Unravelling the effect of household chaos on parenting
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Reducing household chaos to improve parenting quality? An RCT using the SHINE intervention.

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Abstract

It is necessary to understand the etiology of parenting problems and child maltreatment in order to design effective prevention and intervention programs. One factor that has repeatedly been related to more harsh and less sensitive parenting is household chaos (i.e., high noise levels, clutter, and a lack of family routines). A recent lab study showed that increased household chaos is causally related to less sensitive parenting. The current study employed an RCT design and aimed to decrease household chaos in family homes and thereby improve parenting quality. In total, 125 primary caregivers of children around age 1.5 years with relatively high levels of household chaos were enrolled in the RCT. Questionnaires, video-observations, a diary app, and a decibel meter assessing noise were used to measure household chaos and parenting. We were not able to analyze effects on child maltreatment, as the prevalence was too low in our sample. According to our results, the intervention did not lead to reduced household chaos. We did find reduced harsh discipline in the intervention group but found no effects on sensitivity. As we controlled for generic intervention elements, the effect on harsh discipline may be due to an unmeasured effect on household chaos. More sensitive measures may be necessary to detect a significant reduction in household chaos. Our results indicate that household chaos may be a salient factor in demanding parenting situations. Future research should investigate underlying mechanisms of the effect of chaos.

Keywords: household chaos, harsh discipline, sensitive parenting, RCT, intervention

Introduction

Understanding the etiology of parenting problems in general and child maltreatment as its most extreme form is necessary to inform prevention and intervention. Previous studies have shown that parenting is more harsh and less sensitive in more chaotic households (e.g., Coldwell, Pike & Dunn, 2006). As these studies are mostly correlational, directionality of this association is unclear. A recent experimental lab study among female young adults showed that household chaos had a causal effect on sensitive caregiving for an infant simulator (Andeweg, Bodrij, Prevoo, Rippe & Alink, 2020). However, for both stability and generalizability reasons, replication of these results in real families is needed. The current study uses an RCT design to test whether reducing household chaos leads to improved parenting quality and less child maltreatment. Findings could indicate whether reducing household chaos should be included in prevention and intervention programs to improve parenting.

Studies have consistently related more household chaos to lower quality parenting (e.g., Coldwell et al., 2006). Household chaos is defined as a lack of family routines and week structure, high noise levels, material disorganization and crowding (Evans & Wachs, 2010; Matheny, Wachs, Ludwig & Phillips, 1995). As most parent-child interactions take place at home, particularly with children of young age, household chaos may be a salient factor for parenting. Indeed, in more compared to less chaotic households, parents display more negative parenting, such as dysfunctional discipline (i.e., laxness, overreactivity, and verbosity), and anger and hostility (Coldwell et al., 2006; Dumas et al., 2005). Parents also show less positive parenting, are less responsive, less able to understand and respond to child social cues, and show less warmth, enjoyment and stimulating parenting (Coldwell et al., 2006; Corapci & Wachs, 2002; Dumas et al., 2005; Matheny et al., 1995). More harsh and insensitive parenting is related to a slower cognitive development and to more externalizing and internalizing problems in children and adolescents (Bradley & Corwyn, 2007; Wolford, Cooper & McWey, 2018; Firk, Konrad, Herpertz-Dahlmann, Scharke & Dahmen, 2018; Treyvaud et al., 2015). Child maltreatment, which is an extreme form of low quality parenting, also has many negative outcomes on short as well as long term (e.g., Alink, Cicchetti, Kim, & Rogosch, 2009; Alink, Cicchetti, Kim, & Rogosch, 2012; Vachon, Krueger, Rogosch, & Cicchetti, 2015; Danese & Tan, 2014; Norman, Byambaa, Rumna, Butchart, Scott, & Vos, 2012).

Unfortunately, most studies on the associations of household chaos with parenting and child development are correlational and therefore no conclusions about causality can be drawn. It is essential for experimental studies to address causal pathways and to henceforth develop effective prevention and intervention programs to improve parenting quality. A recent study was the first to use an

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experimental manipulation of household chaos in a lab setting with non-parent females taking care of an infant simulator, and showed that household chaos had a small causal effect on sensitivity (Andeweg et al, 2020). These results need to be replicated in real families. When a causal effect of household chaos on parenting quality and on child maltreatment is replicated in families, then interventions to reduce household chaos may form a new, effective way to improve parenting quality and reduce child maltreatment.

To examine the causality of household chaos in parenting, we designed an intervention to reduce household chaos in families experiencing elevated levels of household chaos. This intervention was based on an intervention on changing family routines to reduce obesity (Haines et al., 2013). This resulted in the Structuring the Home to Induce a Nurturing Environment (SHINE) intervention (Bodrij, Prevoo, Andeweg, & Alink, 2017), during which parents set goals to decrease clutter and noise levels and to improve family routines and week structure. An important aspect of the SHINE intervention is motivational interviewing, in which the intervener and client engage in a partnership and the intervener elicits motivation for change and resolves ambivalence with the client, rather than convincing the client to change by posing rational arguments as an expert (Emmons & Rollnick, 2001).

Current study
The current study aimed to test the causal effect of household chaos on parenting quality and child maltreatment by reducing household chaos in families with relatively high levels of household chaos. To do this, a randomized controlled trial (RCT) was conducted among primary caregivers (male or female) of children around the age of 1.5-2 years old. These families were screened for elevated levels of household chaos. During the pre- and posttest multiple measures of household chaos and parenting were administered, using self-report as well as observational and other more objective measures. The SHINE intervention created for this study was used to reduce household chaos (Prevoo et al., 2020). We expected that the intervention would lead to decreased levels of household chaos (i.e., observed household chaos, noise, family routines, and self-reported household chaos) and as a result to less harsh discipline and child maltreatment and to higher levels of sensitivity. Additionally, to control for generic intervention elements we measured perceived effectiveness and therapeutic alliance (Vîslă, Constantino, Newkirk, Ogrodniczuk & Söchting, 2016; Flückiger, Del Re, Wampold, Symonds & Horvath, 2012).

