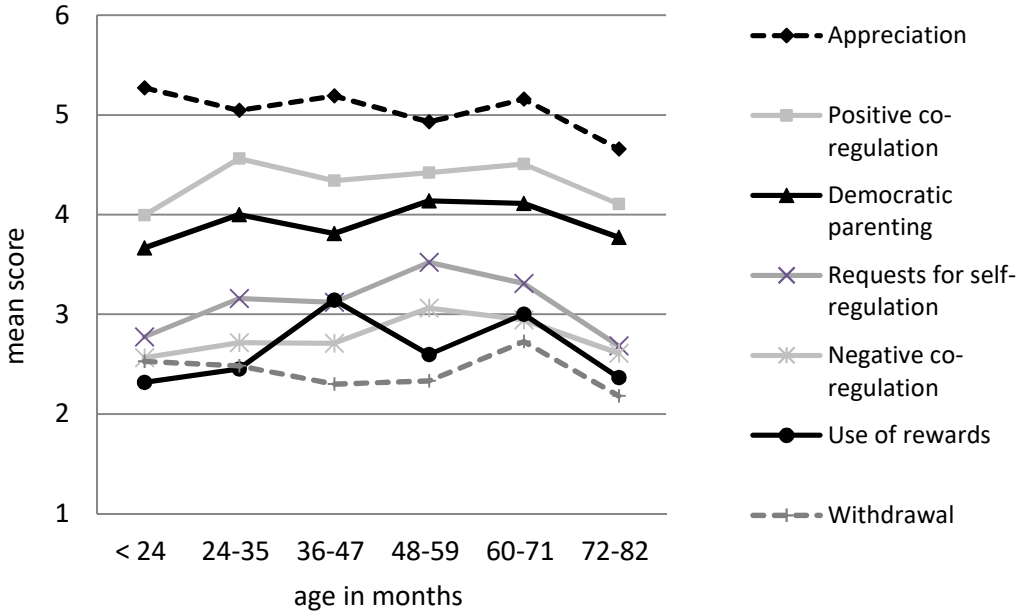
Contradicting our hypotheses, no significant age-related differences in parental co-regulation practices could be found. Only the use of rewards tended to differ with children's age ($F(5, 124) = 2.73$, $p = .10$, $\eta^2 = .10$), showing a peak for parents of three-year-olds. However, the scale "use of rewards" consists of only two items and should thus be interpreted with caution. No other age effects could be observed, suggesting that co-regulation practices are fairly similar in groups of parents with different-aged children (see Figure 3).

(2) Relations between children's self-regulation and parental co-regulation. As expected, negative control strategies correlated with increased attempts of the child to discuss parental demands ($r_{sp} = .38$, $p < .001$), as well as with directed compliance in response to parental requests ($r_{sp} = .54$, $p < .001$) and prohibitions ($r_{sp} = .44$, $p < .001$). In addition, a given child's tendency to ignore parental requests correlated with parental withdrawal in conflict situations ($r_{sp} = .38$, $p < .001$).

Furthermore, children's ignorance behavior was associated with parents' tendency to exert negative control ($r_{sp} = .40$, $p < .001$). Self-regulation requests occurred more often when children showed an increased tendency to argue about parental requests ($r_{sp} = .37$, $p < .001$) and when they tended to express their negative emotions or became aggressive ($r_{sp} = .27$,

p = .11). However, the IMMA-scale "requests for self-regulation" and its relations to other variables should be interpreted with caution, because this scale includes only two items.

Figure 3: Parents's reported co-regulation practices, mean values over all age groups.



Source: Own representation.

