



Universiteit  
Leiden  
The Netherlands

## **Reducing household chaos to improve parenting quality? An RCT**

Andeweg, S.M.'; Bodrij F.F.; Prevoo, M.J.L.; Rippe, R.C.A.; Alink, L.R.A.

### **Citation**

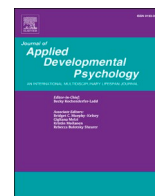
Andeweg, S. M. ', Prevoo, M. J. L., Rippe, R. C. A., & Alink, L. R. A. (2022). Reducing household chaos to improve parenting quality?: An RCT. *Journal Of Applied Developmental Psychology*, 80. doi:10.1016/j.appdev.2022.101398

Version: Publisher's Version

License: [Creative Commons CC BY 4.0 license](#)

Downloaded from: <https://hdl.handle.net/1887/3514978>

**Note:** To cite this publication please use the final published version (if applicable).



## Reducing household chaos to improve parenting quality? An RCT

Suzanne M. Andeweg, F. Fenne Bodrij, Mariëlle J.L. Prevo, Ralph C.A. Rippe, Lenneke R. A. Alink\*

*Education and Child Studies, Leiden University, the Netherlands*

### ARTICLE INFO

#### Keywords:

Household chaos  
Harsh discipline  
Sensitive parenting  
RCT  
Intervention

### ABSTRACT

Household chaos (high noise levels, clutter, and lack of family routines) has been related to more harsh and less sensitive parenting. The current study employed an RCT design aiming to decrease household chaos and thereby improve parenting quality. In total, 125 primary caregivers of children around age 1.5 years with relatively high levels of household chaos participated. Questionnaires, video-observations, a diary app, and a decibel meter assessing noise were used to measure household chaos and parenting. Findings showed reduced harsh discipline in the intervention group but no effect on sensitivity. However, our results could not confirm a reduction in household chaos as a result of the intervention. As we controlled for generic intervention elements (perceived effectiveness and therapeutic alliance), the effect on harsh discipline may be due to an unmeasured effect on household chaos. Our results tentatively indicate that household chaos may be a salient factor in demanding parenting situations.

Understanding the etiology of parenting problems in general and child maltreatment as its most extreme form is necessary to inform prevention and intervention. In line with Belsky (1984) and Bronfenbrenner (1986), parenting is viewed as a complex process that is determined by multiple factors on different ecological levels. These factors range from the wider cultural and political context to the parents' genetic make-up (Belsky & Jaffee, 2006). Even though there are significant effects of parental genetic make-up, environmental contributions to parenting are substantial (Klahr & Burt, 2014). Ample research has shown that parental personality, psychological functioning, and parents' own childhood experiences are important predictors of parenting (Berg-Nielsen, Vikan, & Dahl, 2002; Metsäpelto & Pulkkinen, 2003; Savage, Tarabulsky, Pearson, Collin-Vézina, & Gagné, 2019). In addition to these individual factors, the direct environment plays a role in parenting. One of the most salient current environmental factors that can influence parenting is the home environment. Within this home environment, the level of household chaos has been extensively studied. Studies relating household chaos to parenting generally find that parenting is more harsh and less sensitive in more chaotic households (e.g., Coldwell, Pike, & Dunn, 2006; Corapci & Wachs, 2002; Dumas et al., 2005; Matheny Jr., Wachs, Ludwig, & Phillips, 1995). However, as these studies are mostly correlational, directionality of this association is unclear. Even though there is some experimental evidence of the causal role of chaos (Andeweg, Bodrij, Prevo, Rippe, & Alink, 2021; Bodrij,

Andeweg, Prevo, Rippe, & Alink, 2021), for both stability and generalizability reasons this needs to be replicated and expanded. 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 Jr. et al., 1995). Even though research on the etiology of household chaos is limited, there is some evidence that chaos is related to lower parental education/IQ, less optimal literacy environments, and lower levels of parental effortful control, even though conclusions about causality cannot be drawn (Deater-Deckard, Mullineaux, Petrill, Schatschneider, & Thompson, 2009; Valiente, Lemery-Chalfant, & Reiser, 2007). In addition, child behavior problems and household chaos can mutually influence each other, as indicated by a genetically informed study showing cross-lagged associations between household chaos and children's conduct problems (Jaffee, Hanscombe, Haworth, Davis, & Plomin, 2012).

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

\* Corresponding author at: Leiden University, Institute of Education and Child Studies, P.O. Box 9555, 2300 RB Leiden, the Netherlands.

E-mail address: [alinklra@fsw.leidenuniv.nl](mailto:alinklra@fsw.leidenuniv.nl) (L.R.A. Alink).

<https://doi.org/10.1016/j.appdev.2022.101398>

Received 4 December 2020; Received in revised form 19 February 2022; Accepted 21 February 2022

Available online 8 April 2022

0193-3973/© 2022 The Authors. Published by Elsevier Inc. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

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 in more chaotic households 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 Jr. et al., 1995). The associations between household chaos and parenting may partially explain the effect of chaos on child development, such as lower IQ, more behavior problems, less attentional focusing, and an impaired ability to respond to social cues (Deater-Deckard et al., 2009; Dumas et al., 2005). Indeed, more harsh and insensitive parenting is related to slower cognitive development and to more externalizing and internalizing problems in children and adolescents (Bradley & Corwyn, 2007; Firk, Konrad, Herpertz-Dahlmann, Scharke, & Dahmen, 2018; Jackson, Choi, & Preston, 2019; Lancaster, Jackson, Youngberg, Fitzgerald, & McWey, 2018; Treyvaud et al., 2015; Wolford, Cooper, & McWey, 2018). Child maltreatment, which is an extreme form of low quality parenting, also has many short and long term negative effects on child development (e.g., Alink, Cicchetti, Kim, & Rogosch, 2009; Alink, Cicchetti, Kim, & Rogosch, 2012; Danese & Tan, 2014; Norman et al., 2012; Vachon, Krueger, Rogosch, & Cicchetti, 2015).

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 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., 2021). 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.

Reducing household chaos may be particularly relevant in young children. Based on the bioecological model of human development (Bronfenbrenner & Morris, 2006), the immediate context plays an important role in development through reciprocal interactions between the child and their immediate environment. For young children, the home environment is a substantial part of that immediate environment. Moreover, early childhood may also be one of the most challenging periods for parents in terms of household chaos, because children are mobile and can add to increasing levels of household chaos, but generally do not contribute (easily) to reducing chaos, for example by cleaning up (Alink et al., 2006). It is not surprising that a large part of the research on household chaos was done in preschoolers (e.g., Andrews, Atkinson, Harris, & Gonzalez, 2021). Because of the salience of household chaos for families with young children, the current study focused on families with children who were about 1.5 years of age at the start of the study.

