CHILD MALTREATMENT AND EMOTION REACTIVITY TO POSITIVE INTERPERSONAL EVENTS

by

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Abstract

Child Maltreatment and Emotion Reactivity to Positive Interpersonal Events

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Child maltreatment (CM) can have a lasting impact on the survivor's mental health and functioning, particularly emotion regulation. There is a dearth of research examining CM's impact on positive emotion regulation, and even fewer studies have explored emotion reactivity to positive events. Past findings are somewhat contradictory, as some evidence suggests CM results in blunted positive emotion reactivity, whereas others suggest heightened reactivity. The purpose of the present study is to examine whether CM was related to the day-to-day associations between positive interpersonal experiences and positive affect using a micro-longitudinal (daily) research design. Participants in this study included 1,636 undergraduate students recruited through their introductory psychology research pool. Participants completed a baseline survey that included questions related to physical abuse, emotional abuse, and neglect, and several weeks later they reported on their positive and negative affect and experience of positive interpersonal events over 30 consecutive days. Findings indicated several interaction effects in which individuals with higher levels of CM showed weaker positive associations between enjoyable interpersonal experiences and distinct positive affective states, i.e., CM blunted positive affect reactivity. Secondary analyses examining negative affect as the dependent variable showed several interactions in which individuals with higher CM generally reported less of a decrease in negative affect following positive interpersonal experiences. This study is among the first to

comprehensively examine the impact of CM on positive emotion reactivity using a daily process study design and results suggest that CM differentially impacts associations between interpersonal exchanges and emotion reactivity. Results extend the extant body of literature on CM and emotion reactivity and offers a foundation for future exploration of emotion reactivity that might impact our understanding of the long-term socioemotional experiences of survivors of CM.

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Section I: Extended Literature Review

Child Maltreatment and Emotion Reactivity to Positive Interpersonal Events

Child maltreatment (CM) is a pervasive problem that affects over 700,000 children in the United States each year (U.S. Department of Heath & Human Services, 2014). The Centers for Disease Control and Prevention report that 1 in 4 children experience some form of CM during their lifetimes (https://www.cdc.gov/violenceprevention/childmaltreatment/index.html). CM includes physical, sexual and emotional abuse, and neglect, all of which are intrinsically interpersonal in nature. Both theory and research suggest that CM generally has a greater negative impact than traumatic events that are non-interpersonal in nature (Briere & Rickards, 2007; Cicchetti & Toth, 2005; Etter, Gauthier, McDade-Montez, Cloitre, & Carlson, 2013). Moreover, the experience of CM not only has a detrimental impact during childhood and adolescence (e.g., Langevin, Hebert, Allard-Dansereau, & Bernard-Bonnin, 2016), but can also have long-term negative consequences on the survivor's mental health and functioning (e.g., Infurna, Rivers, Reich & Zautra, 2015; Miller, Chen & Parker, 2011; Mullen, Martin, Anderson, Romans, & Herbison, 1996; Repetti, Taylor & Seeman, 2002; Silverman, Reinherz & Giaconia, 1996). Indeed, young adults with a history of CM report lower well-being and higher rates of psychopathology, such as major depressive disorder, post-traumatic stress disorder, antisocial behavior, and suicide attempts (Silverman et al., 1996). It has been posited that CM influences these deleterious outcomes, in part, through a common pathway referred to as emotion dysregulation, which has been broadly defined as difficulty in identifying, modulating, expressing, and responding to emotions effectively (e.g., Berzenski & Yates, 2011; Burns, Jackson & Harding, 2010; Infurna et al., 2015).

To date, most studies examining the effect of CM on emotion regulation processes have focused on the regulation of negative emotions arising from negative experiences (e.g., Almeida,

2005; Glaser, van Os, Portegijs, & Myin-Germeys, 2006), and relatively few have examined its effect on regulation of positive emotions emanating from positive experiences (e.g., DePierro, D'Andrea, Frewen, & Todman, 2018; Infurna et al., 2015). The lack of focus on CM's possible effect on the link between positive experiences and positive emotions is noteworthy given that numerous studies have demonstrated a strong relationship between positive experiences (particularly enjoyable interpersonal interactions), positive emotions, psychological well-being and resilience (e.g., Bonanno, 2004; Bonanno et al., 2007; Cohn, Fredrickson, Brown, Mikels, & Conway, 2009; Fredrickson, 1998, 2001, 2003; Ong, Bergeman, Bisconti, & Wallace, 2006; Tugade & Fredrickson, 2004). In view of these findings, there may be an important gap in our understanding of CM's long-term effect on overall well-being in that CM may compromise the degree to which positive experiences (especially interpersonal interaction) elicit positive emotions. This is particularly important given that the frequency of positive events typically outnumbers that of negative events (e.g., Gunaydin, Selcuk, & Ong, 2016; Infurna et al., 2015), and thus there are more opportunities to experience positive emotional reactions to enjoyable events.

