



Parental Discipline Techniques and Changes in Observed Temper Tantrum Severity in Toddlers

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Abstract

Although temper tantrums are considered a normal part of emotional development in toddlerhood, for some they foreshadow more serious behavioral and emotional problems. Parental discipline techniques may play a role in explaining why this behavior worsens for some children whereas for others it fades away. With this three-wave longitudinal study, we examined bidirectional associations between specific discipline techniques – ignoring, power assertion, and consistency– and intra-individual changes in the severity of tantrum behavior. We observed tantrum behavior in a standardized clean-up task, overcoming the limitation of most earlier work that relied on parent-report for associated changes in parenting and child behavior over time. For 94 children (53 boys; $M_{age} = 30$ months, range 20–43 months), mothers filled out the Parenting Dimensions Inventory, and temper tantrum severity (i.e., duration and aggressiveness) was coded three times across one year. Random Intercept Cross-Lagged Panel Models suggested parent-effects rather than child-effects: more maternal power assertion and less consistency predicted increases in tantrum severity over time (ignoring did not), but temper tantrum severity did not predict changes in parenting over time. Results indicate that reducing power assertion and increasing consistency may be especially helpful in reducing temper tantrums in children. Findings add to previous findings indicating that mothers' parenting may be driven less by objective child behavior than by her own perceptions of her child's behavior.

Keywords Toddlerhood · Temper tantrum · Parental discipline techniques · Random intercept cross-lagged panel model

Temper tantrums – emotional outbursts that may include crying, screaming, throwing objects, falling to the floor, and sometimes violent body motions (Potegal & Davidson, 2003) – are considered a normal phenomenon in toddlerhood (Castiglia, 1988; van Leeuwen et al., 2009). Severe temper tantrums however, i.e. when temper tantrums last long (i.e., more than 5 minutes, Wakschlag et al., 2012) or involve aggressive behavior, predict later adjustment problems reported by parents (van den Akker et al., 2022); when persisting into later childhood, tantrums predict antisocial behaviors even in adulthood (Caspi et al., 1987). To examine which parental discipline techniques may exacerbate or

reduce the severity of early tantrum behavior, we investigated associations between maternal reports of discipline techniques (power assertion, consistency, ignoring) and longitudinal changes in observed tantrum severity in toddlerhood. As severe tantrums can also be very distressing for parents (Landy & Peters, 1991), and child-effects have consistently been found in studies of behavior problems more generally (Yan et al., 2021), we also examined longitudinal associations between severity of tantrum behavior and changes in the use of these discipline techniques over time.

Impact of Parental Discipline Techniques on Children's Temper Tantrums

When parents consistently communicate and reinforce rules, children can more easily learn what is expected from them (Bandura & McClelland, 1977). When parents, in contrast, are inconsistent, they create an unpredictable environment that may elicit frustration and temper tantrums (Wakschlag

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et al., 2012). For instance, if a child was allowed to play with their crayons during lunchtime one day and wants to play with them again during lunchtime the next day but is not allowed to, the child is more likely to throw a tantrum than when it was never allowed.

Whereas consistency may decrease temper tantrum severity, power assertion – the use of coercion through for instance grabbing, yelling at or punishing the child – may increase tantrum severity, by modeling tantrum-like behaviors for the child (Bandura & McClelland, 1977) and impeding the development of emotion regulation skills through increasing stress for the child (Maughan & Cicchetti, 2002).

In addition to the possibility that parents model tantrum-like behavior (as can happen when parents use power assertion), or by getting what they want (as with inconsistency), children may also be rewarded for their tantrum behavior by the mere fact that they get their parents' attention. Briefly withholding parental attention (i.e., ignoring a child) after misbehavior is indeed associated with increased child compliance (Leijten et al., 2018). Ignoring is thought to reduce problem behavior because children have such a strong desire to gain their parents' attention, that any attention, even negative attention, is rewarding. Parents of two- to four-year-old children report that the most common reason for tantrums is getting their attention, in addition to getting something else they want, like food, objects or activities (Salameh et al., 2021). A cross-sectional study indicated that if parents reported any type of response to their child's tantrum, they reported longer and more intense tantrums (Potegal & Davidson, 2003). Professionals working with parents are therefore advised to encourage parents to withhold attention, for example in the form of a time-out, to avoid rewarding the child's behavior with attention (Sisterhen & Wy, 2021).

Impact of Children's Temper Tantrums on Parental Discipline Techniques

In addition to parenting impacting children's temper tantrums, tantrums may also impact parenting. Parents may become angry and even frightened by severe temper tantrums (Landy & Peters, 1991), making them more likely to resort to power assertion (Bahrami et al., 2018). As power assertion may increase rather than reduce tantrum behavior, a cycle of coercive exchanges may start with parent and child mutually exacerbating each other's problematic behavior (Patterson, 1982). Less severe temper tantrums on the other hand, may make it easier to follow through and be consistent, and may be easier to ignore, potentially reducing the likelihood that parental power assertion increases over time.

