Furthermore, brain activity was related inversely to parenting stress and decrease in parental stress ($p < 0.001$) for the own baby-cry task, in brain regions associated with mentalization (precuneus, mPFC, and temporoparietal junction), and for own child-empathy task in "approach motivation" regions (amygdala).
Conclusions: Attachment-based parenting intervention (Mom Power) results in increased brain responses to baby stimuli in empathy-associated and decreased activity in depression-related circuits. Maternal brain activity was correlated inversely with parenting stress at baseline, as well as with the decrease in parenting stress following the parenting intervention.

EC PAT PTSD

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SYMPOSIUM 40

INDIVIDUAL DIFFERENCES IN ENVIRONMENTAL SENSITIVITY: DIFFERENTIAL SUSCEPTIBILITY AND THE ROLE OF SENSORY-PROCESSING SENSITIVITY

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Objectives: Environmental sensitivity, defined as "the ability to register and process external stimuli," is a basic trait that enables adaptation to the environmental context. Several theories postulate that people differ substantially in their sensitivity to environmental influences, with some more and some less affected by the experiences they make. One psychological marker of environmental sensitivity is sensory-processing sensitivity, a common and genetically based personality trait that can be measured in adults with the Highly Sensitive Person Scale. Recently, the adult scale has been adapted for use with children. This symposium will introduce the concept of environmental sensitivity and present new empirical findings on individual differences in environmental sensitivity as a function of sensory-processing sensitivity from early childhood to adulthood.
Methods: The first presentation introduces the theoretical background of environmental sensitivity and provides information on the development and psychometric validity of the Highly Sensitive Child (HSC) scale. The following two presentations focus on testing whether HSC moderates the effects of parenting quality on socioemotional outcomes. The fourth presentation investigates the heritability of HSC, and the fifth presentation reports neural correlations of sensory-processing sensitivity based on fMRI data.
Results: According to presented results, HSC is a valid, reliable, and psychometrically robust measure of environmental sensitivity in children. HSC predicts parenting effects on both internalizing and externalizing behavior, with more sensitive children being more affected by both negative and positive parenting practices. The twin modeling analyses confirm that HSC has a significant heritable component of approximately 47 percent, and according to the imaging study, SPS is associated with enhanced neural activation in brain regions associated with empathy and the integration of sensory information.
Conclusions: Environmental sensitivity can be measured reliably and predicts the response to both negative and positive experiences. Practitioners would do well to consider individual differences in environmental sensitivity in their clinical practice, both in assessment and treatment.

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40.1 ENVIRONMENTAL SENSITIVITY IN CHILDREN: CONCEPT AND MEASUREMENT

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Objectives: Humans differ substantially in their sensitivity to environmental influences, with some generally more or less affected by the experiences they make. Such individual differences in environmental sensitivity have been associated with a range of psychological, physiological, and genetic factors. One psychological marker of environmental sensitivity is sensory-processing sensitivity (SPS), a common personality trait characterized by greater awareness of sensory stimulation, behavioral inhibition, deeper cognitive processing of environmental stimuli, and higher emotional and physiological reactivity. SPS is proposed to be a stable, genetically-based personality trait that can be measured in adults with the Highly Sensitive Person Scale. Recently, the adult scale has been adapted for the use with children as young as 10 years of age. The Highly Sensitive Child (HSC) Scale short form includes 12 items and features a similar factor structure as the adult version of the questionnaire.
Methods: After summarizing the predominant theories for individual differences in environmental sensitivity, we will address four empirical objectives: 1) We will provide information on the development of the HSC Scale short form; 2) We will report associations between this new self-report measure of child environmental sensitivity and established measures of child temperament and personality; 3) We will present results on the distribution of environmental sensitivity in the sample population to test for the existence of sensitivity subgroups as hypothesized by most of the relevant theories. These objectives will be addressed featuring four different UK-based sample groups with children ranging in age from 10 to 16 years and a total sample size of $N = 3,581$; and 4) Finally, we will present findings demonstrating that the HSC Scale predicts the response to environmental exposures, including psychological intervention.
Results: Across the different studies, HSC Scale proved to be a reliable measure that is not explained by existing measures of temperament and personality and predicts the response to psychological intervention.
Conclusions: Environmental sensitivity can be measured with a short questionnaire in children aged 10 years and older and is an important predictor of treatment response.

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40.2 SENSORY PROCESSING SENSITIVITY AND NEGATIVE EMOTIONALITY AS MARKERS OF DIFFERENTIAL SUSCEPTIBILITY TO PARENTING AMONG KINDERGARTNERS

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Objectives: The differential susceptibility model postulates that children vary in their general susceptibility to parenting, with some being more strongly affected by both negative (risk-promoting) and positive (development-enhancing) experiences. Negative emotionality (NE) has been found to mark differences in susceptibility. Researchers have hypothesized that what might be the underlying link between NE and increased susceptibility is a highly sensitive nervous system manifested in the temperament trait of sensory-processing sensitivity (SPS). In this longitudinal study, we tested NE and SPS as markers of individual differences in susceptibility to parenting among children.
Methods: Dutch children ($N = 280$; 45.3 percent girls) between ages 4 and 6 years participated. Data were collected through questionnaires administered at three waves, spaced seven months apart. Mothers reported on their positive and negative parenting and on the temperament traits of their children. Teachers reported on children's prosocial and externalizing behavior. By use of latent growth curve models, we examined whether negative emotionality and sensory-processing sensitivity would interact with parenting at the beginning of the study and with changes in parenting during the study to predict changes in child behavior during the study and child behavior at the end of the study.
Results: SPS interacted with changes in both negative and positive parenting, predicting changes in externalizing (but not prosocial) behavior, in a manner consistent with differential susceptibility. Compared with less sensitive children, externalizing behavior had decreased the most in sensitive children when parents decreased in negative parenting, but externalizing behavior had increased the most when parents increased in negative parenting.

