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Growing up Together: Differences Between Siblings in the Development of Compliance Separating Within-Family and Between-Family Effects

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This study applies a *within-family, age-snapshot design* to investigate differences between siblings in the development of compliance during the preschool years by disaggregating situational, within-family, and between-family effects. The aim of the study was to investigate the relation between sibling differences in compliance and the within-family factors birth order and differential parenting, as well as interactions between these factors. Using observational data of 311 Dutch families (self-identified as culturally Dutch) with 2 children when each child was 3 and 4 years old (firstborns: 36.2 months old; *SD* = 3.6; 48% girls, second-borns (2 years later): 36.67 months old; *SD* = .62; 47% girls) and both parents. Three-level cross-classified multilevel models showed main effects of observed sibling noncompliance and differential verbal discipline on noncompliance. In addition, second-born children were more compliant than their firstborn siblings, but only when the firstborn was disciplined physically more often than his/her younger sibling. The results provide evidence that birth-order effects may partially be explained by differential parenting and suggest that differences between siblings cannot be fully understood without taking into account the influence of both direct and indirect sibling effects.

Public Significance Statement
Differences in compliance between siblings are not just due to character differences, but can be partially explained by differences in how parents respond to their children. Children receiving more verbal discipline than their older or younger sibling showed more noncompliance. Moreover, when young children see that their younger sibling receives less physical discipline in response to noncompliance than they receive themselves, they tend to be less compliant. This study shows that noncompliance in siblings depends on the behavior of both parents and both children.

Keywords: birth order, siblings, differential parenting, noncompliance, cross-classified multilevel modelling

Supplemental materials: https://doi.org/10.1037/dev0001486.supp

Behavioral regulation is one of the key developmental goals in early childhood, which develops tremendously during the toddler and preschool years and is closely related to early compliance (see Bridgett et al., 2015 for a review; Kochanska et al., 2001). More compliance in early childhood can be related to positive developmental outcomes later in life, including higher levels of moral reasoning, less social-emotional problems, and better physical and psychological health (Mischel et al., 2011; Moffitt et al., 2013). Important factors that have been repeatedly found to contribute to the early development of compliance are child temperament and parental socialization (e.g., Braungart-Rieker et al., 1997; Kochanska et al., 2001; Lehman et al., 2002). However, the influence of siblings and child-specific experiences within the family on compliance has received less attention (Blandon & Volling, 2008; Van Berkel et al., 2017; Van Berkel et al., 2020). This has created a gap in our understanding of the origin of differences in compliance

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between siblings. The current study investigated birth-order effects and differential parenting processes that may explain differences in compliance between siblings by observing compliance of both children at the same age in a *within-family, age-snapshot design*.

The most well-established factor related to the development of compliance during early childhood is external regulation by parents (Kochanska & Aksan, 2006). Positive parental control strategies such as gentle guidance and support are related to children's higher levels of compliance which will contribute to rule internalization and self-regulation (e.g., Blandon & Volling, 2008; Kochanska & Aksan, 2006). Negative control strategies, such as punitive discipline and physical control, on the other hand, have been associated with children's increased noncompliance (Cecil et al., 2012; Kerr et al., 2004). Although, parental discipline will show resemblance between siblings, siblings will differ in noncompliance. Therefore, to understand differences between siblings we need to differentiate between the influence of shared and nonshared within-family factors (i.e., factors that are unique for each sibling; Plomin & Daniels, 1987) and investigate their unique contribution as well as their combined effect on child development.

This is in line with a family systems perspective which states that children within the same family have different experiences, which arise from differences in parent–child interactions and sibling interactions, and that child development has to be understood by investigating the interplay between parental, sibling, individual, and family-wide processes (Minuchin, 1985). Recent studies have found empirical evidence for these theoretical assumptions by showing that between-family factors influence within-family differences. For example low socioeconomic status and family-level risk factors have been associated with higher levels of differential parenting of siblings (Jenkins et al., 2003; Meunier et al., 2013; Prime et al., 2017). As such, differences between siblings can only be understood when taking individual, within-family, and between-family factors into account. The current study investigated several within-family factors which have been related to differences between siblings before, such as differential treatment by parents and birth order (Jenkins et al., 2003; McHale et al., 2012; for a review see Turkheimer & Waldron, 2000).

Differential parenting refers to parents treating their children differently and a child receiving less or more parental positivity or negativity than their sibling (Meunier et al., 2013). Observing parenting toward a sibling enables children to, consciously or unconsciously, compare the parenting they and their sibling receive and perceive differences. Previous studies found that children who perceive to be disadvantaged compared to their siblings show less prosocial behavior, self-control, and compliance, and more externalizing problems (Blandon & Volling, 2008; Caspi et al., 2004; Mullineaux et al., 2009). Moreover, there is some evidence that children perceived to be favored over their sibling showed more positive behaviors, including compliance (Reiss et al., 1995; Van Berkel et al., 2015). In addition to a child-specific effect of differential parenting, differential parenting may also have a family-wide effect as variations in parenting toward the children may affect all children in the family in a similar way (Boyle et al., 2004; Browne et al., 2018). Indeed some studies show that a greater variance in parenting between siblings result in negative outcomes for all siblings (Meunier et al., 2013). The effect of differential parenting may depend on shared within-family factors such as the relative parenting quality of both parents toward the child (Blandon & Volling, 2008; Jenkins et al., 2003; Van Berkel et al., 2015). The effect of differential discipline, which is likely to be relevant for differences between siblings' levels of compliance, may thus depend on the relative level of discipline parents show and the discipline they show toward a specific child. Therefore, a first aim of this study was to investigate the relation between differential parenting and compliance at the ages of 3 and 4 years, while controlling for both the mean family level of parental discipline as well as the variation in parental discipline between siblings across time.

The most frequently studied within-family factor besides differential parenting is probably birth order. Most birth-order studies, however have focused on intelligence (e.g., Wichman et al., 2006) or personality traits (e.g., Healey & Ellis, 2007; Michalski & Shackelford, 2002). Studies on birth-order effects on the development of self-control and socioemotional skills are scarce and show mixed results. While some suggest that second-born children display more behavioral regulation (e.g., more prosocial behavior and less antisocial behavior) and self-control compared to firstborns (Cole & Mitchell, 2000; Salmon et al., 2016), others find no differences between firstborn and second-born children (Donenberg & Baker, 1993; McAlister & Peterson, 2013). Therefore, the second aim of this study was to investigate birth-order differences in compliance at the ages of 3 and 4 years.

During early childhood birth-order effects may result from differences in experiences of children interacting with a younger versus an older sibling (Cole & Mitchell, 2000; Howe et al., 2018). Additionally, differential discipline may affect first and second-born children's compliance in a different way (Kowal et al., 2002). Therefore, as a third aim we investigated interaction effects between birth-order and both sibling behavior and differential parenting. Differences in the roles older and younger siblings take during their interactions may influence birth-order effects on the development of compliance. Because older siblings are cognitively and socioemotionally more mature than younger siblings, they generally take the lead in sibling interactions and more often apply a teaching role, while younger siblings are more inclined to spontaneously imitate behaviors of older siblings and take the role of a learner (Howe et al., 2018). The effect of sibling interactions on development may thus be different for firstborn and second-born children. Younger siblings may benefit from the more advanced behavioral regulation and better understanding of the consequences of transgressions (Kochanska & Aksan, 2006; Vaish et al., 2011) of their older sibling during parental limit setting. As a result, second-born children may internalize rules at a younger age than their firstborn sibling. In addition, some studies suggest that firstborn children may be more inclined to perceive differences in parental treatment as unfair (Shanahan et al., 2008; Shebloski et al., 2005), and as a consequence may be influenced more negatively by differential parenting (Kowal et al., 2002). In line with these results, differential parental discipline may thus have a different effect on the development of firstborn versus second-born children.

