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Infant Temperament and Behavioral Problems: Analysis of High-Risk Infants in Child Welfare

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Abstract

Researchers have demonstrated the association between difficult temperament in infancy and early childhood behavioral problems, but to date this has not been demonstrated in the child welfare population. This study utilized the National Survey of Child and Adolescent Well-Being (NSCAW), a nationally representative, longitudinal survey of children in the child-welfare system. The sample consisted of 1,084 infants 0–12 months old at baseline who were investigated for suspected child abuse. The researchers used longitudinal, multivariable logistic regression to examine the association between difficult temperament score in infants 0–12 months who had child welfare involvement and clinical-range Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000) score at 36-months-follow-up. Findings from this study suggest that among children with substantiated maltreatment, difficult temperament in infancy predicts early childhood behavioral problems. This relationship persists after adjusting for other risk factors, such as placement, caregiver depression, and family income. The study also discusses implications for child welfare practices.

Keywords

Child Maltreatment; Child Welfare; Infant Temperament

Introduction

It is well-known that behavioral problems in childhood predict later psychiatric illnesses including disruptive disorders (e.g., Oppositional Defiant Disorder [ODD], Attention

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Deficit/Hyperactivity Disorder [AD/HD]) and emotional disorders (anxiety and depression; Lavigne et al., 1998). For the general population, difficult temperament in infancy has been consistently linked to behavioral problems in early childhood (Côté et al., 2009; Lahey et al., 2008; Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997). Early childhood behavioral problems (ECBPs) are particularly concerning for children involved in child welfare for three reasons: 1. Parents' perceptions of their child's behavioral problems, particularly aggression, are related to increased risk for parent-child aggression (Rodriguez, 2016); 2. Children with behavioral problems in foster care are only half as likely to reunify with their biological parents (Landsverk, Davis, Ganger, Newton, & Johnson, 1996); and 3. Behavioral problems and aggression account for 60% of placement disruptions for children in foster care (James, 2004). These sequelae, in turn, all correlate with worse outcomes for children (i.e., longer time spent in care, greater frequency of placement changes, increased utilization of mental health services); therefore, it is important to identify risk factors in infancy that increase the risk for ECBPs amongst the child welfare population, so that efforts at prevention and intervention may be provided earlier.

Infant Temperament and Early Childhood Behavior Problems

Identification of risk factors for ECBPs has become easier as pediatric behavioral research has shifted to include children less than two years of age (Bagner, Rodriguez, Blake, Linares, & Carter, 2012). There is ever greater agreement that psychopathology, when understood in the context of the primary attachment relationship, can be detected during the first few years of life (Zeanah, 2009), and a review of both screening and evaluation tools used with very young children (under age 2; Bagner, 2012) identified multiple measures with sound psychometric properties and appropriate specificity/sensitivity. The increased availability of psychometrically sound assessment tools for an infant population has allowed research to examine the development of psychopathology beginning at a very early age. As research into the risk factors for behavioral problems has shifted to include the very young, temperament has become a significant factor worth consideration. Temperament is defined as "constitutionally based differences in reactivity and regulation," (Rothbart, 1986, p. 356) and difficult temperament is understood to correlate with decreased soothability, heightened reactivity to novel stimuli/environments, and increased fussiness (Gross, Conrad, Fogg, & Wothke, 1994; Lipscomb et al., 2011; Oddi, Murdock, Vadnais, Bridgett, & Gartstein, 2013; Olafsen et al., 2008; Rothbart, 1986; Verhage, Oosterman, & Schuengel, 2013). For the general population, difficult temperament in infancy has been consistently linked to ECBPs (Côté et al., 2009; Lahey et al., 2008; Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997). Difficult temperament in infancy appears to persist through adolescence (Kivijärvi, Räihä, Kaljonen, Tamminen, & Piha, 2005; Goldsmith, 1996; Putnam, Gartstein, & Rothbart, 2006; Tremblay et al., 2004; Tomlinson, Harbaugh, & Anderson, 2009), and predicts later aggression and other externalizing behavior problems, and possibly internalizing disorders (Keenan, & Shaw, 1994; Lawson, & Ruff, 2004; Lee, & Bates, 1985; Loeber, & Hay, 1997).

Difficult temperament is typically viewed as a risk factor for the development of later psychopathology, but numerous other factors have also been shown to contribute to the development of behavioral and emotional problems in both infants and toddlers, including

poverty, low maternal education (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Huijbregts, Séguin, Zoccolillo, Boivin, & Tremblay, 2007; Tremblay et al., 2004), and maternal depression (Beck, 1999; Korja, et al., 2008; Madigan, Moran, Schuengel, Pederson, & Otten, 2007; Martins, & Gaffan, 2000). Indeed, maternal depression during an infant's first year appears to have the highest effect on later child behavioral problems (Bagner, Pettit, Lewinsohn, & Seeley, 2010). These factors are often comorbid in the child welfare population, and complicate the relationship between difficult temperament in infancy and later emotional and behavioral problems, such that further investigation of the relationship between these two variables is needed before applying previous research findings to the child welfare population.

The relationship between difficult temperament in infancy and later emotional and behavioral problems has been documented in the general population, but not in the child welfare population, specifically, those children who are being investigated for allegations of abuse and/or neglect. The child welfare population includes all children with whom child protective services have any contact. Because there is conflicting evidence regarding meaningful differences between substantiated and unsubstantiated cases (Hussey et al., 2005; Kugler, Guastaferro, Chenk, Beal, Zadzora & Noll, 2018; Thompson et al., 2001), our study therefore examined the association between difficult temperament in infancy and ECBPs for: the total sample of children involved with child welfare; those with substantiated allegations as a high-risk sub-group; and those with unsubstantiated allegations. We hypothesized that for young children involved in the child welfare system, difficult temperament in infancy will be associated with higher rates of behavioral problems in early childhood.

