

## Abstracts papers 2013/2012

1) Riem, M.M.E., Bakermans-Kranenburg, M.J., Huffmeijer, R., & Van IJzendoorn, M.H. (in press). Does intranasal oxytocin promote prosocial behavior to an excluded fellow player? A randomized controlled trial with Cyberball. *Psychoneuroendocrinology*.

The neuropeptide oxytocin has been shown to stimulate prosocial behavior. However, recent studies indicate that adverse early caregiving experiences may moderate the positive effects of oxytocin. In this double blind randomized-controlled trial we investigated the effects of oxytocin on prosocial behavior during a virtual ball-tossing game called Cyberball. We examined the influence of oxytocin on prosocial helping behavior toward a socially excluded person who was known to the participant, taking into account early caregiving experiences and the emotional facial expression of the excluded person as potential moderators. Participants were 54 women who received a nasal spray containing either 16IU of oxytocin or a placebo and had reported how often their mother used love withdrawal as a disciplinary strategy involving withholding love and affection after a failure or misbehavior. We found that participants compensated for other players' ostracism by throwing the ball more often toward the excluded player. Oxytocin administration further increased the number of ball throws toward the excluded person, but only in individuals who experienced low levels of maternal love withdrawal. The facial expression of the excluded person did not affect prosocial helping behavior and did not moderate the effects of oxytocin. Our findings indicate that the positive effects of oxytocin on prosocial behavior toward a victim of social exclusion are limited to individuals with supportive family backgrounds.

2) Riem, M.M.E., Van IJzendoorn, M.H., Tops, M., Boksem, M.A.S., Rombouts, S.A.R.B., & Bakermans-Kranenburg, M.J. (in press). Oxytocin effects on complex brain networks are moderated by experiences of maternal love withdrawal. *European Neuropsychopharmacology*.

The neuropeptide oxytocin has been implicated in a variety of social processes. However, recent studies indicate that oxytocin does not enhance prosocial behavior in all people in all circumstances. Here, we investigate effects of intranasal oxytocin administration on intrinsic functional brain connectivity with resting state functional magnetic resonance imaging. Participants were 42 women who received a nasal spray containing either 16 IU of oxytocin or a placebo and reported how often their mother used love withdrawal as a disciplinary strategy involving withholding love and affection after a failure or misbehavior. We found that oxytocin changes functional connectivity between the posterior cingulate cortex (PCC) and the brainstem. In the oxytocin group there was a positive connectivity between these regions, whereas the placebo group showed negative connectivity. In addition, oxytocin induced functional connectivity changes between the PCC, the cerebellum and the postcentral gyrus, but only for those participants who experienced low levels of maternal love withdrawal. We speculate that oxytocin enhances prosocial behavior by influencing complex brain networks involved in self-referential processing and affectionate touch, most prominently in individuals with supportive family backgrounds.

3) Stoltenborgh, M., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2013). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology*, 48, 345-355. doi: 10.1007/s00127-012-0549-y

**PURPOSE:** The aim of the current meta-analysis was to provide an estimate of the prevalence of physical and emotional neglect by integrating prevalence figures from the body of research reporting on neglect. An attempt was also made to unravel the substantial variation in prevalence figures reported in primary studies by analyzing the effects of procedural factors and sample characteristics on combined prevalence rates.

**METHODS:** Studies providing prevalence rates of child neglect were searched using electronic databases, exploring specialized journals, and by searching references of publications for other relevant studies. Data were extracted using a coding system. Intercoder reliability was satisfactory. A comprehensive meta-analysis was conducted.

**RESULTS:** Child physical neglect prevalence rates were found for 13 independent samples with a total of 59,406 participants, and child emotional neglect prevalence rates were found for 16 independent samples with a total of 59,655 participants. The overall estimated prevalence was 163/1,000 for physical neglect, and 184/1,000 for emotional neglect, with no apparent gender differences. The influence of research design factors on the prevalence of physical neglect was more pronounced than on the prevalence of emotional neglect. Studies on physical neglect in 'low-resource' countries were conspicuously absent.

**CONCLUSIONS:** Child neglect is a problem of considerable extent, but seems to be a neglected type of maltreatment in scientific research. This is illustrated by the deplorable dearth of studies on child neglect, especially in low-resource countries. Recommendations for the design of future prevalence studies are proposed.

**4) Carcamo, R.A., Van IJzendoorn, M.H., Vermeer, H.J. & Van der Veer, R. (2013). The Validity of the Massie-Campbell Attachment During Stress Scale (ADS). *Journal of Child and Family Studies*. doi: 10.1007/s10826-013-9728-z**

**Abstract:** The present study is the first step towards validating the Massie-Campbell attachment during stress scale (ADS). The ADS is a one-page guide to standardized observation of mother-infant interactions meant to detect insecure attachment behaviors. So far it was used infrequently in scientific research but it is widely applied in the Chilean public health system. To establish the ADS's convergent, concurrent, and construct validity, the ADS was compared with the Strange Situation Procedure (SSP) and correlated with maternal sensitivity. Videotapes of the SSP were coded with the ADS and the resulting ADS attachment classifications were compared with the SSP classifications. It was found that the ADS can distinguish moderately well between securely attached and non-securely attached mother-infant dyads, and the ADS was also associated with observed maternal sensitivity. However, the ADS suffers from a number of limitations that warrant further study. In particular, the ADS proved unable to detect resistantly attached mother-infant dyads. Revision of the scale and its scoring rules seems necessary in order to improve its validity as a screening device in scientific research and clinical practice.

**5) Huffmeijer, R., Alink, L.R.A., Tops, M., Grewen, K.M., Light, K.C., Bakermans-Kranenburg, M.J., & Van IJzendoorn, M.H. (2013). The impact of oxytocin administration and maternal love withdrawal on event-related potential (ERP) responses to emotional faces with performance feedback. *Hormones and Behavior*, 63, 399-410, doi:10.1016/j.yhbeh.2012.11.008.**

This is the first experimental study on the effect of oxytocin administration on the neural processing of facial stimuli conducted with female participants that uses event-related potentials (ERPs). Using a double-blind, placebo-controlled within-subjects design, we studied the effects of 16IU of intranasal oxytocin on ERPs to pictures combining performance feedback with emotional facial expressions in 48 female undergraduate students. Participants

also reported on the amount of love withdrawal they experienced from their mothers. Vertex positive potential (VPP) and late positive potential (LPP) amplitudes were more positive after oxytocin compared to placebo administration. This suggests that oxytocin increased attention to the feedback stimuli (LPP) and enhanced the processing of emotional faces (VPP). Oxytocin heightened processing of the happy and disgusted faces primarily for those reporting less love withdrawal. Significant associations with LPP amplitude suggest that more maternal love withdrawal relates to the allocation of attention toward the motivationally relevant combination of negative feedback with a disgusted face.

**6) Yeniad, N., Malda, M., Mesman, J., Van IJzendoorn, M., & Pieper, S. (2013). Shifting ability predicts math and reading performance in children: A meta-analytical study. *Learning and Individual Differences, 23*, 1-9.**

Empirical evidence on the association between the shifting component of executive functioning and academic performance is equivocal. In two meta-analyses children's shifting ability is examined in relation to their performance in math ( $k = 18$ ,  $N = 2330$ ) and reading ( $k = 16$ ,  $N = 2266$ ). Shifting ability was significantly and equally associated with performance in both math ( $r = .26$ , 95% CI = .15-.35) and reading ( $r = .21$ , 95% CI = .11-.31). Intelligence was found to show stronger associations with math and reading performance than shifting ability. We conclude that the links between shifting ability, academic skills, and intelligence are domain-general.

**7) Van der Voort, A., Linting, M., Juffer, F., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M.H. (2013). Delinquent and aggressive behaviors in early-adopted adolescents: Longitudinal predictions from child temperament and maternal sensitivity. *Children and Youth Services Review, 35*, 439-446. doi:10.1016/j.chilyouth.2012.12.008**

Background: 160 early-adopted children were followed from infancy to adolescence. Central question was whether early and concurrent parenting and child temperament predicted adolescent delinquent and aggressive behaviors.

Methods: Structural equation modeling was used to test the relations between early and concurrent observed maternal sensitivity, mother reported effortful control and teacher reported delinquent and aggressive behaviors.

Results: This longitudinal adoption study showed that lower effortful control, concurrent as well as 7 years earlier, predicted higher levels of delinquency in adolescence and aggression in middle childhood and in adolescence. Lower levels of effortful control in infancy predicted higher levels of maternal sensitivity in adolescence which in its turn predicted less adolescent delinquent behavior.

Conclusions: The findings suggest that effortful control is an important predictor of both aggressive and delinquent behaviors. Maternal sensitivity also plays a role in the development of delinquent behavior, buffering a lack of effortful control, but is not related to aggression at age 14. It is important to note that these relations were found in a sample of parents and their genetically unrelated adopted children.