Method

Participants

For the current study, primary caregivers (i.e., the parent who spent the most time with the child) of singleton children around the age of 1,5 were recruited (see Prevoo, Bodrij, Andeweg & Alink, 2020). Dutch municipalities in the province of South Holland provided contact details for families that fit this description. Letters were sent to 7550 families (see Figure 1), inviting the primary caregiver to fill out a screening questionnaire in which we gathered demographic information and measured the level of household chaos. We received 2010 completed questionnaires. Exclusion criteria were psychopathology and/or physical problems of the primary caregiver and/or participating child (e.g. depression, autism, chronic diseases affecting everyday life), and a child living in the same household of above the age of 12. Inclusion criteria were that the child lived with the primary caregiver and that the primary caregiver was fluent in Dutch. Those who rated at least one of the 15 statements of the Confusion, Hubbub And Order Scale (CHAOS; Matheny et al., 1995) questionnaire as true or completely true for their family were invited to participate in our study with the target child. This resulted in 792 invited families.

In total, 125 families participated in our study. Primary caregivers were the biological mother (89%) or biological father (11%) of the target child. All children lived with both parents. The average age of the primary caregiver was 34.32 years ($SD = 4.13$). The children (54% boys) were on average 19.17 months old ($SD = 1.90$). Our sample mostly had a high socio-economic status. Sixty percent of the participants had a monthly family income of above €3500, 22% earned between €3000-3500, 11% earned between €2500-3000, 5% earned between €2000-2500, and 2% earned between €1500-2000. The average gross monthly family income in 2018 in The Netherlands was €2662 according to the Netherlands Bureau for Economic Policy Analysis (CPB, 2019). Of the primary caregivers, 74% indicated their highest level of education was college or university, 21% indicated vocational education, and 5% indicated high school as highest level of education. Seven participants did not reach the posttest, for whom no differences on demographic variables were found compared to participants who completed the posttest.
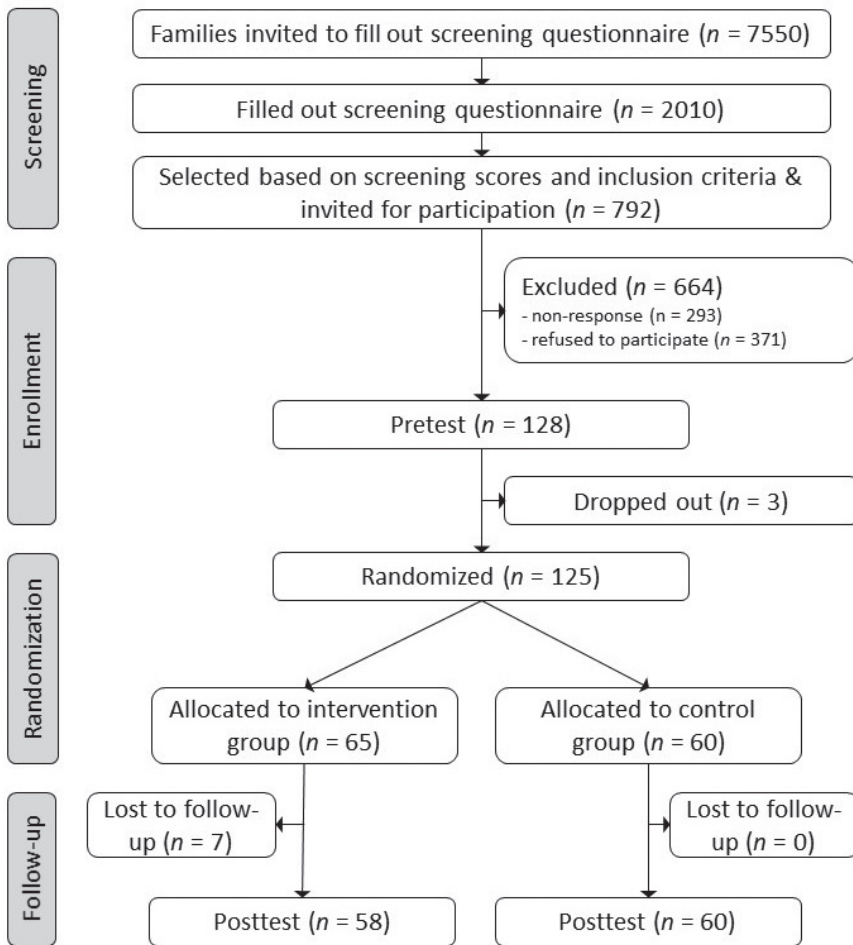
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Figure 1. Flow chart of the recruitment and inclusion of participants.

Procedure

Pre and posttest

The current study was approved by the ethics committee of the Institute of Child and Education Studies from Leiden University (number ECPW 2015-090) and preregistered in the open science framework (Prevoo et al., 2020). Participation included two home visits as pretest, randomization to the intervention or control group, and two home visits as posttest. During the first home visit informed consent was obtained. During the pre- and posttest, parent-child observations were video-taped alongside videotapes of the living room and the child's bedroom for chaos observations. Parent-child observations included a structured play task (5 min), a don't touch task (2 min not allowed to play with a set of toys, 2 min play with

the least interesting toy) and a naturalistic play task (5 min) in which parents were asked to play with their child as they would normally do at a location in their house where they would normally play with their child. During all visits questionnaires were filled out. Perceived effectiveness and therapeutic alliance were assessed in the first posttest home visit using a questionnaire. In between the home visits of the pre- and posttest, a diary app was used to measure family routines. In addition, a decibel meter was placed in the living room to measure decibel level during multiple days. Other aspects of participation included collecting saliva and hair samples to measure physiological stress, observations of parents with an infant simulator, and computer tasks. These data were not used in analyses for the current report. During the last home visit participants received €75 as a reward and children received small gifts during the two home visits in which they participated.