Method

Participants and Procedure

Our study assessed data from the National Survey on Child and Adolescent Well-Being II (NSCAW II), the second cohort of a voluntary, longitudinal study of children who have had contact with the child welfare system as reported by child protective services (CPS). These reports consist of both substantiated and unsubstantiated investigations of maltreatment. Children, caregivers, educators, and caseworkers' face-to-face interviews all served as sources of data.

In order to select a nationally representative cohort, NSCAW implemented a two-stage cluster sampling design. First, 81 primary sampling units (PSU) were randomly selected using a probability proportional to size procedure. These PSUs represent 83 counties nationwide. From these PSUs, a sample of 5,873 children who had been in contact with the child welfare system for investigations of maltreatment were then selected (Dowd, Dolan, Wallin, Smith, Day & Keeney, 2014).

NSCAW II consists of children who were age 2 months to 17.5 years at the point of first contact with child welfare. Children for NSCAW II were sampled from investigations conducted between February 2008 and April 2009; baseline data collection began in March 2008 and was completed in September 2009. Wave 2 data were collected at 18 months, and

wave 3 data at 36 months, after the initial investigation (October 2009 to January 2011, and June 2011 to December 2012 respectively). Our study examines infancy temperament only in children who were under 12 months of age at baseline. This resulted in a sample size of 1,084 children for our study.

Measures

Child Behavior Checklist.—The primary outcome of child behavioral problems was assessed using the Child Behavior Checklist (Achenbach, 1991a), a caregiver-reported measure of emotional-behavioral problems. The CBCL has been shown to reliably identify psychiatric disorders among children (Warnick, Bracken, & Kasl, 2008). It yields eight syndrome scales (aggressive behavior, anxious/depressed, attention problems, rule-breaking behavior, somatic complaints, social problems, thought problems, withdrawn/depressed), two broad-spectrum scales (internalizing, externalizing), and one total score. Caregivers rate over 100 behaviors observed over six months as being *not true*, *somewhat/sometimes true*, or *very/often true* of their child. Internal consistency for NSCAW-II as measured by Cronbach's alpha was high for children aged two to three (Externalizing Problems=.91; Internalizing Problems=.80; Total Problems=.95). Because previous studies have found a relationship between difficult temperament in infancy and both internalizing and externalizing problems in childhood, our study utilized the Total Problems. The Total Problems scale is measured by a continuous standardized T-score, with a T-score of 64 or greater considered to be clinically significant. For our purposes, the Total Problems scale was dichotomized to clinical (a T-score of 64 or greater) and subclinical (a T-score less than 64).

Infant Behavior Questionnaire.—The primary predictor of infant temperament was assessed using the temperament scales developed by the National Longitudinal Study of Youth, derived from the Infant Behavior Questionnaire (Rothbart, 1981; Worobey, & Blajda, 1989), and Campos and Kagan's Compliance Scale (Center for Human Resource Research, 2000). This caregiver-reported measure for infants 0–12 months old yields six scales. For our purposes, only the difficulty scale was utilized. The difficulty scale consisted of 14 items pertaining to infant behavior (such as the frequency with which the infant “cries and fusses” or gets “upset when you leave”). Each question was rated on a 5 point Likert-scale with responses ranging from “almost never” to “almost always”. The values for each item were totaled into a raw score for infants whose caregiver responded to each item. The difficulty scale raw score was then standardized into a continuous T-score for our analysis. Internal consistency for NSCAW-II as measured by Cronbach's alpha was only moderate (Difficulty Scale=0.64). Typically, acceptable alpha scores fall at or above 0.6 or 0.7. In this case, because the Infant Behavior Questionnaire has been extensively validated in other studies and is widely used in infant studies, the scores were not transformed in any way.

Composite International Diagnostic Interview-Short Form.—The Composite International Diagnostic Interview-Short Form (Kessler, Andrews, Mroczek, Ustun, & Wittchen, 1998) is a self-report screening tool derived from the NIMH-Diagnostic Interview Schedule, which reflects an adaptation of the longer form, Composite International Diagnostic Interview. The reliability and validity of the CIDI has been widely studied

(Wittchen, 1994). Only questions evaluating symptoms of depression were asked of caregivers in NSCAW-II. These questions measured both dysphoric and anhedonic depression, based on a series of nine questions. If either type of depression was detected, the caregiver was considered to suffer from depression as indicated by a dichotomous variable to distinguish between depressed and non-depressed caregivers.

Substantiation of Abuse.—Families initially make contact with child welfare agencies during the investigation of child abuse allegations. That investigation may yield findings that the abuse occurred (substantiated) or that it did not occur/cannot be determined (unsubstantiated). As described previously, research into whether meaningful differences exist between the two groups remains inconclusive; therefore, analyses include a dichotomized variable to indicate substantiated and unsubstantiated claims. Our study analyzes only substantiated cases as a high-risk subgroup.

Covariates.—Several demographic and contextual variables have been shown to be related to behavioral problems, including poverty and maternal education (Côté et al., 2006; Huijbregts et al., 2007; Korja et al., 2008; Tremblay et al., 2004), sex (Ford, Goodman, & Meltzer, 2003; Grant, & Weissman, 2007; Marikangas et al., 2010; Shear, Halmi, Widiger, & Boyce, 2007; van der Sluis et al., 2016), race/ethnicity (Anton, Jones, & Youngstrom, 2015), child placement in-home or out-of-home (Villodas, Litrownik, Newton, & Davis, 2016); low, medium, and high scores on the Bayley Infant Neurodevelopmental Screener (Dekker, & Koot, 2003; Emerson, & Einfeld, 2010; Emerson & Hatton, 2007), and type of child's exposure to family violence. This could include child physical or sexual abuse, child neglect, domestic violence, parental substance abuse, and others (van der Put, Lancôt, de Ruiter, van Vugt, 2015). These variables were included in the model as covariates.