**8) Tharner, A., Dierckx, B., Luijk, P.C.M., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., Van Ginkel, J.R., Moll, H.A., Jaddoe, V.W., Hofman, A., Hudziak, J.J., Verhulst, F.C., & Tiemeier, H. (2013). Attachment disorganization moderates the effect of maternal postnatal depressive symptoms on infant autonomic functioning. *Psychophysiology, 50*, 195-203. doi: 10.1111/psyp.12003.**

We examined associations of disorganized attachment and maternal depressive symptoms with infant autonomic functioning in 450 infant-mother dyads enrolled in the Generation R study. Maternal depressive symptoms were measured 2 months postpartum with the Brief Symptom Inventory. At 14 months, we assessed infant attachment with a slightly shortened Strange Situation and measured infant resting heart rate. Respiratory sinus arrhythmia (RSA) was calculated using spectral analysis. Higher levels of maternal postnatal depressive symptoms predicted lower resting RSA in disorganized infants ( $B = -0.31$ ,  $SE = 0.15$ ,  $p = .04$ ,  $R(2) = .05$ ) but not in nondisorganized infants ( $B = 0.05$ ,  $SE = 0.06$ ,  $p = .36$ ). This effect was buffered in disorganized infants with a secondary secure attachment classification. Disorganized infants were more vulnerable to the effect of maternal postnatal depressive symptoms on the physiological stress systems.

**9) Kok, R., Van IJzendoorn, M.H., Linting, M., Bakermans-Kranenburg MJ, Tharner A, Luijk MP, Székely E, Jaddoe VW, Hofman A, Verhulst FC, Tiemeier H. (2013). Attachment insecurity predicts child active resistance to parental requests in a compliance task. *Child: care, health and development*, 39, 277-287. doi: 10.1111/j.1365-2214.2012.01374.x**

**Abstract**

**AIM:** We studied the effects of early mother-child relationship quality and child temperament on the development of child compliance and active resistance in a large population-based cohort study ( $n = 534$ ).

**BACKGROUND:** Parenting and the quality of the parent-child relationship can either hamper or support the development of child compliance directly or in interplay with child temperament.

**METHODS:** Mother-infant dyads were observed at 14 and 36 months and maternal and child behaviours were independently coded. The quality of compliance was assessed at 36 months in a clean-up task. Child behaviour was coded using a system differentiating between two dimensions: Compliance and Active Resistance.

**RESULTS:** Controlling for concurrent maternal sensitivity, child temperament, and gender children with a more insecure attachment relationship showed higher levels of active resistance during Clean-Up than more securely attached children. The effect was stronger for boys than for girls and mainly driven by attachment avoidance.

**CONCLUSIONS:** Early attachment is an important contributor to child socialization of moral behaviour.

**10) Huffmeijer, R., Van IJzendoorn, M.H., & Bakermans-Kranenburg, M.J. (2013). Ageing and oxytocin: Extending human oxytocin research to ageing populations – A mini-review. *Gerontology*. doi: 10.1159/000341333.**

Interest in oxytocin has increased rapidly over the last decades. Consequently, quite a number of studies have addressed the influence of oxytocin on social stress, perception, cognition, and decision making in healthy adults as well as in clinical samples characterized by some form of social disturbance. Surprisingly little research on oxytocin has focused on ageing populations. This is particularly striking in two areas of study: the role of oxytocin in grandparents' behavior toward and bonding with their grandchildren and the effects of oxytocin on the neurocognitive processing of socioemotional stimuli. The current mini-review offers an overview of the literature on the involvement of oxytocin in parental behavior and neurocognitive functioning, and discusses the relevance of these findings to ageing

individuals. As the literature shows that oxytocin is profoundly involved in parenting and in bonding throughout life, it is highly likely that oxytocin plays a role in grandparenting and bonding between grandparents and grandchildren as well. However, results obtained with younger adults may not be directly applicable to older individuals in yet another type of relationship. The possibility that age-related changes occur in the oxytocin system (which is at present unclear) must be taken into account. In addition, ageing impairs neurocognitive processes that are profoundly affected by oxytocin (including some aspects of memory and emotion recognition) and is associated with alterations in both structure and function of the amygdala, which is prominently involved in mediating effects of oxytocin. Research investigating the ageing oxytonergic system and studies focusing on the involvement of oxytocin in socioemotional neurocognitive processes and social behavior in elderly individuals, including grandparents, are therefore urgently needed

**11) Mah, B.L., IJzendoorn, M.H., Smith, R., Bakermans-Kranenburg, M.J. (2013). Oxytocin in postnatally depressed mothers: Its influence on mood and expressed emotion. *Progress in Neuro-Psychopharmacology & Biological Psychiatry*, 40, 267-272. doi: org/10.1016/j.pnpbp.2012.10.005**

Background: Postnatal depression is common and negatively affects the mother–baby relationship; oxytocin has been found to have positive effects on parenting behavior. We hypothesize that intranasal administration of oxytocin to mothers with depression will influence their parenting related expressed emotion, creating a better basis for sensitive parenting.

Methods: Twenty-five postnatally depressed mothers with infants less than one year participated in a randomized, double-blind, placebo controlled within-subject clinical study in 2011. Mothers attended an out-patient perinatal psychiatry setting in NSW, Australia. They received 24 IU of oxytocin alternating with placebo approximately one week apart in random order, prior to completing outcome measures. The outcome measures were the Five Minute Speech Sample, the Self-Assessment Manikin and the Controlled Oral Word Association Test.

Results :In the oxytocin condition mothers were sadder ( $p = .01$ ), and they more often initially described their babies as difficult ( $p = .038$ ), but they reported that the quality of their relationship with their infant was more positive ( $p = .036$ ).

Limitations: Despite an adequate sample size to answer our central hypothesis, a larger sample may have elucidated a moderating effect of childhood trauma.

Conclusion: Oxytocin did not make depressed mothers happier but their perception of the relationship with their baby improved. Treatment with intranasal oxytocin might show some unwanted side-effects in depressed individuals.

**12) Van IJzendoorn M.H., Fridman A., Bakermans-Kranenburg M.J., Sagi-Schwartz A. (2013). Aftermath of Genocide: Holocaust Survivors' Dissociation Moderates Offspring Level of Cortisol. *Journal of Loss and Trauma : International Perspectives on Stress & Coping*, 18, 64-80. doi: 10.1080/15325024.2012.679132**

We examined the effects of the Holocaust on diurnal cortisol secretion in survivors and their adult offspring. Israeli female Holocaust survivors and matched comparisons formed a case-control study design with two generations: 32 Holocaust survivors and 33 comparisons, along with their offspring (total  $N = 144$ ). Participants self-reported on dissociation and physical health, and their salivary cortisol levels were assessed during the day. Complete cortisol data

was available for 58 and 74 first- and second-generation participants, respectively. Holocaust survivors showed higher levels of daily cortisol versus comparisons. Their offspring showed lower cortisol levels only when surviving parents displayed more dissociation.

**13) Naber, F.B.A., Poslawsky, I.E., Van IJzendoorn, M.H., Van Engeland, H. & Bakermans-Kranenburg, M.J. (2012). Brief Report: Oxytocin Enhances Paternal Sensitivity to a Child with Autism: A Double-Blind Within-Subject Experiment with Intranasally Administered Oxytocin. *Journal of Autism and Developmental Disorders*, 43, 224-229. doi: 10.1007/s10803-012-1536-6**

Oxytocin seems associated with parenting style, and experimental work showed positive effects of intranasally administered oxytocin on parenting style of fathers. Here, the first double-blind, placebo-controlled, within-subject experiment with intranasal oxytocin administration to fathers of children with autism spectrum disorder (ASD) is presented. Fathers with their typically developing toddler (n = 18), and fathers of toddlers diagnosed with ASD (n = 14), were observed in two play sessions of 15 min each with an intervening period of 1 week. In all fathers oxytocin elevated the quality of paternal sensitive play: fathers stimulated their child in a more optimal way, and they showed less hostility which suggests the positive effects of oxytocin on paternal sensitive play irrespective of clinical status of their child.

**14) Flink, I.J.E., Jansen, P.W., Beirens, T.M.J., Tiemeier, H., Van IJzendoorn, M.H., Jaddoe, V.W.V., Vincent W., Hofman, A., Raat, H. (2012). Differences in problem behaviour among ethnic minority and majority preschoolers in the Netherlands and the role of family functioning and parenting factors as mediators: the Generation R Study. *BMC Public Health*, 12. doi: 10.1186/1471-2458-12-1092**

**BACKGROUND:** Studies have shown that, compared to native counterparts, preschoolers from ethnic minorities are at an increased risk of problem behaviour. Socio-economic factors only partly explain this increased risk. This study aimed to further unravel the differences in problem behaviour among ethnic minority and native preschoolers by examining the mediating role of family functioning and parenting factors.

**METHODS:** We included 4,282 preschoolers participating in the Generation R Study, an ethnically-diverse cohort study with inclusion in early pregnancy. At child age 3 years, parents completed the Child Behavior Checklist (CBCL/1,5-5); information on demographics, socio-economic status and measures of family functioning (maternal psychopathology; general family functioning) and parenting (parenting stress; harsh parenting) were retrieved from questionnaires. CBCL Total Problems scores in each ethnic subgroup were compared with scores in the Dutch reference population. Mediation was evaluated using multivariate regression models.