The aims of the present study were to advance this area of research in several ways. First, by utilizing an intensive longitudinal (daily process) design, the present study examined the dynamic association between daily positive experiences and positive emotions as they unfold in everyday life and whether these processes varied as a function of CM. Second, use of an intensive longitudinal design allowed for modeling of the within-person association between daily positive experiences and positive emotions, i.e., whether deviations from mean levels of enjoyable experiences related to proximal changes in positive affective states. This enabled the disentanglement of within-person processes from between-person differences in positive events

and emotions, which more accurately aligns with theoretical models of emotion regulation. Third, the proposed study focused on daily positive interpersonal interactions, rather than positive events in general, given their prominence in fostering well-being (Arewasikporn, Sturgeon & Zautra, 2018; Lambert, Gwinn, Baumeister, Strachman, Washburn, Gable, & Fincham, 2013; Rohrer, Richter, Brümmer, Wagner, & Schmukle, 2018). Fourth, this study also examined negative emotions to test whether any observed relationship between CM and regulation of emotions arising from interpersonal interaction were distinct to positive emotions. Finally, using an attachment and social learning theory lens, this study focuses on CM in the context of adverse family environments, as research has shown the negative influence of early family conflict on emotional well-being (Felitti et al., 1998; Taylor, Lerner, Sage, Lehman & Seeman, 2004). These aims were examined in a large sample of college students in early adulthood, a developmental period characterized by heightened emotion reactivity (Gilbert, 2012) and emotional investment in interpersonal interactions (Herres, Ewing, & Kobak, 2016; Weinstein, Mermelstein, Hedeker, Hankin, & Flay, 2006).

Child Maltreatment and Regulation of Negative Emotions

CM can have long-lasting consequences for psychopathology and mental health (e.g., Malinosky-Rummell & Hansen, 1993; Miller et al., 2011; Mullen et al., 1996). Problematic emotion regulation is considered a core feature of most forms of psychopathology (e.g., Cole & Deater-Deckard, 2009; Hopfinger, Berking, Bockting, & Ebert, 2016) and is thought to be a primary mechanism through which CM affects mental health (e.g., Cicchetti, 1989; De Bellis, 2001). Although emotional trauma experienced at any age may result in impaired emotion regulation, trauma in childhood is posited to be particularly detrimental (Cicchetti & Toth, 2005; De Bellis, 2001; Etter et al., 2013; Glaser et al., 2006). Evidence from multiple studies shows

that CM is a stronger predictor of emotion dysregulation than similar traumas occurring later in life (e.g., Bunce, Larsen, & Peterson, 1995; Ehring & Quack, 2010). There are data to suggest that the developing brain is especially sensitive to neuroendocrine changes that impact subsequent learning, emotional response, and interpersonal behaviors, with secondary effects on emotional development (Cicchetti, 2013; Miller et al., 2011; Glaser et al., 2006; Twardosz & Lutzker, 2010). It has also been shown that deprivation of crucial interpersonal and sensory experiences and over-activation of neural systems implicated in fear and stress responses, as seen in childhood neglect and abuse, negatively influences brain development when they occur during this vulnerable period (Twardosz & Lutzker, 2010).

Biologically, CM and early life stress have been associated with diverse and lasting changes in brain development, such as alterations to the hypothalamic-pituitary-adrenal (HPA) axis, that impact one's reactivity to events in their environment (Bugental, Martorell & Barraza, 2003; Teicher, Anderson, Polcari, Anderson, Navalta & Kim, 2003). The HPA system responds to stressors such as CM by producing and releasing adrenocorticotropic hormone, which stimulates the adrenal gland to produce cortisol. Although cortisol is essential for survival, chronically low, high, or poorly regulated cortisol levels can have adverse impacts on health and behavior (Tarullo & Gunnar, 2006). The HPA axis develops throughout childhood, and basal HPA activity and cortisol reactivity are shaped by early life experiences (Tarullo & Gunnar, 2006). Research has shown that adverse early experiences such as CM have complex, long-term effects on the HPA axis, and there is evidence demonstrating an association between CM and both elevated adrenocorticotropic hormone and cortisol levels in response to psychological stressors in adulthood (Tarullo & Gunnar, 2006).