Data Analysis

All statistical analyses were conducted using Stata 14.1. We examined the characteristics of the substantiated, unsubstantiated, and total population by clinical CBCL classification. Sampling weights were applied to both descriptive characteristics and statistical analyses. Weights were constructed to account for unequal selection probabilities and adjusted for nonresponse and overrepresentation by various subgroups such that the data would be nationally representative of families involved with child welfare (Biemer, Christ, Wheelless, & Weisen, 2008). Descriptive characteristics of the total population and those with substantiated abuse were examined. To check for assumptions of independence among predictor variables, the variance inflation factor (VIF) for each predictor variable was calculated. No variable had a VIF over 2.5, a common cutoff value to indicate potential multi-collinearity.

In our sample, variables pertaining to family poverty levels were missing in 16.7% of cases, while CBCL scores were missing in 17.3% of cases. To account for this, twenty multiply imputed datasets were generated using multiple imputation by chained equations (MICE), as this method is able to produce multiple imputation for different variable types (Van Buuren, Boshuizen, & Knook, 1999). The bivariate proportional differences of CBCL clinical status for each group were assessed with Wald tests adjusted for survey data. Two separate

multivariable logistic regressions were conducted to assess the relationship of difficult temperament (predictor variable) on CBCL clinical classification (outcome variable). In the first regression, the association between predictor and outcome was examined for the total sample; in the second regression, the association was examined exclusively for children whose cases of alleged abuse had been substantiated. Both models were adjusted for by survey probability weights and clustering of region as indicated by PSUs. Due to the relatively small sample size of children with clinical CBCL classification in unsubstantiated cases, a multivariable logistic regression for unsubstantiated cases could not produce reliable results and was therefore not included in our study.

Results

Table 1 represents the weighted descriptive characteristics of children in the general child welfare population and those with substantiated cases. In the total population, the difficult temperament score was higher for children classified as having a clinical CBCL score with a weighted mean of 50.5, compared with 47.1 for children with subclinical scores. Hispanic children had a lower proportion of clinical CBCL scores (9.5%) compared to subclinical (27.7%). Children living in poverty were also more likely to have clinical CBCL scores (75.6% vs. 55.8%). Other variables, including substantiation status, did not significantly differ between clinical and subclinical status in bivariate analyses.

Among substantiated cases, the weighted mean difficult temperament score was 53.7 among children with clinical CBCL scores, which was significantly higher than the 47.8 mean weighted score among children with subclinical CBCL scores. More than twice the proportion of children with clinical CBCL scores had a depressed caregiver, compared with children who had subclinical CBCL scores. Among the unsubstantiated cases, the weighted mean difficult temperament score was 46.7 among children with clinical CBCL scores; this was nearly identical to the weighted mean score of 46.6 among children with subclinical CBCL scores. There was no significant difference in the proportion of depressed caregivers when comparing children with subclinical CBCL scores (16.5%) to clinical CBCL scores (19.9%).

Results of the multivariable logistic regression analyses (Table 2) suggest that among the total welfare population African-American children (OR: 0.20; 95% CI: -.06, 0.69, $p < .05$) and Hispanic children (OR: 0.14; 95% CI: 0.05, 0.39, $p < .01$) are less likely than white children to have clinical CBCL scores. The type of abuse to which the child was exposed related significantly to CBCL classification, with substance abuse resulting in greater odds of clinical CBCL score compared with neglect (OR: 3.44; 95% CI: 1.24, 9.56, $p < .05$). There was no significant difference in clinical CBCL scores, however, between substantiated and unsubstantiated cases. All other variables were not significantly associated with CBCL score classification in the general child welfare population.

Among substantiated cases, difficult temperament was associated with higher odds of receiving a clinical CBCL score (OR: 1.07; 95% CI: 1.02, 1.11, $p < .01$). Caregiver depression was also associated with higher odds of having a clinical CBCL score (OR: 6.19; 95% CI: 2.29, 16.70, $p < .01$). In-home placement of the child, however, was associated with

lower odds of receiving a clinical CBCL score (OR: 0.26; CI 0.10, 0.63, $p < .01$). Higher family income was also associated with lower odds of receiving a clinical CBCL score, but only for children whose family income exceeded 200% the poverty line relative to children whose family income fell under the poverty line (OR: 0.26; CI: 0.07, 1.00, $p < .05$). The sample size of unsubstantiated cases was not sufficient to conduct multivariable analysis. No other variables were significant.

Discussion

Previous research has shown that difficult temperament in infancy is related to behavioral problems in childhood (Côté et al., 2009; Lahey et al., 2008; Shaw, Keenan, Vondra, Delliquadri, & Giovannelli, 1997) for the general population. This had not, however, been demonstrated in the child welfare population. Results from our study demonstrated that among those children for whom initial allegations of abuse were substantiated, the relationship between difficult temperament and behavior problems mirrored that of the general population: an infant's odds of receiving a clinical CBCL score within three years increased as their temperament increased in difficulty. This association was not found when analyzing either the whole sample or only those children with unsubstantiated referrals.

