



Mood dysregulation and affective instability in emerging adults with childhood maltreatment: An ecological momentary assessment study



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ABSTRACT

Childhood maltreatment increases risk for mood, anxiety, substance use and personality disorders and is associated with alterations in structure, function and connectivity of brain regions involved in emotional regulation. We sought to assess whether maltreatment was specifically associated with disturbances in positive or negative mood regulation. Ecological momentary ratings were collected with a wristwatch-like device with joy-stick (Seiko ecolog) approximately six times per day over a week in 60 unmedicated participants (22 control, 38 maltreated, 18–25 years old). Forty-five percent of maltreated subjects had a history of major depression but all were currently euthymic. Principal component analysis with varimax rotation was used to provide orthogonal measures of positive and negative valence, which were analyzed for indices of variability, circadian rhythmicity and persistence, using linear and non-linear hierarchical modeling and Hurst analysis. Groups did not differ in mean levels of positive or negative affect. Maltreated subjects had increased variability and circadian and hemicircadian abnormalities in ratings of positive but not negative affect. Conversely, they had higher estimated Hurst exponents for negative but not positive affect ratings indicating a greater degree of persistence. Abnormalities in variability, rhythmicity and persistence were present in both maltreated subjects with and without histories of major depression. These findings suggest that both positive and negative valence systems may be dysregulated in individuals with childhood maltreatment. However the nature of the dysregulation appears to differ fundamentally in these domains, as positive mood ratings were more variable and negative ratings more persistent.

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1. Introduction

Childhood maltreatment has been shown in meta-analyses to be a major risk factor for mood and anxiety disorders (Norman et al., 2012; Teicher and Samson, 2013). According to the adverse childhood experiences study, maltreatment-related early adversity accounted for about 54% of the population attributable risk (PAR) for depression (Anda et al., 2002) and 67% of the PAR for suicide attempts (Dube et al., 2001). Similarly Green et al. (2010) reported

that childhood adversity accounted for 32% of the PAR for anxiety disorders. Childhood maltreatment is also associated with alterations in structure, function, and connectivity of brain regions involved in emotional regulation, including the amygdala, hippocampus, ventromedial prefrontal cortex, dorsolateral prefrontal cortex, anterior insula and anterior cingulate (see Teicher and Samson (2013) for recent review). We recently reported in a large-scale cortical structural network analysis that the main consequence of maltreatment was a reduction in the centrality (central importance) of the anterior cingulate and temporal pole along with increased centrality of the anterior insula and pre-cuneus. We hypothesized that alterations in centrality of anterior cingulate and insula would result in deficient emotional regulation

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(Stevens et al., 2011). Further, alterations in centrality of temporal pole, insula and precuneus may affect the subject's ability to accurately interpret thoughts and intentions of others (Ross and Olson, 2010), their sensitivity to social rejection (Eisenberger, 2012), and their self-awareness (Cavanna and Trimble, 2006; Craig, 2009). This in turn may play a role in reducing self-esteem and self-efficacy, resulting in distorted attribution and emotional response to daily events.

Curiously, relatively few studies have explored the association between childhood maltreatment and mood dysregulation or affective instability. In one of the better studies, Goodman et al. (2003) found a significant association between maltreatment history and measures of affective instability in patients with personality disorders using rating scales. Pietrek et al. (2012), in a laboratory study, found that subjects with depression or borderline personality disorder had an impaired ability to down regulate response to emotional pictures, as assessed using magnetoencephalography. This deficit was observed in the subgroup of subjects with, but not without, high exposure to childhood maltreatment.

An alternative technique for evaluating emotional regulation is ecological momentary assessment (EMA) or experience sampling (Csikszentmihalyi and Larson, 1987; Shiffman et al., 2008). This is a method for repeatedly acquiring self-reported information about an individual's subjective state at the moment of recording to provide a time series of instantaneous status reports collected without recall bias during the course of their daily life (Csikszentmihalyi and Larson, 1987; Shiffman et al., 2008). Theoretically, EMA has numerous advantages over rating scales as subjects record their mood state at the moment rather than endeavoring to recall how it was and how it fluctuated over days to weeks (Ebner-Priemer and Trull, 2009; Shiffman et al., 2008). Further, multiple records collected over an extended time series can be analyzed in a variety of ways to assess dynamic change (Ebner-Priemer and Trull, 2009; Shiffman et al., 2008).