**RESULTS:** After adjustment for confounders, preschoolers from ethnic minorities were more likely to present problem behaviour than the Dutch subgroup (e.g. CBCL Total Problems Turkish subgroup (OR 7.0 (95% CI 4.9; 10.1)). When considering generational status, children of first generation immigrants were worse off than the second generation ( $P < 0.01$ ). Adjustment for socio-economic factors mediated the association between the ethnic minority status and child problem behaviour (e.g. attenuation in OR by 54.4% ( $P < 0.05$ ) from OR 5.1 (95% CI 2.8; 9.4) to OR 2.9 (95% CI 1.5; 5.6) in Cape Verdean subgroup). However, associations remained significant in most ethnic subgroups. A final adjustment for family functioning and parenting factors further attenuated the association (e.g. attenuation in OR by 55.5% ( $P < 0.05$ ) from OR 2.2 (95% CI 1.3; 4.4) to OR 1.5 (95% CI 1.0; 2.4) in European other subgroup).

**CONCLUSIONS:** This study showed that preschoolers from ethnic minorities and particularly children of first generation immigrants are at an increased risk of problem behaviour compared to children born to a Dutch mother. Although socio-economic factors were found to partly explain the association between the ethnic minority status and child problem behaviour, a similar part was explained by family functioning and parenting factors. Considering these findings, it is important for health care workers to also be attentive to symptoms of parental psychopathology (e.g. depression), poor family functioning, high levels of parenting stress or harsh parenting in first and second generation immigrants with young children.

**15) Flink, I.J.E., Jansen, P.W., Beirens, T.M.J., Tiemeier, H., Van IJzendoorn, M.H., Jaddoe, V.W.V., Hofman, A., Raat, H. (2012). Family functioning and parenting factors as mediators of the relationship between the ethnic minority status and child problem behaviour. *European Journal of Public Health*, 22, 82-82.**

**Background:** Studies have shown that, compared to native counterparts, preschoolers from ethnic minorities are at an increased risk of problem behaviour. Socio-economic factors only partly explain this increased risk. This study aimed to further unravel the differences in problem behaviour among ethnic minority and native preschoolers by examining the mediating role of family functioning and parenting factors.

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Conclusions: This study showed that preschoolers from ethnic minorities and particularly children of first generation immigrants are at an increased risk of problem behaviour compared to children born to a Dutch mother. Although socio-economic factors were found to partly explain the association between the ethnic minority status and child problem behaviour, a similar part was explained by family functioning and parenting factors. Considering these findings, it is important for health care workers to also be attentive to symptoms of parental psychopathology (e.g. depression), poor family functioning, high levels of parenting stress or harsh parenting in first and second generation immigrants with young children.

*Keywords:*

Ethnicity; Migration; Paediatric; Psychosocial factors; Mental Health

**16) Tharner, A., Luijk, P.C.M., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., Raat, H., Moll, H.A., Jaddoe, V.W., Hofman, A., Verhulst, F.C., & Tiemeier, H. (2012). Breastfeeding and its role for maternal sensitive responsiveness and infant attachment. *Journal of Developmental and Behavioral Pediatrics*, 33, 396-404. doi: 10.1097/DBP.0b013e318257fac3.**

**OBJECTIVE:** To examine the association of breastfeeding with maternal sensitive responsiveness and infant-mother attachment security and disorganization.

**METHODS:** We included 675 participants of a prospective cohort study. Questionnaires about breastfeeding practices were administered at 2 and 6 months postpartum. At 14 months, maternal sensitive responsiveness was assessed in a 13-minute laboratory procedure using Ainsworth's sensitivity scales, and attachment quality was assessed with the Strange Situation Procedure. Mothers were genotyped for oxytocin receptor genes OXTR rs53576 and OXTR rs2254298. Linear regressions and analyses of covariance adjusted for various background variables were conducted. We tested for mediation and moderation by maternal sensitive responsiveness and maternal oxytocin receptor genotype.

**RESULTS:** Continuous analyses showed that longer duration of breastfeeding was associated with more maternal sensitive responsiveness ( $B = 0.11$ , 95% confidence interval [CI] 0.02; 0.20,  $p < .05$ ), more attachment security ( $B = 0.24$ , 95% CI = 0.02; 0.46,  $p < .05$ ), and less attachment disorganization ( $B = -0.20$ , 95% CI -0.36; -0.03,  $p < .05$ ). Duration of breastfeeding was not related to the risk of insecure-avoidant or insecure-resistant versus secure attachment classification, but longer duration of breastfeeding predicted a lower risk of disorganized versus secure attachment classification ( $n = 151$ ; odds ratio [OR] = 0.81, 95% CI 0.66 to 0.99,  $p = .04$ ). Maternal sensitive responsiveness did not mediate the associations, and maternal oxytocin receptor genotype was not a significant moderator.

**CONCLUSIONS:** Although duration of breastfeeding was not associated with differences in infant-mother attachment classifications, we found subtle positive associations between duration of breastfeeding and sensitive responsiveness, attachment security, and disorganization.

**17) Tharner, A., Luijk, P.C.M., van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., Jaddoe, V.W.V., Hofman, A., Verhulst, F.C., & Tiemeier, H. (2012). Maternal lifetime history of depression and depressive symptoms in the prenatal and early postnatal period do not predict infant-mother attachment quality in a large, population-based Dutch cohort study. *Attachment & Human Development, 14*, 63-81. doi: 10.1080/14616734.2012.636659**

We examined the effects of maternal history of depressive disorder and the effects of depressive symptoms during pregnancy and the early postpartum period on attachment insecurity and disorganization. A total of 627 mother-infant dyads from the Generation R Study participated in a population-based cohort from fetal life onwards. Maternal history of depression was assessed by diagnostic interviews during pregnancy; maternal peri- and postnatal depressive symptoms were assessed with questionnaires in 506 of these women at 20 weeks pregnancy and two months postpartum; and infant-mother attachment security was observed when infants were aged 14 months. A history of maternal depressive disorder, regardless of severity or psychiatric comorbidity, was not associated with an increased risk of infant attachment insecurity or disorganization. Likewise, maternal peri- and postnatal depressive symptoms were not related to attachment insecurity or disorganization at 14 months. These results are important because mothers from otherwise low risk backgrounds often have previously been depressed or are struggling with non-clinical depressive symptoms during pregnancy and after giving birth. Our findings are discussed in terms of protective factors that may limit the potentially negative effects of maternal depressive symptoms on the infant-mother attachment relationship in the general population. The role of selective attrition and lack of information about the mothers' attachment status for the current null-findings are also discussed.

**18) Tharner, A., Luijk, P.C.M., Van IJzendoorn, M.H. van, Bakermans-Kranenburg, M.J., Jaddoe, V.W.V., Hofman, A., Verhulst, F.C. & Tiemeier, H. (2012). Infant attachment, parenting stress, and child behavioral problems at age 3 years. *Parenting: Science and Practice*, 12, 261-281. doi:10.1080/15295192.2012.709150**

*Objective.* To examine the role of infant attachment classification and parenting stress for toddler emotional and behavior problems. *Design.* Participants were 606 infant–mother dyads who took part in a population-based cohort study in the Netherlands. Infant–mother attachment classification was assessed using the Strange Situation Procedure when the children were 14 months old. At 18 months, parenting stress was measured with the Dutch version of the Parenting Stress Index. When the children were 3 years old, both mothers and fathers completed the Child Behavior Checklist. *Results.* Infant attachment moderated the effect of parenting stress on child emotional and behavior problems. Parenting stress was related to more aggression and attention problem behaviors in insecurely attached children, but not in securely attached children. Moreover, higher parenting stress was associated with more withdrawal problem behaviors in insecurely attached children, in particular in insecure-resistant and in disorganized children. *Conclusion.* In the presence of an insecure attachment relationship, more parenting stress is related to more (internalizing) withdrawal problem behavior and to more (externalizing) aggression and attention problems. Attachment security in infancy buffers the influence of parenting stress on child emotional and behavior problems

**19) Tiemeier, H., Velders, F.P., Szekely, E., Roza, S.J., Dieleman, G., Jaddoe, V.W.V., White, T.J.H., Bakermans-Kranenburg, M.J., Hofman, A., Van IJzendoorn, M.H., Hudziak, J. & Verhulst, F.C. (2012). The Generation R Study: a review of design, findings to date and a study of the 5-HTTLPR by environment interaction from fetal life onwards. *Journal of the American Academy of Child and Adolescent Psychiatry*, 51, 1119-1135. doi: 10.1016/j.jaac.2012.08.021**

Objective: First, we give an overview of child psychiatric research in the Generation R Study, a population-based cohort from fetal life forward. Second, we examine within Generation R whether the functional polymorphism (5-HTTLPR) in the promoter of the serotonin transporter

gene interacts with prenatal maternal chronic difficulties, prenatal maternal anxiety or postnatal maternal anxiety to influence child emotional development. Method: A total of 2,136 northern European children were genotyped for 5-HTTLPR and rs25531. Mothers reported chronic difficulties and anxiety symptoms at 20 weeks' pregnancy and when the child

was 3 years old. Child emotion recognition was observed at 3 years, and child emotional problems were assessed with the CBCL/1½–5 at 5 years. Results: There were consistent main effects of maternal difficulties and anxiety on child emotional problems, but no main effect of 5-HTTLPR. Moreover, children with the s allele were at increased risk for emotional problems if their mothers reported prenatal anxiety symptoms ( $\beta = 2.02, p = .001$ ) or postnatal anxiety symptoms ( $\beta = 1.64, p = 0.001$ ). Also, in children of mothers with prenatal anxiety symptoms, the s allele was associated with less accurate emotion-matching ( $\beta = -0.11, p = .004$ ). Conclusions: This population-based study shows that vulnerability due to 5-HTTLPR is not specific for certain adverse exposures or severe events, but suggests that the small effects

of gene–environment interaction on emotional development become manifest early in life. *J. Am. Acad. Child Adolesc. Psychiatry*, 2012;51(11):1119–1135. Key Words: Generation R, 5-HTTLPR, maternal anxiety, gene–environment interaction, emotional problems