The relationship between difficult temperament and ECBPs among the substantiated group is likely a result of a complex interaction between caregivers and infants. Parents who are predisposed toward abusive behavior may lack the coping and parenting skills necessary to manage infants with difficult temperaments. The interaction between a child's difficult temperament and a parent's abusive behavior may create an additive effect which exacerbates the impairment, resulting in behavioral problems in early childhood. Early identification of ECBPs has led to successful early interventions to ameliorate these problems (e.g., Murray, 2010; Nixon, 2002; Shaw, Dishion, Supplee, Gardner, Arnds, 2006). If child welfare workers can identify infants with difficult temperaments, preventative efforts may be made to reduce the likelihood of these infants going on to develop ECBPs, thereby reducing one of the risk factors for increased parent-child aggression (Rodriguez, 2016).

The finding that difficult temperament only predicted the development of ECBPs for infants with substantiated allegations of child abuse or neglect suggests that there may be a meaningful difference between families based on substantiation status. There is conflicting evidence regarding how different the two samples really are (substantiated vs. unsubstantiated). For example, Hussey and colleagues (2005) compared behavioral and developmental outcomes for 806 children who had child abuse allegations made between 4 and 8 years of age. They found no significant differences between average scores on any of the outcome measures. However, Thompson and colleagues (2001) examined the records of 15,812 juveniles and found that the youth's odds of subsequent offending were reduced by 55% when their previous maltreatment allegation had been recorded as unsubstantiated, suggesting that substantiation status is related to future outcomes for youth. It may be that substantiation status matters for some outcomes, but not others. In a more recent study looking at the effect of substantiation status on adolescent health outcomes (Kugler, Guastaferrro, Chenk, Beal & Zadzora, 2018), they found there was no difference between those with investigations/substantiated status and investigations/unsubstantiated status on

outcomes of teen motherhood, HIV-risk behaviors, and substance use; however, they did find a difference in rates of depression amongst adolescents with a history of substantiated child abuse when compared to those with unsubstantiated findings. It is possible that there are meaningful differences between the substantiated/unsubstantiated groups on some measures, but not on others. Our results support the conclusion that there is a meaningful difference between the substantiated and unsubstantiated groups in the way that temperament influences the development of ECBPs.

Of the covariates included in the model, three emerged as significant among children with substantiated allegations: placement, caregiver depression, and family income. Children who remained in the home were less likely to receive clinical CBCL scores three years after the initial investigation. Previous research has found that children remaining with their permanent caregivers following child welfare involvement displayed more behavior problems on caregiver-reported measures (Achenbach, 1991b; Bellamy, 2008; USDHHS, 2005), but only when compared to children in the general population and not to children placed in out-of-home care. In our study, the finding that children remaining in-home were less likely to receive clinical CBCL scores three years later may indicate that the primary relationship with the caregiver is protective against the development of behavioral problems; but it may also reflect an artifact of reporting bias, as previous research has found that foster parents with higher education levels were more likely to perceive their foster children as having mental health needs compared to kinship or in-home caregivers (Zima, Bussing, Yang, & Belin, 2000). Therefore, it is unclear whether foster parents are over-reporting symptoms, in-home caregivers are under-reporting, or both. Further investigation is necessary to determine whether placement influences the frequency and intensity of behavioral problems, or whether caregiver factors influence caregivers' perception of behavioral problems.

Our study also found that infants with substantiated allegations are more likely to develop behavioral problems when their caregiver is depressed. This is unsurprising, given that maternal depression is a strong contributor to the development of behavior problems in young children (Beck, 1999; Côté et al., 2006; Huijbregts et al., 2007; Martins, & Gaffan, 2000; Tremblay et al., 2004). The interaction between difficult temperament and maternal depression can exacerbate each other, which may lead to further development of behavioral problems. Also consistent with research on the general population, higher family income was protective against infants developing behavioral problems for substantiated cases (Côté et al., 2006; Huijbregts et al., 2007; Tremblay et al., 2004).

Although our study is the first to demonstrate the relationship between difficult temperament and ECBPs among children with substantiated abuse, the following limitations should be noted. Caregivers self-reported both temperament and behavioral problems, and as no corroboration of caregiver-ratings was available, their reports may over- or under-estimate the severity of both the child's temperament and/or their behavioral problems. It was also not possible to examine the impact of other early educational or social experiences that may influence the development of later behavioral problems, as these variables were not available in the data set. Due to a relatively small sample size among unsubstantiated cases our study cannot assess the effect temperament has on later behavior beyond a simple bivariate

comparison in this subgroup. Although the unadjusted analysis of difficult temperament scores showed no significant association with CBCL classification in unsubstantiated cases, results could not be reliably produced in multivariable analysis due to a lack of statistical power. Therefore, our study cannot be extrapolated beyond a comparison of substantiated cases to the total child welfare population (substantiated and unsubstantiated cases).

These findings have potential implications for child welfare. Among 0–12 month-old infants with substantiated abuse, it may be beneficial to assess infant temperament and prioritize early intervention for infant-caregiver dyads for those infants with difficult temperament. Of note, the vast majority (89.1%) of infants reported to child welfare prior to 12 months of age remained in-home with their primary caregiver regardless of substantiation status, and the majority of those who remained in-home (60.7%) were re-reported within five years of the initial report (Putnam-Hornstein, Simon, Eastman, & Magruder, 2015). The highest rate of re-reporting was found among infants whose initial allegations were substantiated. This suggests that, in instances of substantiated maltreatment, the services currently provided to caregivers are insufficient for reducing recidivism.

One method to improve outcomes for high risk infants may be for child welfare agencies to include infant mental health training to appropriately identify infant mental health problems and/or infant risk factors, and provide referrals as needed. Standardized measures are available for use and offer a variety of formats (parent/caregiver report, observational coding, clinician rating; see Bagner, 2012 for a review). According to the California Center for Infant-Family and Early Childhood Mental Health (<http://cacenter-ecmh.org/wp/>), infant mental health is increasingly recognized as an area of specialization, and certification programs are now emerging to ensure competency for practitioners. Assessment of infant temperament in substantiated cases of child abuse may be vital for identifying those most in need and linking them with services before behavioral problems manifest. The prevention behavioral problems could result in improved outcomes for children residing both in- and out-of-home (in reduced parent-child aggression and reduced placement disruptions/increased reunification, respectively).