Intervention

After the pretest, participants were randomized to the intervention ($n = 60$) or control group ($n = 65$). The SHINE intervention consisted of four home visits and three follow-up phone calls, scheduled with one week in between (see Prevoo et al., 2020). During the first visit, a Q-sort was used to assess the importance of the different aspects of household chaos (clutter, noise levels, and routines) were for individual parents. Based on this q-sort, the participant chose the sequence of the themes of the home visits. The next three home visits were focused on these themes - one per home visit - and the follow-up phone calls were aimed at reflecting on all prior discussed themes. This intervention used similar techniques to aid in altering household routines as the Healthy Habits, Happy Homes intervention (Haines et al., 2013), such as motivational interviewing, printed information, and text messages. The interveners received extensive training in motivational interviewing (Emmons & Rollnick, 2001), including feedback on videotapes from training intervention sessions. Drift of the techniques of motivational interviewing was prevented by scheduling regular intervision sessions. Using motivational interviewing and printed information, the parent selected a goal from a predetermined list of goals fitting the specific theme (between 12 and 16 options per theme). Examples are putting away toys before bedtime (clutter), turning off the TV if no one is watching (noise level), and getting dressed before waking up the child (family routines). Parents were also allowed to set an additional goal that was not included in the list. Parents received a cardboard box to help declutter, a family planner whiteboard to help with family routines, and borrowed a traffic light that responded with a red light to high decibel levels to help with noise levels. Parents wrote down their goals on cards that were placed in a visible place in their home to remind them of their goal in between contact moments. Two text messages were sent weekly that also served as reminders of their goal.

Control group

Participants in the control group received seven weekly phone calls asking how the child was developing. This number of contact moments was equal to that in the intervention, so that the amount of attention was comparable across conditions. Parents in the control condition also received a booklet with general information about child development concerning physical, cognitive, social and emotional development (Van Zeijl et al., 2006). These topics were revisited during the phone calls and parallel to the intervention condition, parents received two text messages a week with reminders about the information that was discussed during the phone call. Household chaos was not discussed during the phone calls and no specific parenting advice was given.

Measures

Self-reported household chaos

The self-report questionnaire used to measure household chaos was the Confusion, Hubbub, and Order Scale (CHAOS; Matheny et al., 1995) and consisted of 15 items such as "We almost always seem to be rushed". Items were answered on a five-point Likert scale with 1) Completely not true, 2) Not true, 3) Sometimes true, sometimes not true, 4) True, 5) Completely true, and with a sixth option for not applicable. This option was coded as system missing and some items were reverse coded so that higher scores always reflected higher levels of chaos. Parents who indicated a 4 or 5 for at least one item were included in the study. Mean scores were calculated for the screening and for the posttest (Cronbach's alphas of .71 and .80, respectively).

Clutter

The video-observations of the living room and child's bedroom were coded with a coding scheme based on the Purdue Home Stimulation Inventory (PHSI; Wachs, Francis & McQuiston, 1979) and the Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984). This resulted in seven items which were coded for both rooms, such as whether items on surfaces impeded the use of that surface (e.g., items stacked on a chair, making it impossible to sit on the chair), the ratio of visible to closed storage space, and the amount of stimulation based on spaciousness, clutter, amount of decoration, and use of bold colors. Inter-coder reliability was good with a mean intra-class coefficient of all different pairs (single measure, absolute agreement) of .76 (range .61 - .97, $N = 20$). Coding was discussed regularly to prevent coder drift. The 14 items were standardized and means were calculated for the pre and posttest. Higher scores indicated higher observed household chaos.

Family routines

A diary app was used to measure family routines. Four days in between the two pretest home visits were chosen when the parent was home with the child most

of the day or the entire day. Parents received questions about mealtime and bedtime. We calculated the standard deviation in the time the child woke up, had lunch, went to bed, the light was turned off, and the child fell asleep. These scores were standardized and then averaged for the pretest and posttest. A higher score reflected more variation in the timing of mealtime and bedtime routines, and thus reflected more household chaos.

Noise
A decibel meter measured average dBA per second in the participant's living room during the pretest and again during the posttest. Data were used from the four days that the diary app was programmed. The mean dBA levels during the morning (7:00-8:30) and evening (17:30-19:00) were calculated. These means were averaged for the pretest and for the posttest, with higher scores indicating higher noise levels.

Sensitivity
Videos of the free play task and the naturalistic play task were coded for sensitivity. During the free play task parent and child played with toys brought by the researchers, whereas during the naturalistic play task parent and child played as they normally would in their home and could choose the play activity. It was expected that an effect of the home environment on parenting may be more visible in a naturalistic setting than in a structured task, while the structured task controlled for differences in play activity and therefore allowed for greater comparability. The Ainsworth Sensitivity Scales for sensitivity and non-intrusiveness were used (Ainsworth, Bell & Stayton, 1974). The scales ranged from 1) very insensitive or highly intrusive to 9) very sensitive or non-intrusive. Inter-coder reliability for sensitivity was good with a mean intra-class coefficient of all different pairs (single measure, absolute agreement) of .82 (range .70 - .92, $N = 29$). Coding was discussed regularly to prevent coder drift. The scores for sensitivity and non-intrusiveness were averaged for the free play and naturalistic play separately (correlated at p <.001 with rs between .78 and .80), with higher scores indicating higher levels of sensitivity (including non-intrusiveness).

Discipline
Videos of the don't touch task were coded for harsh discipline using an adapted version of the discipline scales used by Joosen, Mesman, Bakermans-Kranenburg, and Van IJzendoorn (2012). Our version consisted of a physical discipline scale which evaluated frequency and intensity of physical attempts to make the child comply with the don't touch task, a laxness scale based on frequency of giving in, and an overreactivity scale based on frequency of verbal and non-verbal signs of anger or losing one's temper. All scales ranged from 1 to 5. Inter-coder reliability for all scales was good with a mean intra-class coefficient of all different pairs (single measure, absolute agreement) of .79 (range .66 - .92, $N = 24$) and coding was

discussed regularly to prevent coder drift. As very little laxness was observed, this scale was not used. The scores for physical discipline and overreactivity were summed (correlations within pre- and posttest with rs between .168–.347, ps between <.001 - .070), with higher scores reflecting more harsh discipline.