Wonderlich et al. (2007) used EMA to assess the potential effects of childhood abuse on affective stability in subjects with bulimia nervosa. They found that emotional abuse was significantly associated with higher variability in anger–hostility ratings and higher levels of negative affect (Wonderlich et al., 2007), but physical and sexual abuse were not.

The aim of the present study was to assess the potential impact of childhood maltreatment on mood regulation in maltreated individuals selected from the community without regard to psychopathology. Studies that recruit maltreated subjects with psychopathology may overestimate the consequences of maltreatment by selecting the most adversely affected individuals. Conversely, studies that specifically select maltreated individuals without psychopathology may bias results in the opposite direction. Our goal was to select a sample based on exposure history that would contain both susceptible subjects with histories of psychopathology as well as more resilient subjects without psychiatric histories to provide a more balanced assessment of the overall consequences of maltreatment.

2. Material and methods

2.1. Subjects

This study was approved by the McLean Hospital IRB. All subjects provided informed written consent. Methods for recruitment have been described in detail (Teicher et al., 2012). Briefly, we recruited unmedicated 18–25 years olds from the community through advertisements. Potentially interested subjects were given access to a HIPAA-compliant online enrollment system that

collected extensive information about their developmental and medical history and degree of exposure to various forms of childhood maltreatment. Subjects with premature birth or birth complications, maternal substance abuse during pregnancy, or medical disorders that could affect brain development were excluded as were those who had experienced multiple unrelated forms of adversity such as natural disasters or motor vehicle accidents. Subjects were required to be free from neurological disease or significant head trauma. Subjects selected for interview either had no history of childhood maltreatment, reported exposure to a specific type of maltreatment (e.g., parental verbal abuse) or had exposure to one or more maltreatment-related events that fulfilled the DSM-IV A1 and A2 criteria for a traumatic experience. Sixty subjects meeting criteria underwent EMA as per protocol. All subjects tested negative for drug use by urinalysis and for recent alcohol consumption by breath test. Subjects were paid \$20 for completing the online assessment, \$50 per interview and assessment session (typically two 4-h sessions) and \$25 for EMA.

2.2. Assessments

Structured Clinical Interviews for DSM-IV Axis I and II psychiatric disorders (SCID) (First et al., 1997) were used for diagnoses. Maltreatment was assessed using the 100-item semi-structured Traumatic Antecedents Interview (TAI) (Herman et al., 1989), which evaluates exposure to physical or sexual abuse, witnessing violence, physical or emotional neglect, significant separations or losses, verbal abuse, or parental discord (Roy and Perry, 2004). Subjects were also evaluated using both self-report and interview versions of the Conflict–Tactic Scales (CTS) (Straus et al., 1998). Information from the TAI and CTS were used to determine their ACE score (Anda et al., 2006; Felitti et al., 1998) based on criteria delineated in Anda et al. (2007). Degree of exposure to maltreatment was also quantified using the childhood trauma questionnaire (CTQ) (Bernstein et al., 1997, 1994), which is a 28-item self-report inventory that provides a brief, reliable, and valid screen for histories of abuse and neglect.

Kellner's symptom questionnaire (SQ) was used to provide self-report ratings of psychiatric symptom severity, during the current week, in four domains (depression, anxiety, anger–hostility, somatization) (Kellner, 1987). The symptom subscales have excellent test–retest reliability and correlate well with Hamilton depression rating scale (Kellner, 1987). We have previously found that SQ scores were substantially increased in individuals reporting exposure to physical, sexual and emotional abuse (Teicher et al., 2006) as well as peer verbal abuse (Teicher et al., 2010).

Symptoms of 'limbic irritability', were assessed using the limbic system checklist (LSCL-33) (Teicher et al., 1993), which was created to evaluate the frequency with which subjects experience symptoms often encountered as ictal temporal lobe epilepsy phenomena, as described by Spiers et al. (1985). 'Limbic irritability' is the symptom cluster most strongly affected by exposure to childhood maltreatment in our studies (Teicher and Parigger, 2015; Teicher et al., 2006; Teicher et al., 2010; Teicher and Vitaliano, 2011), and limbic irritability was found, in one study, to mediate the risk between childhood maltreatment and symptoms of depression and dissociation (Dackis et al., 2012).

Dissociation was assessed using the Dissociative Experience Scale (DES) (Bernstein and Putnam, 1986), which consists of 28 questions and Likert lines assessing the frequency of occurrence of various dissociative experiences in an individual's daily life. DES scores are also strongly associated with exposure to multiple forms of abuse (Teicher et al., 2006) as well as peer verbal abuse (Teicher et al., 2010).

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