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Abbreviations:

NSCAW-II	National Survey of Child and Adolescent Wellbeing II
CBCL	Child Behavior Checklist
ECBPs	Early Childhood Behavioral Problems

References

- Achenbach TM, Rescorla LA (2000). Manual for the ASEBA Preschool Forms & Profiles Burlington, VT: University of Vermont, Research Center for Children, Youth, & Families.
- Anton MT, Jones DJ, Youngstrom EA (2015). Socioeconomic status, parenting, and externalizing problems in African American single-mother homes: A person-oriented approach. *Journal of Family Psychology*, 29(3), 405–415. doi:10.1037/fam0000086. [PubMed: 26053349]
- Bagner DM, Pettit JW, Lewinsohn PM, Seeley JR (2010). Effect of Maternal Depression on Child Behavior: A Sensitive Period? *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(7), 699–707. doi:10.1016/j.jaac.2010.03.012. [PubMed: 20610139]
- Bagner DM, Rodríguez GM, Blake CA, Linares D, Carter AS (2012). Assessment of Behavioral and Emotional Problems in Infancy: A Systematic Review. *Clinical Child and Family Psychology Review*, 15(2), 113–128. doi:10.1007/s10567-012-0110-2. [PubMed: 22262040]
- Beck CT (1999). Maternal depression and child behaviour problems: A meta-analysis. *Journal of Advanced Nursing*, 29(3), 623–629. [PubMed: 10210459]
- Bellamy JL (2008). Behavioral Problems Following Reunification of Children in Long Term Foster Care. *Children and Youth Services Review*, 30(2), 216–228. doi:10.1016/j.childyouth.2007.09.008. [PubMed: 19190714]
- Biemer P, Christ S, Wheelless S, & Weisen C (2008). National Survey of Child and Adolescent Well-Being (NSCAW): Statistical User's Manual Ithaca, NY: National Data Archive on Child Abuse and Neglect, Cornell University.
- Center for Human Resource Research. (2000). NLSY79 1998 Child and Young Adult Data Users Guide Columbus: The Ohio State University.
- Côté SM, Boivin M, Liu X, Nagin DS, Zoccolillo M, Tremblay RE (2009). Depression and anxiety symptoms: onset, developmental course and risk factors during early childhood. *Journal of Child Psychology and Psychiatry*, 50(10), 1201–1208. doi:10.1111/j.1469-7610.2009.02099.x. [PubMed: 19519755]
- Côté SM, Vaillancourt T, LeBlanc JC, Nagin DS, Tremblay RE. (2006) The Development of Physical Aggression from Toddlerhood to Pre-Adolescence: A Nation Wide Longitudinal Study of Canadian Children. *Journal of Abnormal Child Psychology*, 34(1), 71–85. doi:10.1007/s10802-005-9001-z. [PubMed: 16565888]
- Dekker MC, Koot HM (2003). DSM-IV Disorders in Children with Borderline to Moderate Intellectual Disability. I: Prevalence and Impact. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42(8), 915–922. doi:10.1097/01.CHI.0000046892.27264.1A. [PubMed: 12874493]
- Dowd K, Dolan M, Wallin J, Smith K, Day O, Keeney J, Wheelless SBP (2014). National Survey of Child and Adolescent Well-Being (NSCAW): NSCAW II Combined Waves 1–3 Data File User's Manual, Restricted Release Version Ithaca; NY: National Data Archive on Child Abuse and Neglect.
- Emerson E, Einfeld S (2010). Emotional and behavioural difficulties in young children with and without developmental delay: a bi-national perspective. *Journal of Child Psychology and Psychiatry*, 51(5), 583–593. doi:10.1111/j.1469-7610.2009.02179.x. [PubMed: 20015191]
- Emerson E, Hatton C (2007). Mental health of children and adolescents with intellectual disabilities in Britain. *The British Journal of Psychiatry*, 191, 493–499. doi:10.1192/bjp.bp.107.038729. [PubMed: 18055952]
- Ford T, Goodman R, Meltzer H (2003). The British Child and Adolescent Mental Health Survey 1999: The prevalence of DSM-IV disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, 42(10), 1203–1211. doi:10.1097/00004583-200310000-00011. [PubMed: 14560170]
- Goldsmith HH (1996). Studying temperament via construction of the toddler behavior assessment questionnaire. *Child Development*, 67(1), 218–235. [PubMed: 8605830]
- Grant BF, Weissman MM (2007). Gender and the prevalence of psychiatric disorders. In: Narrow WE, First MB, Sirovatka PJD (Eds.), *Age and Gender Considerations in Psychiatric Diagnosis: A Research Agenda for DSM-V* (31–45) Arlington: American Psychiatric Publishing.