The current study investigated differences between siblings in the development of compliance during the preschool years by applying a longitudinal within-family, age-snapshot design (Wichman et al., 2006), and by separating the effects of individual, sibling, parental, and family factors. The design allows us to (a) compare siblings of the same family across time at the same age, (b) investigate within-family factors, while controlling for between-family differences, and (c) control for rapid developmental changes

in preschoolers compliance (Kochanska et al., 2001). We hypothesize that differences between siblings' compliance are related to several within-family factors: (a) differential parenting (i.e., children who are disciplined more often than their sibling show more noncompliance), (b) birth-order—with second-born children being more compliant than their firstborn siblings. In addition, we expect (c) an interaction between birth order and differential parenting, with firstborn siblings showing a stronger negative relation between compliance and receiving differential discipline than second-born children. Finally, we expect (d) an interaction effect between birth order and (non)compliance of the sibling. We expect that noncompliance of second-born children is stronger related to noncompliance of their older siblings than firstborns' noncompliance to the noncompliance of their younger siblings. Given the evidence relating individual child characteristics to development of compliance, we controlled all multilevel models for child gender (Kochanska, 2002), fearful temperament (Dong et al., 2018; Lehman et al., 2002) and inhibitory control (Kochanska et al., 2001; Lehman et al., 2002; Posner & Rothbart, 2009).

Method

Sample

The sample was recruited in the context of the longitudinal study *Boys will be boys?* examining gender-differentiated socialization during early childhood. Data was collected in four waves when the second-born child was 12, 24, 36, and 48 months old. Families with two children (firstborn: 30 to 42 months old and second-born: 12 months old) in the Western region of the Netherlands were selected from municipality records and invited by mail to participate between April 2010 and May 2011. Exclusion criteria were single parenthood, same-sex parented families, severe physical or intellectual handicaps of parent or child, and parents born outside the Netherlands or not speaking the Dutch language. Of the 1,249 invited families, 31% (N = 390) agreed to participate. At the time of the fourth wave 20 families no longer participated as a result of moving abroad (n = 5), family problems (n = 8), or because families considered further participation too demanding (n = 9). For the analyses of this paper, families with missing of one of the study measures on all waves were excluded, resulting in a final sample of 311 families. Excluded families had on average lower educated parents, fathers who worked more hours per week, and younger mothers (ps $< .05$) than included families. However, on other study variables families did not differ, such as child age, sibling gender combination, noncompliance, parental discipline, inhibitory control, or temperament of both children (ps $> .15$). The distribution of sibling gender configuration was as follows: 99 boy-boy (27%), 86 girl-girl (23%), 93 boy-girl (25%), and 90 girl-boy (25%).

At the time of Wave 1, firstborn children were on average 36.2 months old (SD = 3.6) and their younger siblings 12.4 months old (SD = .3). At Wave 1 mothers were aged between 25 and 46 years (M = 34.0, SD = 3.9) and fathers between 26 and 63 years (M = 36.9, SD = 5.0). Most participating parents were married or had a similar registered living arrangement (94%), and the remaining 6% lived together without any kind of registered agreement. All parents self-identified as culturally Dutch. With regard to educational level, most of the mothers (80%) and fathers (77%) had a high educational level (academic or higher vocational schooling). At the time of Wave 4 a third child had been born in 118 (32%) of the families and in five (1%) of these families a fourth child was born. Therefore, family size was added to the analyses as a covariate. Parents of nine families were divorced (2%), analyses with and without these families yielded similar results, so these families were retained in the current data set.

Procedure

Each family was visited twice every wave, within a period of approximately two weeks, once for observation of the mother and the two children and once for observation of the father and the two children. The order of father and mother visits was counterbalanced. After the two visits families received a gift of 30 Euros and the children received small presents after each visit. Before each home visit, both parents were asked to individually complete a set of questionnaires. During the home visits, participating families gave their informed consent, and parent–child interactions and sibling interactions were filmed. At Wave 1 and 2 only the firstborns and both parents completed computer tasks, while from Wave 3 both children completed computer tasks. All visits were conducted by pairs of trained graduate or undergraduate students. Ethical approval for the study was provided by the Research Ethics Committee of the Institute of Education and Child Studies of Leiden University. This study nor the analyses plan was preregistered. The data and syntax that support the findings of this study can be found in Supplementary File 1.

Measures

Noncompliance

Noncompliance was measured in a four-minute disciplinary *don't-touch* context used previously in several studies on compliance in early childhood (e.g., Kok et al., 2013; Van der Mark et al., 2002). The parent was asked to put a set of attractive toys on the floor in front of both children and to make sure the children did not touch the toys. After 2 minutes, both siblings were allowed to play for another 2 minutes only with an unattractive stuffed animal. Events of noncompliance were coded for each child when the child reached toward or touched the prohibited toys after parental instruction not to touch the toys. If a child reached or touched the toys more than once within 10 seconds, this was coded as one event of noncompliance. Noncompliance scores could range between 0 and a maximum of 12 events (i.e., 120 seconds/10 seconds). Interobserver reliability was good with all intraclass correlations (single rater, absolute agreement) for all pairs of the 31 coders above .80. To prevent coder drift regular meetings with coders were organized. For the current study noncompliance coded during the second and fourth minute of this task (i.e., the second minute of the two different parts of the observational task) was used, while parental discipline coded during the first and the third minute (i.e., the first minute of the two different parts, see below) was used in the analyses, to obtain measures of observed noncompliance and parental discipline from different segments to reduce the interdependence between the two observed measures (Kok et al., 2013). Because levels of noncompliance were correlated between the four minutes of the task (rs = .31 $\sim$ .66, ps $< .001$) and decreased in the second part of the task when children were

allowed to play with one of the presented toys, $F(3, 353) = 18.52$, $p < .001$, we chose to use half of the first context and half of the second context to compute a measure of noncompliance.