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 (Prevoe, Bodrij, Andeweg, & Alink, 2020), 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 (Prevoe 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 (Flückiger, Del Re, Wampold, Symonds, & Horvath, 2012; Vīslā, Constantino, Newkirk, Ogrodniczuk, & Söchting, 2016).

## 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 Prevoe et al., 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 Fig. 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 families with twins/multiples, 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 older than 12 years living in the same household. 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 Jr. et al., 1995) questionnaire as true or completely true for their family were invited to participate in our study with the target child. In total, 792 families met the inclusion criteria and were thus invited to participate in the study.

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 ( $SD = 4.13$ , range 23–44 years). The children (54% boys) were on average 19.17 months old ( $SD = 1.90$ , range 14–28 months). 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. All secondary caregivers were biological parents of the child, except for one (and in one case information on the secondary caregiver was missing). No same-sex couples were reported. All participants were living in the Netherlands at the time of the study, 89% identified with the Dutch ethnicity and 11% with a non-Dutch ethnicity. There were 104 households with two Dutch-born caregivers, 5 households had two non-Dutch-born caregivers, and 15 households were mixed Dutch-non-Dutch. Seven participants did not

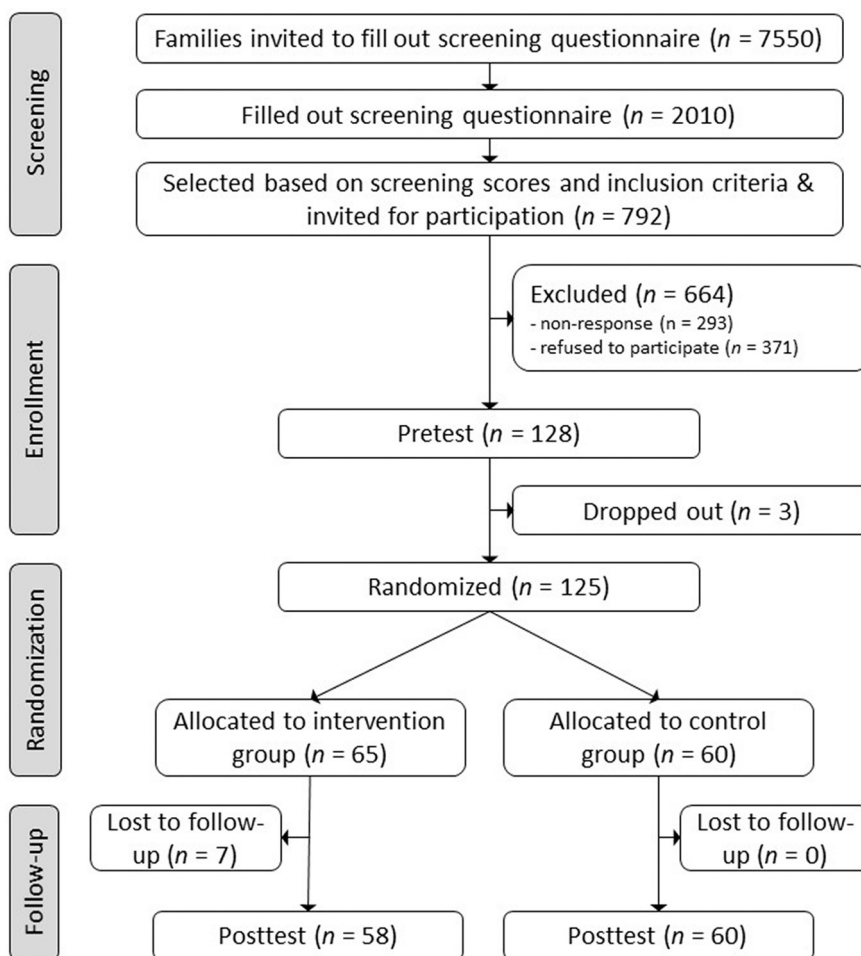


Fig. 1. Flow chart of the recruitment and inclusion of participants.

reach the posttest, for whom no differences on demographic variables were found compared to participants who completed the posttest.

## Procedure

### Pre and posttest

The current study was approved by the ethics committee of the Institute of Child and Education Studies, Leiden University (number ECPW 2015–090) and preregistered in the open science framework (Prevo et al., 2020). Participation included two home visits as pretest, randomization to the intervention or control group, and two home visits as posttest. The parent and child participated together in the first visit, and only the parent participated in the second visit (scheduled one week apart). 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). 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, two weeks apart. These home visits had the following themes: 1. General introduction, 2. Family routines and weekly schedule; 3. Organizing materials in the home; 4. Reducing noise. One week after home visits 2–4, the intervener called the participant to discuss all previous topics and sent two text messages to remind the parent of their goal. Parents were also provided with cards with reminders to be displayed at central places in the house (see Prevo 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. At the end of each visit, the intervener discussed with the participating parent how the other caregiver would be involved in achieving the goal.

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. Motivational interviewing was used to guide parents in setting and meeting goals in order to reduce chaos in their household. Parents could choose goals from a predefined list of goals specific for each of the three themes, and could also formulate an additional goal. The intervener helped the parent to operationalize their goals in the form of implementation intentions (Gollwitzer, 1999; Gollwitzer & Sheeran, 2006): 'if..., then...' statements, in which the 'if...' is about when and where the parent will implement the goal and the 'then...' explicates how the parent will implement the goal. The intervener also guided the parent in anticipating situations in which the implementation of the goals could be difficult and in thinking about solutions for those situations. 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 intervention 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.

#### 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 per 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 Jr. 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 0.71 and 0.80, 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 0.76 (range 0.61–0.97,  $N = 20$ ). 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 (5 min) and the naturalistic play task (5 min) 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. In both tasks parents were instructed to play with their child as they would normally do at a location in their house where they would normally play with their child. 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 was good with a mean intra-class coefficient of all different pairs (single measure, absolute agreement) of 0.82 (range 0.70–0.92,  $N = 29$ ). 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  $r$ s between 0.78 and 0.80), with higher scores indicating higher levels of sensitivity (including non-intrusiveness).