Experimental evidence for the effects of parenting behavior on disruptive child behavior comes from both parenting program evaluation research (e.g., Mingeback et al., 2018 for a review of reviews) and focused experimental research (e.g., Leijten et al., 2018 for a review), with studies showing that changing parenting behavior can result in changes in child behavior. At the same time, experimental research has shown that parents are impacted by differences in child behavior, with parents of hyperactive children reducing their demands and controlling behavior when their children were randomized to receive Ritalin that led to more compliant behavior (Barkley, 1989). And more recently, an experimental study that elicited disruptive behavior in children showed that child disruptive behavior increases parental stress and physical arousal (Schulz et al., 2019). In addition, observational studies provide evidence that parent and child influence each other in moment-to-moment interaction (e.g., Lunkenheimer et al., 2016). However, although it is clear that both child- and parent-effects can and do play a role, these studies do not tell us about whether both interaction partners are equally important in predicting each other's behavior over time, across naturally occurring development. To examine this, longitudinal studies are necessary.

A recent meta-analysis on the longitudinal associations between children's behavior problems and "incompetent parenting" – including harsh, psychologically controlling and intrusive parenting for instance – indicated that child-effects (i.e., children eliciting behavior in their parents) are as strong as parent-effects (i.e., parents eliciting behavior in their children) (Yan et al., 2021). However, almost all the studies used maternal reports to measure child behavior – with some studies of older children also using teacher reports – but rarely including independent observer reports of child behavior. Due to the limited evidence from observations of child disruptive behavior so far, and the possibility that maternal perceptions of their child's behavior are only slightly related to objective observations of child behavior (e.g., Chang & Shaw, 2016), we do not know yet whether the "child-effects" that have often been reported are indeed driven by actual child behavior, or whether they are better interpreted as "maternal perception of her child-effects." That is, it could be that mothers are impacted in their parenting more by how they view their child, than by how problematic their child's behavior actually is compared to other children.

There were two exceptions in the preschool age range. One study included an observational measure of child non-compliance at age three and failed to find a child-effect: more observed noncompliance was not associated with more maternal negative parenting three years later (Combs-Ronto et al., 2009). There were also no parent-effects on

observed child non-compliance in this study. In contrast, longitudinal parent- and child-effects were found for a composite of maternal and teacher- reports of child externalizing behavior. Another study only used observed child disruptive behavior to examine parent-effects, and found no association between maternal negative control when the child was 18 months and disruptive behavior at 24 months (Chang & Shaw 2016).

Another shortcoming of many studies to date is not separating within-from between-person effects. This is problematic as findings that merely reflect changes in rank-order between individuals, are interpreted as though they indicate within-person changes (Hamaker et al., 2015). However, between-person effects do not necessarily apply to the within-person level, a phenomenon known as Simpson's paradox (Kievit et al., 2013). For instance, adolescent secrecy is associated with more parental privacy invasion at the between-person level (i.e. adolescents who are more secretive experience their parents as more invading of their privacy), whereas adolescent secrecy is associated with less privacy invasion at the within-person level (i.e., adolescents perceived their parents as invading their privacy less when they increased their secrecy; Dietvorst et al., 2017). A notable exception is a study by Besemer and colleagues (2016), who found that elementary school aged boys' levels of problem behavior did not predict subsequent changes in maladaptive parenting or vice versa, but that within-person changes in problem behavior and maladaptive parenting were correlated. Another study also found correlated change between childhood aggression from age 3 to age 7 and maternal responsiveness and harsh discipline (Baydar & Akcinar, 2018), as well as some evidence for effects of levels of aggression predicting changes in harsh discipline and responsiveness as well as vice versa.

Because temper tantrums can be an early sign of behavioral (Harvey et al., 2015) and mood disorders (Belden et al., 2008), investigating which parental discipline techniques specifically play a role in the exacerbation or reduction of temper tantrums may aid early prevention efforts. Our findings may help inform professionals working with parents to give concrete advice to parents that may help them regulate their child's behavior, as well as their own reactions to their child's behavior.

The Present Study

With this three-wave, one-year longitudinal study, we aim to understand how maternal reports of parenting discipline techniques (consistency, power assertion, and ignoring) are longitudinally associated with observed tantrum behavior severity in toddlers and how observed tantrum behavior

severity is in turn longitudinally associated with parenting discipline techniques. We included children aged 20–43 months ($N=94$), including the developmental span from when children just start to display temper tantrums, to when the peak of mean levels of these behaviors decline (van den akker et al., 2022). Although overall tantrum severity decreases towards the higher end of this age range, individual differences between children may occur throughout this developmental span. Indeed, some children continue to display relatively severe tantrum behavior, which may be a sign of later development of adjustment problems (Belden et al., 2008; Harvey et al., 2015). By examining how parenting discipline techniques are associated to differences between children in how their tantrum behavior changes over time (between individual differences in within-individual changes) may help explain why some children continue to show more severe tantrums into early school age, whereas for others this behavior fades away. To separate stable between-person differences from the within person changes under study, we used Random Intercept Cross Lagged Panel Modeling (RI-CLPM; Hamaker et al., 2015). We expected that maternal consistency and ignoring would be longitudinally associated with decreases in tantrum severity, while power assertion would be associated with increases in tantrum severity. When children displayed more severe tantrums, we expected that mothers would increase their power assertion, and decrease in inconsistency and ignoring over time.