Parental Discipline

Fathers' and mothers' verbal and physical discipline in response to child noncompliance were coded during the first and the third minute of the *do not-touch* context (described above). Parental responses were coded as present or absent within 10 seconds after noncompliant behavior (the child reaching for or touching the toys) for both children separately. Verbal discipline was coded when a parent made comments concerning the rule of the task (e.g., telling the child not to touch the toys) and physical discipline was coded when a parent was holding the child, pushing the child away, blocking the way toward the toys, or moving the toys out of reach or from the child's hands. The mean intraclass correlation coefficient (single rater, absolute agreement) for all pairs of the 31 coders was, similar to the coding of noncompliance, above .80. Children and parents within the same family were coded by different coders to guarantee independence of the ratings. To prevent coder drift regular meetings with coders were organized for both parental discipline and noncompliance. The number of events of noncompliance was highly correlated to the number of verbal (rs = .69 $\sim$ .84; ps $<$ .001) and physical (rs = .54 $\sim$ .64; ps $<$ .001) interferences by parents. Therefore, the total number of times verbal and physical discipline occurred (in the first and third minute of the task) was divided by the total number of noncompliant events (during these same two minutes) to create a relative score for the two discipline strategies (Endendijk et al., 2017; Hallers-Haalboom et al., 2016). As a consequence of this approach, parents of children who showed no noncompliance during the first and third minute of the task had a missing value on parental discipline. In none of the families there were children who showed no events of noncompliance during all observations. Therefore, we allowed the multilevel model to handle missing data on parental discipline. The ratio scores of parental discipline were positively related to the number of parental interferences for both verbal (rs = .26 $\sim$ .39, $p < .001$) and physical (rs = .55 $\sim$ .68, $p < .001$) discipline. In addition, only the ratio score of verbal discipline was negatively related to noncompliance (rs = $-.20 \sim -.35$, $p < .001$), whereas ratios of physical discipline were not related to noncompliance (rs = .02 $\sim -.10$, $p > .07$), except for maternal physical discipline at Wave 2 toward the firstborn child, $r(310) = -.18$, $p = .002$. This indicates that parents who disciplined more often also disciplined more consistently and that when children showed more events of noncompliance, parents became less consistent in their verbal discipline.

Differential discipline was computed by subtracting the average level of parental discipline toward the child from the average level of parental discipline directed toward the sibling. As such we only included the child-specific (within-family) effect of differential parenting because the aim of our study was to investigate differences between siblings rather than between families.

Inhibitory Control

To measure inhibitory control an adapted version of the Cat-Mouse task (Simpson & Riggs, 2006), a computerized Go/NoGo task for 3 and 4-year-old children was administered during either the first or the second visit (counterbalanced) of each wave. The experimenter explained that the child had to catch all the mice that appeared on the screen (Go-stimuli) by pressing a red button and to not catch the cats that appeared on the screen (NoGo-stimuli). The task consisted of a practice session during which the child received feedback, with five mice and five cats appearing in alternating order, and a test session, with 30 mice and 10 cats appearing in random order. Correct rejections (no respons to NoGo-stimuli) were used as a measure for inhibitory control (Groot et al., 2004). To ensure that correct rejections indeed reflected inhibitory control, instead of a lack of responding to any of the stimuli, children had to reach accuracy on at least two thirds of the go trials to compute a measure for inhibitory control (Simpson & Riggs, 2006), resulting in exclusion of 14 families with missing data at all four measurements. Families with missing data on inhibitory control did not differ from other families on child age, sibling gender combination, noncompliance, or temperament of both children (ps $> .09$).

Temperamental Fearfulness

Parental reports of both children's activity level, inhibitory control, soothability, and fearfulness were obtained at the four research waves from the (Early) Childhood Behavior Questionnaire (ECBQ—for the 12 month olds—and CBQ; Putnam et al., 2008). Mothers and fathers rated on 55 items (fearfulness: 11 items; soothability: 11 items) the frequency of specific child behaviors in a given context during the past 6 months on a 7-point Likert scale (ranging from 1 = *never* to 7 = *always*). Internal consistency for both mothers' and fathers' reports on fearfulness across the four time points ranged from .53 to .69 (alpha) for firstborns and from .45 to .78 (alpha) for second-born children. Because of the low reliability of this subscale a scale-level factor analyses was conducted, which identified a two-factor structure with factor loadings (varimax rotation) ranging from $|.55$ to $.94|$ of father and mother report for first and second-born children. The first factor "*Reactivity*" was defined by high positive loadings of activity level and high negative loadings for inhibitory control, and the second factor "*Negative affectivity*" was defined by high positive loadings of fear and high negative loadings for soothability. The factor negative affectivity showed sufficient internal consistency ranging from .73 to .80 (alpha) for firstborns and from .68 to .82 (alpha) for second-born children. Therefore, the broader scale negative affectivity was used instead of the smaller construct fearfulness. Negative affectivity was constructed by combining standardized mean scores of the separate scales. Families of which questionnaires of both parents on both children of one wave were missing were deleted from analyses ($N = 49$). Again, families with missing data did not differ from other families on child age, sibling gender combination, parental discipline, noncompliance, inhibitory control, or temperament of both children (ps $> .13$).

Data-Analysis

To assess the effect of birth order and differential parenting on noncompliance without the confounding factor of child age, while taking situational, between-parent and between-family differences into account, we used a longitudinal within-family design to compare the behaviors of the two children at the same ages, i.e., noncompliance of the firstborn children as measured at Waves 1 and 2 (when they were on average 3, respectively 4 years old) and noncompliance of their second-born siblings as measured at Waves 3

and 4 (when they were on average 3, respectively 4 years old; see Table 1). To refer to children aged 3 and 4 years (who can be either the firstborn children at Waves 1 or 2, or the second-born children at Waves 3 or 4), we use the term *focus child* in the result section. The term *sibling* is used to refer to the sibling of the focus child: either the younger one (aged 1 or 2 years at Wave 1 or 2) or the older one (aged 5 or 6 years at Wave 3 or 4; see Figure 1).

Cross-Classified Multilevel Model

In the current study repeated observations of noncompliance (at the ages of 3 and 4 year) were simultaneously nested within firstborn or second-born children and within parents as each parent was observed at both time points. Furthermore, children and parents were nested in families. This indicates that the data was hierarchically nested, in that a unit at the lower level (i.e., within-family level) was nested in only one entity at the higher level (i.e., between-family level), while at the within-family level observations were simultaneously nested in two nonhierarchical clusters (i.e., within parents and siblings, see Figure 1). In other words, the data was cross-classified at the within-family level. To account for this data structure three-level cross-classified multilevel models (CCMM) were estimated, using the Linear Mixed-effects model in SPSS 23.0. Multilevel models partition the variance into levels corresponding to the nested structure of the data (reported in the lower part of Table 2). In this study this resulted in four variance components: between-family variance (level 3), between-sibling and between-parent variance (both level 2: within-family variance), and variance of the individual observations at different ages (level 1: situational variance including measurement error, Figure 1). Estimated variance at the between-sibling level indicate the extent to which firstborns and second-borns differ from each other in noncompliance at the same age, with lower values indicating more similarity between siblings. Estimated variance at the between-parent level indicate the extent to which children differ in the average amount of noncompliance they show in the presence of their mother and their father. The between-family variance estimate represents the extent to which families differ on the average amount of noncompliance. As a result, effects of differential parenting and birth-order can be investigated, while taking between-family, between-parent, individual, and situational differences in development over time into account (Dunn et al., 2015; Frampton et al., 2010).

First, to establish the relative importance of the four variance components for explaining variation in children's noncompliant behavior, an "unconditional model" (model 1) including only a random intercept and no predictors was estimated. Intraclass correlations (ICC) were computed at all four levels. ICCs provide information on the relative importance of a given level as a source of variation (Goldstein et al., 2002). For instance, a high ICC at the sibling-level would indicate that a large portion of the total variation in noncompliance between children is explained by variance between siblings.