##### Discipline

Videos of the don't touch task were coded for harsh discipline (by different coders than the ones who coded sensitivity) using an adapted version of the discipline scales used by Joosen, Mesman, Bakermans-Kranenburg, and Van IJzendoorn, M. H. (2012). During this task the parent was asked to prevent the child from playing with a set of toys for 2 min followed by allowing the child to play with only the least interesting toy for 2 min. Our version consisted of three 5-point scales assessing behavior towards the child: 1. physical discipline, which evaluated frequency and intensity of physical attempts to make the child comply with the don't touch task (ranging from no physical discipline to regular forceful physical discipline or at least one act of physical punishment such as slapping), 2. laxness, based on frequency of giving in (ranging from no laxness to predominant laxness), and 3. overreactivity, based on frequency of verbal and non-verbal signs of anger or losing one's temper (ranging from no overreactivity to predominant overreactivity as shown by irritation and/or anger). Inter-coder reliability

for all scales was good with a mean intra-class coefficient of all different pairs (single measure, absolute agreement) of 0.79 (range 0.66–0.92,  $N = 24$ ) 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  $r$ s between 0.168 and 0.347,  $p$ s between  $<0.001$ –0.070), 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 0.54 for the pretest and 0.56 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 0.24), 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 0.96 and 0.93, 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 ( $r$ s  $> 0.98$ ), 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 pre-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 ( $r = 0.27$ ,  $p = .005$ ). 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 ( $r = 0.54$ ,  $p < .001$ ). Within the posttest sensitivity in both settings was again significantly correlated ( $r = 0.64$ ,  $p < .001$ ) and more harsh discipline was significantly correlated to less sensitivity in the naturalistic setting ( $r = -0.25$ ,  $p = .006$ ). Most measures were stable over time, with significant correlations between pre- and posttest for household chaos measures ( $r$ s between 0.26 and 0.63,  $p$ s  $< 0.011$ ) and for parenting measures ( $r$ s between 0.29 and 0.41,  $p$ s  $< 0.002$ ). The pre- and posttest measure of discipline were not significantly correlated ( $r = 0.10$ ,  $p = .278$ ). 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 ( $r = 0.28$ ,  $p = .004$ ). In the posttest, measures of parenting and household chaos were uncorrelated.

Covariates were included if there was a significant correlation with pretest measures of household chaos or parenting, because firstly we think this approach yields more practically relevant and generalizable results, as theoretically, covariates may also change from pre to posttest. Secondly, adjusting for pretest associated covariates aligns with the current randomization into intervention vs control, which also occurs at pretest stage. A younger age of the parent was significantly correlated to more harsh discipline ( $r = -0.19$ ,  $p = .036$ ). A younger age of the child was also significantly related to more harsh discipline ( $r = -0.19$ ,  $p = .045$ ) and to less sensitive parenting during free play ( $r = 0.23$ ,  $p = .014$ ). More children living in the household was related to higher noise levels ( $r = 0.32$ ,  $p = .001$ ) and to more self-reported household chaos ( $r = 0.31$ ,  $p < .001$ ). Lower parental education was significantly correlated with more harsh discipline ( $r = -0.19$ ,  $p = .039$ ), and lower sensitivity during free play and the naturalistic setting ( $r = 0.23$ ,  $p = .011$  and  $r = 0.18$ ,  $p = .049$ ). Perceived effectiveness and therapeutic alliance were also entered as covariates and were significantly correlated ( $r = 0.36$ ,  $p < .001$ ). Higher perceived effectiveness was significantly correlated with more harsh discipline at posttest ( $r = 0.21$ ,  $p = .029$ ). Therapeutic alliance was significantly correlated with less self-reported household chaos at posttest ( $r = -0.22$ ,  $p = .028$ ).

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 ( $M = 3.61$ ,  $SD = 0.98$ ;  $t(122) = -2.01$ ,  $p = .046$ ,  $d = -0.36$ ). 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 ( $M = 4.26$ ,  $SD = 0.73$ ;  $M = 2.18$ ,  $SD = 0.78$ ;  $t(109) = -2.07$ ,  $p = .041$ ,  $d = -0.40$ , and  $t(109) = -6.81$ ,  $p < .001$ ,  $d = -1.30$ , 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

**Table 1**  
Descriptive statistics of measures of household chaos and parenting.

	Pretest			Posttest		
	Overall		Control	Intervention		Control
	M (SD)	Min-max	M (SD)	M (SD)	Min-max	M (SD)
Self-reported household chaos	2.29 (0.41)	1.21–3.27	2.30 (0.41)	2.20 (0.42)	1.27–3.21	2.24 (0.48)
Clutter*	0.00 (0.44)	–0.98–1.33	–0.01 (0.41)	–0.02 (0.38)	–0.86–1.25	0.02 (0.50)
Noise	43.71 (7.53)	22.38–60.20	43.80 (8.09)	42.56 (5.71)	25.84–58.36	43.59 (5.35)
Family routines*	–0.02 (0.62)	–1.08–2.66	0.00 (0.64)	0.02 (0.69)	–1.52–2.18	–0.07 (0.70)
Discipline	3.82 (1.13)	2.00–9.00	3.61 (0.98)	3.38 (1.01)	2.00–6.00	3.62 (1.04)
Sensitivity free play	6.57 (1.63)	2.50–9.00	6.63 (1.50)	5.88 (1.78)	1.50–9.00	5.63 (1.71)
Sensitivity naturalistic	7.15 (1.55)	2.00–9.00	7.35 (1.63)	6.61 (1.63)	3.00–9.00	6.67 (1.62)
					Min-max	Min-max
					1.40–3.07	1.27–3.21
					–0.86–0.87	–0.86–1.25
					25.84–58.36	25.84–58.36
					–1.17–2.18	–1.52–1.65
					2.00–6.00	2.00–6.00
					1.50–9.00	2.00–8.50
					3.00–9.00	3.00–9.00

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

chaos (first step:  $\beta = -0.02, p = .791, \eta^2_{\text{partial}} = 0.38$ ; second step:  $\beta = 0.02, p = .819, \eta^2_{\text{partial}} = 0.44$ ). This was the same for clutter (first step:  $\beta = -0.06, p = .407, \eta^2_{\text{partial}} = 0.40$ ; second step:  $\beta = -0.11, p = .178, \eta^2_{\text{partial}} = 0.45$ ), noise (first step:  $\beta = -0.05, p = .589, \eta^2_{\text{partial}} = 0.09$ ; second step:  $\beta = -0.13, p = .254, \eta^2_{\text{partial}} = 0.39$ ), and family routines (first step:  $\beta = 0.01, p = .948, \eta^2_{\text{partial}} = 0.05$ ; second step:  $\beta = 0.08, p = .494, \eta^2_{\text{partial}} = 0.24$ ). This meant that the intervention did not lead to lower levels of household chaos.