**20) Tiemeier, H., Bakermans-Kranenburg, M., Dierckx, B., Luijk, M., Tharner, A., Van IJzendoorn, M., Verhulst, F. (2012). Attachment disorganization moderates the effect of**

**maternal depressive symptoms on infant autonomic functioning. *Journal of Psychosomatic Research*, 72, 504-504.**

We examined associations of disorganized attachment and maternal depressive symptoms with infant autonomic functioning in 450 infant-mother dyads enrolled in the Generation R study. Maternal depressive symptoms were measured 2 months postpartum with the Brief Symptom Inventory. At 14 months, we assessed infant attachment with a slightly shortened Strange Situation and measured infant resting heart rate. Respiratory sinus arrhythmia (RSA) was calculated using spectral analysis. Higher levels of maternal postnatal depressive symptoms predicted lower resting RSA in disorganized infants ( $B = -0.31$ ,  $SE = 0.15$ ,  $p = .04$ ,  $R^2 = .05$ ) but not in nondisorganized infants ( $B = 0.05$ ,  $SE = 0.06$ ,  $p = .36$ ). This effect was buffered in disorganized infants with a secondary secure attachment classification. Disorganized infants were more vulnerable to the effect of maternal postnatal depressive symptoms on the physiological stress systems.

**21) Velders, F.P., Dieleman, G., Cents, R.A.M., Bakermans-Kranenburg, M.J., Jaddoe, V.W.V., Hofman, A., Van IJzendoorn, M.H., Verhulst, F.C. & Tiemeier, H. (2012). Variation in the Glucocorticoid Receptor Gene at rs41423247 Moderates the Effect of Prenatal Maternal Psychological Symptoms on Child Cortisol Reactivity and Behavior. *Neuropsychopharmacology*, 37, 2541-2549. doi: 10.1038/npp.2012.118**

Prenatal maternal psychopathology affects child development, but some children seem more vulnerable than others. Genetic variance in hypothalamic-pituitary-adrenal axis genes may influence the effect of prenatal maternal psychological symptoms on child emotional and behavioral problems. This hypothesis was tested in the Generation R Study, a population-based cohort from fetal life onward. In total, 1727 children of Northern European descent and their mothers participated in this study and were genotyped for variants in the glucocorticoid receptor (GR) gene (rs6189/rs6190, rs10052957, rs41423247, rs6195, and rs6198) and the FK506-binding protein 5 (FKBP5) gene (rs1360780). Prenatal maternal psychological symptoms were assessed at 20 weeks pregnancy and child behavior was assessed by both parents at 3 years. In a subsample of 331 children, data about cortisol reactivity were available. Based on power calculations, only those genetic variants with sufficient minor allele frequencies (rs41423247, rs10052957, and rs1360780) were included in the interaction analyses. We found that variation in GR at rs41423247 moderates the effect of prenatal maternal psychological symptoms on child emotional and behavioral problems (beta 0.41, SE 0.16,  $p = 0.009$ ). This prenatal interaction effect was independent of mother's genotype and maternal postnatal psychopathology, and not found for prenatal psychological symptoms of the father. Moreover, the interaction between rs41423247 and prenatal psychological symptoms was also associated with decreased child cortisol reactivity (beta -2.30,  $p$ -value 0.05). These findings emphasize the potential effect of prenatal gene-environment interaction, and give insight in possible mechanisms accounting for children's individual vulnerability to develop emotional and behavioral problems.

**22) Huffmeijer, R., Alink, L.R.A., Tops, M., Bakermans-Kranenburg, M.J., & van IJzendoorn, M.H. (2012). Asymmetric frontal brain activity and parental rejection predict altruistic behavior: Moderation of oxytocin effects. *Cognitive Affective and Behavioral Neuroscience*, 12, 382-392.**

Asymmetric frontal brain activity has been widely implicated in reactions to emotional stimuli and is thought to reflect individual differences in approach-withdrawal motivation. Here, we investigate whether asymmetric frontal activity, as a measure of approach-withdrawal motivation, also predicts charitable donations after a charity's (emotion-eliciting) promotional video showing a child in need is viewed, in a sample of 47 young adult women.

In addition, we explore possibilities for mediation and moderation, by asymmetric frontal activity, of the effects of intranasally administered oxytocin and parental love withdrawal on charitable donations. Greater relative left frontal activity was related to larger donations. In addition, we found evidence of moderation: Low levels of parental love withdrawal predicted larger donations in the oxytocin condition for participants showing greater relative right frontal activity. We suggest that when approach motivation is high (reflected in greater relative left frontal activity), individuals are generally inclined to take action upon seeing someone in need and, thus, to donate money to actively help out. Only when approach motivation is low (reflected in less relative left/greater relative right activity) do empathic concerns affected by oxytocin and experiences of love withdrawal play an important part in deciding about donations.

**23) Riem, M.M.E, Van IJzendoorn, M.H., Tops, M., Boksem, M.A.S., Rombouts S.A.R.B., & Bakermans-Kranenburg, M.J. (2012). No Laughing Matter: Intranasal Oxytocin Administration Changes Functional Brain Connectivity during Exposure to Infant Laughter. *Neuropsychopharmacology*, 37, 1257-1266**

Infant laughter is a rewarding experience. It activates neural reward circuits and promotes parental proximity and care, thus facilitating parent–infant attachment. The neuropeptide oxytocin might enhance the incentive salience of infant laughter by modulating neural circuits related to the perception of infant cues. In a randomized controlled trial with functional magnetic resonance imaging we investigated the influence of intranasally administered oxytocin on functional brain connectivity in response to infant laughter. Blood oxygenation level-dependent responses to infant laughter were measured in 22 nulliparous women who were administered oxytocin and 20 nulliparous women who were administered a placebo. Elevated oxytocin levels reduced activation in the amygdala during infant laughter and enhanced functional connectivity between the amygdala and the orbitofrontal cortex, the anterior cingulate, the hippocampus, the precuneus, the supramarginal gyri, and the middle temporal gyrus. Increased functional connectivity between the amygdala and regions involved in emotion regulation may reduce negative emotional arousal while enhancing the incentive salience of the infant laughter.

**24) Van der Kooy-Hofland, V. A. C., van der Kooy, J., Bus, A. G., van IJzendoorn, M. H., & Bonsel, G. J. (2012). Differential Susceptibility to Early Literacy Intervention in Children With Mild Perinatal Adversities: Short- and Long-Term Effects of a Randomized Control Trial. *Journal of Educational Psychology*, 104, 337-349. doi: 10.1037/a0026984**

In a randomized control trial, the authors tested whether short- and long-term effects of an early literacy intervention are moderated by mild perinatal adversities in accordance with differential susceptibility theory. One-hundred 5-year-old children (58% male) who scored at or below the 30th percentile on early literacy measures were randomized to a Web-based remedial early literacy program Living Letters or a treated control group. Parents gave written informed consent to access the perinatal data of their children at the Perinatal Register in the Netherlands. Twenty-one children were, at birth, small for gestational age (between the 2.5th and 10th percentiles) or late preterm (between 34 and 37 weeks, 6 days). In this group with mild perinatal adversities, intervention children outperformed the control group immediately after the intervention and after 8 months of formal reading instruction, but a similar effect of the computerized literacy program in children without mild perinatal adversities was absent. In line with the theory of differential susceptibility, children with mild perinatal adversities seem to be more open to environmental input, for better and for worse. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

**25) Beijersbergen, M.D., Juffer, F., Bakermans-Kranenburg, M.J., & Van IJzendoorn, M.H. (2012). Remaining or becoming secure: Parental sensitive support predicts**

**attachment continuity from infancy to adolescence in a longitudinal adoption study.** *Developmental Psychology*, 48, 1277-1282. doi:10.1037/a0027442.