Subsequently, CCMM's containing additional fixed effects at each variance level were estimated, with predictors at the situational level only (model 2), with additional predictors at the sibling level (model 3), with additional predictors at the parent level (model 4) and with additional predictors at the between-family level (model 5). Finally, a CCMM including interactions between (a) birth order and differential parenting and (b) birth order and noncompliance (model 6) was estimated. In the CCMMs we controlled for child's age (L1), number of siblings (L2-sibling and L3), inhibitory control (L1, L2-sibling and L3), child and siblings temperamental negative affect (L1, L2-sibling, L2-parent and L3), child and sibling gender (L1, L2 and L3), parent gender (L2-parent), age-difference firstborn and second-born at time of observation (L3) and order in which parents were observed (L2-parent). CCMM models were estimated using maximum likelihood to compare difference in -2 *log likelihood* between subsequent models as an indication of improvement in model fit. Significance of fixed effects was evaluated with individual Wald tests and significance of random effects were evaluated via likelihood ratio tests (i.e., $-2\Delta LL$ with degrees of freedom equal to the number of new fixed effects). Noncompliance of the focus child was positively skewed which was corrected with a square root transformation (Tabachnick & Fidell, 2012) which was used in all CCMMs. Model assumptions were confirmed using normality plots of the residuals, best linear unbiased estimator (BLUE), and best linear unbiased predictor (BLUP; Santos Nobre & Da Motta Singer, 2007).

To disaggregate the situational, between-sibling, between-parent, and between-family effects of the continuous predictor variables person-mean centering (also known as group-mean centering) was used (Curran & Bauer, 2011) to calculate separate predictors representing specific variance of the predictor at each level. For example, the child's mean level of parental discipline at a specific age (e.g., the mean of discipline by mother and by father observed during the two observations when the child was 3 years old) was subtracted from the predictor variable of parental discipline, resulting in a new situational predictor of parental discipline representing situational variation around a child's own mean level at a specific age (for a detailed description see the Appendix). Hence four variables of siblings' noncompliance, parental discipline and temperament were created: 1) representing the variation in child noncompliance/parental discipline/reported temperament between observations [L1], 2) representing the variation in noncompliance/parental discipline/reported temperament between siblings [L2: between-sibling effects], 3) representing the variation in noncompliance/parental discipline/reported temperament between parents [L2: between-parent effects], and 4) representing the variation of sibling noncompliance/parental discipline/reported temperament between families [L3: between-family effects].

Results

Developmental Patterns of Older and Younger Siblings' Noncompliance

Descriptive statistics for age, inhibitory control, noncompliance, temperament of and parental discipline toward both children during all waves are presented in Table 1 (for temperament descriptive statistics of the subscales are presented since the combined factor was based on standardized measures). The standard deviations of noncompliance for both siblings at different ages indicate that the task was appropriately challenging for children from 12 to 73 months old. Paired *t*-tests showed birth-order effects for inhibitory control and noncompliance. At the age of 3 years, firstborns displayed lower levels of inhibitory control, $t(180) = -2.40$, $p = .017$, $d = .18$, and more noncompliance toward both parents, $t_{mother}(309) = 3.81$, $p < .001$, $d = .22$, $t_{father}(309) = 3.11$, $p = .002$, $d = .18$, than their second-born siblings at the same age. At the age of 4 years, firstborns showed only more noncompliance toward their mother, $t(308) = 4.12$, $p < .001$, $d = .24$, than their second-born siblings at the same age. In

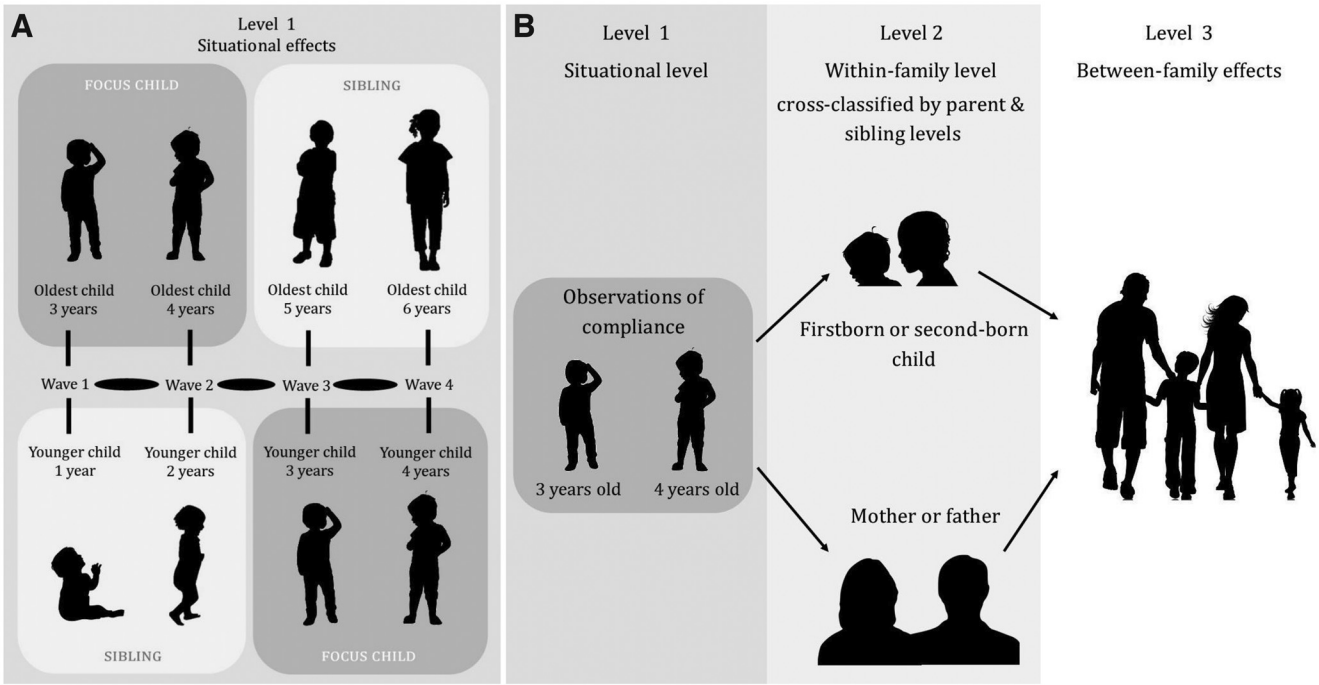
Table 1
Descriptive Statistics of Firstborn and Second-Born Children of the Four Research Waves