Method

Participants

This study is a secondary analysis of data from a study of the effectiveness of Home-Start interventions (Asscher et al., 2008). The study was approved by the local Ethics Review Board at the University of Amsterdam (code: 2020-cde-12,710), and the analyses conducted in this study were registered on the Open Science Framework before analyzing the data (https://osf.io/qnx7j/?view_only=c1f18e520de4559ad466ac20f4ef33c).

The broader study includes four waves of data, i.e., baseline, 1 month later, 6 months later, and 12 months later. In the present study, the first (T1), third (T2), and the fourth wave (T3) of data were included because they were each spaced 6 months apart resulting in equal distance between time points, which is necessary for RI-CLPM. In this study, only the participants in the control group (group of participants who self-reported need for support and a community sample) were included to avoid intervention effects. A

comparison group was recruited via well-baby clinics in a region where Home-Start was not available yet. Over a thousand families were approached for participation; $N=375$ questionnaires were returned. The families, who wished to receive information about the research for further research ($N=236$), were sent a short questionnaire assessing parental stress (Dutch version of Parenting Stress Index - short form) (De Brock et al., 1992). Additionally, the following questions were asked: “Do you need support regarding parenting every now and then?” (Yes/No), “If this support were from a volunteer, coming 3 hours each week, to support you, would you want to use this service?” (Yes/No), “How often do you find your child to be more difficult than other children?” The categories from 1 to 4 represent “hardly ever” to “almost always.” Participants were included in a “need for support control group” ($N=52$) if they had: (1) parental stress levels above the norm group mean for non-clinical groups ($M>2.48$) or (2) at least two out of three positive answers to the additional questions. From the parents who did not meet these criteria, a community control group was recruited ($N=45$).

A total of 97 dyads participated in the observational task at least at one assessment point (55 boys and 42 girls): 96 participated at T1, mean age of children=29.97 months, ranging from 18 to 43 months; 92 at T2, and 89 at T3. There were 94 participants (ranging from 20 to 43 months) included in the analyses: two participants were excluded because of missing data for age, and an 18-month old child was excluded as an outlier. Percentages of mothers’ educational levels were: 4% for elementary school, 11% for secondary school, 79% for non-university higher education, and 6% for university or higher. In terms of income, 10% of the families were of low socioeconomic status (SES) (<€1,400 per month), 47% of intermediate SES (€1,400–€2,800 per month), and 43% of high SES (>€2,800 per month). 97% of mothers were of Dutch nationality; 9% were single mothers. Little’s MCAR test indicated missing data could be treated as missing completely at random $\chi^2(117)=123.34, p=.326$.

Procedure

At each assessment, mothers were asked to first complete questionnaires regarding their parenting behavior, as well as their child’s behaviors. Mother-child play interactions were observed and videotaped during standardized home observations. A box of building blocks (Duplo) with two little cars and a carpet of about one square meter in size were used. The observational task had four parts: free play (2 minutes), building a tower (4 minutes), building a bridge (3 minutes), and clean-up (3 minutes, the mother was instructed to touch the blocks two times max.). We coded the clean-up section

for tantrum behavior, as this section was likely to elicit frustration in the child.

Measures

Severity of Temper Tantrums

The observational coding scheme for this study was based on the codes derived by Potegal and Davidson (2003) from parental descriptions of temper tantrums (for the full coding scheme, see Appendix I). The observations were coded in 15-second intervals, for the occurrence of the following temper tantrum behaviors: stiffen, falling to the floor, shouting/screaming, crying, pushing/pulling, stamping, hitting, kicking, throwing, and running away. Whining and affiliation were also coded, but as these are only coded as tantrum behaviors when they co-occur with other behaviors, they were not relevant to the present study (Potegal & Davison, 2003).