Contradicting our hypotheses, negative affect when failing to reach a personal goal was not associated with negative control strategies of parents (r_{sp} = .24, *p* = .39), nor did we find any significant relations between children's self-regulation in terms of compliance and positive co-regulation practices of parents (r_{sp} = .22, *p* = .90). In this context, it seems interesting to note that mean scores for scales indicating positive parenting practices (i.e. positive co-regulation, democratic parenting, and appreciation) and better self-regulation in a child (i.e. goal-orientation and compliance) were generally higher than scores for negative parenting (i.e. withdrawal, negative co-regulation), and low self-regulation (i.e. ignorance, directed compliance, debating, negative emotional expression) in the present sample: positive vs. negative parenting scales: *M* = 4.44, *SD* = 0.54 vs. *M* = 2.59, *SD* = 0.58, *t*(129) = 29.87, *p* < .001, *d* = 2.63; high vs. low self-regulation: *M* = 3.68, *SD* = 0.52 vs. *M* = 2.18, *SD* = 0.58, *t*(130) = -20.55, *p* < .001, *d* = 1.81 (see also Figures 2 and 3).

(3) Relations between parental expectations and co-regulation practices. Parents with high beliefs and goals regarding their child's internal self-regulation also requested more self-regulation (r_{sp} = .27, *p* = .04), but did report similar degrees of co-regulation practices as parents with lower expectations.

2.4 Discussion

The present study provides first data obtained with a newly developed questionnaire (IMMA: Pauen et al. 2014) designed to study empirical relations between parental expectations, children's self-regulation skills and parental co-regulation practices during early childhood. Parents of children ranging from 1 to 6 years of age were asked to fill out this inventory and

correlations between different scales were examined regarding the relations between parental expectations, child self-regulation behaviors, and parental co-regulation. Main findings refer to (1) age-related changes, (2) associations between co-regulation practices of parents and children's self-regulation, and (3) relations between parental expectations, and their co-regulation practices.

(1) Age-related differences in parental expectations, children's self-regulation, and parental co-regulation practices

Age-related changes in parental expectations. As expected, parental beliefs and goals regarding children's ability to show self-regulation gradually increased with age. With respect to parental beliefs and goals regarding children's ability to deal with personal limitations we found a substantial increase between three and four years. During this time, German children usually enter kindergarten and thus need to deal with situations on their own – without the help of their primary caregiver. It is well possible that parental expectations regarding their child's ability to cope with personal limitations or failed attempts to reach a goal increase as this behavior gains relevance in daily life.

Adapting to external demands was valued as an important educational goal by parents of all age groups. Even parents of children younger than 24 months often stated that they wanted their child to learn how to cope with requests and prohibitions at their proper age. When educational goals slightly exceed actual capacities, this can promote the development of any skill, as long as the corresponding discrepancy is not too large (Vygotsky 1978). Parents in the present sample seemed to do so intuitively, as mean scores for goals regarding children's self-regulation were significantly higher than expectations about children's self-regulation capacities in each age group. Whether this finding only applies to parents of a rather high educational and socio-economic background characterizing our sample or to parents in general cannot be answered based on the reported data. Which factors influence parental goal setting and how discrepancies between educational goals and actual competences of the child influence children's self-regulation development provide further interesting questions that could be explored in future studies using the IMMA questionnaire.

Age-related changes in children's self-regulation. As expected, parents of older children reported more compliance in response to caregiver requests than parents of younger children, with major changes occurring during the first two years. Furthermore, children seem to accept prohibitions better with age. Especially between five and six years, less parental pressure was needed in corresponding situations. This may result from major progress in children's basic executive functions during the first years of life (Bernier et al. 2010; Garon et al. 2008; Holodynski et al. 2013).

In addition, social learning processes might play a crucial role. All children of the present sample were in day-care facilities where they experience social interactions with other children and caregivers on a daily basis. In this setting, children often need to adapt to social demands. They learn to obey rules and prohibitions. Especially during preschool years (i.e. between four and six years), day-care facilities try to enhance children's self-regulation skills to promote school readiness (e.g. Blair/Raver 2015). This could have positive effects on children's compliance behavior.

As self-regulation skills are known to improve with age we also expected to see a decrease in emotion expression and aggression. This was not the case. Since scores for showing negative emotions and aggressive behaviors were rather low in all sub-groups of our sample, this may reflect a bottom effect. In addition, problems related to social desirability may have prevented parents from admitting that their offspring shows behaviors clearly regarded as negative in our society. It would be interesting to get data on the same child from parents and daycare personal in parallel, and to compare results obtained from different caregivers filling out the IMMA questionnaire. Future studies may address this issue.