In a longitudinal study with 125 early adopted adolescents, we examined continuity of attachment from infancy to adolescence and the role of parental sensitive support in explaining continuity or discontinuity of attachment. Assessments of maternal sensitive support and infant attachment (Strange Situation Procedure) were completed when infants were 12 months old. When the children were 14 years old, we observed mothers' sensitive support during a conflict discussion. The adolescents' attachment representations were assessed with the Adult Attachment Interview. Mothers of secure adolescents showed significantly more sensitive support during conflicts than did mothers of insecure adolescents. Overall, no continuity of attachment from infancy to adolescence was found. However, maternal sensitive support in early childhood and adolescence predicted continuity of secure attachment from 1 to 14 years, whereas less maternal sensitive support in early childhood but more maternal sensitive support in adolescence predicted children's change from insecurity in infancy to security in adolescence. We conclude that both early and later parental sensitive support are important for continuity of attachment across the first 14 years of life. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

**26) Molendijk, M.L., Bus, B.A.A., Spinhoven, P., Kaimatzoglou, A., Oude Voshaar, R.C., Penninx, B.W.J.H., Van IJzendoorn, M.H., Elzinga, B.M. (2012) A systematic review and meta-analysis on the association between BDNF val66met and hippocampal volume—a genuine effect or a winners curse? *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 159b, 731-740. doi: 10.1002/ajmg.b.32078.**

Inconsistencies have been reported with regard to an association between val(66)met, a polymorphism on the BDNF gene, and hippocampal volume. We performed a systematic review and a meta-analysis to determine the magnitude and direction of this putative association and estimated the potential influence of demographic, clinical, and methodological characteristics of studies. Tests of publication bias and time-related trends were performed and statistical power of the included studies was calculated. The literature search for MRI studies on differences in total hippocampal volume as a function of BDNF val(66)met returned 25 records that fulfilled our criteria (total N = 3,620). Meta-analysis showed that carriers of a met allele had lower hippocampal volumes relative to val/val homozygotes ( $d = 0.13$ ,  $P = 0.02$ ). Between-study heterogeneity in effect size estimates was substantial ( $Q = 54.47$ ,  $P < .001$ ) and this could not be explained by demographic, clinical, and methodological differences across studies. Funnel plot inspection and trim-and-fill estimations suggested evidence for publication bias and effect sizes decreased substantially over the years (Pearson's  $r = -0.54$ ,  $P < .01$ ). All included studies were underpowered. This meta-analysis shows that carriers of a met allele have lower total hippocampal volumes relative to val/val homozygotes. However, effect sizes converged closer to null with virtually each attempt at replication and were based on underpowered studies. Altogether, this may call into question whether the observed effect is a genuine biological effect of the met allele or whether it is subject to a winners curse, with large effect sizes found in a few early studies and increasingly smaller effect sizes in later studies.

**27) Jaddoe, V.W., Van Duijn, C.M., Franco, O.H., Van der Heijden A.J., Van IJzendoorn M.H., De Jongste, J.C., Van der Lugt, A., Mackenbach, J.P., Moll, H.A., Raat, H., Rivadeneira, F., Steegers E.A., Tiemeier, H., Uitterlinden, A.G., Verhulst, F.C., Hofman, A. (2012) The Generation R Study: design and cohort update 2012. *European Journal of Epidemiology*, 27, 739-756. doi: 10.1007/s10654-012-9735-1**

The Generation R Study is a population-based prospective cohort study from fetal life until adulthood. The study is designed to identify early environmental and genetic causes and

causal pathways leading to normal and abnormal growth, development and health during fetal life, childhood and adulthood. The study focuses on six areas of research: (1) maternal health; (2) growth and physical development; (3) behavioural and cognitive development; (4) respiratory health and allergies; (5) diseases in childhood; and (6) health and healthcare for children and their parents. Main exposures of interest include environmental, endocrine, genetic and epigenetic, lifestyle related, nutritional and socio-demographic determinants. In total,  $n = 9,778$  mothers with a delivery date from April 2002 until January 2006 were enrolled in the study. Response at baseline was 61 %, and general follow-up rates until the age of 6 years exceed 80 %. Data collection in mothers, fathers and children include questionnaires, detailed physical and ultrasound examinations, behavioural observations, and biological samples. A genome and epigenome wide association screen is available in the participating children. From the age of 5 years, regular detailed hands-on assessments are performed in a dedicated research center including advanced imaging facilities such as Magnetic Resonance Imaging. Eventually, results forthcoming from the Generation R Study contribute to the development of strategies for optimizing health and healthcare for pregnant women and children.

**28) Astill, R.G., Van der Heijden K.B., van IJzendoorn, M.H., van Someren, E.J.W. (2012). Sleep, cognition, and behavioral problems in school-age children: A century of research meta-analyzed. *Psychological bulletin*, 138,1109-1138. doi:10.1037/a00282204.**

Clear associations of sleep, cognitive performance, and behavioral problems have been demonstrated in meta-analyses of studies in adults. This meta-analysis is the first to systematically summarize all relevant studies reporting on sleep, cognition, and behavioral problems in healthy school-age children (5–12 years old) and incorporates 86 studies on 35,936 children. Sleep duration shows a significant positive relation with cognitive performance ( $r = .08$ , confidence interval [CI] [.06, .10]). Subsequent analyses on cognitive subdomains indicate specific associations of sleep duration with executive functioning ( $r = .07$ , CI [.02, .13]), with performance on tasks that address multiple cognitive domains ( $r = .10$ , CI = [.05, .16]), and with school performance ( $r = .09$ , CI [.06, .12]), but not with intelligence. Quite unlike typical findings in adults, sleep duration was not associated with sustained attention and memory. Methodological issues and brain developmental immaturities are proposed to underlie the marked differences. Shorter sleep duration is associated with more behavioral problems ( $r = .09$ , CI [.07, .11]). Subsequent analyses on subdomains of behavioral problems showed that the relation holds for both internalizing ( $r = .09$ , CI [.06, .12]) and externalizing behavioral problems ( $r = .08$ , CI [.06, .11]). Ancillary moderator analyses identified practices recommended to increase sensitivity of assessments and designs in future studies. In practical terms, the findings suggest that insufficient sleep in children is associated with deficits in higher-order and complex cognitive functions and an increase in behavioral problems. This is particularly relevant given society's tendency towards sleep curtailment. (PsycINFO Database Record (c) 2012 APA, all rights reserved)

**29) Groh, A. M., Roisman, G.I., Van IJzendoorn, M.H., Bakermans-Kranenburg, M.J., & Fearon, R.M.P. (2012). The Significance of Insecure and Disorganized Attachment for Children's Internalizing Symptoms: A Meta-Analytic Study. *Child Development*, 83, 591-610. doi: 10.1111/j.1467-8624.2011.01711.x.**

This meta-analytic review examines the association between attachment and internalizing symptomatology during childhood, and compares the strength of this association with that for externalizing symptomatology. Based on 42 independent samples ( $N = 4,614$ ), the association between insecurity and internalizing symptoms was small, yet significant ( $d = 0.15$ , CI 0.06\_0.25) and not moderated by assessment age of internalizing problems.

Avoidance, but not resistance ( $d = 0.03$ , CI  $0.11_0.17$ ) or disorganization ( $d = 0.08$ , CI  $0.06_0.22$ ), was significantly associated with internalizing symptoms ( $d = 0.17$ , CI  $0.03_0.31$ ). Insecurity and disorganization were more strongly associated with externalizing than internalizing symptoms. Discussion focuses on the significance of attachment for the development of internalizing versus externalizing symptomatology.

**30) Stoltenborgh, M., Bakermans-Kranenburg, M. J., Alink, L. R. A., & Van IJzendoorn, R. H. (2012). The universality of childhood emotional abuse: A meta-analysis of worldwide prevalence. *Journal of Aggression, Maltreatment & Trauma, 21*, 870-890. doi: 10.1080/10926771.2012.708014**

This comprehensive meta-analysis combined prevalence figures of child emotional abuse reported in 29 studies, including 46 independent samples with a total of 7,082,279 participants. The overall estimated prevalence was 3/1,000 for studies using informants and 363/1,000 for studies using self-report measures of child emotional abuse. Procedural factors seem to exert a greater influence on the prevalence of childhood emotional abuse than sample characteristics and definitional issues, without fully explaining the vast variation of prevalence rates reported in individual studies. We conclude that child emotional abuse is a universal problem affecting the lives of millions of children all over the world, which is in sharp contrast with the United Nation's Convention on the Rights of the Child

**31) Stoltenborgh, M., Bakermans-Kranenburg, M. J., & Van IJzendoorn, M. H. (2012). The neglect of child neglect: A meta-analytic review of the prevalence of neglect. *Social Psychiatry and Psychiatric Epidemiology, 48*, 345-355. doi: 10.1007/s00127-012-0549-y**

**PURPOSE:** The aim of the current meta-analysis was to provide an estimate of the prevalence of physical and emotional neglect by integrating prevalence figures from the body of research reporting on neglect. An attempt was also made to unravel the substantial variation in prevalence figures reported in primary studies by analyzing the effects of procedural factors and sample characteristics on combined prevalence rates.

**METHODS:** Studies providing prevalence rates of child neglect were searched using electronic databases, exploring specialized journals, and by searching references of publications for other relevant studies. Data were extracted using a coding system. Inter-coder reliability was satisfactory. A comprehensive meta-analysis was conducted.

**RESULTS:** Child physical neglect prevalence rates were found for 13 independent samples with a total of 59,406 participants, and child emotional neglect prevalence rates were found for 16 independent samples with a total of 59,655 participants. The overall estimated prevalence was 163/1,000 for physical neglect, and 184/1,000 for emotional neglect, with no apparent gender differences. The influence of research design factors on the prevalence of physical neglect was more pronounced than on the prevalence of emotional neglect. Studies on physical neglect in 'low-resource' countries were conspicuously absent.

**CONCLUSIONS:** Child neglect is a problem of considerable extent, but seems to be a neglected type of maltreatment in scientific research. This is illustrated by the deplorable dearth of studies on child neglect, especially in low-resource countries. Recommendations for the design of future prevalence studies are proposed.