Child maltreatment

Child maltreatment was measured through a self-report questionnaire. The Conflict Tactic Scales – Parent Child (CTS-PC; Straus, Hamby, Finkelhor, Moore & Runyan, 1998) was used in combination with the emotional neglect scale of the Childhood Trauma Questionnaire (CTQ; Bernstein et al., 1994; see Pittner et al., 2019). The questionnaire consisted of 32 items which were scored on a five-point Likert scale from 1) Never to 5)(Almost) always. The subscales psychological aggression, corporal punishment, physical maltreatment, and neglect (total of 23 items) were averaged, with Cronbach's alphas of .54 for the pretest and .56 for the posttest. Scores ranged from 1.00 to 1.43 ($M = 1.06$, $SD = 0.07$) in the pretest and from 1.00 to 1.48 ($M = 1.06$, $SD = 0.07$) in the posttest, indicating there was hardly any incidence of child maltreatment in our sample. Thus, the CTS-PC could unfortunately not be used for analyses.

Perceived effectiveness and therapeutic alliance

We administered a questionnaire to both the intervention and control group during the posttest with 22 items on perceived effectiveness and therapeutic alliance. Items were answered on a 5-point Likert scale. Examples are "How fruitful was the intervention for your family as a whole?" with 1) Little, to 5) A lot, or "How did you experience the contact with the intervener?" with 1) Bad cooperation, to 5) Good cooperation. The pattern matrix from Principal Component Analyses (PCA) with oblique rotations indicated two correlated components (component correlation of .24), reflecting the perceived effectiveness (10 items) and therapeutic alliance (12 items). These items were averaged per scale to calculate a score for perceived effectiveness and for therapeutic alliance (Cronbach's alphas of .96 and .93, respectively). The distribution of therapeutic alliance score was skewed, as most participants were positive about the intervener (standardized skewness = -6.93). Transformed or categorized versions of this variable correlated highly with the skewed variable (rs > .98), which is why we decided to use the variable as is. Higher scores indicated more positive evaluations.

Analyses

Data were used from all participants who were randomized ($N = 125$). As 7 of the participants dropped out after randomization, we imputed these missing data and performed intent-to-treat analyses. Multiple imputation was used, with 100 conditional imputations using 5 iterations each, using functions from the mice function from the mice package (version 3.7.0). Results were pooled by using

functions from mitml, miceadds, and merTools packages. All analyses were performed in SPSS version 25 and R version 3.6.1 with Rstudio version 3.4.4 with a fixed starting seed for reproducibility.

To test whether reduced household chaos mediated the effect of condition (i.e., the intervention or control group) on parenting, we conducted multiple regression analyses with 5% alpha level. We tested whether condition predicted posttest scores in household chaos. Next, we tested whether condition predicted posttest scores in parenting. These analyses were conducted separately for four measures of household chaos (self-reported household chaos, clutter, noise, and family routines) and three measures of parenting (harsh discipline, sensitivity in free play, and sensitivity in a naturalistic setting). Based on the outcomes of these analyses, we measured whether the mediator (i.e., a measure of household chaos) predicted parenting and evaluated the effect of condition on parenting after adding chaos as a predictor. All analyses were conducted in two steps: in the first step, we controlled for the per-test score of the outcome measure. In the second step, we added demographic variables, perceived effectiveness, and therapeutic alliance as covariates.

Results

Preliminary analyses

Descriptive statistics and Pearson's correlations are shown in Table 1 and Table 2, respectively. In the pretest, measures of household chaos were not significantly intercorrelated, with the exception of clutter and noise ($r = .27$, $p = .005$). There were no significant correlations among measures of household chaos in the posttest. For parenting, within the pretest sensitivity in free play and in the naturalistic setting were significantly correlated ($r = .54$, $p < .001$). Within the posttest sensitivity in both settings was again significantly correlated ($r = .64$, $p < .001$) and more harsh discipline was significantly correlated to less sensitivity in the naturalistic setting ($r = -.25$, $p = .006$). Most measures were stable over time, with significant correlations between pre- and posttest for household chaos measures (rs between .26 and .63, $ps < .011$) and for parenting measures (rs between .29 and .41, $ps < .002$). The pre- and posttest measure of discipline were not significantly correlated ($r = 10$, $p = .278$). Measures of household chaos were not related to parenting measures in the pretest, with the exception of a significant correlation between more pretest noise and higher pretest sensitivity during free play ($r = .28$, $p = .004$). In the posttest, measures of parenting and household chaos were uncorrelated.

Table 1

Descriptive statistics of measures of household chaos and parenting.

