
EFFECTS OF CHILDHOOD POVERTY AND CHRONIC STRESS ON EMOTION REGULATORY BRAIN FUNCTION IN ADULTHOOD

KIM ET.AL (2013).



BACKGROUND

- Childhood poverty is linked to higher risk for psychopathology and physical illness in adulthood
 - And adult morbidity when controlling for income in adulthood
- Chronic stress associated with living in low-income families has long-term effects on physiological stress regulatory systems, leading to pathology
 - Might lead to neurobiological changes
 - But is childhood poverty prospectively linked to ER mechanisms in the CNS?
 - Could be beneficial for identifying neural patterns of ER dysfunction in individuals who grew up in low-income families

BACKGROUND

- Amygdala: threat detection and response
- Prefrontal cortex (PFC) : top-down regulation of the amygdala
 - VLPFC, DLPFC, and mPFC implement strategies such as cognitive reappraisal
 - Increased activity in these areas during reappraisal of negative stimuli predicts decreased amygdala activity and decreased perceived negative affect
- Amygdala and PFC dysregulation in populations with mood dysregulation
- Amygdala and PFC function affected by socioeconomic disparities
- But what mechanisms underly the relationship between childhood SES and neural functioning?
 - Is chronic stress a mediator?
- Children in low-income families have higher risk of exposure to many types of chronic stressors
 - Low SES in childhood may predict physiological stress dysregulation and emotion dysregulation in adolescence



AIMS

1. To investigate whether childhood family income is prospectively associated with adult neural activity in PFC and amygdala during emotion regulation
2. To investigate stress as a mediator of this relationship

METHODS

- Measured childhood poverty exposure as family income at age 9
- Conducted fMRI emotion regulation paradigm
 - Participants are instructed to Maintain or Reappraise while viewing negative images
- Chronic stress measured as average exposure to various physical and social risk factors from ages 9-17.
- Controlled for adult income levels
- Participants: n = 49
 - Recruited at age 9, followed up at age 24
 - 55.1 male, 100% white

FINDINGS

- Ratings of negative affective states were statistically different between the Reappraisal and Maintain conditions
 - But ability to regulate negative emotions was not related to family income at age 9, early chronic stress exposure, or current adult income level
- Reappraisal showed greater activity in bilateral inferior/middle/superior frontal gyrus, precentral gyrus, striatum, insula, parietal lobe, and temporal lobe compared to maintenance, but not in the amygdala using ROI
 - Bilateral amygdala activation was detected when comparing Reappraisal and Maintenance to Baseline
- Lower family income at age 9 predicted reduced activation in left DLPFC, VLPFC/insula/temporopolar area, precentral gyrus, and inferior parietal lobe/superior temporal gyrus
 - Not associated with adult income level

FINDINGS

- Amygdala ROI analysis: Childhood income negatively predicted activation of left amygdala during Reappraisal vs. Maintain conditions
 - No other cluster showed negative association with family income at age 9
- Psychophysiological interaction (PPI) analysis:
 - Lower family income at age 9 → amygdala activity positively coupled with left VLPFC during Reappraisal
 - Higher family income at age 9 → amygdala activity negatively coupled with left VLPFC during Reappraisal
 - Family income at age 9 not associated with amygdala-DLPFC connectivity
- Reappraisal success positively predicted DLPFC and VLPFC, but not amygdala activity, suggesting downregulated activity during Reappraisal
 - Use of everyday reappraisal coping was not associated with neural activity

FINDINGS

- Heightened chronic stress in childhood mediated the relationship between family income at age 9 and increased DLPFC activity during Reappraisal (full mediation)
- Heightened chronic stress in childhood mediated the relationship between family income at age 9 and increased VLPFC activity during Reappraisal (full mediation)
- No mediation effect for amygdala

DISCUSSION QUESTIONS

- Why would children with chronic stress experience impaired ER ability (via the PFC)? Evolutionary adaption? (Brandon)
- Why do you think that childhood income level, but not current income level as an adult, was linked to neural activity during emotion regulation? How can this be explained from a developmental perspective? Do you think that current adult income level should impact neural activity during emotion regulation? Why or why not? (Giana)
 - Emotion regulation critical period? (Josh)
- What could explain this lack of subjective rating differences in the presence of differences in neuroimaging results? Are subjective measures sensitive enough? Do individuals who experienced childhood poverty experience emotional distress differently? (Brandon)
 - Could differences in their experience using cognitive reappraisal have affected the differences reported in subjective ratings of successful emotion regulation or might they have affected the study in other ways? (Rebecca)
- Participants came from the rural US, where the income gap remains much larger than in the urban US. What are the implications of this in the current study? Did the researchers choose rural communities because this stronger income divide might encourage greater variance between families in poverty and those with wealth? Would we expect a smaller effect here if the sample was urban instead? (Haley)