	Wave	Age *M* (*SD*)	Inhibitory control *M* (*SD*)	Parent	Fearfulness *M* (*SD*)	Soothability *M* (*SD*)	Noncompliance *M* (*SD*)	Verbal discipline *M* (*SD*)	Physical discipline *M* (*SD*)	Organization multilevel model
Firstborn	1	36.27 (3.59)	6.22 (3.12)[a]	mother	2.57 (0.77)	5.50 (0.73)	3.49 (2.88)[a]	0.77 (0.31)	0.46 (0.37)	focus child
				father	2.55 (0.70)	5.44 (0.62)	3.24 (3.03)[a]	0.76 (0.28)	0.46 (0.37)	
	2	48.29 (3.58)	8.17 (2.11)	mother	2.73 (0.81)[a]	5.51 (0.76)[a]	3.38 (3.15)[a]	0.71 (0.36)	0.46 (0.39)	focus child
				father	2.70 (0.71)[a]	5.42 (0.71)[a]	2.80 (2.84)	0.70 (0.33)	0.45 (0.39)	
	3	60.48 (3.59)		mother	2.63 (0.82)	5.51 (0.80)	2.58 (2.89)	0.71 (0.33)	0.39 (0.36)	sibling
				father	2.66 (0.81)	5.49 (0.69)	2.30 (2.69)	0.70 (0.33)	0.40 (0.37)	
	4	72.41 (3.59)		mother	2.35 (0.76)	5.52 (0.83)	2.29 (2.39)	0.67 (0.36)	0.34 (0.37)	sibling
				father	2.37 (0.70)	5.52 (0.69)	2.33 (2.53)	0.70 (0.36)	0.33 (0.37)	
Second-born	1	12.45 (0.29)		mother	1.83 (0.61)	6.12 (0.63)	2.61 (2.75)	0.56 (0.38)	0.77 (0.32)	sibling
				father	1.89 (0.60)	5.93 (0.64)	2.84 (3.18)	0.48 (0.39)	0.70 (0.36)	
	2	24.47 (0.33)		mother	2.33 (0.70)	5.69 (0.63)	3.82 (3.34)	0.74 (0.30)	0.59 (0.36)	sibling
				father	2.34 (0.65)	5.55 (0.62)	3.16 (3.04)	0.79 (0.54)	0.57 (0.38)	
	3	36.67 (0.62)	6.97 (2.82)[b]	mother	2.61 (0.77)	5.50 (0.67)	2.75 (3.04)[b]	0.73 (0.32)	0.51 (0.38)	focus child
				father	2.58 (0.71)	5.44 (0.63)	2.58 (2.97)[b]	0.77 (0.30)	0.47 (0.40)	
	4	48.60 (0.66)	8.19 (2.06)	mother	2.59 (0.76)[b]	5.61 (0.74)[b]	2.58 (2.65)[b]	0.75 (0.31)	0.43 (0.39)	focus child
				father	2.63 (0.67)[b]	5.50 (0.67)[b]	2.50 (2.57)	0.75 (0.29)	0.40 (0.37)	

Note. Verbal and physical discipline are proportions relative to the number of events of noncompliance. The shaded rows contain data of the two children at the same age. The focus of this study is comparison of siblings at the age of 3 and 4 years old, hence the *focus child* is the child that is 3 or 4 years old during the observation and the other child is the *sibling*. Superscripts letters a and b note significant differences in variables across firstborn and second-born children at a similar age.

Figure 1

Schematic Impression of the Cross-Classified Multilevel Model With Repeated Observations (Situational; Level 1) Nested Within Both Parents and Siblings (Cross-Classification; Level 2) Nested Within Families (Level 3)



Note. Figure 1A illustrates the observations of the two children per family over time. Figure 1B illustrates a classification diagram of the CCMM structure. The focus of this study is the comparison of siblings at the age of 3 and 4 years old, hence the *focus child* is the child that is 3 or 4 years old during the observation and the other child is the *sibling*. Silhouette images are retrieved from the stock image databases Pixabay, Vecteezy, and ClipArtQueen: see references Boy Silhouette PNG (n.d.); Christinass (n.d.); Pargeter (n.d.); Pixabay (n.d.-a), Pixabay (n.d.-b); Rambleron (n.d.-a); Rambleron (n.d.-b).

Figure 2 the developmental patterns of noncompliance for firstborn and second-born children is presented, based on mean scores of the separate observations with father and mother present.

Three-Level Cross-Classified Multilevel Models

The unconditional model (i.e., model without predictors, model 1 of Table 2) showed an improved fit compared to a two-level model that ignored the family structure of the data, $-2\Delta LL(1) = 29.15$, $p < .001$, and compared to three-level models ignoring the cross-classification of parents and siblings at level 2, $-2\Delta LL_{parent\ only}(1) = 32.71$, $p < .001$; $-2\Delta LL_{sibling\ only}(1) = 55.00$, $p < .001$, which justifies the use of three-level CCMMs. The *ICC*s indicated that, at Level 1, the majority of variance in noncompliance (64%) was accounted for by differences between observations. At Level 2, only 8% of the variance was explained by the difference between siblings and 14% of the variance in noncompliance was explained by differences between parents. At Level 3, the remaining 14% was explained by variance between-families. This suggests a limited degree in sibling similarity in noncompliance and considerable variation in observations of noncompliance across time.

Fixed Effects at the Situational Level

In model 2 (see Table 2) the fixed effects of predictors at the situational level (L1) were entered. The fixed effects showed a main effect of siblings' noncompliance, and parental verbal discipline toward the focus child. Significant effects at this level explain variation in noncompliance between the four observations. The significant effect of siblings' noncompliance indicated that children showed more noncompliance during a specific observation when their sibling showed higher levels of noncompliance during this specific observation compared to other observations (suggesting synchrony in siblings' behaviors). Similarly, the significant effect of parental verbal discipline indicated that children showed more noncompliance during a specific observation when their parents were less consistent in their verbal discipline, compared to the observations at the other wave. There were no significant effects of parental physical discipline or parental discipline toward the sibling. This indicates that to understand birth-order effects, we need to control for the situation specific level of siblings' noncompliance and parental verbal discipline in the subsequent models.

Fixed Effects at the Within-Family Level

Sibling Variance. At the sibling level (L2; within-family effects) factors that vary between siblings were entered. Main effects of birth order, siblings' noncompliance, and differential verbal discipline were found (model 3 of Table 2). The significant effects at this level explain variation in noncompliance between the firstborn and second-born siblings. The results indicated that firstborns showed higher levels of noncompliance than second-born children when compared at the age of 3 and 4 years. The effect of *siblings'* noncompliance indicated that at the age of 3 and 4 years children showed more noncompliance when

Table 2
Cross-Classified Multilevel Model Predicting Children's Noncompliance (LG10)-Developmental and Within-Family Fixed Effects

Parameter	Model 1 *b* (*SE*)	Model 2 *b* (*SE*)	Model 3 *b* (*SE*)	Model 4 *b* (*SE*)	Model 5 *b* (*SE*)	Model 6 *b* (*SE*)
			Fixed effects			
Intercept	1.85 (0.02)**	1.99 (0.03)**	1.80 (0.04)**	1.84 (0.05)**	1.82 (0.04)**	1.81 (0.03)**
Level 1 (situational–level)						
Noncompliance sibling		0.08 (0.01)**	0.07 (0.01)**	0.05 (0.01)**	0.05 (0.01)**	0.05 (0.01)**
Parental discipline verbal		−0.28 (0.09)**	−0.41 (0.06)**	−0.37 (0.07)**	−0.36 (0.06)**	−0.35 (0.06)**
Parental discipline physical		−0.13 (0.08)				
Parental discipline verbal to sibling		−0.16 (0.09)				
Parental discipline physical to sibling		0.03 (0.08)				
Level 2 (within-family)						
Sibling level						
Birth order[a]			0.14 (0.04)**	0.12 (0.03)**	0.13 (0.03)**	0.15 (0.04)**
Noncompliance sibling			0.05 (0.01)**	0.05 (0.01)**	0.05 (0.01)**	0.04 (0.03)
Parental discipline physical			−0.19 (0.12)			
Differential parental discipline verbal			−0.13 (0.07)*	−0.16 (0.06)*	−0.16 (0.06)*	−0.15 (0.07)*
Differential parental discipline physical			−0.10 (0.07)			0.08 (0.09)
Parent level						
Noncompliance sibling				0.06 (0.01)**	0.06 (0.01)**	0.06 (0.01)**
Parental discipline verbal				0.04 (0.12)		
Parental discipline physical				−0.23 (0.08)**	−0.19 (0.08)*	−0.19 (0.08)*
Level 3 (Between-family)						
Noncompliance sibling[b]						
Parental discipline physical					−0.13 (0.12)	
Interaction at the Sibling level						
Birth Order × Noncompliance Sibling						0.02 (0.04)
Birth Order × Differential Parental Discipline Physical						−0.24 (0.12)*
			Random effects			
Situational	0.32 (0.01)**	0.31 (0.02)**	0.31 (0.01)**	0.31 (0.01)**	0.31 (0.01)**	0.31 (0.01)**
Sibling	0.04 (0.01)**	0.04 (0.02)*	0.02 (0.01)	0.02 (0.01)*	0.02 (0.01)*	0.02 (0.01)*
Parent	0.07 (0.01)**	0.01 (0.02)	0.01 (0.01)	0.00 (0.01)	0.00 (0.01)	0.00 (0.01)
Between-family	0.07 (0.02)**	0.07 (0.02)**	0.09 (0.01)**	0.09 (0.01)**	0.09 (0.01) **	0.09 (0.01) **
$-2\Delta LL$		1,080.73**	107.53**	24.92**	8.84*	4.27*