*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:  $\beta = -0.14, p = .150, \eta^2_{\text{partial}} = 0.03$ ; second step:  $\beta = -0.32, p = .006, \eta^2_{\text{partial}} = 0.17$ ), with a decrease of harsh discipline in the intervention group (see Fig. 2). Perceived effectiveness was also positively related to harsh parenting in this multivariate model. Because of this unexpected finding and the complex conditional interpretation in a multivariate model, we tested whether perceived effectiveness was also related to posttest harsh discipline, controlled for pretest harsh discipline. This was not the case,  $\beta = 0.05, p = .08, d = 0.36$ . We also explored the role of perceived effectiveness within separate groups and found that, controlled for pretest harsh discipline, the association between perceived effectiveness and posttest harsh discipline was only significant in the experimental group,  $\beta = 0.32, p = .02, d = 0.67$ , and not in the control group.

Condition did not predict sensitivity during free play (first step:  $\beta = 0.06, p = .503, \eta^2_{\text{partial}} = 0.17$ ; second step:  $\beta = 0.10, p = .337, \eta^2_{\text{partial}} = 0.23$ ), or sensitivity in the naturalistic setting (first step:  $\beta = 0.02, p = .861, \eta^2_{\text{partial}} = 0.08$ ; second step:  $\beta = 0.06, p = .579, \eta^2_{\text{partial}} = 0.16$ ). This means that the intervention did not lead to higher sensitivity levels.

**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 with a medium effect size (Lakens, 2013), while no significant 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. However, with our measures of household chaos we could not confirm that this intervention effect was mediated by decreased chaos. An alternative explanation could be 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 and child behavior. Indeed, self-efficacy is related to harsh discipline (Lesniowska, Gent, & Watson, 2016) and interventions focusing on increasing parental self-efficacy have been proven to lead to increased parenting quality and reduced behavior problems of children (Coleman & Karraker, 1997; Mouton, Loop, Stiévenart, & Roskam, 2018). In general, the generic role of motivational interviewing should be

**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. \*\*\*  $p < 0.001$ . \*\*  $p < 0.01$  \*  $p < 0.05$ .

investigated to find out whether and how this technique could have driven effects and could therefore be considered a generic active intervention element.

We do think that it is also plausible that the intervention effect could be explained by unmeasured aspects of chaos. As the focus on household chaos was the main difference between the intervention and control condition, and because we controlled for generic intervention elements (perceived effectiveness and therapeutic alliance), 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. Furthermore, a central aspect in our intervention was setting goals, and some of these goals may have been more proximal to the parent-child relationship (e.g., putting away toys) than others (e.g., reducing TV noise), which may have directly impacted discipline. Nevertheless, all goals were related to reducing chaos and parenting was not explicitly addressed during the intervention. In addition, setting goals and thinking how to be able to meet them may have been a skill related to increasing routines that we were not able to measure but could have affected parenting.

The effect of the intervention on harsh parenting is in line with previous correlational studies (e.g., Coldwell et al., 2006; Dumas et al., 2005) and points to a possible 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, co-occurred 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, van 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, 2018; Jones & Prinz, 2005).

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. (2021) 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 et al., 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.

Even though perceived effectiveness was higher in the intervention group, overall there was no association between perceived effectiveness and change in harsh parenting from pre- to posttest, and the effect of condition was significant, controlled for perceived effectiveness, the significant association between perceived effectiveness and change in harsh parenting in the intervention group is worth mentioning. This indicates that individuals having received the intervention who actually

**Table 3**  
Posttest measures of household chaos explained by condition and covariates.

	Self-reported household chaos			Clutter			Noise			Family routines					
	B (sd)	β	t/F	B (sd)	β	t/F	B (sd)	β	t/F	B (sd)	β	t/F	p		
<i>Step 1</i>															
Intercept	0.82 (0.22)		33.04	<0.001		37.00	<0.001		36.36 (3.62)		3.67	0.030	1.33	0.273	
Condition	-0.02 (0.07)		3.65	<0.001	0.09 (0.11)	0.82	0.416		-0.58 (1.08)		10.05	<0.001	-0.06	0.951	
Pretest	0.63 (0.09)	-0.02	-0.27	0.791	-0.06 (0.07)	-0.83	0.407	-0.07	0.17 (0.07)	-0.05	-0.54	0.589	0.01 (0.12)	0.07	0.948
<i>Step 2</i>															
Intercept	1.09 (0.61)		8.72	<0.001	0.58 (0.08)	7.60	<0.001	9.35			2.41	0.018	0.24 (0.11)	2.25	0.027
Condition	0.02 (0.08)	0.02	1.78	0.079	0.70 (0.56)	1.27	0.209		35.64 (9.28)		3.84	<0.001	0.18 (1.05)	1.50	0.192
Pretest	0.55 (0.09)		6.11	<0.001	-0.11 (0.08)	-1.36	0.178	-0.13	-1.44 (1.23)	-0.13	-1.15	0.254	0.10 (0.15)	0.69	0.494
Age participant	-0.00 (0.01)		-0.24	0.811	0.57 (0.08)	7.30	<0.001	7.30	0.14 (0.07)		1.95	0.055	0.26 (0.11)	2.35	0.021
Age child	0.01 (0.02)		0.70	0.485	0.01 (0.01)	0.94	0.350		-0.01 (0.13)		-0.08	0.938	-0.01 (0.02)	-0.49	0.627
Participant education	-0.02 (0.03)		-0.57	0.571	-0.03 (0.02)	-1.88	0.063	-1.88	-0.34 (0.27)		-1.24	0.217	-0.00 (0.03)	-0.03	0.975
Number of children	0.13 (0.05)		2.70	0.008	0.01 (0.03)	0.23	0.820		-0.05 (0.51)		-0.10	0.921	0.00 (0.06)	0.08	0.939
Perceived effectiveness	-0.02 (0.04)		-0.40	0.689	0.00 (0.05)	0.02	0.986		1.85 (0.76)		2.43	0.017	0.04 (0.08)	0.43	0.665
Therapeutic alliance	-0.08 (0.06)		-1.36	0.177	0.08 (0.06)	1.75	0.084		0.48 (0.69)		0.70	0.488	-0.09 (0.08)	-1.19	0.237
					-0.11 (0.06)	-1.71	0.090		1.41 (0.96)		1.46	0.149	0.03 (0.11)	0.23	0.817

Note. All statistics are based on imputed data, with the exception of the model statistics. Condition was coded as 1 = control group, 2 = intervention. Standardized coefficients were provided for main variables only, not adjustment-only covariates.