Another interesting observation concerns children's tendency to discuss requests and prohibition of parents rather than to follow instructions immediately. Between three and four years of age, this tendency increased, presumably because children's language skills improve. Pretend play activities also increase during this period (Weisberg 2015), and are associated with higher-level verbal negotiations (Howe et al. 1998). Four- to five-year-olds discuss about the goals and contents in play and seem to spent 20-50% of their play time negotiating with their play partners (Doyle/Connolly 1989). This behavior is probably also shown in interactions with caregivers.

As children approach school age (i.e. between five and six years) this way of responding to parental requests and prohibitions seemed to decrease again, presumably because self-regulation skills improve and rule understanding increases. Questioning and discussing external requests and prohibitions by authorities may be relevant to achieve this kind of rule understanding, but should become less frequent once the rules are clear to the child and it becomes more capable and willing to show compliance. In sum, our findings are in accord with knowledge about general development in early childhood.

Age-related changes in parental co-regulation strategies. Parents' co-regulation strategies did not differ significantly between age groups. We only observed marginal age-related changes in toddlerhood for the use of rewards. The fact that parents of toddlers reported to use more rewards to co-regulate their three-year-olds than either parents of younger or older children may have to do with the fact that three-year-olds are old enough to understand the relation between behavior and consequences. Hence, they can guide their behavior consciously based on this understanding. At the same time, they may still be a little too young to understand verbal explanations for why parents make a request or express a prohibition. Parents may adapt to this situation by using rewards to achieve compliance.

As mentioned previously, existing data suggests moderate to high stability in parenting behaviors (e.g. Dallaire/Weinraub 2005; Holden/Miller 1999). A study explicitly asking how stable parental discipline practices are during toddlerhood (i.e. between 16- and 37-months) found mixed results, showing stability in absolute values at least for punitive discipline (Huang et al. 2009). Considering the fact that we did not test the same parents repeatedly, our findings are not directly comparable to those of longitudinal studies. Nonetheless, it seems interesting to speculate why no group differences could be observed.

One possible explanation may be that parents interpret items of IMMA differently at different ages of their child. More specifically, they may adapt their reading of a given item to

the age of their child: for example, showing compassion, helping the child to achieve a personal goal, trying to calm a child down, or threatening with consequences in case of non-compliance may be realized in different ways when dealing with a one- or a six-year-old. More in-depth analyses are needed to describe the specific patterns of parenting if the study goal is to assess changes related to the age of the child. In general, we conclude that more longitudinal studies are needed to explore stability in co-regulation practices. In such studies, parental practices should be described precisely in order to reveal age-related changes.

(2) Relations between children's self-regulation and parental co-regulation

In line with studies that point to a negative impact on parental negative control (Karreman et al. 2006), negative co-regulation behavior correlated with indicators of lower self-regulation. Parents who describe their child as showing passive or active resistance when being asked to follow parental requests or to accept prohibitions also reported more negative co-regulation strategies and more withdrawal than parents who describe their child as being compliant. This might indicate the usefulness of the IMMA questionnaire to identify maladaptive interactive patterns in the caregiver-child dyad. Furthermore, corresponding observations provide some support for the idea that negative co-regulation and a lack of self-regulation stabilize each other (see introduction). However, no such correlation could be found with respect to negative emotion expression and aggression. As already mentioned previously, this may be due to bottom effects regarding the corresponding self-regulation scales in the present sample. Future studies should thus clarify whether the same effects can be found in families at high risk for child maltreatment.

Also pointing to the potential usefulness of IMMA in clinical contexts, we found that withdrawal behavior in parents correlated significantly with reported ignorance in children. If a parent avoids trouble by giving in easily, a child may learn to ignore prohibitions by running away or pretending to not have heard the parent. But parents may also get discouraged if their child often ignores their requests and prohibitions, and thus give in more easily. To better understand the nature of the observed correlation, longitudinal studies are needed.