- Gross D, Conrad B, Fogg L, Wothke W (1994). A longitudinal model of maternal self-efficacy, depression, and difficult temperament during toddlerhood. *Research in Nursing & Health*, 17(3), 207–215. [PubMed: 8184132]
- Huijbregts SCJ, Séguin JR, Zoccolillo M, Boivin M, Tremblay RE (2007). Associations of Maternal Prenatal Smoking with Early Childhood Physical Aggression, Hyperactivity-Impulsivity, and their Co-Occurrence. *Journal of Abnormal Child Psychology*, 35(2), 203–215. doi:10.1007/s10802-006-9073-4. [PubMed: 17294130]
- Hussey JM, Marshall JM, English DJ, Knight ED, Lau AS, Dubowitz H, Kotch JB (2005). Defining Maltreatment According to Substantiation: Distinction without a Difference? *Child Abuse and Neglect*, 29(5), 479–492. doi:10.1016/j.chiabu.2003.12.005. [PubMed: 15970321]
- James S (2004). Why Do Foster Care Placements Disrupt? An Investigation of Reasons for Placement Change in Foster Care. *Social Service Review*, 78(4), 601–627. doi:10.1086/424546.
- Keenan K, Shaw DS (1994). The development of aggression in toddlers: A study of low-income families. *Journal of Abnormal Child Psychology*, 22(1), 53–77. doi:10.1007/BF02169256. [PubMed: 8163775]
- Kessler RC, Andrews G, Mroczek D, Ustun B, Wittchen HU (1998). The World Health Organization Composite International Diagnostic Interview--Short-Form (CIDI-SF). *International Journal of Methods in Psychiatric Research*, 7(4), 171–185. doi:10.1002/mpr.47.
- Kivijärvi M, Räihä H, Kaljonen A, Tamminen T, Piha J (2005) Infant temperament and maternal sensitivity behavior in the first year of life. *Scandinavian Journal of Psychology*, 46(5), 421–428. doi:10.1111/j.1467-9450.2005.00473.x. [PubMed: 16179024]
- Korja R, Savonlahti E, Ahlqvist-Björkroth S, Stolt S, Haataja L, Lapinleimu H....PIPARI study group (2008). Maternal depression is associated with mother-infant interaction in preterm infants. *Acta Paediatrica*, 97(6), 724–730. doi:10.1111/j.1651-2227.2008.00733.x. [PubMed: 18373715]
- Kugler KC, Guastaferrro K, Chenk CE, Beal SJ, Zadzora KM, Noll JG (2018). The effect of substantiated and unsubstantiated investigations of child maltreatment and subsequent adolescent health. *Child Abuse and Neglect*. Advance online publication doi: 10.1016/j.chiabu.2018.06.005.
- Lahey BB, Van Hulle CA, Keenan K, Rathouz PJ, D'Onofrio BM, Rodgers JL, Waldman ID (2008). Temperament and Parenting During the First Year of Life Predict Future Child Conduct Problems. *Journal of Abnormal Child Psychology*, 36(8), 1139–1158. doi:10.1007/s10802-008-9247-3. [PubMed: 18568397]
- Landsverk J, Davis I, Ganger W, Newton R, Johnson I (1996). Impact of child psychosocial functioning on reunification from out-of-home placement. *Children and Youth Services Review*, 18(4–5), 447–462. doi:10.1016/0190-7409(96)00014-X.
- Lavigne JV, Arend R, Rosenbaum D, Binns HJ, Christoffel KK, Gibbons RD (1998). Psychiatric Disorders with Onset in the Preschool Years: I. Stability of Diagnoses. *Journal of the American Academy of Child and Adolescent Psychiatry*, 37(12), 1246–1254. doi: 10.1097/00004583-199812000-00007. [PubMed: 9847496]
- Lawson K, Ruff H (2004). Early attention and negative emotionality predict later cognitive and behavioural function. *International Journal of Behavioral Development*, 28(2), 157–165. doi: 10.1080/01650250344000361.
- Lee CL, Bates JE (1985). Mother-Child Interaction at Age Two Years and Perceived Difficult Temperament. *Child Development*, 56(5), 1314. doi:10.2307/1130246. [PubMed: 4053745]
- Lipscomb ST, Leve LD, Harold GT, Neiderhiser JM, Shaw DS, Ge X, Reiss D (2011). Trajectories of Parenting and Child Negative Emotionality During Infancy and Toddlerhood: A Longitudinal Analysis. *Child Development*, 82(5), 1661–1675. doi:10.1111/j.1467-8624.2011.01639.x. [PubMed: 21883160]
- Loeber R, Hay D (1997). Key issues in the development of aggression and violence from childhood to early adulthood. *Annual Review of Psychology*, 48, 371–410. doi:10.1146/annurev.psych.48.1.371.
- Madigan S, Moran G, Schuengel C, Pederson DR, Otten R (2007). Unresolved maternal attachment representations, disrupted maternal behavior and disorganized attachment in infancy: Links to toddler behavior problems. *Journal of Child Psychology and Psychiatry*, 48(10), 1042–1050. doi: 10.1111/j.1469-7610.2007.01805.x. [PubMed: 17915005]