**32) Van IJzendoorn, M.H., Huffmeijer, R., Alink, L.R.A., Bakermans-Kranenburg, M.J. and Tops, M. (2012). The impact of oxytocin administration on charitable donating is moderated by experiences of parental love-withdrawal. *Frontiers in Psychology, 2*, 1-8. doi: 10.3389/fpsyg.2011.00258**

Oxytocin has been implicated in a variety of prosocial processes but most of this work has used laboratory tasks (such as the ultimatum game or the dictator game) to evaluate oxytocin's prosocial effects. In a double blind randomized trial we examined the influence of intranasal administration of oxytocin on real, high-cost donating money to a charity without any expectation for reciprocation. Participants in the current study were 57 female undergraduate students, aged 18-30 years, who received a nasal spray containing either 24 IU of oxytocin or a placebo, and were then given the opportunity to make a charitable donation. The participants reported how often their parents used love-withdrawal as a disciplinary strategy involving withholding love and affection after a failure or misbehavior. Oxytocin appeared to increase the participants' willingness to donate money to a charity but only in participants who experienced low levels of parental love-withdrawal. In contrast, oxytocin administration was ineffective in enhancing donating behavior in individuals who experienced high levels of parental love-withdrawal. We conclude that the positive effect of oxytocin administration on prosocial behavior may be limited to individuals with supportive backgrounds.

**33) Van IJzendoorn, M.H., & Bakermans-Kranenburg, M.J., (2012). A sniff of trust: meta-analysis of the effects of intranasal oxytocin administration on face recognition, trust to in-group, and trust to out-group. *Psychoneuroendocrinology*, 37, 438- 443. doi: 10.1016/j.psyneuen.2011.07.008**

The neuropeptide oxytocin has a popular reputation of being the 'love' hormone. Here we test meta-analytically whether experiments with intranasal administration of oxytocin provide support for the proposed effects of oxytocin. Three psychological effects were subjected to meta-analysis: facial emotion recognition (13 effect sizes, N=408), in-group trust (8 effect sizes, N=317), and out-group trust (10 effect sizes; N=505). We found that intranasal oxytocin administration enhances the recognition of facial expressions of emotions, and that it elevates the level of in-group trust. The hypothesis that out-group trust is significantly decreased in the oxytocin condition was not supported. It is concluded that a sniff of oxytocin can change emotion perception and behavior in trusting relationships.

**34) Groeneveld, M. G., Vermeer, H. J., Van IJzendoorn, M. H., & Linting, M. (2012). Stress, cortisol and well-being of caregivers and children in home-based child care: a case for differential susceptibility. *Child: Care, Health & Development*, 38, 251-260. doi:10.1111/j.1365-2214.2010.01194.x.**

**BACKGROUND:** We examined whether children cared for by stressed caregivers show lower socio-emotional well-being and more stress, compared with children cared for by less stressed caregivers.

**METHODS:** Perceived stress and cortisol levels of professional caregivers (n = 44), and associations with children's (n = 44) well-being and cortisol levels in home-based child care were examined.

**RESULTS:** Caregiver perceived stress and cortisol levels were related to children's well-being but not to children's cortisol levels. Children's social fearfulness acted as a moderator between caregivers' mean ratio of diurnal change in cortisol and children's well-being. When caregiver cortisol levels decreased, more fearful children were reported higher on well-being than less fearful peers. In contrast, when caregiver cortisol levels increased, more fearful children were reported lower on well-being.

**CONCLUSIONS:** The findings point to differential susceptibility. Child care organizations and parents need to notice that a non-stressful child care environment is in particular important for children with a difficult temperament.

**35) Groeneveld, M.G., Vermeer, H.J., Van IJzendoorn, M.H. & Linting, M. (2012). Caregivers' cortisol levels and perceived stress in home-based and center-based childcare. *Early Childhood Research Quarterly*, 27, 166-175. doi:10.1016/j.ecresq.2011.05.003**

The current study examined professional caregivers' perceived and physiological stress, and associations with the quality of care they provide. Participants were 55 female caregivers from childcare homes and 46 female caregivers from childcare centers in the Netherlands. In both types of settings, equivalent measures and procedures were used. On non-work days, caregivers' salivary cortisol levels decreased between 11 am and 3 pm, whereas on work days, caregivers' cortisol levels remained at the same level during this period. Caregivers' cortisol levels and perceived stress did not differ across the two types of settings. In home-based childcare, caregivers offered higher-quality caregiving, compared to caregivers in center-based childcare. In home-based childcare--but not in center care--caregivers' negative appraisal was associated with less positive caregiver behavior. These findings suggest that work at childcare influences cortisol secretion in professional caregivers, and that perceived stress but not cortisol is associated with quality of care. (Contains 3 tables and 2 figures.)

**36) Fridman, A., Bakermans-Kranenburg, M.J., Sagi-Schwartz, A., & Van IJzendoorn, M.H. (2012). Genetic moderation of cortisol secretion in holocaust survivors: A pilot study on the role of ADRA2B. *International Journal of Behavioral Development*, 36, 79-84. doi: 10.1177/0165025411406859**

In the current study we tested whether ADRA2B moderates stress regulation of Holocaust survivors as indexed by their diurnal cortisol secretion and cortisol reactivity to a stressor. Salivary cortisol levels of 54 female Holocaust survivors and participants in the comparison group were assessed during a routine day and in response to a stress-evoking procedure (an adapted version of the Trier Social Stress Test [TSST]). ADRA2B did not moderate differences between Holocaust survivors and participants in the comparison group in terms of cortisol reactivity to the TSST. Holocaust survivors with the wildtype ADRA2B, however, displayed higher diurnal cortisol levels than did participants in the comparison group with the same genotype, whereas no difference was found between these groups in carriers of the deletion variant, previously associated with more reexperiencing of traumatic events. Carriers of the deletion variant might have been driven in the long run to resolve their vividly remembered experiences, and therefore currently show less stress dysregulation as evident from their cortisol levels.

**37) Jansen PW, Raat H, Mackenbach JP, Bakermans-Kranenburg MJ, Van IJzendoorn MH, Verhulst FC, Tiemeier H. (2012). Early determinants of maternal and paternal harsh discipline. The Generation R Study. *Family Relations*, 61, 253-270. doi: 10.1111/j.1741-3729.2011.00691.x.**

Research described risk factors for maternal use of harsh discipline, but knowledge about determinants of paternal harsh discipline is lacking. This study aimed to identify determinants of harsh discipline and whether this differed between mothers and fathers. Harsh disciplining practices were self-reported by Dutch parents of 3-year-old children. Data were available for 3,756 children and both parents. Younger parental age, non-Western national origin, family dysfunction, psychopathology, and delinquency history were independently associated with an increased risk of maternal and paternal harsh discipline. Indicators of socioeconomic status (e.g., financial difficulties and educational level) were also associated with harsh discipline, but in mothers only. Our results suggest that preventive interventions should ideally be applied early in children's lives or even before birth, given the prevalence of parental harsh

discipline in young children. These interventions should have a special focus on socially disadvantaged families and on parents with psychopathology and family stress.

**38) Bakermans-Kranenburg, M.J., Dobrova-Krol, N.A., & Van IJzendoorn, M.H.(2012). Impact of institutional care on attachment disorganization and insecurity of Ukrainian preschoolers: Protective effect of the long variant of the serotonin transporter gene (5HTT). *International Journal of Behavioral Development*, 36, 11-18. doi:10.1177/0165025411406858**

Institutional care has been shown to lead to insecure and disorganized attachments and indiscriminate friendliness. Some children, however, are surprisingly resilient to the adverse environment. Here the protective role of the long variant of the serotonin receptor gene (5HTT) is explored in a small hypothesis-generating study of 37 Ukrainian preschoolers reared in institutional settings or in their biological families. Attachment was observed with the Strange Situation Procedure, and indiscriminate social behavior was assessed in a semistructured interview with the caregiver. We found a moderating role of 5HTT for the association between adverse environment and attachment disorganization. Children with the *ss* or *sl* genotype showed more attachment disorganization and less attachment security when they grew up in an institution compared to children who lived in a family, but children who were homozygous for the *l* allele appeared to be protected against the adverse institutional environment on attachment. We conclude that not all children may be equally vulnerable to extremely adverse rearing experiences

**39) Huffmeijer, R., Alink, L.R.A., Tops, M., Grewen, K.M., Light, K.C., Bakermans-Kranenburg, M.J., & Van IJzendoorn, M.J. (2012). Salivary levels of oxytocin remain elevated for more than two hours after intranasal oxytocin administration. *Neuroendocrinology Letters*, 33, 21–25.**

**OBJECTIVE:** This is the first study investigating whether levels of oxytocin in saliva remained elevated after intranasal oxytocin administration for the duration of an experiment (in which neurobehavioral effects of oxytocin were observed) taking more than two hours.

**METHODS:** Oxytocin levels were measured in saliva samples collected from 57 female participants right before (T0), approximately 1¼ h (T1), and approximately 2¼ h (T2) after intranasal administration of 16 IU of oxytocin or a placebo, using a double-blind, within-subjects design.

**RESULTS:** Average levels of oxytocin did not differ between conditions before use of the nasal spray, markedly increased only after oxytocin administration, and were still elevated after 2¼ h.

**CONCLUSION:** Salivary levels of oxytocin remained persistently elevated over the course of our experiment, i.e. for more than two hours after intranasal oxytocin administration and over a time-period in which neurobehavioral effects of oxytocin are commonly observed. This suggests that salivary concentrations may be a valuable biomarker for oxytocin, and may help to explain its effects on brain activity, information processing, and behavior.