DISCUSSION QUESTIONS

- How is chronic stress impairing neural functioning during emotion regulation? (Betty)
- How do we help these people? (Shayne)
 - Mindfulness/meditation? (Sarah)
- How might parenting act as a mediating (or moderating) factor for the development of healthy emotion regulation for children who grew up in poverty? (Bobby)
- How might other important variables related to poverty that were not measured be important in assessing the relationship between poverty and emotion regulation outcomes? (Bobby)
- How do we reconcile this differences in self report vs. neural activity findings? Does this finding *actually* equate to poor emotion regulation by those with lower childhood SES? (Lizard)
- Confounds? For example, participant response to the following task was measured: “rationalizing or objectifying the content of the pictures (e.g., an abused woman smoking a cigarette is an actress in a movie between scenes).” Domestic violence occurs more frequently in impoverished homes. Couldn’t early exposure to domestic violence cause stronger and more persistent (i.e., difficult to regulate) emotional responses to stimuli depicting such violence? (Haley)

EMOTIONAL AROUSAL DURING SOCIAL STRESS IN YOUNG ADULTS WITH AUTISM

DIJKHUIS ET.AL (2019)



BACKGROUND

- Individuals with ASD:
 - Difficulties in social functioning may be related to arousal, attention abnormalities, and deficits in emotion regulation
- Accurately labeling negative emotional states is necessary for coping with emotional consequences of social situations and managing behavioral impulses
 - Aids in social adaption
 - Unconscious control of emotions is preempted by physiological regulatory processes
 - In children with and without ASD, HRV may be related to socio-emotional behaviors and skills such as social responsiveness, spontaneous eye contact, etc...

TWO THEORIES

1. The Polyvagal Theory: individual differences in HRV mediate emotion regulation and expression
 1. HRV is an index for vagal tone
 2. The Neurovisceral Integration Model: a central set of neural structures integrates internal signals from the body with signals from the environment to evaluate if the body's physiological state, cognition, perception and action match environmental demands.
- HRV seems to be a good measure to assess behavior in socially challenging environments in individuals with ASD
 - Can be measured using the TSST, which has shown that children and adolescents with ASD show less HRV reactivity in response to challenging tasks compared to TD controls
 - But some results are contradictory
 - Studies mostly focus on children and adolescents; more studies in adults needed
 - Few studies address emotional awareness of arousal in ASD
 - But those that have suggest that adults with ASD might be less able to recognize/describe their own emotions

AIMS

1. Further address the contribution of emotional arousal regulation to social functioning in young adults with ASD
 1. Hypothesized that individuals with ASD would show less HR and HRV reactivity in response to social stress task than TD individuals
 2. Hypothesized comparable HR during baseline and stressful tasks, but lower baseline HRV in ASD group compared to controls
 3. Hypothesized that individuals with ASD would show less emotional awareness after task completion than TD peers

METHODS

- Trier Social Stress Task (neutral video of nature scene, explanation of presentation phase, preparation phase, presentation phase, questionnaire regarding emotional awareness)
 - Jury was meant to lead participants to question their own behavior to facilitate negative emotional arousal
 - <https://www.youtube.com/watch?v=DXiZGmZOsnI>
- Eye tracking measured gaze behavior
- ECG data collected for heart rate assessment
- Participants: 51 young adults with ASD and 28 TD peers (72% Male)
 - Postsecondary students enrolled in higher ed in the Netherlands

FINDINGS

- No significant differences in baseline HR found between groups
 - No group differences in HR reactivity
- No significant differences in baseline HRV found between groups
 - ASD individuals showed decreased HRV reactivity compared to TD controls (no change from baseline in ASD group)
- No differences in awareness of emotions between ASD and control groups
- No significant correlation between HRV and emotional awareness for either group
- HR was negatively correlated with feeling unpleasant in ASD group

DISCUSSION QUESTIONS

- How can they compare physiological response when the medication usage is so different and may be blunting the effect of the ASD group? (Josh)
- Compounded effect of co-occurring anxiety or depression on emotional arousal? Control group was not evaluated using gold-standard measures to rule out co-occurring psychiatric conditions which I think can affect results. (Nicole)
- The Dijkhuis paper discussed the neurophysiological difference between ASD and normal developing adults. I imagined there would be difference between these two groups of people and some are shown in the paper and some are not. One thing that stood out to me is that the average IQ was higher in their ASD group than their normal developing group. I don't know ASD well but I don't think that's the norm. Do they coincidentally find a group with high IQ or they intentionally select this group of participants? (Shayne)
- How would the results change if these factors (BMI; weight) were taken into account? Would this be a mediating factor that bridges the gap in the mismatch between emotional regulation and awareness, thus impacting social adaptations? How much of a difference would TD individuals who had similar BMI or weight to the ASD group display with the same procedures? (Kelly)