- Martins C, Gaffan EA (2000). Effects of early maternal depression on patterns of infant-mother attachment: A meta-analytic investigation. *Journal of Child Psychology and Psychiatry & Allied Disciplines*, 41(6), 737–746.
- Merikangas KR, He J-P, Burstein M, Swanson SA, Avenevoli S, Cui L ... Swendsen J (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the National Comorbidity Survey Replication--Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry*, 49(10), 980–989. doi:10.1016/j.jaac.2010.05.017. [PubMed: 20855043]
- Murray DW (2010). Treatment of preschoolers with attention-deficit/hyperactivity disorder. *Current Psychiatry Reports*, 12, 374–381. doi: 10.1007/s11920-010-0142-6. [PubMed: 20676944]
- Nixon RD (2002). Treatment of behavior problems in preschoolers: A review of parent training programs. *Clinical Psychology Review*, 22, 525–546. doi:10.1016/S0272-7358(01)00119-2. [PubMed: 12094510]
- Oddi KB, Murdock KW, Vadnais S, Bridgett DJ, Gartstein MA (2013). Maternal and Infant Temperament Characteristics as Contributors to Parenting Stress in the First Year Postpartum. *Infant and Child Development*, 22(6), 553–579. doi:10.1002/icd.1813.
- Olafsen KS, Kaarensen PI, Handegård BH, Ulvund SE, Dahl LB, Rønning JA (2008). Maternal ratings of infant regulatory competence from 6 to 12 months: Influence of perceived stress, birth-weight, and intervention: A randomized controlled trial. *Infant Behavior and Development*, 31(3), 408–421. doi:10.1016/j.infbeh.2007.12.005. [PubMed: 18282607]
- Putnam SP, Gartstein MA, Rothbart MK (2006). Measurement of fine-grained aspects of toddler temperament: The early childhood behavior questionnaire. *Infant Behavior and Development*, 29(3), 386–401. doi:10.1016/j.infbeh.2006.01.004. [PubMed: 17138293]
- Putnam-Hornstein E, Simon JD, Eastman AL, Magruder J (2015). Risk of re-reporting among infants who remain at home following alleged maltreatment. *Child Maltreatment*, 20(2), 92–103. doi: 10.1177/1077559514558586. [PubMed: 25416553]
- Rodriguez CM (2016). Predicting Parent-Child Aggression Risk: Cognitive Factors and Their Interaction with Anger. *Journal of Interpersonal Violence*, 33(3), 359–378. doi: 10.1177/0886260516629386. [PubMed: 26872504]
- Rothbart MK (1986). Longitudinal observation of infant temperament. *Developmental Psychology*, 22(3), 356–365.
- Rothbart MK (1981). Measurement of Temperament in Infancy. *Child Development*, 52(2), 569–578.
- Shaw DS, Dishion TJ, Supplee L, Gardner F, Arnds K (2006). Randomized trial of a family-centered approach to the prevention of early conduct problems: 2-year effects of the family check-up in early childhood. *Journal of Consulting and Clinical Psychology*, 74, 1–9. doi: 10.1037/0022-006X.74.1.1. [PubMed: 16551138]
- Shaw DS, Keenan K, Vondra JI, Delliquadri E, Giovannelli J (1997). Antecedents of preschool children's internalizing problems: A longitudinal study of low-income families. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36(12), 1760–1767. [PubMed: 9401338]
- Shear K, Halmi KA, Widiger TA, Boyce C (2007). Sociocultural factors and gender. In: Narrow WE, First MB, Sirovatka PJ, Regier DA (Eds.), *Age and Gender Considerations in Psychiatric Diagnosis: A Research Agenda for DSM-V (65–79)* Arlington: American Psychiatric Publishing.
- Thompson KM, Wonderlich SA, Crosby RD, Ammerman FF, Mitchell JE, Brownfield D (2001). An assessment of the recidivism rates of substantiated and unsubstantiated maltreatment cases. *Child Abuse and Neglect*, 25(9), 1207–1218. [PubMed: 11700693]
- Tomlinson PS, Harbaugh BL, Anderson KH (1996). Children's temperament at 3 months and 6 years old: Stability, reliability, and measurement issues. *Issues in Comprehensive Pediatric Nursing*, 19(1), 33–47. [PubMed: 8920498]
- Tremblay RE, Nagin DS, Séguin JR, Zoccolillo M, Zelazo PD, Boivin M ... Japel C (2004). Physical Aggression During Early Childhood: Trajectories and Predictors. *Pediatrics*, 114(1):e43–50. doi: 10.1542/peds.114.1.e43. [PubMed: 15231972]
- U.S. Department of Health and Human Services, Administration for Children & Families. (4 2005). National Survey of Child and Adolescent Well-Being (NSCAW) CPS Sample Component Wave I Data Analysis Report <http://www.acf.hhs.gov/opre/resource/nscaw-cps-sample-component-wave-I-data-analysis-report>.

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- Van Buuren S, Boshuizen HC, Knook DL (1999). Multiple imputation of missing blood pressure covariates in survival analysis. *Statistics in Medicine*, 18, 681–694. [PubMed: 10204197]
- van der Put CE, Lanctôt N, de Ruiter C, van Vugt E (2015). Child maltreatment among boy and girl probationers: Does type of maltreatment make a difference in offending behavior and psychosocial problems? *Child Abuse and Neglect*, 46, 142–151. doi:10.1016/j.chiabu.2015.05.012. [PubMed: 26072283]
- van der Sluis S, Polderman TJC, Neale MC, Verhulst FC, Posthuma D, Dieleman GC (2016). Sex differences and gender-invariance of mother-reported childhood problem behavior. *International Journal of Methods in Psychiatric Research*, 26(3), pp-. 2016. doi:10.1002/mpr.1498.
- Verhage ML, Oosterman M, Schuengel C (2013). Parenting self-efficacy predicts perceptions of infant negative temperament characteristics, not vice versa. *Journal of Family Psychology*, 27(5), 844–849. doi:10.1037/a0034263. [PubMed: 24015708]
- Villodas MT, Litrownik AJ, Newton RR, Davis IP (2016). Long-term placement trajectories of children who were maltreated and entered the child welfare system at an early age: Consequences for physical and behavioral well-being. *Journal of Pediatric Psychology*, 41(1), 46–54. doi: 10.1093/jpepsy/jsv031. [PubMed: 25834181]
- Warnick EM, Bracken MB, Kasl S (2008). Screening Efficiency of the Child Behavior Checklist and Strengths and Difficulties Questionnaire: A Systematic Review. *Child and Adolescent Mental Health*, 13(3), 140–147. doi:10.1111/j.1475-3588.2007.00461.x.
- Wittchen HU (1994). Reliability and validity studies of the WHO--Composite International Diagnostic Interview (CIDI): A critical review. *Journal of Psychiatric Research*, 28(1), 57–84. [PubMed: 8064641]
- Worobey J, Blajda VM (2000). Temperament Ratings at Two Weeks, Two Months, and One Year: Differential Stability of Activity and Emotionality. *Developmental Psychology*, 25(2), 257–263.
- Zeanah CH (ed.) (2009). *Handbook of Infant Mental Health*, 3rd Edition. New York: Guilford.
- Zima BT, Bussing R, Yang X, Belin TR (2000). Help-seeking steps and service use for children in foster care. *The Journal of Behavioral Health Services & Research*, 27(3), 271–285. [PubMed: 10932441]

Table 1.