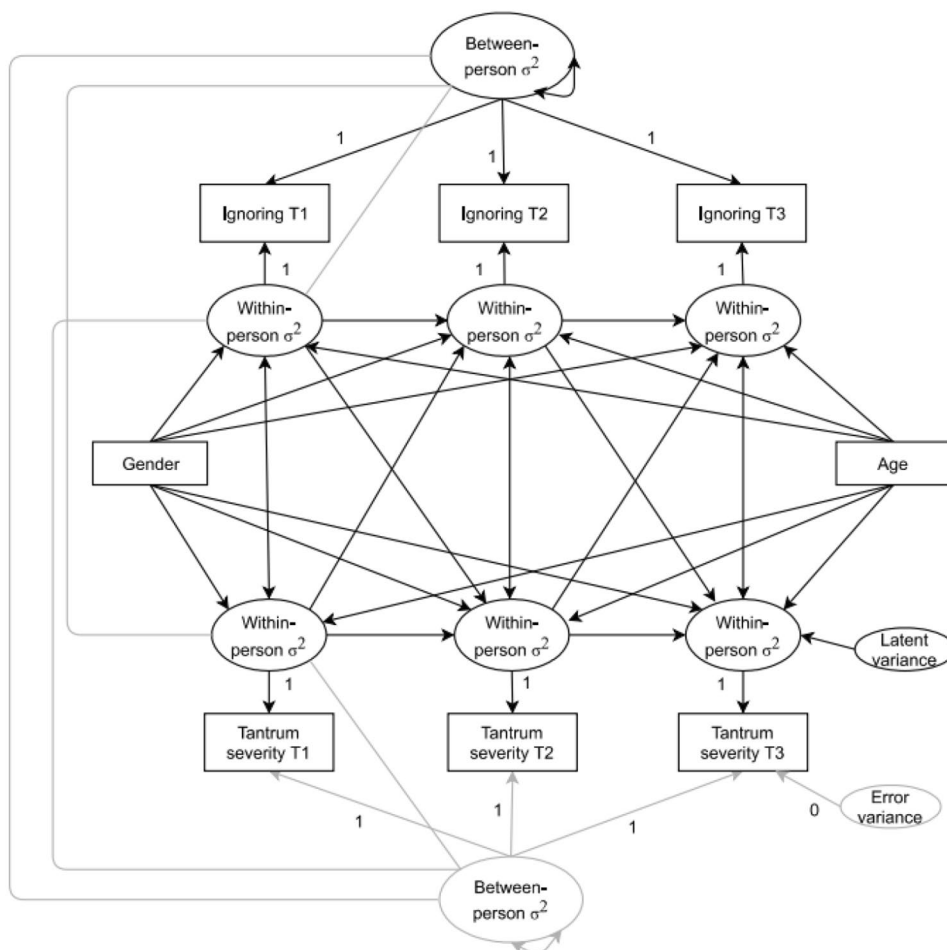
Two raters trained until reaching an inter-rater reliability of $\kappa=0.80$. All observations were coded by one rater, who was blind to mothers’ reports on the parenting questionnaire. A second rater coded a random selection of approximately 12% of the observations.

From these codes, we computed the tantrum duration (i.e., the number of intervals where a tantrum behavior occurred) and aggressiveness (i.e., the number of physically and verbally aggressive behaviors – hitting, kicking, throwing, and shouting) to indicate tantrum severity. The task was successful in eliciting tantrum behaviors, with almost half of the sample exhibiting tantrum behaviors (48.2%) and more than one third showing aggressive tantrum behaviors (37.2%). Duration and Aggressiveness were strongly correlated ($r=.78$) supporting feasibility of computing a composite. We first standardized the variables across timepoints (to preserve differences over time) and then averaged them to form a measure of temper tantrum severity. The two raters discussed codes weekly to minimize coder drift. Interrater reliability estimates of the included tantrum behaviors was $\kappa=0.69$ overall, indicating moderate reliability (Koo & Li, 2016). ICCs of the composite measures that were included in our analyses were higher, with ICCs for duration and aggressiveness 0.97 and 0.90 respectively (variance decompositions see Appendix 2), indicating excellent reliability (Koo & Li, 2016).

Parenting Discipline Techniques

Mothers completed the Parenting Dimensions Inventory (PDI) at each wave (Slater & Power, 1987), including

Fig. 1 Random Intercept Cross-Lagged Panel Model (RI-CLPM) of ignoring and temper tantrum severity. Ignoring was substituted by power assertion and consistency in the other two models. The lines with lighter colors represent zero estimation of the variances, covariances, or factor loadings. As the between-person variance for tantrum severity was too small, some light grey lines were originally conceptualized and removed from the model. Error variances of all observed variables were fixed to zero and the latent variances of the latent variables were freely estimated



parenting dimensions of consistency, power assertion, and ignoring. Threatening and hitting the child in response to misbehavior, and talking with the child about alternative behavior were also assessed but not investigated here.

The consistency scale consists of 8 items (4 items are reverse scored), e.g., “I always follow through disciplining my child, regardless of how long it takes” and “Sometimes it takes so long before I get a chance to react to misbehavior of my child, that I just leave it.” Each item is scored on a 6-point scale (1 = *I totally disagree* to 6 = *I totally agree*). Cronbach’s alphas for mothers reported consistency indicated sufficient reliability, T1 = 0.69, T2 = 0.75, T3 = 0.74.

For ignoring and power assertion mothers indicated for 6 hypothetical situations of child misbehavior (e.g., “Your child hits his/her friend after an argument”) how likely it was (0 = *very unlikely*, 3 = *very likely*) that they would respond a certain way. For ignoring the responses were: “Leave it/pretend you did not see it” and “Punish the child by ignoring it” (for a total of 12 items for ignoring). For *power assertion* they indicated for the same hypothetical

situations how likely it was that they would: “raise your voice or curse,” “grab and shake the child,” “take away a toy or privilege (e.g., sending away to own room, no TV, no candy)” (18 items for power assertion). Cronbach’s alphas indicated sufficient reliability for both ignoring (T1 = 0.70, T2 = 0.75, T3 = 0.76), and power assertion (T1 = 0.81, T2 = 0.81, T3 = 0.73).

Data Analyses

Data were first screened for outliers. As ignoring and tantrum severity for all occasions were skewed (> 1.00; Morgan et al., 2000), box plots adjusted for skewness were inspected (Hubert & Vandervieren, 2008), which indicated one outlier for tantrum severity at T2. No outliers were detected for consistency and power assertion.