**40) Vermeer, H. J., Van IJzendoorn, M. H., Groeneveld, M. G., & Granger, D. A. (2012). Downregulation of the immune system in low-quality child care: The case of Secretary Immunoglobulin A (SIgA) in toddlers. *Physiology & Behaviour*, 105, 161-167, doi: 10.1016/j.physbeh.2011.08.017**

Does the experience of stress during child care lead to downregulation of the immune system, in particular in low-quality care? Saliva was collected from 68 toddlers attending center or

family child care at home and at child care, and assayed for secretory IgA (SIgA). Caregiver sensitivity was used as an index of quality of care and was observed during three videotaped episodes of 10 min. Diurnal patterns of SIgA showed a steep fall in the morning followed by a flattening out. SIgA was not associated with type of care, but lower caregiver sensitivity was associated with lower SIgA levels in both types of care. Quality of child care is associated with a non-specific secretory component of children's mucosal immunity with well established protective effects against upper respiratory infections.

**41) Bakermans-Kranenburg, M.J., McCreery Bunkers, K., Dobrova-Krol, N.A., Engle, P., Fox, N.A., Gamer, G., Goldman, P., Greenberg, A., Groark, C.J., Groza, V., Gunnar, M.R., Johnson, D.E., Juffer, F., Kreppner, J.M., LeMare, L., McCall, R.B., Muhamedrahimov, R.J., Nelson, C.A., Palacios, J., Sonuga-Barke, E.J.S., Steele, H., Steele, M., Van IJzendoorn, M.H., Verhulst, F., Vorria, P. & Zeanah, C.H. (2012). The development and care of institutionally reared children. *Child Development Perspectives*, 6, 174-180. doi: 10.1177/0165025411406858**

This article briefly summarizes the literature on elements of research, practice, and policy pertaining to the development and care of children raised in institutions. It covers such children's development while they reside in institutions and after their transition to adoptive or foster families. Of special interest are attachment and indiscriminate friendliness, physical growth, neurobiological deficits, and sensitive periods. Early exposure of a year or 2 to a substandard institution is related to higher than expected rates of a variety of long-term neurological, physical, cognitive, and behavioral deficiencies and problems, even if the children are subsequently reared in advantaged families. Countries hoping to transition from a reliance on institutions to family care alternatives face a variety of unique challenges relating to their prevailing historical, cultural, political, and financial circumstances. Although there has been progress, developing a child welfare system of family alternatives may take time in some countries.

**42) Cassibba, R., Van IJzendoorn, M.H. & Coppola, G. (2012). Emotional availability and attachment across generations: variations in patterns associated with infant health risk status. *Child Care Health and Development*, 38, 538-544. doi: 10.1111/j.1365-2214.2011.01274.x**

**BACKGROUND:** The presence of limits or distortions in the children's communicative behaviours (due to a chronic illness) may interfere with the possibility to build secure attachment relationships. Moreover, the distress that the atypical chronic illness condition brings to family life may interfere the intergenerational transmission of attachment.

**METHODS:** This study evaluated the associations between maternal attachment representations, emotional availability and mother-child attachment in a clinical and in a comparison group. Forty infants (23 female) in their 14th month of life and their mothers participated in this study, 20 dyads with clinical infants (10 premature infants and 10 infants affected by atopic dermatitis) and 20 full-term and healthy comparison infants. The Adult Attachment Interview, the Emotional Availability Scales (EAS) and the Strange Situation Procedure were used to assess, respectively, the security of mothers' attachment representations, the emotional availability and the quality of mother-child attachment.

**RESULTS:** We found that the two groups (clinical vs. comparison) did not differ with respect to the Adult Attachment Interview and the Emotional Availability Scales measures. A significant difference was found in the distribution of the infant-mother attachment patterns, with a higher incidence of insecure infants in the clinical group. In the typically developing group, more secure maternal attachment representations predicted more emotional availability in mother-infant interactions, which predicted more secure infant-mother attachments.

However, we did not find similar support for intergenerational transmission of attachment in the clinical group.

**CONCLUSIONS:** We speculate that constant concerns about the child's health condition and communicative difficulties of clinical infants may hamper or even mitigate the intergenerational transmission of attachment.

**43) Emmen, R.A.G., Malda, M., Mesman, J., Ekmekci, H. & Van IJzendoorn, M.H. (2012). Sensitive parenting as a cross-cultural ideal: Sensitivity beliefs of Dutch, Moroccan, and Turkish mothers in the Netherlands. *Attachment & Human Development, 14*, 601-619. doi: 10.1080/14616734.2012.727258.**

The primary goal of this study is to test the hypothesis that beliefs about the ideal sensitive mother are similar across Dutch, Moroccan, and Turkish mothers living in the Netherlands. A total of 75 mothers with at least one child between the ages of six months and six years described their views about the ideal sensitive mother using the Maternal Behavior Q-Sort (Pederson, Moran, & Bento, 1999 ). These views were highly similar within and across cultural and socio-economic groups. Nevertheless, family income fully mediated the relationship between ethnic background and sensitivity beliefs; income of minority mothers was lower which was in turn predictive of a lower sensitivity belief score. Our findings suggest that the main behavioral markers of sensitivity are valued by mothers from different cultural backgrounds. The role of socio-economic status in sensitivity beliefs is consistent with the Family Stress Model.

**44) Van IJzendoorn, M.H., Fridman, A., Bakermans-Kranenburg, M.J. & Sagi-Schwartz, A. (2012). Aftermath of genocide: Holocaust survivors' dissociation moderates offspring level of cortisol. *Journal of Loss and Trauma. International Perspectives on Stress & Coping, 18*, 64-80. doi: 10.1080/15325024.2012.679132.**

We examined the effects of the Holocaust on diurnal cortisol secretion in survivors and their adult offspring. Israeli female Holocaust survivors and matched comparisons formed a case-control study design with two generations: 32 Holocaust survivors and 33 comparisons, along with their offspring (total  $N = 144$ ). Participants self-reported on dissociation and physical health, and their salivary cortisol levels were assessed during the day. Complete cortisol data was available for 58 and 74 first- and second-generation participants, respectively. Holocaust survivors showed higher levels of daily cortisol versus comparisons. Their offspring showed lower cortisol levels only when surviving parents displayed more dissociation.

**45) Van IJzendoorn, M.H. & Bakermans-Kranenburg, M.J. (2012). Differential susceptibility experiments: Going beyond correlational evidence: Comment on beyond mental health, differential susceptibility articles. *Developmental Psychology, 48*, 769-774. doi: 10.1037/a0027536**

Reviewing the studies on differential susceptibility presented in this section, we argue that the time is ripe to go beyond correlational designs to differential susceptibility experiments. In such experiments, randomization prevents hidden moderator effects on the environment and guarantees the independence of moderator and outcome, while the environment is manipulated and assessed in standard ways. Correlational studies generate a priori expectations about crucial moderators (e.g., temperament, biological sensitivity, and genetics). We discuss the differential susceptibility experiments available up until now and conclude that these experiments are feasible and contribute in unique ways to our conceptions of differential susceptibility.

**46) Van IJzendoorn, M.H., Bhandari, R., Van der Veen, R., Grewen, K.M. & Bakermans-Kranenburg, M.J. (2012). Elevated salivary levels of oxytocin persist more than 7h after intranasal administration. *Frontiers in Neuroscience*, 6, 1-6. doi: 10.3389/fnins.2012.00174**

We addressed the question how long salivary oxytocin levels remain elevated after intranasal administration, and whether it makes a difference when 16 or 24 IU of oxytocin administration is used. Oxytocin levels were measured in saliva samples collected from 46 female participants right before intranasal administration (at 9:30 a.m.) of 16 IU ( $n = 18$ ) or 24 IU ( $n = 10$ ) of oxytocin, or a placebo ( $n = 18$ ), and each hour after administration, for 7 h in total. Oxytocin levels did not differ among conditions before use of the nasal spray. Salivary oxytocin levels in the placebo group showed high stability across the day. After oxytocin administration oxytocin levels markedly increased, they peaked around 1 h after administration, and were still significantly elevated 7 h after administration. The amount of oxytocin (16 or 24 IU) did not make a difference for oxytocin levels. The increase of oxytocin levels for at least 7 h shows how effective intranasal administration of oxytocin is. Our findings may raise ethical questions about potentially persisting behavioral effects after participants have left the lab setting. More research into the long-term neurological and behavioral effects of sniffs of oxytocin is urgently needed.

**47) 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, 101-117. doi: 10.1080/14616734.2012.661217.**

In a longitudinal study with 73 mothers and their second-born child, stability and main-level differences between measures of maternal sensitivity across settings and over time were examined. Furthermore, the predictability of harsh discipline by these different maternal sensitivity measures was studied. Maternal sensitivity was assessed at three and six months during bathing, free play on mother's lap and the baseline and reunion episode of the Still Face Paradigm (SFP; Tronick, Als, Adamson, Wise, & Brazelton, 1978 ). Harsh discipline was observed during three home visits in the second year of life. Results showed a single underlying factor for all maternal sensitivity settings at both time points and significant stability over time. Harsh discipline was predicted by maternal sensitivity at three months, which was fully mediated by maternal sensitivity at six months. Early failure to respond appropriately to infant signals is an important indicator of risk for future harsh parenting.