Adjusted R<sup>2</sup>: Self-reported household chaos Step 1: 0.37 (F(2; 107) = 33.04), Step 2: 0.39 (F(8; 88) = 8.72); Clutter Step 1: 0.39 (F(2; 111) = 37.00), Step 2: 0.40 (F(8; 91) = 9.35); Noise Step 1: 0.07 (F(2; 70) = 3.67), Step 2: 0.31 (F(8; 57) = 4.72); Family routines Step 1: 0.01 (F(2; 50) = 1.33), Step 2: 0.08 (F(8; 38) = 1.50).

improved, considered the intervention as less effective compared to the ones who did not improve or improved less. This may imply that improving harsh parenting might still feel as difficult for parents who took part in the intervention at the time of the posttest and does not feel as an improvement. Therefore, in future developments of the intervention, we would recommend addressing this perception with parents in the last intervention session.

*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 Jr. 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. Finally, we did not systematically assess to what extent the participants implemented the information and goals of the intervention. Therefore, we were not able to test whether this influenced the effect of the intervention.

*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. For example, it should be explored whether greater involvement of the second parent would boost the effectiveness of the intervention. Even though the primary caregiver is expected to play the largest role in the life of the child, the second caregiver is often also substantially involved in household tasks and caregiving and therefore plays an important role in the development of the child. 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.

**Table 4**  
Posttest measures of parenting explained by condition and covariates.

	Harsh discipline				Sensitivity – free play				Sensitivity – naturalistic			
	B (sd)	β	t/F	p	B (sd)	β	t/F	p	B (sd)	β	t/F	p
<i>Step 1</i>			1.63	0.201			11.38	<0.001			4.94	0.009
Intercept	3.56 (0.41)		8.67	<0.001	2.71 (0.73)		3.71	<0.001	4.42 (0.85)		5.19	<0.001
Condition	-0.28 (0.19)	-0.14	-1.45	0.150	0.20 (0.29)	0.06	0.67	0.503	0.05 (0.29)	0.02	0.18	0.861
Pretest	0.09 (0.09)		1.05	0.295	0.42 (0.09)		4.89	<0.001	0.30 (0.09)		3.18	0.002
<i>Step 2</i>			2.39	0.022			3.41	0.002			2.14	0.040
Intercept	4.92 (1.66)		2.97	0.004	1.27 (2.43)		0.52	0.603	0.35 (2.42)		0.14	0.886
Condition	-0.64 (0.23)	-0.32	-2.78	0.006	0.35 (0.36)	0.10	0.97	0.337	0.19 (0.34)	0.06	0.56	0.579
Pretest	0.05 (0.10)		0.58	0.562	0.37 (0.10)		3.87	<0.001	0.27 (0.10)		2.77	0.007
Age participant	-0.02 (0.02)		-0.72	0.471	0.01 (0.04)		0.29	0.769	0.02 (0.04)		0.42	0.672
Age child	-0.02 (0.05)		-0.38	0.708	0.03 (0.08)		0.40	0.693	0.02 (0.07)		0.31	0.757
Participant education	0.00 (0.09)		0.05	0.957	0.19 (0.15)		1.30	0.196	0.31 (0.14)		2.19	0.031
Number of children	-0.09 (0.13)		-0.66	0.510	0.07 (0.20)		0.36	0.717	0.21 (0.20)		1.08	0.281
Perceived effectiveness	0.37 (0.13)		2.93	0.004	-0.07 (0.20)		-0.33	0.742	-0.14 (0.19)		-0.75	0.454
Therapeutic alliance	-0.13 (0.16)		-0.82	0.416	-0.17 (0.25)		-0.69	0.495	0.22 (0.24)		0.91	0.365

Note. All statistics are based on imputed data, with the exception of the model statistics. Condition was coded as 1 = control group, 2 = intervention. Standardized coefficients were provided for main variables only, not adjustment-only covariates.

Adjusted R<sup>2</sup>: Sensitivity – free play Step 1: 0.01 (F (2; 114) = 1.63), Step 2: 0.10 (F (8; 94) = 2.39); Sensitivity – free play 1: 0.15 (F (2; 113) = 11.38), Step 2: 0.16 (F (8; 93) = 3.41); Sensitivity – naturalistic Step 1: 0.07 (F (2; 107) = 4.94), Step 2: 0.09 (F (8; 89) = 2.14).

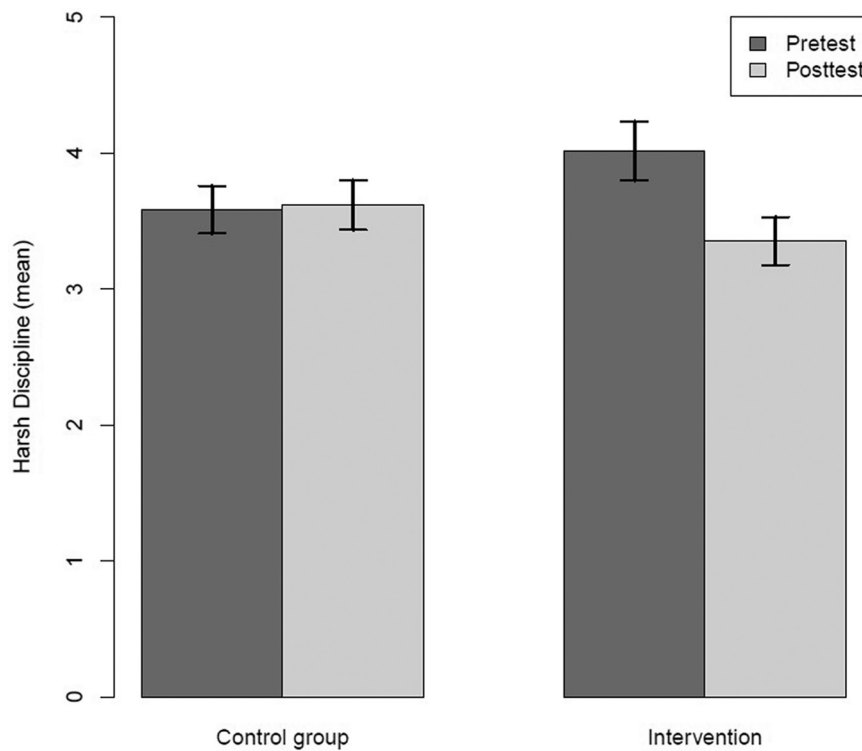


Fig. 2. Mean harsh discipline on pre- and posttest for the intervention and control group. Error bars indicate 95% confidence intervals.