To answer our research questions, three RI-CLPMs were estimated (Hamaker et al., 2015; Mund & Nestler, 2019), including tantrum severity with a different parenting

discipline technique in each model (Fig. 1). Residual correlations were set according to the suggestions of Mulder and Hamaker (2021): the slopes of phantom latent variables were fixed to 1; error variances of the observed variables were fixed to 0; covariances between the latent variables for T2 and T3 were constrained to be equal. All analyses controlled for child gender (0=girl, 1=boy) and age (in months at T1) by regressing the latent variables for tantrum severity and the parenting discipline techniques of all occasions on these covariates. Because the age was missing for two cases, and FIML cannot handle missingness in exogenous variables, these cases were excluded from the final analysis ($N=94$). Models with the same parameters at different times constrained to be equal (e.g., tantrum severity T1 on ignoring T2=tantrum severity T2 on ignoring T3) were compared with models without such constraints. When this omnibus test was significant, constraints were added one at a time to see which were significant. We used Robust Full Information Maximum Likelihood estimation to deal with missing data and non-normally distributed variables. To determine absolute model fit, the Root Mean Square Error of Approximation (RMSEA) and the Comparative Fit Index (CFI) were used - with RMSEA < 0.05 indicating close fit, and < 0.08 mediocre fit (Browne & Cudeck, 1992), and CFI > 0.95 indicating good fit (Hu & Bentler, 1999). These fit statistics were scaled in default using the Yuan-Bentler correction (*Mplus* variant) (Yuan & Bentler, 2000). Chi-Squared Difference Tests were used for nested model comparisons, scaled in default with the Satorra-Bentler scaling correction factor (Satorra & Bentler, 2001) as we used a robust estimator.

Results

Descriptive statistics and correlations for the study variables are presented in Table 1. The reports of parenting discipline techniques were fairly stable across measurements (all $r_s \geq 0.46$) while measurements of tantrum severity were not significantly associated across time. The ICC also indicated that only a very small portion of the variance of tantrum severity was explained by between-person differences, $ICC_{\text{tantrum severity}} = 3.55\%$. For the three variables of parenting discipline techniques, around one half to two-thirds of the variance was explained by between-person differences, $ICC_{\text{ignoring}} = 59.08\%$, $ICC_{\text{power assertion}} = 52.49\%$, and $ICC_{\text{consistency}} = 68.40\%$. The parenting discipline techniques were not strongly interrelated (all $r_s \leq 0.35$), indicating the importance of studying them separately.

When estimating the models, the variance of the random intercept of tantrum severity was negative (and non-significant) resulting in a non-positive definite solution for the

Table 1 Descriptive and Correlations for Temper Tantrum Severity and Parenting Discipline Techniques ($N = 94$)

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Ignoring T1	-											
2. Ignoring T2	0.51**	-										
3. Ignoring T3	0.56**	0.70**	-									
4. Power Assertion T1	0.33**	0.20	0.24*	-								
5. Power Assertion T2	0.15	0.16	0.25*	0.55**	-							
6. Power Assertion T3	0.29**	0.22*	0.35**	0.46**	0.57**	-						
7. Consistency T1	-0.07	-0.14	-0.07	-0.14	-0.23*	-0.29**	-					
8. Consistency T2	-0.15	-0.17	-0.18	-0.11	-0.14	-0.26*	0.70**	-				
9. Consistency T3	-0.02	0.02	-0.01	0.09	-0.10	-0.13	0.63**	0.69**	-			
10. Tantrum Severity T1	0.36**	0.25*	0.20	0.26*	-0.12	-0.20	0.01	0.01	0.12	-		
11. Tantrum Severity T2	-0.10	0.00	-0.06	0.21*	0.13	-0.09	-0.13	-0.10	-0.06	0.19	-	
12. Tantrum Severity T3	-0.07	-0.06	0.03	0.02	0.12	0.20	-0.07	-0.15	-0.15	-0.09	-0.03	-
<i>M</i>	0.27	0.23	0.19	0.83	0.86	0.87	4.60	4.65	4.54	0.04	0.29	-0.16
<i>SD</i>	0.33	0.31	0.28	0.48	0.43	0.38	0.75	0.76	0.77	1.09	0.77	0.71

Note. All variables were standardized. Tantrum severity and duration were standardized across time points. A negative standardized value in this case means that at T3 the value was lower than the mean across all timepoints. * $p < .05$, ** $p < .01$

model, likely due to the small between-person variance. To solve this problem, we constrained the variance of random intercept of the tantrum severity to 0 (with the covariance between the random intercepts of temper tantrum severity and parental discipline techniques becoming zero). For temper tantrum severity, all variance was thus within-person variance.

For power assertion and consistency, the fully constrained model did not provide a significantly worse fit than the freely estimated model, so this model was chosen as our final model. For ignoring, the fully constrained model fitted significantly worse than the freely estimated model. The autoregressive effects of tantrum severity could be constrained to be equal across the two intervals, and the cross-lagged effect from ignoring to tantrum severity was constrained also, but the autoregressive effects for ignoring and cross-lagged effects from tantrum severity to ignoring differed across the intervals. The fit of the three final models

was good, see Table 2. The estimates of the RI-CLPMs are presented in Table 3.