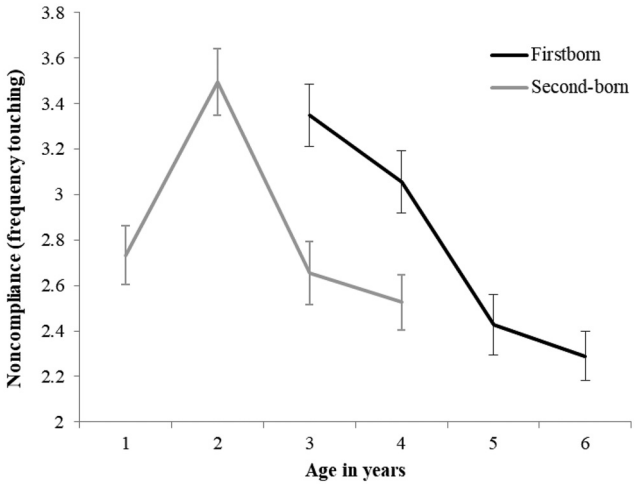
[a] 0 = second-born, 1 = firstborn. [b] Adding sibling noncompliance at the between-family level resulted in an overfitted model as indicated by a failure of the Hessian Matrix to positive definite and a random between- family effect of 0. Therefore, noncompliance at the between-family level was not included in the CCMM. $-2\Delta LL$ of the models with only significant fixed factors were compared. Models were controlled for child's age (L1), number of siblings (L2-sibling & L3), inhibitory control (L1, L2-sibling & L3), child and siblings negative affect (L1, L2-sibling, L2-parent & L3), child and sibling gender (L1, L2 & L3), parent gender (L2-parent), age-difference firstborn and second-born at time of observation (L3) and order in which parents were observed (L2-parent).
* $p < .05$. ** $p < .01$

their sibling (a 1- and 2-year-old younger sibling for the firstborn versus a 5- and 6-year-old for the second-born child) on average showed more noncompliance. This result indicates that there is similarity in siblings' behavior not only when observed in the same situation but also across situations. Finally, the effect of differential verbal discipline indicated that children showed more noncompliance when the focus child received more verbal discipline than his or her sibling (a 1- and 2-year-old younger sibling for the firstborn versus a 5- and 6-year-old for the second-born child). Parental discipline directed to the child or the sibling did not explain differences in compliance between siblings when compared at the age of 3 and 4 years. Thus, the results at the sibling level provided evidence for the hypothesized effects of differential parenting—children who received more verbal discipline than their siblings, showed less compliance after controlling for the variance explained by the level of parental verbal discipline directed toward the focus child in the specific observational setting (the fixed effect of verbal discipline at L1; hypothesis a). In addition, model 2 provides evidence for a birth-order effect: second-born children were more compliant than their firstborn siblings (hypothesis b), while controlling for child temperament, siblings' noncompliant behavior, and variations in parental discipline toward the children.

Parent Variance. The parent level (L2; within-family effects) explains variation in child noncompliance toward fathers and mothers. At the parent level a main effect of sibling noncompliance and parental physical discipline was found (model 4 of Table 2). Children showed more noncompliance with a specific parent when their sibling showed more noncompliance with this parent. In addition, when a parent was less consistent in his or her use of physical discipline toward the child compared to the other parent, the child showed more noncompliance with this parent. Differences in verbal discipline between parents was related to differences in compliance toward fathers and mothers. These results indicate similarity between siblings' noncompliance when controlling for variance in noncompliance between parents and differences in parental discipline.

Fixed Effects at the Between-Family Level. Finally, at the between-family level factors that possibly explain variance between families were entered. No main effects were found for any of the study variables. This indicates that family mean level differences in

Figure 2
Development of Firstborn and Second-Born Noncompliance Over the Course of Four Years



parental discipline as well as family mean level sibling noncompliance did not explain additional variance in child noncompliance. Variance in noncompliance of 3 and 4 year-old children was thus explained by variations in parental discipline between situations, between the specific children and between the two parents in the family but not by variations in mean levels of parental discipline between families. Similarly, variance in noncompliance of 3- and 4-year-old children was explained by variations in sibling noncompliance between situations, between the specific children (i.e., the difference between the level of noncompliance of a −1 or 2-year-old sibling versus a 5- or 6-year-old sibling) and toward the two parents, but not by variations in mean levels of sibling noncompliance between families. The chi-square test of the difference in *−2 log likelihood*—an indication of model fit—showed significant increase in explained variance for each model presented in Table 2, which corresponds with the significant fixed effects.

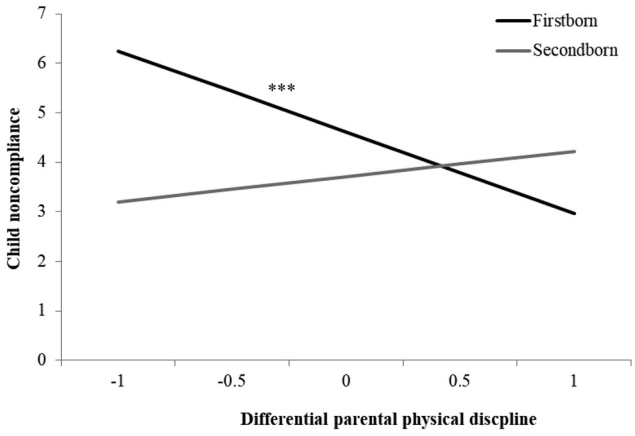
Interactions With Birth Order. To investigate what processes may explain birth-order effects in the development of compliance during early childhood, interactions between birth order and differences in parental discipline toward both children (L2; hypothesis c), and sibling noncompliance (L2; hypothesis d) were added in model 6 (see Table 2). Only the interaction between differential parental physical discipline by birth order was significant. Separate multilevel models for first and second-born children as a follow-up for the interaction effect showed that firstborns showed more noncompliance when their sibling received less consistent physical discipline compared to the firstborn child, $t(338) = -3.61$, $p < .001$, 95% CI = $-.57 \sim -.17$, while for second-born children, noncompliance was not related to differential physical discipline, $t(320) = .45$, $p = .65$, 95% CI = $-.17 \sim .28$ (see Figure 3).