**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, possibly implying that household chaos affects parenting. 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.

**CRedit authorship contribution statement**

**Suzanne M. Andeweg:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing. **F. Fenne Bodrij:** Conceptualization, Methodology, Validation, Investigation, Data curation, Writing – review & editing. **Mariëlle J.L. Prevo:** Conceptualization, Methodology, Software, Validation, Investigation, Data curation, Writing – review & editing, Supervision, Project administration. **Ralph C.A. Rippe:** Methodology, Software, Validation, Formal analysis, Data curation, Writing – review & editing, Supervision. **Lenneke R.A. Alink:** Conceptualization, Methodology, Validation, Investigation, Writing – review & editing, Supervision, Project administration, Funding acquisition.

## Acknowledgements

This study was supported by a Netherlands Organization for Scientific Research VIDI grant awarded to Lenneke Alink (grant no. 016.145.360). The authors would like to thank Marinus van IJzendoorn for his input at the early stages of this study.

## References

- Ainsworth, M. D. S., Bell, S. M., & Stayton, D. J. (1974). Infant mother attachment and social development; socialization as a product of reciprocal responsiveness to signals. In M. P. M. Richards (Ed.), *The integration of a child into a social world* (pp. 99–135). Cambridge: Cambridge University Press.
- Albanese, A. M., Russo, G. R., & Geller, P. A. (2018). The role of parental self-efficacy in parent and child well-being: A systematic review of associated outcomes. *Child: Care, Health and Development*, 45(3), 333–363. <https://doi.org/10.1111/cch.12661>
- Alink, L. R. A., Cicchetti, D., Kim, J., & Rogosch, F. A. (2009). Mediating and moderating processes in the relation between maltreatment and psychopathology: Mother-child relationship quality and emotion regulation. *Journal of Abnormal Child Psychology*, 37, 831–843. <https://doi.org/10.1007/s10802-009-9314-4>
- Alink, L. R. A., Cicchetti, D., Kim, J., & Rogosch, F. A. (2012). Longitudinal associations among child maltreatment, social functioning, and cortisol regulation. *Developmental Psychology*, 48, 224–236. <https://doi.org/10.1037/a0024892>
- Alink, L. R. A., Mesman, J., Van Zeeijl, J., Stolk, M. N., Juffer, F., Koot, H. M., ... Van IJzendoorn, M. H. (2006). The early childhood aggression curve: Development of physical aggression in 10- to 50-month-old children. *Child Development*, 77, 954–966. <https://doi.org/10.1111/j.1467-8624.2006.00912.x>
- Andeweg, S. M., Bodrij, F. F., Prevoo, M. J., Rippe, R. C., & Alink, L. R. (2021). Does sensory-processing sensitivity moderate the effect of household chaos on caregiver sensitivity? An experimental design. *Journal of Family Psychology*, 35(3), 356. <https://doi.org/10.1037/fam0000766>
- Andrews, K., Atkinson, L., Harris, M., & Gonzalez, A. (2021). Examining the effects of household chaos on child executive functions: A meta-analysis. *Psychological Bulletin*, 147(1), 16–32. <https://doi.org/10.1037/bul0000311>
- Beckerman, M., van Berkel, S. R., Mesman, J., & Alink, L. R. A. (2017). The role of negative parental attributions in the associations between daily stressors, maltreatment history, and harsh and abusive parenting. *Child Abuse & Neglect*, 64, 109–116. <https://doi.org/10.1016/j.chiabu.2016.12.015>
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 55, 83–96. <https://doi.org/10.2307/1129836>
- Belsky, J., & Jaffee, S. R. (2006). The multiple determinants of parenting. In D. Cicchetti, & D. J. Cohen (Eds.), *Developmental psychopathology. Vol. 3. Risk, disorder, and adaptation* (2nd ed., pp. 38–85). Hoboken, NJ: Wiley.
- Berg-Nielsen, T. S., Vikan, A., & Dahl, A. A. (2002). Parenting related to child and parental psychopathology: A descriptive review of the literature. *Clinical Child Psychology and Psychiatry*, 7, 529–552. <https://doi.org/10.1177/1359104502007004006>
- Bernstein, D. P., Fink, L., Handeisman, L., Foote, J., Lovejoy, M., Wenzel, K., ... Ruggiero, J. (1994). Initial reliability and validity of a new retrospective measure of child abuse and neglect. *American Journal of Psychiatry*, 151, 1132–1136. <https://doi.org/10.1176/ajp.151.8.1132>
- Bodrij, F. F., Andeweg, S. M., Prevoo, M. J., Rippe, R. C., & Alink, L. R. (2021). The causal effect of household chaos on stress and caregiving: An experimental study. *Comprehensive Psychoneuroendocrinology*, 8, Article 100090. <https://doi.org/10.1016/j.cpnec.2021.100090>
- Bradley, R. H., & Corwyn, R. F. (2007). Externalizing problems in fifth grade: Relations with productive activity, maternal sensitivity, and harsh parenting from infancy through middle childhood. *Developmental Psychology*, 43(6), 1390–1401. <https://doi.org/10.1037/0012-1649.43.6.1390>
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22, 723–742.
- Bronfenbrenner, U., & Morris, P. (2006). The bioecological model of human development. In Damon, & R. Lerner (Eds.), *Theoretical models of human development* (pp. 793–828). New York, NY: Wiley.
- Caldwell, B. M., & Bradley, R. H. (1984). *Home observation for measurement of the environment*. Little Rock: University of Arkansas.
- Coldwell, J., Pike, A., & Dunn, J. (2006). Household chaos – Links with parenting and child behaviour. *Journal of Child Psychology and Psychiatry*, 47(11), 1116–1122. <https://doi.org/10.1111/j.1469-7610.2006.01655.x>
- Coleman, P. K., & Karraker, K. H. (1997). Self-efficacy and parenting quality: Findings and future applications. *Developmental Review*, 18, 47–85.
- Corapci, F., & Wachs, T. D. (2002). Does parental mood or efficacy mediate the influence of environmental chaos upon parenting behavior? *Merrill-Palmer Quarterly*, 48(2), 182–201. <https://doi.org/10.1353/mpq.2002.0006>
- Crandall, A., Deater-Deckard, K., & Riley, A. W. (2015). Maternal emotion and cognitive control capacities and parenting: A conceptual framework. *Developmental Review*, 36, 105–126. <https://doi.org/10.1016/j.dr.2015.01.004>
- Danese, A., & Tan, M. (2014). Childhood maltreatment and obesity: Systematic review and meta-analysis. *Molecular Psychiatry*, 19(544), 554. <https://doi.org/10.1038/mp.2013.54>