Concurrent Associations Between Tantrums and Parenting

As expected, power assertion was associated with more severe tantrum behavior at T1 (moderate effects; Cohen 1988). Associations between power assertion and tantrum severity were additionally significant at T2 and T3 (small effects; Cohen 1988) – when mothers increased in power assertion, children increased in tantrum severity over time. Unexpectedly however, consistency was not correlated with tantrum severity at T1, and ignoring was related to more, rather than less severe tantrum behavior at T1. Within-person changes in ignoring and consistency were not correlated with changes in tantrum severity.

Table 2 Model Fit Statistics and Results of Model Comparisons (N = 94)

Model	Model fit statistics			Model comparison		
	$\chi^2(df)$	RMSEA	CFI	Models	$\Delta\chi^2(df)$	p
Ignoring -Temper Tantrum Severity						
M1: Free model	3.52(4)	0.000 [0.000, 0.146]	1.000			
M2: Fully constrained model	14.69(8)	0.087 [0.000, 0.156]	0.943	M2 vs.M1	12.55(4)	0.014*
M3: TTS.T1→TTS.T2 = TTS.T2→TTS.T3	6.70(5)	0.059 [0.000, 0.161]	0.984	M3 vs. M1	3.37(1)	0.066
M4: M3 + IGN.T1→IGN.T2 = IGN.T2→IGN.T3	11.11(6)	0.091 [0.000, 0.173]	0.954	M4 vs. M3	5.73(1)	0.017*
M5: M3 + IGN.T1→TTS.T2 = IGN.T2→TTS.T3	7.17(6)	0.044 [0.000, 0.142]	0.989	M5 vs. M3	0.30(1)	0.587
M6: M5 + TTS.T1→IGN.T2 = TTS.T2→IGN.T3	11.65(7)	0.080 [0.000, 0.158]	0.958	M6 vs. M5	5.31(1)	0.021*
Power Assertion -Temper Tantrum Severity						
M1: Free model	2.92(4)	0.000 [0.000, 0.135]	1.000			
M2: Fully constrained model	5.35(8)	0.000 [0.000, 0.091]	1.000	M1 vs. M2	2.45(4)	0.654
Consistency – Temper Tantrum Severity						
M1: Free model	3.60(4)	0.000 [0.000, 0.124]	1.000			
M2: Fully constrained model	6.75(8)	0.000 [0.000, 0.101]	1.000	M1 vs. M2	3.22(4)	0.521

Note. χ^2 statistics, RMSEAs, and CFIs were scaled by the Yuan-Bentler correction (Mplus variant). In the scaled χ^2 Difference Test, the Satorra Bentler correction factor was used. The final models are indicated in bold. * $p < .05$, ** $p < .01$

Table 3 Estimates of the RI-CLPMs Linking Temper Tantrum Severity and Parental Discipline Techniques (N = 94)

Parameter	Ignoring			Power Assertion			Consistency		
	b(SE)	p	β	b(SE)	p	β	b(SE)	p	β
Covariances									
Discipline T1 ↔ TTS T1	0.39(0.20)	0.043*	0.40	0.41(0.15)	0.006**	0.42	-0.09(0.19)	0.636	-0.10
Discipline T2 ↔ TTS T2	0.04(0.07)	0.630	0.04	0.18(0.07)	0.008**	0.19	-0.14(0.08)	0.086	-0.15
Discipline T3 ↔ TTS T3	0.05(0.10)	0.627	0.04	0.24(0.09)	0.005**	0.20	-0.14(0.09)	0.120	-0.15
Autoregressive paths									
Discipline T1 → Discipline T2	0.06(0.29)	0.830	0.06	0.19(0.12)	0.126	0.22	0.10(0.21)	0.631	0.12
Discipline T2 → Discipline T3	0.38(0.23)	0.095	0.46	0.19(0.12)	0.126	0.22	0.10(0.21)	0.631	0.12
TTS T1/2 → TTS T2/3	0.08(0.05)	0.124	0.12	0.01(0.07)	0.848	0.02	0.06(0.06)	0.362	0.08
Cross-lagged paths									
Discipline T1/2 → TTS T2/3	-0.21(0.18)	0.237	-0.07	0.50(0.25)	0.043*	0.25	-0.29(0.14)	0.038*	-0.19
TTS T1 → Discipline T2	0.07(0.05)	0.196	0.30	-0.04(0.04)	0.228	-0.14	-0.07(0.05)	0.116	-0.19
TTS T2 → Discipline T3	-0.01(0.02)	0.503	-0.06	-0.04(0.04)	0.228	-0.14	-0.07(0.05)	0.116	-0.19

Note. * $p < .05$, ** $p < .01$

Across Time Parent- and Child-Effects

The power assertion and consistency models indicated significant parent-effects across time (large effects; Orth et al., 2022); when mothers reported more power assertion observed child tantrum severity increased over time, whereas when mothers reported more consistent discipline, observed child tantrum severity decreased over time. These associations were similar in magnitude from T1 to T2 as from T2 to T3. Ignoring was not associated with changes in tantrum severity over time. We did not find any child-effects, as child tantrum severity did not predict changes in any of the parenting discipline techniques over time.