Discussion

The current study investigated the combined effects of birth order, sibling's noncompliance, and differential parenting on differences between siblings in the development of compliance at 3 and 4 years of age by applying a longitudinal developmentally sensitive within-family age-snapshot design. This design allowed us to investigate within-family processes that differ between siblings while controlling for between-family differences, differences between fathers and mothers, and changes over time. Our results indicated that while controlling for situational and between-family effects (a) first and second-born children showed more noncompliance when their sibling received relatively less consistent verbal discipline, (b) second-born children were more compliant than their firstborn siblings at the age of 3 and 4 years, (c) only firstborn children showed more noncompliance when their younger siblings received less consistent physical discipline than they received, and (d) there was no evidence of an interaction effect between birth order and sibling noncompliance. The current study focused on firstborn and second-born children, therefore we can only speculate on whether or not the results would also apply to earlier- and later-born children in families with more than two children.

As expected, differential verbal discipline across older and younger siblings was related to more noncompliance of 3 and 4-year-old children receiving more consistent verbal discipline than their younger sibling (for firstborns) or their older sibling (for second-born children; hypothesis a). Preschoolers thus showed more noncompliance compared to their sibling at the same age when they were disciplined more often than their (older or younger) sibling, when controlling for situational variation, variation between parents, and variation between families in both compliance and parental discipline. This finding is in line with several previous studies indicating that children who are treated less positively compared to their siblings show less favorable behavior including more noncompliance (Blandon & Volling, 2008; Boisvert et al., 2012; Caspi et al., 2004; Mullineaux et al., 2009). In addition, the current result extends previous studies by showing that the effect of differential parenting remains after controlling for mean levels

Figure 3
The Association Between Child Noncompliance and the Difference in Parental Physical Discipline of the Sibling by Birth Order



Note. A negative value on differential discipline indicates that the focus child is disciplined more frequently than his/her sibling, a positive value indicates that the focus child is disciplined less often than his/her sibling in the same wave. For interpretation purposes the nontransformed values of child noncompliance are presented.
*** $p < .01$.

of parenting and differences in parental discipline between families, indicating that the effect of differential parenting may be quite robust. Yet another possibility is that differences in verbal discipline partially reflect differences in child noncompliance or that the association is bidirectional, whereby it is not possible to differentiate causal parent or child effects.

Consistent with our hypothesis b we found that, even when controlling for situational variation in compliance of both children over time, differences in compliance toward fathers and mothers, differences in parental discipline toward a 3- or 4-year-old firstborn and second-born child and differences in parental discipline between families, second-born children were more compliant than their firstborn siblings when compared at the ages of 3 and 4 years. Interestingly this birth-order effect was qualified by an interaction between birth order and differences in parental discipline toward the child compared to discipline toward the sibling (hypothesis c). While second-born children's noncompliant behavior was not related to differential physical discipline between themselves and their 5- or 6-year-old older siblings, firstborns showed more noncompliance when they received more physical discipline than their 1- or 2-year-old younger sibling. This result is in line with studies suggesting that earlier born siblings are more sensitive to differential parenting (Shanahan et al., 2008: Shebloski et al., 2005) and could be explained by the differences in the perceived fairness of differential physical discipline by firstborn and second-born children (Kowal et al., 2002; McHale et al., 2000). Differential discipline could be seen as fair when it is sensitive to developmental differences between the two children. More physical interference in response to noncompliant behavior of 1- or 2-year-olds, who cannot fully understand the rules and/or regulate their behavior, may be a more adaptive strategy than verbal interference (Hallers-Haalboom et al., 2016; Grolnick et al., 1998), while older siblings may be more responsive to verbal discipline given their better understanding of language and behavioral regulation skills (Berk, 2006). A comparison of parental discipline toward the two children during the first research wave with the sample of the current study (described in Hallers-Haalboom et al., 2016) showed that parents indeed tend to use more physical interferences with their 1-year-old compared to their 3-year-old, while verbal interferences were used more frequently with the older compared to the younger child. Other differences in parental responses to their children's noncompliance were more laxness toward the noncompliance of 1-year-olds and more distraction in response to noncompliance of 3-year-olds. This may suggest that when older siblings received more physical discipline than their 1- or 2-year-old younger sibling, parents did not interfere with the noncompliance of the younger sibling, while in situations during which second-born children received more physical discipline compared to the older sibling, parents may have used distraction or verbal discipline with the 5 or 6-year-old older sibling. If this was the case, 3- and 4-year-old firstborn children may have felt disadvantaged by their parents and as result showed more noncompliant behavior (Kowal et al., 2002).

Interestingly, the relation between child noncompliance and sibling noncompliance was similar for firstborns and second-borns, which suggests, in contradiction to our hypothesis d, that second-borns were not more likely to imitate their (5- or 6-year-old) older sibling's (non)compliant behaviors than firstborns were to imitate their (1- or 2-year-old) younger sibling's (non)compliant behaviors. Studies on sibling influences have emphasized the tendency of children to imitate the behaviors of their older siblings (e.g., Abramovitch et al., 1980; Barr & Hayne, 2003). Although to a lesser extent, preschoolers have certainly also been observed to imitate their younger sibling (Abramovitch et al., 1980; Howe et al., 2018). It may well be that children are more selective in imitating behavior of their younger siblings than of their older siblings and that imitating noncompliant behavior of a younger sibling seems appealing for a child. A previous study on birth-order effects on sibling imitation, comparing 4-year-old first and second-born children within-families, indeed showed that the content and form of imitation differed between firstborns and second-borns (Howe et al., 2018). In addition, being compliant while your sibling is not compliant may be a more difficult task, demanding more inhibitory control, than following the noncompliant behavior. This finding may thus suggest that older siblings are imitated as often as younger siblings, which could also partly explain that second-born children outperformed their firstborn siblings on compliance. Since firstborn children were confronted with a younger sibling who had more difficulty with being compliant, while second-born children were confronted with an older sibling who was better able to comply with parental rules, first and second-born children probably have a completely different example to imitate during parental limit setting. The effect of sibling interactions on development may thus be different for firstborn and second-born children. Second-born children may benefit from the more advanced behavioral regulation and better understanding of the consequences of transgressions (Kochanska & Aksan, 2006; Vaish et al., 2011) of their older sibling during parental limit setting, while firstborns may experience an extra challenge by being confronted by the less regulated behavior of their younger sibling. As a result, second-born children may internalize rules at a younger age than their firstborn sibling.

Yet another possible explanation for the lack of an interaction between birth-order and sibling noncompliance is that firstborn siblings at the age of 3 or 4 years old are imitated by their 1- or 2-year-old second-born siblings to the same extent that second-born siblings at the age of 3 or 4 years imitate their 5- or six-year-old firstborn siblings. In other words: the similarities in noncompliance between siblings at different time points may reflect stability in the extent to which the younger sibling imitates the older sibling rather than similarity in the extent to which firstborns and second-borns imitate an older versus a younger sibling at the age of 3 and 4 years old. However because imitation develops over time, and spontaneous imitation increases with age during early childhood (Young et al., 2011), this explanation may not be the most plausible. Alternatively, the similarities in compliance across siblings may reflect similarities in inhibitory control, which is partly influenced by (shared) genetic factors (Gagne & Saudino, 2016). However, since the relation between child and sibling compliance was corrected for their level of inhibitory control, we expect that shared genetic factors will not completely explain the association between siblings' compliance. The fact that inhibitory control only explained variance in child noncompliance between families and not between siblings within-families may also be explained by the influence of shared genetic factors. Finally, part of the similarities in noncompliance between siblings may also be explained by similarities in parental discipline in response to noncompliance of both siblings. However, after controlling for the other variables, no relation between parental

discipline toward both siblings (between-family level) and compliance was found, which may suggest that noncompliance of the sibling was more important than the overall family-wide level of parental discipline for child compliance.