Likewise, sensitive children decreased the most in externalizing behavior when parents maintained high levels of positive parenting but increased the most in externalizing behavior when parents' positive parenting decreased. NE did not interact with negative or positive parenting.
Conclusions: Among kindergartners, SPS turns out to be a more appropriate marker of individual differences in susceptibility than NE. These findings suggest that SPS may, indeed, underlie previously reported associations between NE and increased susceptibility.

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40.3 PARENTING DIMENSIONS AS PREDICTORS OF INTERNALIZING SYMPTOMS IN ADOLESCENTS: THE MODERATING ROLE OF SENSORY PROCESSING SENSITIVITY

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Objectives: In 1997, Elaine and Arthur Aron proposed the construct of sensory-processing sensitivity, referring to the tendency to respond to lower thresholds of information than others and to better detect subtle differences in the environment. Sensory-processing sensitivity is conceptualized as a temperamental trait that increases the individual's reactivity to environmental variables. The aim of the present study was to examine the extent to which sensory-processing sensitivity interacts with dimensions of parenting in the prediction of internalizing symptoms (i.e., depressive symptoms, loneliness, and social anxiety).
Methods: A sample group of 990 adolescents (50.10 percent boys, mean age 14.83 years; SD = 0.92) completed self-report questionnaires on sensory-processing sensitivity, parenting, depressive symptoms, loneliness, and social anxiety.
Results: For all three types of internalizing symptoms, higher levels of symptoms were predicted by lower levels of parental support and proactive control and by higher levels of psychological control and sensory-processing sensitivity. Sensory-processing sensitivity moderated the association between parenting dimensions and symptoms only for social anxiety.
Conclusions: Sensory-processing sensitivity and maladaptive types of parenting predict internalizing problems in adolescents. In the case of social anxiety, sensory-processing sensitivity has also been found to interact with parenting.

ADOL DEV FAM

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40.4 HERITABILITY OF ENVIRONMENTAL SENSITIVITY

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Objectives: According to the different theories of environmental sensitivity, individuals vary in the extent to which they are sensitive to their environments, and variations in this inherent sensitivity may explain the differential outcomes in response to both adverse and positive exposures. Variability in environmental sensitivity is proposed to have a genetic basis. Despite encouraging reports from candidate gene-environment interaction studies reporting that certain genetic polymorphism are associated with environmental sensitivity, the heritability of this trait is yet unexplored. Addressing this empirical gap in research, this is the first study to investigate the heritability of environmental sensitivity and examine the genetic overlap with the Big Five personality traits.
Methods: The 12-item high sensitive child questionnaire was used as the phenotype of environmental sensitivity in a large sample group of adolescent twins ($N = 1,479$ pairs) from the Twins Early Development Study in the United Kingdom. A Big Five personality questionnaire was available for a subset of the sample group ($N = 600$ pairs). Heritability estimates were derived using classic twin-modeling methodology.
Results: Genetic factors explained 47 percent nonshared environments and 53 percent of the variability in environmental sensitivity, with no significant contribution from shared environments. Neuroticism was correlated positively with high sensitivity ($r = 0.34$). The phenotypic correlation between environmental sensitivity and neuroticism was mainly attributed to the effect of overlapping genetic influences.
Conclusions: Individual differences in environmental sensitivity are explained by both heritable and environmental factors. Genetic factors account for almost 50 percent of the variance. The shared variance between the High Sensitive Child Scale and neuroticism is mostly attributed to shared genetic factors. Environmental sensitivity is largely independent of the Big Five personality traits.

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40.5 THE HIGHLY SENSITIVE BRAIN: THE NEURAL CORRELATES OF SENSORY PROCESSING SENSITIVITY

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Objectives: Sensory processing sensitivity (SPS) is a trait associated with greater responsiveness to the environment and social stimuli. It is found in approximately 20 percent of humans and in over 100 other species. High (vs. low) SPS individuals report being more affected by subtleties in the environment, positive and negative stimuli, and other peoples' moods. Recent neuroimaging investigations of SPS in adults confirm these characteristics. For example, fMRI studies have shown that greater SPS is associated with activation of visual areas that help individuals make fine visual distinctions and stronger neural responses to novel positive and negative stimuli. The present study examined the neural correlates of SPS in adults' responses to the emotions of others. This work may shed light on SPS in children, who are particularly susceptible to both positive and negative social environments.
Methods: In an fMRI study of 18 adults (scanned twice over the first year of marriage), coupled individuals were shown happy, sad, and neutral facial images of a partner (vs. a stranger matched by age, sex, and ethnicity). Brain activations in response to partners' and strangers' positive and negative (vs. neutral) face images were correlated with the standard "Highly Sensitive Person" Scale to examine the effects of SPS.
Results: Correlations showed that greater SPS was associated positively with enhanced neural activation in regions associated with empathy, awareness, integration of sensory information, and action in response to the happy and sad facial images of others. In addition, responses to partners' positive affects showed enhanced neural activity, including reward system activation in association with greater SPS.
Conclusions: Results from neuroimaging studies show how the brain mediates complex SPS processes associated with greater responsiveness to environmental stimuli, awareness to subtleties, and "feeling" what others are feeling. They also suggest that individuals with high SPS may be particularly responsive to positive stimuli. These findings may be useful for parents and the development of programs and measures for highly sensitive children.

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