Finally, parents of children who express their anger and aggression more often requested more self-regulation of their child. This may be due to emotion display rules. Negative emotions like anger are not appreciated in our society. It is possible that less regulated children induce more parental requests to show self-regulation, or that parental requests for self-regulation induce more negative feelings and active resistance in the child. Again, longitudinal studies are needed to determine the causal direction of this relation.

Contradicting our initial hypotheses, we did not find significant correlations between higher self-regulation skills in terms of a child's compliance and positive parental practices, as reported in the literature. This means that parents who show positive practices may or may not have children with good self-regulation skills. How can we explain this unexpected finding? It seems important to note that self-regulation skills in children ranging between one and six years of age vary largely due to maturation and developmental progress rather than inter-individual difference. If parental practices remain largely stable across different age groups whereas self-regulation skills change, this clearly works against finding significant correlations

for the entire sample. Larger samples of children of the same age would be needed to fully evaluate this hypothesis.

(3) Relations between parental expectations and co-regulation practices

Not unexpectedly, parents with higher beliefs and goals regarding their child's self-regulation also request more self-regulation. Interestingly though, parents with high expectations did not show less co-regulation behaviors (e.g. less negative control, less positive co-regulation, or less use of rewards). Maybe parents with high expectations first request self-regulation, but respond with co-regulative strategies if their requests fail to elicit the expected response in the child. It is also possible that there are different groups of parents with high expectations: One group may try to foster their child's self-regulation by co-regulating more than parents with lower expectations, while others may reduce the amount of co-regulation to leave room for self-regulation of their child. The specific combination may also vary with the child's age and temperament. Alternatively, parents may have referred to their beliefs about children's capacity to self-regulate in general, rather than focusing only on their own child or other children of the same age. This would reduce covariation between beliefs and behaviors (see Miller 1988 for a review on relations between parental beliefs and behaviors).

We also found no association between parental goals regarding their child's self-regulation and co-regulative behaviors. This contradicts our initial hypothesis and other studies showing substantial associations of this kind (e.g. Hastings/Grusec 1998; Rowe/Casillas 2011). At the same time, it confirms findings from social psychology indicating that intentions explain less than 30% of the variance in behavior of adults, and that the relation between intentions and behavior also varies substantially with the situational context (e.g. Armitage/Conner 2001; Sheeran 2002). Yet another reason for the given lack of relations between parental goals and applied strategies may be that parents who share goals may still have different ideas about how to best achieve them. While some parents may try to support self-regulation in their child by providing more co-regulation, others may assume that it is better to show less co-regulation. Asking parents more details about how they are planning to implement their goals could help to shed more light on the absence of goal-behavior correlations in this context. In any case, we conclude that there is no simple answer to the question how parental expectations are related to parental practices. More information about specific expectations, parenting attitudes, goals, and strategies is needed to better understand the relation between both aspects.

3 Conclusions, limitations and future prospects

Caregivers' expectations regarding children's self-regulation have been found to show age-related changes that are largely consistent with the existing literature. Furthermore, we observed significant correlations between negative forms of children's self-regulation and negative parental co-regulation, suggesting that the IMMA questionnaire (Pauen et al. 2014) might be useful for identifying maladaptive parent-child interactive patterns.

It should be noted, though, that the present sample consisted almost exclusively of German women with academic background. Thus, we still do not know whether the reported

findings are generalizable to fathers or to other populations. Previous studies comparing parenting in mothers and fathers have shown that they vary significantly with respect to their parenting goals (Hastings/Grusec 1998), which may also affect their parenting behaviors. It is possible that self-regulation beliefs and parenting goals correlate with co-regulation behaviors in fathers, but not in mothers. Hence, it will be important to compare both sexes and to investigate their level of congruence and its effects on a child's self-regulation and mental health (Chen/Johnston 2012; Lindsey/Caldera 2005).