The findings of the current study should be interpreted while keeping some limitations in mind. First, our sample consisted primarily of highly educated parents, which may limit the generalizability of the results. Second, the use of listwise deletion for missing data could be considered a limitation. Even though families with missing data did not differ from families with complete data on the study variables, they did differ on some demographic factors. This suggests that missing values were not missing completely at random, and the pattern suggest that possibly parents with a lower SES may have been more likely to drop out of the longitudinal study, which limits the generalizability of the results. A third limitation is that noncompliance of both children as well as parental discipline toward both children were measured simultaneously, which as stated above may have amplified the birth-order effect. It should be noted that we controlled for noncompliance of the sibling in our analyses, used multiple observations over time, and used separate variance components of both noncompliance and parental discipline to disentangle variance across time, across parents, across siblings, and across families. However, future studies would ideally also compare noncompliance of firstborn and second-born children and parental discipline in different contexts. In addition, future studies may focus on how this early difference in noncompliance may evolve over time. Furthermore, the use of ratio scores for parental discipline may involve some limitations. Although the use of a ratio handles the problem of multicollinearity between parental discipline and child noncompliance, it may suggest that the number of events of noncompliance is not relevant. However, it is probably easier for parents to consistently respond to every event of noncompliance when there are fewer events to respond to. This is also reflected by the negative correlations between the ratio score of verbal discipline and the number of events. This should be kept in mind when interpreting the results. However, the negative association could also indicate that if children do not respond to the verbal interferences of parents, parents will adopt a different strategy to make their children comply, for example by distracting them.

Finally, because all children in the current study were firstborn or second-born children we were unable to investigate to what extent differences between siblings are related to being a firstborn versus a second-born child or to being an older versus a younger sibling. Other studies could investigate whether the results of this study can be replicated in a sample of older and younger siblings who are not necessarily firstborn and second-born children.

The current study adds to the literature on differences between siblings by using a within-family age-snapshot design, applying an innovative cross-classified multilevel model, and not merely testing birth-order effects but also investigating differential parenting and sibling synchrony as possible important factors explaining differences in the development between firstborn and second-born children at preschool age. The results of this study show that the birth-order effect on preschoolers' noncompliance may be primarily explained by differential parenting. Firstborn preschoolers were only less compliant than their second-born siblings at preschool age, when firstborn preschoolers were disciplined more often physically than their younger (infant) siblings. Firstborn children may thus be more sensitive to differential discipline compared to second-born children. In addition, this study found evidence that differences in the developmental level of their counterpart may influence noncompliance. This may be through imitation or merely synchrony in the behaviors of siblings during joint situations. This suggests that birth-order effects cannot be fully understood without taking into account the influence of both direct (trough imitation) and indirect (through differential parenting) sibling effects. Even when older and younger siblings may influence each other's development through similar processes, for example, imitation and differential treatment, developmental outcomes will differ dependent on the developmental level of the child's counterpart.

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(*Appendix follows*)

Appendix

Partitioning Variance in Predictors of the CCMM

Unconditional three-level CCMMs were specified each with one of the predictors as dependent variable to disentangle the variance of these variables for the four different levels. Subsequently, separate predictors were created applying person-mean centering to analyze the specific effects on noncompliance at each level. This allowed us to examine whether variance in children's noncompliance can be explained by variance in for example their siblings' noncompliance across time (level 1—situational), across parents (level 2—between-parent), across the firstborn and the second-born (level 2—between-siblings) and across families (level 3—between-family).

Given that firstborns and second-born children were observed at the same ages, the age of the focus child explained only within-child variance at the situational-level (L1). Age of the sibling of the focus child explained, in addition to variance across time (L1), variance between siblings (within-family; L2). Variance of age across time (variance at L1) of the sibling and the focus child were the same, since they were observed at the same moments in time. Furthermore, age was confounded with the dichotomous measure of time of observation, $r(2487) = .997$, $p < .001$, since all children were observed when they were 3 (at Wave 1) and 4 years old (Wave 2). In addition, the between-sibling variance of sibling age was confounded with the effect of birth order, $r(2487) = .997$, $p < .001$, because half of the focus children had an 18 to 30 months younger sibling (i.e., were firstborns) and the other half had an 18 to 30 months older sibling (i.e., were second-born children; Table 1). Therefore, one of these measures was included: to keep the multilevel analyses more parsimonious we included the two dichotomous variables for age (0 = 3-year-old, 1 = 4-year-old) and birth order (0 = second-born, 1= firstborn) instead of the continuous variables child and sibling age. Age difference between the focus child and the sibling explained only between-family variance (L3), and gender of the focus child and the siblings explained between-sibling and between-family variance (L2 and L3). Inhibitory control was measured during the father or the mother visit, meaning that it could not explain between-parent variance (L2).

Furthermore, noncompliance of the sibling and physical parental discipline toward the focus child and the temperament measure of the child and the sibling showed variance at all four levels. Verbal discipline toward the focus children showed no between-sibling or between-family variance. This indicates that siblings received equally consistent parental responses of verbal discipline when compared at the same age and parents of different families were equally consistent in their use of verbal discipline. Finally, physical discipline toward the sibling showed no between-parent or between-family variance and verbal discipline toward the sibling showed only residual variance. This indicates that variance in physical discipline toward the sibling was related to variations over different observations and to the age differences of the siblings that were present when a firstborn child of 3 or 4 years was observed or when a second-born child of 3 or 4 years was observed (i.e., the between-sibling variance). This was also reflected by strong association between the between-sibling variance of physical discipline and birth order, $r(2487) = .69$, $p < .001$.

To disaggregate the developmental, between-sibling, between-parent, and between-family effects person-mean centering was used (Curran & Bauer, 2011). As such, the situational effect (L1) was represented by the deviation of the observed variable around each individual's average level over the repeated observations within one wave. The between-sibling effect (L2) was represented by the deviation of an individual child's average level over the repeated observations, around the family average level of the two children in the family. As such the between-sibling effects indicate how much more often a child was, for example, physically disciplined during the four observations (once with mother and once with father at three-years and four-years) compared to the amount of physical discipline both children on average received during all observations. The between-parent effect (L2) was represented by the deviation of an individual parent's average level over the repeated observations around the family average level of the two parents in the family. Thus the between-parent effects indicate how much more often a parent used, for example, physical discipline during the four observations (when the firstborn was 3 years old (a), when the firstborn was four-years old (b), and when the second-born was 3 years old (c) and 4 years old (d)) compared to the amount of physical discipline both parents on average used during all observations. Finally, the between-family effect (L3) was represented by the family average level centered by the grand mean of the target variable. Hence four variables of siblings' noncompliance, parental discipline, and temperament were created: (a) representing the variation in child noncompliance/parental discipline/reported temperament over time [L1: situational effects], (b) representing the variation in noncompliance/parental discipline/reported temperament between siblings [L2: between-sibling effects], (c) representing the variation in noncompliance/parental discipline/reported temperament between parents [L2: between-parent effects], and (d) representing the variation of sibling noncompliance/parental discipline/reported temperament between families [L3: between-family effects].

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