	Pretest						Posttest					
	Overall		Intervention		Control		Overall		Intervention		Control	
	M(SD)	Min–max	M(SD)	Min–max	M(SD)	Min–max	M(SD)	Min–max	M(SD)	Min–max	M(SD)	Min–max
Self-reported household chaos	2.29 (0.41)	1.21-3.27	2.30 (0.41)	1.47-3.27	2.28 (0.40)	1.21-3.14	2.22 (0.45)	1.27-3.21	2.20 (0.42)	1.40-3.07	2.24 (0.48)	1.27-3.21
Clutter*	0.00 (0.44)	-0.98-1.33	0.02 (0.46)	-0.81-1.06	-0.01 (0.41)	-0.98-1.33	0.00 (0.44)	-0.86-1.25	-0.02 (0.38)	-0.86-0.87	0.02 (0.50)	-0.81-1.25
Noise	43.71 (7.53)	22.38-60.20	43.63 (7.11)	28.88-59.21	43.80 (8.09)	22.38-60.20	43.06 (5.53)	25.84-58.36	42.56 (5.71)	25.84-55.81	43.59 (5.35)	29.46-58.36
Family routines*	-0.02 (0.62)	-1.08-2.66	0.00 (0.64)	-1.08-2.12	-0.04 (0.61)	-1.04-2.66	-0.03 (0.69)	-1.52-2.18	0.02 (0.69)	-1.17-2.18	-0.07 (0.70)	-1.52-1.65
Discipline	3.82 (1.13)	2.00-9.00	4.02 (1.23)	2.00-9.00	3.61 (0.98)	2.00-7.00	3.50 (1.03)	2.00-6.00	3.38 (1.01)	2.00-6.00	3.62 (1.04)	2.00-6.00
Sensitivity free play	6.57 (1.63)	2.50-9.00	6.63 (1.50)	2.00-9.00	6.51 (1.78)	2.50-9.00	5.75 (1.74)	1.50-9.00	5.88 (1.78)	1.50-9.00	5.63 (1.71)	2.00-8.50
Sensitivity naturalistic	7.15 (1.55)	2.00-9.00	6.97 (1.45)	3.00-9.00	7.35 (1.63)	2.00-9.00	6.64 (1.61)	3.00-9.00	6.61 (1.63)	3.00-9.00	6.67 (1.62)	3.00-9.00

Note. * = standardized scores. These descriptive statistics are based on observed cases.

Covariates were included if there was a significant correlation with pretest measures of household chaos or parenting. A younger age of the parent was significantly correlated to more harsh discipline ($r = -.19$, $p = .036$). A younger age of the child was also significantly related to more harsh discipline ($r = -.19$, $p = .045$) and to less sensitive parenting during free play ($r = .23$, $p = .014$). More children living in the household was related to higher noise levels ($r = .32$, $p = .001$) and to more self-reported household chaos ($r = .31$, $p < .001$). Lower parental education was significantly correlated with more harsh discipline ($r = -.19$, $p = .039$), and lower sensitivity during free play and the naturalistic setting ($r = .23$, $p = .011$ and $r = .18$, $p = .049$). Perceived effectiveness and therapeutic alliance were also entered as covariates and were significantly correlated ($r = .36$, $p < .001$). Higher perceived effectiveness was significantly correlated with more harsh discipline at posttest ($r = .21$, $p = .029$). Therapeutic alliance was significantly correlated with less self-reported household chaos at posttest ($r = -.22$, $p = .028$).

There were no significant differences in pretest levels of household chaos and sensitivity in both the naturalistic and structured setting between the intervention and control group. The intervention group showed more harsh discipline at pretest ($M = 4.02$, $SD = 1.23$) than the control group ($M = 3.61$, $SD = 0.98$; $t(122) = -2.01$, $p = .046$). The intervention group reported higher therapeutic alliance ($M = 4.51$, $SD = 0.53$) and higher perceived effectiveness ($M = 3.30$, $SD = 0.93$) than the control group ($M = 4.26$, $SD = 0.73$; $M = 2.18$, $SD = 0.78$; $t(109) = -2.07$, $p = .041$, and $t(109) = -6.81$, $p < .001$, respectively).

Household chaos predicted by condition

Pooled results from the imputed data set are reported henceforth, with the exception of the adjusted R^2 and F-statistics (see Table 3). Condition was not a significant predictor of self-reported household chaos (first step: $R^2 = .37$, $F(2; 107) = 33.04$, $\beta = -0.02$, $p = .791$; second step: $R^2 = .39$, $F(8; 88) = 8.72$, $\beta = 0.02$, $p = .819$). This was the same for clutter (first step: $R^2 = .39$, $F(2; 111) = 37.00$, $\beta = -0.07$, $p = .407$; second step: $R^2 = .40$, $F(8; 91) = 9.35$, $\beta = -0.13$, $p = .178$), noise (first step: $R^2 = .07$, $F(2; 70) = 3.67$, $\beta = 0.10$, $p = .589$; second step: $R^2 = .31$, $F(8; 57) = 4.72$, $\beta = -0.13$, $p = .254$), and family routines (first step: $R^2 = .01$, $F(2; 50) = 1.33$, $\beta = 0.01$, $p = .948$; second step: $R^2 = .08$, $F(8; 38) = 1.50$, $\beta = 0.08$, $p = .494$). This meant that the intervention did not lead to lower levels of household chaos.

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Table 2.
Correlations between pretest and posttest measures of household chaos and parenting.

	Self-reported household chaos	Clutter	Noise	Family routines	Harsh discipline	Sensitivity free play	Sensitivity naturalistic
Self-reported household chaos	.62***	.17	.15	.07	-.05	-.06	-.08
Clutter	.16	.63***	-.04	-.16	.07	.05	.07
Noise	.07	.27**	.30*	-.01	.15	-.06	-.03
Family routines	.04	-.11	.05	.26*	-.04	-.07	.04
Harsh discipline	.05	.03	.02	.06	.10	-.13	-.25**
Sensitivity free play	.01	.06	.28**	.08	-.17	.41***	.64***
Sensitivity naturalistic	-.00	.07	.20	.05	.02	.54***	.29**

Note. The grey diagonal reflects the correlation between pre- and posttest within a measure. Below the diagonal reflects pretest correlations. Above the diagonal reflects posttest correlations. *** $p < .001$. ** $p < .01$ * $p < .05$

Table 3

Posttest measures of household chaos explained by condition and covariates.