Of course, socio-economic background may be equally important in this context, as parenting style is known to be influenced by educational background of parents (Azad et al. 2014; Carr/Pike 2012) as well as by the economic situation of the family (Azad et al. 2014). Furthermore, cultural comparisons seem necessary before any conclusions about universal or culture-specific relations between self- and co-regulation can be drawn.

In the present study, only questionnaire data was used to assess self-regulation and parenting. To increase the reliability and validity of the measures used, future studies should also collect behavioral and/or observational data to assess a child's self-regulation and parents' co-regulation strategies. This is also necessary to probe the validity of the IMMA questionnaire for diagnostic use in clinical or counseling settings.

The IMMA seems to be a promising instrument for studying the dynamics of caregiver-child interactions in self-regulation contexts. For that purpose, it should be extended and modified. Some scales consist of only few items and could be expanded to increase reliability. In addition, the factor structure of each IMMA part still needs to be evaluated using a new sample and confirmatory analyses. (We already completed work on a revised version that will be published soon.)

More aspects mentioned in the model by Morris et al. (2007) should be considered simultaneously to receive a broader picture of the co-regulation development in the caregiver-child dyad. A child's and parents' temperament could be of special interest in this context and might help to gain a deeper understanding of the correlational patterns found. Maybe assessing temperament could also help us to distinguish between a child's "willingness to be socialized" (Darling/Steinberg 1993) and its individual self-regulation capacities in situation requiring compliance.

Research on self-regulation development has already come a long way. Although parental influences have been discussed for a long time, there is still a lot of work to be done to catch the dynamic interplay between children and their parents. The fundamental importance of self-regulation for nearly all aspects of life implicates the need to take a close look at the dynamics of self- and co-regulation in the caregiver-child dyad during early childhood. Longitudinal studies would be most helpful in this regard.

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5 Appendix

5.1 Scale construction of IMMA 1-6

To explore the factor structure of each IMMA part (I-III), principal axis analyses (oblimin oblique rotation) were used. To determine the number of factors for each part Kaiser criterion (Kaiser 1960), as well as Cattell's scree plot (Cattell 1966) were used. Items not clearly associated with any factor (i.e. loadings <.30) were eliminated and a second analysis with the remaining items was conducted.

The following Tables A1-A3 show all item-factor loadings.

Table A1: Item-factor loadings for part one of the questionnaire *(Parents' beliefs and goals concerning their children's coping with impulses).*[3]

Item	**Factor**		
	1	**2**	**3**
Children of the same age as my child are able to.....			
… regulate feelings	**.666**	.057	-.040
… control own needs	**.626**	.165	-.058
… control their will	**.465**	.147	-.012
… delay own interests as needed	**.653**	.275	-.242
It is important for me that my child learns....			
… to regulate feelings	**.724**	-.232	.226
… to control own needs	**.752**	-.162	.233
… to control one's own will	**.587**	-.147	.444
… to delay one's own interests as needed	**.574**	-.056	.308
Children of the same age as my child are able to....			
… to comply with requests	.026	**.679**	.102
… accept limits and prohibitions	-.032	**.795**	.162
… follow rules	.082	**.654**	.129
… behave thoughtfully towards others	.469	**.420**□	-.025
… be polite towards others	.455	**.412**□	.095
It is important to me that my child learns to.....			
… to comply with requests	-.016	.123	**.784**
… accept limits and prohibitions	-.062	.131	**.794**
… follow rules	-.021	.120	**.854**
… behave thoughtfully towards others	.283	.092	**.558**
… be polite towards others	.358	-.018	**.563**

Note: These items showed double loadings. Based on theoretical considerations, we decided to add them to Factor 2.

Source: Own representation.

3 Please note that this is a preliminary version of the IMMA, as well as preliminary translation into English. We currently prepare another publication reporting a revised version.