**48) Joosen, K.J., Mesman, J., Bakermans-Kranenburg, M.J., Pieper, S., Zeskind, P.S. & Van IJzendoorn, M.H. (2012). Physiological reactivity to infant crying and observed maternal sensitivity. *Infancy*, 1, 18. doi: 10.1111/j.1532-7078.2012.00122.x**

Relations between maternal sensitivity and physiological reactivity to infant crying were examined using measures of heart rate (HR) and respiratory sinus arrhythmia (RSA) in 49 mothers of second-born infants. Using the Ainsworth Sensitivity Scale, an independent assessment of maternal sensitivity was made during maternal free play and bathing of their infants. Physiological reactivity was measured while mothers listened to three blocks of infant cry sounds in a standard cry paradigm. Mothers scoring high on sensitivity were compared to less sensitive mothers on both their physiological reactivity to the presented crying sounds and their physiological mean-level differences. Significant interaction effects were found for both HR and RSA. Highly sensitive mothers showed a larger increase in HR and stronger RSA withdrawal in response to the first block of cry sounds compared to less sensitive mothers. Main effects showed that highly sensitive mothers had lower mean overall HR, and higher mean RSA levels across all three blocks of crying sounds compared to less sensitive mothers. RSA withdrawal and accompanying HR increases are discussed from a polyvagal

perspective as indicative of a better capability in responding to infant signals of negative affect.

**49) McCall, R.B., Van IJzendoorn, M.H., Juffer, F., Groza, V.K. & Groark, C.J. (2012). The development and care of institutionally-reared children. *Child Development Perspectives*, 6, 174-180. doi: 10.1111/j.1750-8606.2011.00231.x**

This article briefly summarizes the literature on elements of research, practice, and policy pertaining to the development and care of children raised in institutions. It covers such children's development while they reside in institutions and after their transition to adoptive or foster families. Of special interest are attachment and indiscriminate friendliness, physical growth, neurobiological deficits, and sensitive periods. Early exposure of a year or 2 to a substandard institution is related to higher than expected rates of a variety of long-term neurological, physical, cognitive, and behavioral deficiencies and problems, even if the children are subsequently reared in advantaged families. Countries hoping to transition from a reliance on institutions to family care alternatives face a variety of unique challenges relating to their prevailing historical, cultural, political, and financial circumstances. Although there has been progress, developing a child welfare system of family alternatives may take time in some countries.

**50) Mesman, J., Van IJzendoorn, M.H. & Bakermans-Kranenburg, M.J. (2012). Unequal in opportunity, equal in process: Parental sensitivity promotes positive child development in ethnic minority families. *Child Development Perspectives*, 6 SI, 239-250. doi: 10.1111/j.1750-8606.2011.00223.x**

Most studies on parental sensitivity are based on Western samples, and the cross-cultural applicability of this construct has been subject to debate. This article reports on a systematic literature review on observational studies of parental sensitivity in ethnic minority families with young children. It shows that parental sensitivity is generally lower in ethnic minority families than in majority families. The evidence suggests that the main cause for this difference is family stress due to socioeconomic disadvantage. The review found little evidence for cultural explanations. Most importantly, the review shows that parental sensitivity is related to positive child development in ethnic minority families. Interventions attempting to improve ethnic minority children's well-being should focus on both reducing family stress and enhancing parental sensitivity.

**51) Out, D., Bakermans-Kranenburg, M.J., Van Pelt, J. & Van IJzendoorn, M.H. (2012). Salivary  $\alpha$ -amylase and intended harsh caregiving in response to infant crying: Evidence for physiological hyperreactivity. *Child Maltreatment*, 17, 295-305. doi: 10.1177/1077559512464427**

This is the first study on adults' physiological reactivity to infant cry sounds and the association with intended harsh parenting using salivary  $\alpha$ -amylase (sAA) as a novel and noninvasive marker of autonomic nervous system activity. The sample consisted of 184 adult twin pairs. In an experimental design, cry sounds were presented and adults' perception and their intended caregiving responses were measured. Saliva samples were collected after each cry sound. For the majority of the sample, a decrease in sAA across the cry paradigm was observed. However, adults who indicated that they would respond in a harsh way to the crying infant were significantly less likely to show a decrease in sAA. Consistent with previous studies on physiological hyperreactivity in abusive parents, these findings suggest that failure to habituate to repeated infant crying may be one of the mediating mechanisms through which excessive, inconsolable, and high-pitched infant crying triggers less optimal caregiving.

**52) Pergamin-Hight, L., Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H. & Bar-Haim, Y. (2012). Variations in the promoter region of the serotonin-transporter gene and biased attention for emotional information: A meta-analysis. *Biological Psychiatry*, 71, 373-379. doi: 10.1016/j.biopsych.2011.10.030**

Background: Selective attention to negative information has been strongly implicated in the etiology and maintenance of anxiety and offered as a potential intermediate phenotype for anxiety disorders. Attention biases have been studied in relation to a polymorphism in the promoter region of the serotonin transporter gene (5-HTTLPR) offering equivocal findings. The present meta-analysis tested whether the extant published data support the notion that variation in the 5-HTTLPR genotype modulates selective attention to negative information.

Methods: Eleven relevant samples from 10 published articles were identified through a systematic literature search (total  $n = 807$ ). Relevant attention bias and 5-HTTLPR data were extracted based on specific coding rules, and Cohen's  $d$  effect size index was used to calculate all outcome measures. Publication bias was assessed using various methods.

Results: Carriers of the low (SS, SL<sub>G</sub>, L<sub>G</sub>L<sub>G</sub>) transmission efficacy genotype display attentional vigilance toward negatively valenced stimuli, a pattern not found in the intermediate (SL<sub>A</sub>, L<sub>A</sub>L<sub>G</sub>) and high (L<sub>A</sub>L<sub>A</sub>) efficacy genotypes. This phenomenon emerges as of medium effect size.

Conclusions: The meta-analysis supports the notion that allele variants of the 5-HTTLPR are associated with selective attention to negative stimuli. More studies are needed to fully establish the consistency of this effect. Future studies applying systematic attention bias modification may shed further light on the role of 5-HTTLPR in the development of anxiety disorders and in the prediction of clinical response to attention bias modification treatments.

**53) Riem, M.M.E., Bakermans-Kranenburg, M.J., Van IJzendoorn, M.H., Out, D. & Rombouts, S.A.R.B. (2012). Attachment in the brain: Adult attachment representations predict amygdala and behavioral responses to infant crying. *Attachment & Human Development*, 14, 533-551. doi: 10.1080/14616734.2012.727252**

Current research found that adult attachment representations influence neural, emotional, and behavioral responses to infant crying, thus validating the Berkeley Adult Attachment Interview with functional Magnetic Resonance Imaging. This study examined amygdala activation, feelings of irritation, and the use of excessive force as indicated by grip strength using a handgrip dynamometer during exposure to infant crying and scrambled control sounds in 21 women without children. Individuals with insecure attachment representations showed heightened amygdala activation when exposed to infant crying compared to individuals with secure attachment representations. In addition, insecure individuals experienced more irritation during infant crying and used more excessive force than individuals with a secure representation. Amygdala hyperactivity might be one of the mechanisms underlying the experience of negative emotions during exposure to infant crying in insecure individuals and might explain why insecure parents respond inconsistently to infant signals or reject their infants' attachment behavior.

**54) Van IJzendoorn, M.H., Belsky, J., & Bakermans-Kranenburg, M.J., (2012). Serotonin transporter genotype 5HTTLPR as a marker of differential susceptibility? A meta-analysis of child and adolescent gene-by-environment studies. *Translational Psychiatry*, 2, e147, doi:10.1038/tp.2012.73**

We present results of a meta-analysis of gene-by-environment ( $G \times E$ ) studies involving the serotonin transporter genotype 5HTTLPR to evaluate empirical support for two competing conceptual frameworks in developmental psychopathology: diathesis-stress and differential susceptibility. From a diathesis-stress perspective, the cumulative negative effects of the short allele (ss and sl genotypes) and adverse environments on development have been stressed. From a differential-susceptibility perspective, carriers of the s allele are predicted to be more open to adverse as well as positive environments, for better and for worse. Studies with children and adolescents up to 18 years of age ( $N=9361$ ) were included. We found 41 effect sizes ( $N=5863$ ) for the association between negative environments and developmental outcomes with or without significant moderation by 5HTTLPR genotype and 36 effect sizes ( $N=3498$ ) for the potentially 5HTTLPR-moderated association between positive environments and developmental outcomes. Five moderators were examined: age, ethnicity, genotyping (biallelic or triallelic) and methods used to assess environment and outcome. In the total set of studies, including studies with mixed ethnicities, we found that ss/sl carriers were significantly more vulnerable to negative environments than ll carriers, thus supporting the diathesis-stress model. In the Caucasian samples, however, ss/sl carriers also profited significantly more from positive environmental input than ll carriers. Associations between (positive or negative) environment and (positive or negative) developmental outcome were absent for ll carriers. The meta-analytic findings support the hypothesis that in Caucasian samples 5HTTLPR is a genetic marker of differential susceptibility.  $G \times E$  interactions might be critically dependent on ethnicity