Discussion

With this study, we aimed to examine bidirectional, longitudinal associations between mothers' reports of her use of several specific disciplining techniques and their toddlers' tantrum behavior as observed during a standardized home observation. When mothers reported to have used more power assertion in the previous period, children were observed to display more tantrum behavior. In contrast, when mothers reported that they had used more consistent reinforcement of rules, their children were observed to decrease in tantrum behavior. Although we expected ignoring to be associated with less tantrum behavior, it was associated with more tantrum behavior initially, and unrelated to tantrum behavior across time. We did not find any evidence for effects of observed child behaviors on maternal reports of parenting.

Consistency

Although initial levels of maternal consistency and child tantrum severity were not related, when mothers reported to have used more consistency in the previous month, their children decreased in observed tantrum severity over time. As mothers can actually only be consistent across a certain amount of time (Lippold et al., 2016), perhaps it makes sense that a longer timeframe is necessary for it to have an effect on child behavior. Only when mothers act consistently over time, will children become to expect certain consequences, and only then can they modify their behavior accordingly.

Power Assertion

For power assertion we did find concurrent associations with child tantrum severity. Children who were observed to display more severe tantrum behavior at the first measurement

moment, had parents who reported more power assertion. Additionally, increases in power assertion over time were associated with increases in temper tantrum severity during that same interval. Over and above these initial associations and correlated changes, power assertion predicted increases in observed tantrum severity across time. Although parents may use power assertion in an attempt to reduce their child's disruptive behavior, results of our study support theory and previous findings that this type of disciplining actually exacerbates tantrum severity (Potegal, 2019). This effect does not take long to show up in independent observations, as can be seen by the concurrent associations that we found in our study.

Two previous studies examining harsh parenting in relation to observed child disruptive behavior have not found evidence for longitudinal associations (Chang & Shaw, 2016; Combs-Ronto et al., 2009). Both these studies examined observed parenting behavior – either pure or in a composite including self-reports of general harsh parenting – rather than focusing on maternal reports of which parenting techniques they generally use. Because most observational periods are relatively short, parents likely are not able to show the full range of techniques that they use in day-to-day interactions with their children in a single observation session. In a single instance, parents can choose only one technique out of their repertoire, but this does not mean they would not use other techniques in other instances. In addition, parents may have inhibited more negative parenting behavior when the research team was present. Future research will need to understand whether these differences in findings are indeed due to differences in measurement, or whether they are driven by other study features (e.g., sample characteristics).

Ignoring

For ignoring, we also found an initial association, albeit not in the expected direction. Children who were observed to display more severe tantrum behavior at the first measurement moment, had parents who reported more, rather than less, ignoring. Perhaps our finding indicates that children interpret their mother's ignoring as silent permission, rather than as withdrawal of attention. One reason is that the items measuring ignoring that we included are different from how ignoring is typically taught in behavioral parent training programs to reduce problem behavior. For instance, rather than that negative attention seeking is specifically ignored, as we would be taught in behavioral parent training (van Zeijl et al., 2006), our measure asked parents whether they ignored their child's misbehavior. This type of ignoring might send the message to the child that their behavior is condoned and

may be more indicative of permissive parenting (Robinson et al., 1995), which is associated with more externalizing problems (Sommer, 2010) and lower self-regulation for young children (Piotrowski et al., 2013). Another reason might be that ignoring from parents did not last long enough for some parents to be sufficient for behavioral extinction, and when these parents then eventually give in to the child's demands, they eventually reinforce their children's tantrum behavior. Perhaps associations were not significant because we could not differentiate between parents who did use ignoring effectively and perhaps reduced tantrum behavior, from those who did not use it effectively and increased tantrum behavior.

Child-Effects

Temper tantrum severity did not predict changes in any of the mothers' parenting discipline techniques over time. This finding contrasts previous findings, that often indicate that for disruptive behavior, child-effects are approximately equally strong as parent-effects (Yan et al., 2020). However, previous studies have mostly confounded within- and between-person variance, and have relied on parental reports of child disruptive behavior. A study that did differentiate within- and between person variance (but relied on parent reports of child behavior) also did not find child effects of externalizing problems on parenting (Besemer et al., 2016). Additionally, a study that included observations of child non-compliance did not find child-effects on maternal parenting behavior, whereas maternal reports of externalizing problems were longitudinally predictive of maternal negative parenting (Combs-Ronto et al., 2009). Overall, more studies are needed that separate between- from within-person effects and that include observations of child disruptive behavior to shed more light on the nature of child effect of disruptive behavior on parenting.