Table A2: Item factor loadings for part two of the questionnaire (Children's reactions to internal impulses and external demands and limitations)

Item	Factor							
	1	2	3	4	5	6	7	8
My child complies with my demand only after…								
… repeated request.	**.528**	.057	.133	-.032	-.058	.216	.149	.083
… I've given him/her a strict look.	**.674**	-.016	.284	.242	-.127	.030	.055	.204
… I've raised my voice and/or ranted.	**.687**	-.139	-.003	-.081	-.041	.121	.107	-.053
… I've threatened him/her with consequences.	**.833**	-.190	.005	-.185	.007	-.109	-.131	-.005
When my child is facing problems to reach a goal s/he…								
… starts to cry.	.041	**-.467**	.054	.129	-.241	-.133	.116	.033
… gets angry and loud.	-.007	**-.856**	-.099	-.133	.094	.016	-.040	-.035
… gets aggressive against objects.	-.015	**-.773**	-.006	.062	-.052	.183	-.031	-.012
… gets aggressive against other people.[1]	.038	**-.761**	.091	.140	-.032	-.072	-.027	.058
When my child has been requested for sth. s/he…								
… fights and rages without complying.[1]	.085	**-.342**	.126	-.133	-.084	.121	.166	.090
When my child has been requested for sth. s/he…								
… complies immediately, without protest.	-.466	-.075	**.309**	-.024	.025	-.076	-.190	-.056
… shows displeasure, but complies immediately.	.028	-.089	**.519**	-.075	-.010	-.232	.195	-.078
… complies only after having finished his/her ongoing activity.	.208	-.077	**.378**	-.062	.066	.111	-.045	.091
When I've prohibited sth. s/he…								
… accepts the prohibition without protest.	.057	.037	**.372**	.066	.022	-.068	-.028	-.373
… accepts the prohibition upon protest.	-.074	.056	**.510**	-.330	.022	.015	.027	.120
When my child has been requested for sth. s/he…								
… starts discussing without complying.	.343	-.060	.017	**-.561**	.111	.021	.219	-.163
When I've prohibited sth. s/he…								
… starts whining/begging to make me withdraw the prohibition.	-.058	.029	.040	**-.707**	-.097	-.085	-.036	.141
… starts discussing to make me withdraw the prohibition.	.026	.058	.119	**-.901**	-.054	.002	-.041	.016
When facing problems to reach a goal s/he…								
… keeps trying and wants to make it on his/her own.	-.030	.052	.054	-.050	**.645**	.095	.047	.004
… is giving in after a short time. (reversed)	.049	.002	-.129	.004	**.923**	-.052	.014	.072
… is turning to something else. (reversed)	-.049	-.029	.097	.154	**.682**	-.063	-.020	.003
When being requested for sth. s/he…								
… complies only after I've physically forced him/her to.[1]	.115	-.084	.052	.069	.050	**.818**	.076	-.167
When I've prohibited sth. s/he…								
… complies only after I've physically forced him/her to.[1]	-.073	-.009	-.063	.008	-.046	**.738**	-.081	.173
When being requested for sth. s/he…								
… pretends not to have heard me.	.243	.095	-.002	-.196	-.048	.108	**.304**	.174
… eludes me (e.g. is hiding, or running away).[1]	.013	.005	.120	.026	.006	-.020	**.804**	-.058
When I've prohibited sth. s/he…								
… ignores it and pretends not to have heard me.[1]	-.052	-.080	-.265	.072	.028	.025	**.454**	.387
When I've prohibited sth. s/he accepts the prohibition only after…								
… repeated warning.	-.037	.020	.099	-.127	.005	.129	.057	**.758**
… I've given him/her a strict look.	.037	-.036	.085	.064	.015	-.036	-.024	**.896**
… I've raised my voice and/or ranted.	.209	-.048	-.056	-.044	.041	.030	.023	**.725**
… I've threatened him/her with consequences.	.425	-.003	.010	-.322	.106	-.188	-.072	**.471**[¤]
When I've prohibited sth. s/he…								
… fights and rages without complying.	-.060	-.201	-.133	-.133	-.010	.087	.259	**.367**

Note. 1 = Directed compliance (requests), 2 = Negative emotion expression & aggression, 3 = Compliance, 4 = Discussion behavior, 5 = Goal-orientation, 6 = Directed compliance (physical pressure), 7 = Ignorance, 8 = Directed compliance (prohibitions); [1] = extremely high item difficulty (i.e., < .20)
[¤] This item showed double loadings. Based on theoretical considerations, we decided to add it to Factor 8.