	Self-reported household chaos						Clutter						Noise						Family routines					
	B (sd)	β	Df	t/F	p	Adj. R²	B (sd)	β	Df	t/F	p	Adj. R²	B (sd)	β	Df	t/F	p	Adj. R²	B (sd)	β	Df	t/F	p	Adj. R²
Step 1			107 (2)	33.04	<.001	0.37			111 (2)	37.00	<.001	.39			70 (2)	3.67	.030	.07			50 (2)	1.33	.273	.01
Intercept	0.82 (0.22)			3.65	<.001		0.09 (0.11)		110.19	0.82	.416		36.36 (3.62)		90.98	10.05	<.001		-0.01 (0.20)		90.83	-0.06	.951	
Condition	-0.02 (0.07)	-.02	106.20	-0.27	.791		-0.06 (0.07)	-.07	105.79	-0.83	.407		-0.58 (1.08)	-.05	91.34	-0.54	.589		0.01 (0.12)	.01	91.24	0.07	.948	
Pretest	0.63 (0.09)		103.55	7.38	<.001		0.58 (0.08)		112.02	7.60	<.001		0.17 (0.07)		87.16	2.41	.018		0.24 (0.11)		91.32	2.25	.027	
Step 2			88 (8)	8.72	<.001	0.39			91 (8)	9.35	<.001	.40			57 (8)	4.72	<.001	.31			38 (3)	1.50	.192	.08
Intercept	1.09 (0.61)		93.26	1.78	.079		0.70 (0.56)		94.35	1.27	.209		35.64 (9.28)		72.51	3.84	<.001		0.18 (1.05)		77.15	0.17	.867	
Condition	0.02 (0.08)	-.02	98.30	0.23	.819		-0.11 (0.08)	-.13	91.87	-1.36	.178		-1.44 (1.23)	-.13	82.64	-1.15	.254		0.10 (0.15)	.08	87.18	0.69	.494	
Pretest	0.55 (0.09)		96.94	6.11	<.001		0.57 (0.8)		102.17	7.30	<.001		0.14 (0.07)		84.70	1.95	.055		0.26 (0.11)		86.65	2.35	.021	
Age participant	-0.00 (0.01)		99.61	-0.24	.811		0.01 (0.01)		97.21	0.94	.350		-0.01 (0.13)		85.45	-0.08	.938		-0.01 (0.02)		90.94	-0.49	.627	
Age child	0.01 (0.02)		106.23	0.70	.485		-0.03 (0.02)		101.88	-1.88	.063		-0.34 (0.27)		87.92	-1.24	.217		-0.00 (0.03)		77.61	-0.03	.975	
Participant education	-0.02 (0.03)		90.74	-0.57	.571		0.01 (0.03)		94.71	0.23	.820		-0.05 (0.51)		82.10	-0.10	.921		0.00 (0.06)		96.52	0.08	.939	
Number of children	0.13 (0.05)		103.17	2.70	.008		0.00 (0.05)		94.05	0.02	.986		1.85 (.76)		76.32	2.43	.017		0.04 (0.08)		84.23	0.43	.665	
Perceived effectiveness	-0.02 (0.04)		91.45	-0.40	.689		0.08 (0.05)		76.30	1.75	.084		0.48 (0.69)		74.45	0.70	.488		-0.09 (0.08)		86.58	-1.19	.237	
Therapeutic alliance	-0.08 (0.06)		98.31	-1.36	.177		-0.11 (0.06)		76.73	-1.71	.090		1.41 (0.96)		62.96	1.46	.149		0.03 (0.11)		72.12	0.23	.817	

Note. All statistics are based on imputed data, with the exception of the model statistics. Condition was coded as 1 = control group, 2 = intervention.

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Table 4

Posttest measures of parenting explained by condition and covariates.

	Harsh discipline						Sensitivity – free play						Sensitivity – naturalistic					
	B(sd)	β	Df	t/F	p	Adj. R²	B(sd)	β	Df	t/F	p	Adj. R²	B(sd)	β	Df	t/F	p	Adj. R²
Step 1			114 (2)	1.63	.201	.01			113 (2)	11.38	<.001	.15			107 (2)	4.94	.009	.07
Intercept	3.56 (0.41)		111.11	8.67	<.001		2.71 (0.73)		118.02	3.71	<.001		4.42 (0.85)		115.56	5.19	<.001	
Condition	-0.28 (0.19)	-.14	113.15	-1.45	-.150		0.20 (0.29)	.06	114.65	0.67	.503		0.05 (0.29)	.02	113.79	0.18	.861	
Pretest	0.09 (0.09)		101.93	1.05	.295		0.42 (0.09)		115.93	4.89	<.001		0.30 (0.09)		114.05	3.18	.002	
Step 2			94 (8)	2.39	.022	.10			93 (8)	3.41	.002	.16			89 (8)	2.14	.040	.09
Intercept	4.92 (1.66)		103.52	2.97	.004		1.27 (2.43)		104.50	0.52	.603		0.35 (2.42)		104.39	0.14	.886	
Condition	-0.64 (0.23)	-.32	98.17	-2.78	.006		0.35 (0.36)	.10	103.24	0.97	.337		0.19 (0.34)	.06	102.77	0.56	.579	
Pretest	0.05 (0.10)		101.43	0.58	.562		0.37 (0.10)		110.33	3.87	<.001		0.27 (0.10)		106.40	2.77	.007	
Age participant	-0.02 (0.02)		101.41	-0.72	.471		0.01 (0.04)		105.84	0.29	.769		0.02 (0.04)		106.05	0.42	.672	
Age child	-0.02 (0.05)		106.73	-0.38	.708		0.03 (0.08)		107.89	0.40	.693		0.02 (0.07)		108.58	0.31	.757	

Table 4
Continued.

	Harsh discipline						Sensitivity – free play						Sensitivity – naturalistic					
	B(sd)	β	Df	t/F	p	Adj. R²	B(sd)	β	Df	t/F	p	Adj. R²	B(sd)	β	Df	t/F	p	Adj. R²
Participant education	0.00 (0.09)		106.88	0.05	.957		0.19 (0.15)		109.59	1.30	.196		0.31 (0.14)		105.56	2.19	.031	
Number of children	-0.09 (0.13)		100.31	-0.66	.510		0.07 (0.20)		106.88	0.36	.717		0.21 (0.20)		102.46	1.08	.281	
Perceived effectiveness	0.37 (013)		85.88	2.93	.004		-0.07 (0.20)		93.88	-0.33	.742		-0.14 (0.19)		94.11	-0.75	.454	
Therapeutic alliance	-0.13 (0.16)		89.11	-0.82	.416		-0.17 (0.25)		98.39	-0.69	.495		0.22 (0.24)		98.43	0.91	.365	

Note. All statistics are based on imputed data, with the exception of the model statistics. Condition was coded as 1 = control group, 2 = intervention.