It is important to note that development of disruptive behavior problems can be investigated at different timescales which likely interact in producing behavior problems (Granic & Patterson, 2006). In this study we examined how parenting techniques relate to tantrum behavior on a developmental timescale. We chose measurements six months apart, rather than one or several years as many longitudinal studies do, as the children were so young and development can be expected to happen more quickly at this young age. Child effects of observed tantrum severity may still occur over shorter timescales than investigated here, especially in real time. The correlated changes that we found for power assertion for instance, could be due to bidirectional associations that unfold across hours, days and weeks. Although daily diaries or experience sampling can shed light on these

shorter timeframe dynamics (Peterson et al., 2002), these are again subject to bias of parents' perceptions of their child's behavior. Observational studies where parent and child are observed with short intervals would be necessary to prevent this, for instance observing dinner time as a relatively standardized situation that may be comparable across days. At the same time, it could also be interesting to investigate how these parenting techniques as real time processes impacting children in the moment (e.g., Lunkenheimer et al., 2016). We would expect that these real-time interactions will have an effect on temper tantrums over developmental time, with the effect only showing up after parents repeatedly apply a certain technique rather than immediately in the moment (Granic & Patterson, 2006).

Strengths and Limitations

Strengths of this study include the longitudinal design and direct observation of child tantrum behaviors in a standardized task. Additionally, we oversampled at-risk children, which increased the likelihood that we would observe sufficient instances and severity of tantrum behaviors as well as have a wider range of scores on the disciplining techniques. Furthermore, we employed an analysis technique that allowed us to separate between- from within-person associations, with our analysis plan preregistered.

In addition to these strengths, some limitations are also worth mentioning. First, the sample size was not large enough to examine whether the associations that were observed were the same across the entire age range of the children included in the study. Although the selected age range is especially relevant for studying temper tantrums, it may be that different processes are relevant for different ages. For instance, parenting techniques may become especially relevant when the child's self-regulation has undergone some maturation (Rothbart et al., 2011). Alternatively, younger children may be especially susceptible to the effects of parenting techniques as their tantrum behavior has not formed into a stable behavioral pattern yet (Granic & Patterson, 2006). Additionally, we were not able to investigate gender differences in the associations. Boys develop more behavior problems and early differences in parenting have been shown to be relevant to this difference (McKee et al., 2007). Perhaps boys experience more power assertive and inconsistent parenting and may be more likely to develop increased tantrum behavior as a result. Overall, although it is not clear what an acceptable lower limit for the sample size for RI-CLPM should be (Hamaker, 2018), we deem it likely that our sample size can be considered small relative to the complexity of the models. This may have impacted our power to find significant effects. At the same time, the

models fit the data well, and power is likely increased by oversampling at-risk families. A simulation study examining how different models fared in detecting within-person changes as a result of therapy showed that RI-CLPM were preferable with small sample sizes as type 1 error was especially high in the other types of models at $N=50$ and $N=100$, with much less bias for these effects for these sample sizes in the RI-CLPM (Falkenström et al., 2022). Second, although observational measures are not subject to the bias associated with parental reports of child behavior, they may also be limited in that they include only a snapshot of the family's life and may not be entirely representative of the typical interactions between mother and child. At the same time, we used the final three minutes of an observation that had been going on for 10 minutes already, increasing the chance that the mother and child had reverted to their typical interaction style. Additionally, the clean-up task can be considered highly ecologically valid, as parents are likely to ask their child to clean up toys on a regular basis. Even though we oversampled at-risk children, most of the temper tantrum behaviors were relatively mild in the task (e.g., laying down, pushing the blocks, walking away, or crying) and more than half of the children did not exhibit aggressive tantrum behaviors (e.g., hitting, screaming, or kicking) in our study. Child-effects may be more pronounced when children display more extreme tantrum behavior. Third, in the present study we took the approach of oversampling at-risk families. Although this increased the likelihood that we would include children who showed disruptive behavior in a relatively small sample, results may be different when a larger sample that is more representative of mean-levels of these types of problems in the population were included. Finally, we examined only mothers' reports of their discipline techniques. Paternal parenting plays a unique role in child externalizing behavior (Scott et al., 2018) and associations between the discipline techniques they employ and their child's tantrum severity also deserves attention. Also, as participants in our study were Dutch toddlers and parents, replication in samples from different countries and cultural backgrounds is necessary.

Conclusion

Results of this study indicate that certain parenting techniques might be more important in explaining within-person changes in the severity of toddler's temper tantrums than others. Mothers who reported that they had been less consistent and more power assertive in the past month had children who increased in tantrum behavior during standardized observations. When mothers indicated that they ignored their child's misbehavior, their children were observed to

display more severe tantrum behavior initially, but there were no further over time associations, indicating that ignoring misbehavior might not matter as much in explaining exacerbating disruptive behavior during this age range. Observed child tantrum behavior was not predictive of changes in maternal reports of parenting over time. As most studies examining naturally occurring development across these early years that have found child-effects have mostly focused on maternal reports of her child's problem behavior, and/or have not separated within- from between-person effects, more studies are necessary to examine the importance of child-effects for within-person changes in parenting in this age range. Our results indicate that maternal inconsistency and power assertion might be a useful target for intervention in the early prevention of disruptive behavior.

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Compliance with Ethical Standards

Ethical Approval The study was approved by the local Ethics Review Board at the University of Amsterdam (code: 2020-cde-12,710).

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