Source: Own representation.

Table A3: Item factor loadings for part three of the questionnaire (Parenting practices in reaction to the child)

Item	Factor						
	1	2	3	4	5	6	7
If my child does not accept my request…							
… I repeat my request forcefully.	**.409**▫	-.084	-.033	-.438	.098	-.139	.016
… I give him/her a very strict look.	**.559**	.006	-.053	-.190	.138	-.081	-.049
… I raise my voice and/or rant.	**.704**	-.038	-.126	-.010	-.086	-.135	-.088
… I threaten him with consequences.	**.722**	-.044	.002	.006	-.151	-.193	-.040
… I force my child to comply.	**.810**	.130	-.047	.096	.087	-.052	.030
… I give him/her the cold shoulder.[1]	**.446**	-.092	-.353	.027	-.063	.121	-.058
… I deny him/her something s/he wants to have/do.	**.686**	-.048	-.090	.018	-.066	.202	.136
If my child gets exasperated about my request…							
… I ask him/her to stop making a scene.	**.322**	-.024	.109	-.217	-.070	.013	-.229
… I insist on getting his/her compliance.	**.563**	-.022	.284	-.007	-.114	-.019	-.006
If my child is frustrated when trying to reach a goal…							
… I show compassion.	-.048	**.615**	-.046	-.032	-.154	.010	.037
… I try to calm him/her down.	.051	**.530**	.053	.102	-.140	.064	-.283
… I encourage him/her to keep trying.	.058	**.457**	.090	-.005	-.042	.133	.209
… I help him/her to reach his/her goal.	.138	**.508**	.034	-.239	.061	.244	-.011
If my child gets exasperated about my request…							
… I show compassion.	-.084	**.709**	-.177	.041	.052	-.222	-.084
… I try to calm him/her down.	-.094	**.323**	-.064	-.158	.094	.023	-.243
If my child does not comply with my request, I give in.[1]	.083	.046	**-.453**	.208	-.065	.015	-.169
If my child gets exasperated about my request…							
… I defer my request.	.020	.093	**-.500**	-.314	-.021	.084	.020
… I give up on my request.[1]	.038	.019	**-.855**	-.010	.048	.042	.041
If my child does not accept my request …							
… I offer a compromise.	-.163	-.039	-.217	**-.320**▫	-.373	-.069	-.239
… I explain my request in more detail.	.003	.137	.019	**-.809**	-.081	.032	.017
If my child is frustrated when trying to reach a goal …							
… I ask him/her to calm down.	.144	-.012	.064	-.042	**-.381**	-.129	-.096
… I encourage him/her to vent his/her frustration.	-.032	.161	-.019	.036	**-.753**	.135	.109
If my child complies							
… I thank him/her for it.[2]	-.042	-.078	-.121	.036	-.121	**.717**	.016
… I praise him/her explicitly for it.	-.093	.103	.018	-.053	.149	**.724**	-.194
If my child complies, I give him/her a small reward.	-.083	.223	-.038	.328	-.001	.223	**-.604**
If my child does not accept my request, I promise a reward for compliance.	.181	-.091	-.164	-.150	-.145	.083	**-.742**

Note. 1 = Negative co-regulation, 2 = Positive co-regulation, 3 = Withdrawal , 4 = Democratic parenting behavior, 5 = Request for self-regulation, 6 = Appreciation, 7 = Use of rewards; [1] = extremely high item difficulty (i.e., < .20), [2] = extremely low item difficulty (i.e., >.80). ▫These items showed double loadings. Based on theoretical considerations, we decided to add them to Factor 1 and Factor 4, respectively.

Source: Own representation.

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