- Deater-Deckard, K., Mullineaux, P. Y., Beekman, C., Petrill, S. A., Schatschneider, C., & Thompson, L. A. (2009). Conduct problems, IQ, and household chaos: A longitudinal multi-informant study. *Journal of Child Psychology and Psychiatry*, 50, 1301–1308. <https://doi.org/10.1111/j.1469-7610.2009.02108.x>
- Deater-Deckard, K., Wang, Z., Chen, N., & Bell, M. A. (2012). Maternal executive function, harsh parenting, and child conduct problems. *Journal of Child Psychology and Psychiatry*, 53(10). <https://doi.org/10.1111/j.1469-7610.2012.02582.x>
- Dumas, J. E., Nissley, J., Nordstrom, A., Phillips Smith, E., Prinz, R. J., & Levine, D. W. (2005). Home chaos: Sociodemographic, parenting, interactional and child correlates. *Journal of Clinical and Adolescent Psychology*, 34(1), 93–104. [https://doi.org/10.1207/s15374424jccp3401\\_9](https://doi.org/10.1207/s15374424jccp3401_9)
- Emmons, K. M., & Rollnick, S. (2001). Motivational interviewing in health care settings: Opportunities and limitations. *American Journal of Preventive Medicine*, 20(1), 68–74. [https://doi.org/10.1016/S0749-3797\(00\)00254-3](https://doi.org/10.1016/S0749-3797(00)00254-3)
- Evans, G. W., & Wachs, T. D. (2010). *Chaos and its influence on children's development*. Washington, DC: American Psychological Association.
- Firk, C., Konrad, K., Herpertz-Dahlmann, B., Scharke, W., & Dahmen, B. (2018). Cognitive development in children of adolescent mothers: The impact of socioeconomic risk and maternal sensitivity. *Infant Behavior and Development*, 50, 238–246. <https://doi.org/10.1016/j.infbeh.2018.02.002>
- Flückiger, C., Del Re, A. C., Wampold, B. E., Symonds, D., & Horvath, A. O. (2012). How central is the alliance in psychotherapy? A multilevel longitudinal meta-analysis. *Journal of Counseling Psychology*, 59(1), 10–17. <https://doi.org/10.1037/a0025749>
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54(7), 493.
- Gollwitzer, P. M., & Sheeran, P. (2006). Implementation intentions and goal achievement: A meta-analysis of effects and processes. *Advances in Experimental Social Psychology*, 38, 69–119.
- Haines, J., McDonald, J., O'Brien, A., Sherry, B., Bottino, C. J., Evans Schmidt, M., & Taveras, E. M. (2013). Healthy habits, happy homes: Randomized trial to improve household routines for obesity prevention among preschool-aged children. *JAMA Pediatrics*, 167(11), 1072–1079. <https://doi.org/10.1001/jamapediatrics.2013.2356>
- Jackson, A. P., Choi, J. K., & Preston, K. S. J. (2019). Harsh parenting and black boys' behavior problems: Single mothers' parenting stress and nonresident fathers' involvement. *Family Relations Interdisciplinary Journal of Applied Family Science*, 68(4), 436–449. <https://doi.org/10.1111/fare.12373>
- Jackson, A. P., & Scheines, R. S. (2005). Single mothers' self-efficacy, parenting in the home environment, and children's development in a two-wave study. *Social Work Research*, 29(1), 7–20. <https://doi.org/10.1093/swr/29.1.7>
- Jaffee, S. R., Hanscombe, K. B., Haworth, C. A., Davis, O. P., & Plomin, R. (2012). Chaotic homes and children's disruptive behavior: A longitudinal cross-lagged twin study. *Psychological Science*, 23, 643–650.
- Jones, T. L., & Prinz, R. J. (2005). Potential roles of parental self-efficacy in parent and child adjustment: A review. *Clinical Psychology Review*, 25(3), 341–363. <https://doi.org/10.1016/j.cpr.2004.12.004>
- Joosen, K. J., Mesman, J., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2012). Maternal sensitivity to infants in various settings predicts harsh discipline in toddlerhood. *Attachment & Human Development*, 14(2), 101–117. <https://doi.org/10.1080/14616734.2012.661217>
- Klahr, A. M., & Burt, S. A. (2014). Elucidating the etiology of individual differences in parenting: A meta-analysis of behavioral genetic research. *Psychological Bulletin*, 140, 544–586. <https://doi.org/10.1037/a0034205>
- Lakens, D. (2013). Calculating and reporting effect sizes to facilitate cumulative science: A practical primer for t-tests and ANOVAs. *Frontiers in Psychology*, 4, 863. <https://doi.org/10.3389/fpsyg.2013.00863>
- Lancaster, M., Jackson, L., Youngberg, S., Fitzgerald, M., & McWey, L. M. (2018). The role of peers in the linkages between harsh parenting and mental health outcomes among adolescents from families at-risk. *Journal of Aggression, Maltreatment & Trauma*, 27(10), 1060–1074. <https://doi.org/10.1080/10926771.2018.1425789>
- Lesniowska, R., Gent, A., & Watson, S. (2016). Maternal fatigue, parenting self-efficacy, and overreactive discipline during the early childhood years: A test of a mediation model. *Clinical Psychologist*, 20(3), 109–118. <https://doi.org/10.1111/cp.12056>
- Matheny, A. P., Jr., Wachs, T. D., Ludwig, J. L., & Phillips, K. (1995). Bringing order out of chaos: Psychometric characteristics of the confusion, hubbub, and order scale. *Journal of Applied Developmental Psychology*, 16, 429–444. [https://doi.org/10.1016/0193-3973\(95\)90028-4](https://doi.org/10.1016/0193-3973(95)90028-4)
- Metsäpelto, R. L., & Pulkkinen, L. (2003). Personality traits and parenting: Neuroticism, extraversion, and openness to experience as discriminative factors. *European Journal of Personality*, 17, 59–78. <https://doi.org/10.1002/per.468>
- Mouton, B., Loop, L., Stievenart, M., & Roskam, I. (2018). Confident parents for easier children: A parental self-efficacy program to improve young Children's behavior. *Educational Sciences*, 8, 134. <https://doi.org/10.3390/educsci8030134>
- Nelson, J. A., O'Brien, M., Blankson, A. N., Calkins, S. D., & Keane, S. P. (2009). Family stress and parental responses to children's negative emotions: Tests of the spillover, crossover, and compensatory hypotheses. *Journal of Family Psychology*, 23(5), 671–679. <https://doi.org/10.1037/a0015977>
- Netherlands Bureau for Economic Policy Analysis CPB. (2019, September 17). *Macro Economische Verkenning (MEV) 2020 (Septemberraming)* [Press release]. Retrieved from <https://www.cpb.nl/macro-economische-verkenning-mev-2020>.
- Norman, R. E., Byambaa, M., Rumma, N., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLoS Medicine*, 9(11), Article e1001349. <https://doi.org/10.1371/journal.pmed.1001349>
- O'Halloran, P. D., Shields, N., Blackstock, F., Wintle, E., & Taylor, N. F. (2015). Motivational interviewing increases physical activity and self-efficacy in people living in the community after hip fracture: A randomized controlled trial. *Clinical Rehabilitation*, 30(11), 1108–1119. <https://doi.org/10.1177/0269215515617814>