Weighted descriptive characteristics for children under 12 months in percent or mean (sd) by total and substantiated cases.

Variable	Total Cases (Proportion %)		Substantiated Cases (Proportion %)		Unsubstantiated Cases (Proportion %)	
	Subclinical(raw n = 921)	Clinical(raw n = 163)	Subclinical(raw n = 628)	Clinical(raw n = 116)	Subclinical(raw n = 293)	Clinical(raw n = 47)
Substantiated Cases	33.6	39.5	---	---	---	---
Temperament Score ^{*,†}	47.1 (9.2)	50.5 (9.1)	47.8 (8.7)	53.7 (12.4)	46.6 (9.4)	46.7 (7.4)
In-home Placement	83.5	83.7	68.9	59.3	93.5	93.7
Race Group						
White [‡]	38.5	55.3	26.6	45.9	45.9	74.2
African American	30.0	32.4	27.9	26.6	31.4	16.7
Hispanic ^{*,†}	27.7	9.5	41.3	23.4	19.2	5.9
Other	4.0	2.8	4.2	4.2	3.5	3.1
Female [‡]	44.8	44.8	58.7	55.8	36.3	19.8
Infant Development (Bayley)						
Low	12.6	31.7	7.8	9.8	15.8	44.1
Medium	31.6	22.8	29.5	30.9	33.2	19.4
High	55.8	45.5	62.8	59.3	50.9	36.4
Caregiver Depressed [‡]	14.8	19.9	11.8	34.4	16.5	19.9
Poverty Level						
Below Poverty Line ^{*,†}	55.8	75.6	62.1	63.1	50.8	78.3
100%–200%	26.5	12.2	17.8	13.7	33.0	19.2
Over 200% [‡]	17.8	12.2	20.1	23.3	16.2	2.6
Caregiver Education						
Less than high school degree	24.7	38.3	22.5	30.0	24.4	24.4
High school degree	42.0	28.4	29.8	38.3	49.9	33.8
Greater than high school degree	33.4	33.3	47.7	31.7	24.5	41.7
Type of Abuse						
Physical abuse	10.6	3.4	6.3	7.2	11.7	2.6
Neglect [‡]	42.1	36.8	52.9	45.7	29.4	11.8
Substance [‡]	19.2	45.1	17.6	22.6	17.5	61.2

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Variable	Total Cases (Proportion %)		Substantiated Cases (Proportion %)		Unsubstantiated Cases (Proportion %)	
	Subclinical(raw n = 921)	Clinical(raw n = 163)	Subclinical(raw n = 628)	Clinical(raw n = 116)	Subclinical(raw n = 293)	Clinical(raw n = 47)
Domestic Violence	14.9	5.1	13.8	3.6	13.0	7.1
Other	13.3	9.5	9.4	20.9	12.9	4.8

* Significant difference between subclinical and clinical children among total cases ($p < 0.05$)

[†] Significant difference between subclinical and clinical children among substantiated cases ($p < 0.05$)

[‡] Significant difference between subclinical and clinical children among unsubstantiated cases ($p < 0.05$)

Table 2.

Survey-weighted multivariable logistic regression for clinical level CBCL score

Variable	Total Odds Ratio 95% CI	Substantiated
Substantiated Cases	1.21 (0.44, 3.32)	---
Difficult Temperament	1.04 (0.99, 1.09)	1.07 (1.02, 1.11) **
Depressed Caregiver	2.32 (0.91, 5.96)	6.19 (2.29, 16.70) **
In-home Placement	0.69 (0.22, 2.13)	0.26 (0.10, 0.63) **
Female	0.37 (0.14, 1.02)	1.01 (0.48, 2.13)
Race Group		
White (reference)	---	---
African American	0.20 (0.06, 0.69) *	0.58 (0.16, 2.05)
Hispanic	0.14 (0.05, 0.39) **	0.44 (0.14, 1.42)
Other	0.38 (0.09, 1.58)	0.82 (0.16, 4.36)
Infant Development (Bayley)		
Low (reference)	---	---
Medium	0.72(0.26, 1.97)	1.56 (0.45, 5.41)
High	0.59 (0.17, 2.00)	1.06 (0.37, 3.02)
Poverty Level		
Below Poverty Line (reference)	---	---
100%–200%	0.29 (0.03, 2.37)	0.48 (0.14, 1.72)
Over 200%	0.19 (0.01, 2.88)	0.26 (0.07, 1.00) *
Caregiver Education		
Less than high school degree (reference)	---	---
High school degree	0.74 (0.17, 3.21)	0.86 (0.28, 2.64)
Greater than high school degree	1.70 (0.41, 7.11)	0.99 (0.28, 3.50)
Type of Abuse		
Neglect (reference)	---	---
Physical	0.81 (0.16, 3.98)	0.75 (0.18, 3.14)
Substance Abuse	3.44 (1.24, 9.56) *	0.86 (0.27, 2.73)
Domestic Violence	0.70 (0.07, 6.54)	0.22 (0.04, 1.19)
Other	1.05 (0.25, 4.35)	1.74 (0.57, 5.28)

*
< 0.05**
< 0.01