Parenting predicted by condition

Results from these multiple regression analyses are shown in Table 4. Condition was a significant predictor of harsh discipline after the covariates were added (first step: $R^2 = .01$, $F(2 ; 114) = 1.63$, $\beta = -0.14$, $p = .150$; second step: $R^2 = .10$, $F(8 ; 94) = 2.39$, $\beta = -0.31$, $p = .006$), with a decrease of harsh discipline in the intervention group (see Figure 2). Condition did not predict sensitivity during free play (first step: $R^2 = .15$, $F(2; 113) = 11.38$, $\beta = 0.06$, $p = .503$; second step: $R^2 = .16$, $F(8; 93) = 3.41$, $\beta = 0.10$, $p = .337$), or sensitivity in the naturalistic setting (first step: $R^2 = .07$, $F(2; 107) = 4.94$, $\beta = 0.02$, $p = .861$; second step: $R^2 = .09$, $F(8; 89) = 2.14$, $\beta = 0.06$, $p = .579$). This means that the intervention did not lead to higher sensitivity levels.
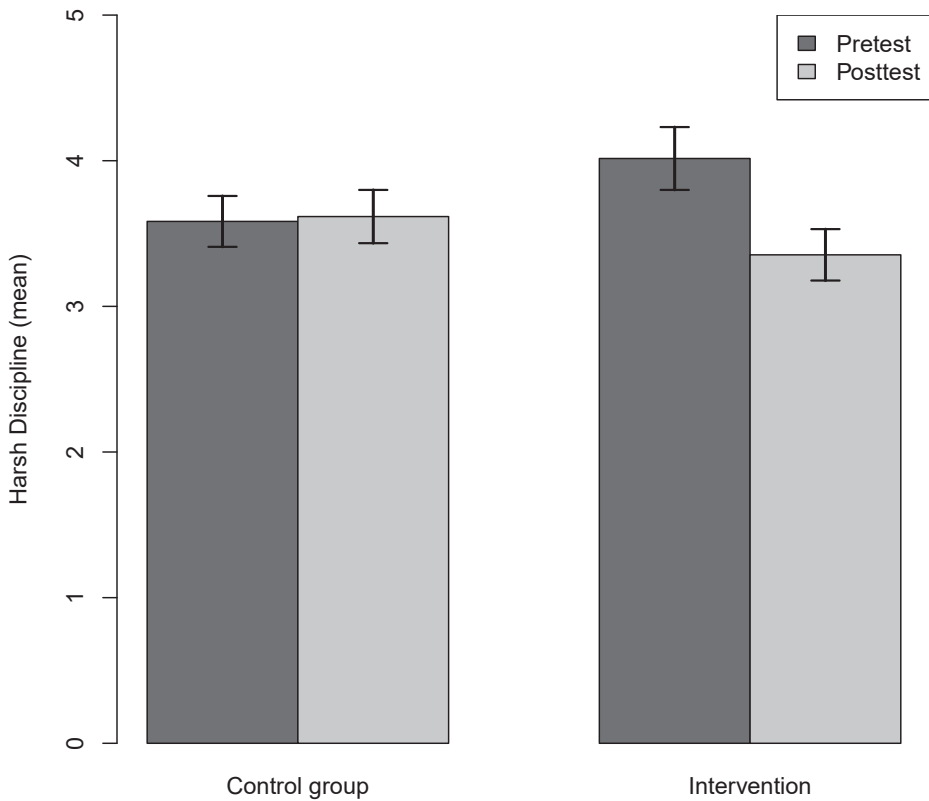
Figure 2. Mean harsh discipline on pre- and posttest for the intervention and control group.

Discussion

We used an RCT design to test whether there is a causal effect of household chaos on parenting. The intervention group received the SHINE intervention, which was designed for the purpose of this study to reduce household chaos (see Prevoo et al., 2020). We were not able to evaluate the effect of the intervention on child maltreatment as the incidence of reported child maltreatment was too low in the current sample. The intervention group showed a significant reduction in harsh discipline, while no intervention effects on sensitivity in free play or the naturalistic setting were found. We could not confirm the hypothesized mediating role of an intervention-induced reduction in household chaos in the effect on parenting.

We found that our intervention, aimed at reducing household chaos, was successful in decreasing harsh discipline. This is in line with previous correlational studies (e.g., Coldwell et al., 2006; Dumas et al., 2005) and points to a causal effect of household chaos on harsh parenting. While our intervention was successful in reducing harsh discipline, no differences in sensitivity during free play or in the naturalistic setting were found. As the task to measure harsh discipline (i.e., the don't touch task) was more demanding than the tasks to measure sensitivity, this may indicate that the effect of household chaos on parenting is most relevant in demanding situations. The effect of household chaos may be most relevant in an already demanding situation by making the situation even more demanding or stressful, resulting in more harsh discipline. This additive effect of household chaos on parenting in demanding situations was also proposed by Coldwell et al. (2006), who found that more child problem behavior, which can be considered demanding, cooccurred with more negative parenting especially in chaotic households. Household chaos may thus be causally related to parenting specifically in already demanding parenting situations.