- Pittner, K., van Ijzendoorn, M. H., Alink, L. R. A., Buisman, R. S. M., Compier-De Block, L. H. C. G. C., van den Berg, L. J. M., & Bakermans-Kranenburg, M. J. (2019). The genetic and environmental etiology of child maltreatment in a parent-based extended family design. *Development and Psychopathology, 31*, 157–172. <https://doi.org/10.1017/S0954579418001608>
- Prevo, M. J. L., Bodrij, F. F., Andeweg, S. M., & Alink, L. R. A. (2020). *Changing chaos: The causal role of household chaos in child maltreatment - study 2 [preregistration]*. <https://doi.org/10.17605/OSF.IO/CUV6X>
- Savage, L. E., Tarabulsky, G. M., Pearson, J., Collin-Vézina, D., & Gagné, L. M. (2019). Maternal antecedents of childhood maltreatment and later parenting outcome: A meta-analysis. *Development and Psychopathology, 31*, 9–21.
- Selander, J., Bluhm, G., Theorell, T., Pershagen, G., Babisch, W., Seiffert, I., & Jarup, L. (2009). Saliva cortisol and exposure to aircraft noise in six European countries. *Environmental Health Perspectives, 117*(11), 1713–1717. <https://doi.org/10.1289/ehp.0900933>
- Straus, M. A., Hamby, S., Finkelhor, D., Moore, D. W., & Runyan, D. (1998). Identification of child maltreatment with the parent-child conflict tactics scales: Development and psychometric data for a national sample of American parents. *Child Abuse & Neglect, 22*, 249–270. [https://doi.org/10.1016/S0145-2134\(97\)00174-9](https://doi.org/10.1016/S0145-2134(97)00174-9)
- Treyvaud, K., Doyle, L. W., Lee, K. J., Ure, A., Inder, T. E., Hunt, R. W., & Anderson, P. J. (2015). Parenting behavior at 2 years predicts school-age performance at 7 years in very preterm children. *The Journal of Child Psychology and Psychiatry, 57*(7), 814–821. <https://doi.org/10.1111/jcpp.12489>
- Vachon, D. D., Krueger, R. F., Rogosch, F. A., & Cicchetti, D. (2015). Assessment of the harmful psychiatric and behavioral effects of different forms of child maltreatment. *JAMA Psychiatry, 72*, 1135–1142. <https://doi.org/10.1001/jamapsychiatry.2015.1792>
- Valiente, C., Lemery-Chalfant, K., & Reiser, M. (2007). Pathways to problem behaviors: Chaotic homes, parent and child effortful control, and parenting. *Social Development, 16*(2), 249–267. <https://doi.org/10.1111/j.1467-9507.2007.00383.x>
- Van Berckel, S. R., Prevo, M. J. L., Linting, M., Pannebakker, F. D., & Alink, L. R. A. (2020). Prevalence of child maltreatment in the Netherlands: An update and cross-time comparison. *Child Abuse and Neglect, 103*. <https://doi.org/10.1016/j.chiabu.2020.104439>
- Van Zeijl, J., Mesman, J., Van Ijzendoorn, M. H., Bakermans-Kranenburg, M. J., Juffer, F., Stolk, M. N., et al. (2006). Attachment-based intervention for enhancing sensitive discipline in mothers of 1-to 3-year-old children at risk for externalizing behavior problems: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 74*(6), 994–1005. <https://doi.org/10.1037/0022-006X.74.6.994>
- Víslá, A., Constantino, M. J., Newkirk, K., Ogrodniczuk, J. S., & Söchting, I. (2016). The relation between outcome expectation, therapeutic alliance, and outcome among depressed patients in group cognitive-behavioral therapy. *Psychotherapy Research, 28*(3), 446–456. <https://doi.org/10.1080/10503307.2016.1218089>
- Wachs, T. D., Francis, J., & McQuiston, S. (1979). Psychological dimensions of the infant's physical environment. *Infant Behavior & Development, 2*, 155–161. [https://doi.org/10.1016/S0163-6383\(79\)80017-X](https://doi.org/10.1016/S0163-6383(79)80017-X)
- Wang, Z., Deater-Deckard, K., & Bell, M. A. (2013). Household chaos moderates the link between maternal attribution bias and parenting. *Parenting, 13*(4), 233–252. <https://doi.org/10.1080/15295192.2013.832569>
- Wolford, S. N., Cooper, A. N., & McWey, L. M. (2018). Maternal depression, maltreatment history, and child outcomes: The role of harsh parenting. *American Journal of Orthopsychiatry, 89*(2), 181–191. <https://doi.org/10.1037/ort0000365>