Stress may be an underlying mechanism in the effect of household chaos on parenting. Previous research has shown that chaotic environments are more stressful (Nelson, O'Brien, Blankson, Calkins, & Keane, 2009; Selander et al., 2009) and stress has been related to more harsh parenting (Beckerman, Berkel, Mesman & Alink, 2017). Other mechanisms through which household chaos affects harsh discipline are reduced self-regulation and reduced parental self-efficacy. More household chaos has been related to lower self-regulation (Crandall, Deater-Deckard, & Riley, 2015), which in turn has been related to more harsh discipline (Deater-Deckard, Wang, Chen, & Bell, 2012; Valiente et al., 2007). In addition, parental self-efficacy was lower in more chaotic households (Corapci & Wachs, 2002) and parents with low parental self-efficacy showed less positive parenting and more harsh discipline (Albanese, Russo & Geller, 2019; Jones & Prinz, 2005).

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The current absence of an effect of household chaos on sensitivity may be due to measuring sensitivity in a non-demanding parenting situation. Previous correlational studies have consistently found that sensitivity was lower in more chaotic households (e.g., Coldwell et al., 2006; Dumas et al., 2005) and Andeweg et al. (2020) found that sensitivity was lower after experimentally elevated levels of household chaos in a lab setting. In this lab study, participants took care of an infant simulator for 45 min while the simulator was programmed to cry inconsolably at certain times, which can be considered a demanding parenting situation. In Corapci and Wachs (2002), sensitivity was inferred from 45 min observations where the researcher followed the parent and child through the home. It is likely that more demanding parenting situations occurred in these 45 min observations than in the 5 min free play or naturalistic play observations used in the current study. Also, studies with puppet interviews with the child (e.g., Coldwell et al., 2006), or self-report questionnaires on parenting (e.g., Valiente, Lemery-Chalfant, & Reiser, 2007) found that positive parenting was lower in more chaotic households. Demanding parenting situations were an element of these instruments. Thus, it is likely that household chaos may only affect sensitivity in more demanding parenting situations, and that our measures of sensitivity were not demanding enough to elicit an effect of household chaos.

We expected to find that the intervention would affect parenting through decreased household chaos. We were not able to find this mediation effect. As the focus on household chaos was the main difference between the intervention and control condition, and because we controlled for generic intervention elements, we assume that the effect on harsh discipline is due to a reduction of household chaos, but that we were unable to measure this reduction. It is possible that our measures were not sufficiently sensitive. For instance, cleaning up toys before bedtime (one of the goals parents could work in in the intervention) would not be noticed with our measure of clutter, as clutter was coded from video-observations during the day, well before bedtime. Also, using a 5-point Likert scale may not be sufficiently sensitive to measure a small but informative significant reduction on the CHAOS questionnaire. Another possibility is that the effect of the intervention on harsh discipline is due to improved self-efficacy through the use of motivational interviewing in our intervention. As previously mentioned, the intervention may have affected harsh discipline through reducing household chaos and thereby improving parental self-efficacy. As motivational interviewing has been related to increased self-efficacy (Emmons & Rollnick, 2001; O'Halloran, Shields, Blackstock, Wintle, & Taylor, 2015) and higher self-efficacy is related to higher quality parenting (Jackson & Scheines, 2005), it is also possible that the intervention improved self-efficacy directly and not through reduced household chaos, and thereby affected harsh discipline.

Strengths and limitations

Strengths of the current study include the RCT design, basing our intervention on a previously studied intervention, using observations to assess parenting, controlling for demographic as well as generic intervention elements, and measuring multiple aspects of household chaos. Also, the drop-out rate was low (6%), which decreases potential drop-out bias. The first limitation is that our measures of household chaos may not have been sensitive enough to detect a significant reduction in household chaos. Second, we could not study an effect of household chaos on child maltreatment, as the incidence of child maltreatment was too low in the current sample. Our sample consisted of participants with relatively high levels of obtained education and income, limiting the generalizability of our results. This could also explain why our measures of household chaos and parenting measures were mostly uncorrelated in our sample, in contrast to previous studies which found more household chaos to be related to lower quality parenting (e.g. Coldwell et al., 2006; Corapci & Wachs, 2002; Dumas et al., 2005; Matheny et al., 1995). As low parental education and unemployment are known risk factors for child maltreatment (Van Berkel, Prevoo, Linting, Pannebakker, & Alink, 2020) and are related to more household chaos (e.g., Wang, Deater-Deckard, & Bell, 2013), evaluating the causality of household chaos on parenting quality in a low-SES sample is desirable.

Future research and implications

Future research should test whether stress, self-regulation or parental self-efficacy explain the effect of reduced household chaos on harsh parenting. The use of self-reported as well as observational measures, as done in this study, is recommended to ensure comparability across studies, although adaptations to make measures more sensitive may be necessary. For instance, the CHAOS questionnaire could be adapted to use a 10-point Likert scale instead of a 5-point Likert-scale, and longer or more naturalistic observations of parental sensitivity may be necessary. Other pathways of future research include conducting the current study design within a low SES sample, to test whether our findings are generalizable to low SES families. Focusing on more low SES and high-risk samples may be important, as these families could benefit most in terms of parenting from reducing household chaos. It should be noted that the SHINE intervention was designed for research purposes and not for clinical practice. After establishing that household chaos affects parenting quality in at-risk families, alterations to this intervention may be necessary before implementing it in clinical practice. Lastly, helping families to adequately manage household chaos may be effective to prevent harsh parenting. This could be done by, for instance, helping first-time parents in forming family routines or helping parents set boundaries for noise control.

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Conclusion

In conclusion, our study is the first to investigate the causal effect of household chaos on parenting in families. Our intervention was successful in reducing harsh discipline, meaning household chaos affects parenting. The effect of household chaos may be most relevant in more challenging parenting situations, meaning it may make demanding parenting situations even more demanding, resulting in more harsh discipline. Possible underlying mechanisms are stress, self-regulation, and parental self-efficacy. Replicating the current study design in a low-SES sample is important as low-SES families generally have more chaotic homes and show lower quality parenting, and may thus benefit most from reducing household chaos. Lastly, helping parents to manage household chaos levels could be effective in preventing harsh parenting.

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