Other explanations have been put forth to explain how CM affects emotion regulation. For example, social learning and attachment theories emphasize the critical role played by parents and caregivers. Social learning-based models posit that children successfully develop emotion regulation abilities through observation and interaction with parents and caregivers (Bowlby, 1973; Calkins & Hill, 2007; Cole, Michel, & Teti, 1994; Ehring & Quack, 2010; Langevin et al., 2016). The style in which parents and caregivers regulate their own emotions functions as a model for how developing children learn to handle their emotional states (Ehring & Quack, 2010). Moreover, parents and caregivers help cultivate the child's understanding and labeling of their emotional states, so that the child can eventually regulate their emotions successfully (Ehring & Quack, 2010). Infants and young children initially rely heavily on these significant others to regulate their emotions; however, over time they begin to internalize these abilities so that they themselves can identify, regulate and express emotions and modulate their own behavior (Diamond & Aspinwall, 2003; Eisenberg & Sulik, 2012; Morris, Silk, Steinberg, Myers, & Robinson, 2007; van der Kolk & Fisler, 1994).

Related to social-learning-based models, Bowlby's (1973) attachment theory also highlights the impact of early experiences with caregivers on the regulation of negative emotions. This theory posits that the attachment a child develops when parents or caregivers are responsive to its needs functions as a secure base from which the child can explore the world. These early relationships have a profound influence on individuals internal working models – i.e., cognitive frameworks comprised of mental representations of the self, of how to relate to others and what to expect from others (Gosnell & Gamble, 2013) – with implications for how one behaves, views the world, and engages in relationships. Working models are thought to be carried into adulthood and impact all future social relationships; thus, disrupting them can have

serious consequences. When individuals have a history of negative experiences, as in the case of CM, they can develop problematic or "insecure" attachment styles, such as avoidant or anxious attachment (Cichetti & Toth, 2005; Gosnell & Gamble, 2013). Avoidant attachments are characterized by discomfort with closeness, avoidance of support seeking, and reliance on the self. Anxious attachments are characterized by displays of anxiety related to the strong desire for closeness, excessive attempts to obtain attention or care from others, and a fear of abandonment or rejection (Brennan, Clark, & Shaver, 1998; Gosnell & Gamble, 2013). Secure attachments, on the other hand, are associated with numerous positive outcomes, including greater self-esteem, positive mood, appropriate support seeking, and greater persistence on challenging tasks (Feeney, 2004; Gosnell & Gamble, 2013). Children who are unable to form secure attachments with their caregivers due to traumatic caregiver-child interactions (including CM) may experience negative consequences in their socio-emotional development, such as impaired emotion regulation and coping abilities (Langevin et al., 2016; Morris et al., 2007; van der Kolk & Fisler, 1994). These skills are needed for effective response to stress, and these deficits can impact the individual both during childhood and into adulthood.

Another relevant model is betrayal trauma theory (Freyd, 1996; Freyd, DePrince, & Gleaves, 2007; Gamache, Van Ryzin, & Dishion, 2016), which asserts that the interpersonal context in which the trauma occurs is of particular importance. Betrayal traumas specifically refer to traumas in which an individual is harmed or violated by a person they depend on for survival, such as a trusted caregiver or significant other (Freyd, Klest, Allard, 2005; Gamache et al., 2016). This theory posits that CM perpetrated by individuals known to the survivor are more serious forms of betrayal than maltreatment by strangers, as there is a greater degree of trust and dependency built into these relationships. Research has consistently shown that traumas that

include significant betrayal are associated with worse outcomes when compared to other types of trauma (e.g., Edwards, Freyd, Dube, Anda, & Felitti, 2012; Gamache et al., 2016; Goldsmith, Chesney, Heath, & Barlow, 2013).

In general, the historical emphasis on exploring links between CM and regulation of negative emotions reflects the disease-model approach. Specifically, this approach focuses on understanding, and ultimately mitigating, dysfunction rather than understanding and optimizing adaptive functioning. Again, studying the effects of negative emotions and reactivity to stressors is not without justification; the consequences are salient, observably detrimental, and have clear physiological correlates (e.g., Sharma, Singh Balhara, Sagar, Deepak, Mehta, 2011). However, in the last several decades researchers have increasingly focused on strength-based approaches when examining human behavior. The emergence of positive psychology (Seligman & Csikszentmihalyi, 2000) has been particularly important to this shift, wherein mental health is thought of as optimal functioning as well as the absence of illness (Clark & Watson, 1988). Consequently, there has been increased attention to strategies to promote positive emotions in daily life (e.g., Fredrickson 1998, 2001, 2003; Garland, Fredrickson, Kring, Johnson, Meyer, & Penn, 2010). However, this approach to understanding mental health has not been applied widely to CM and positive emotional responses encountered in early adulthood.

Regulation of Positive Emotions and Child Maltreatment

Most theories concerning CM and emotion regulation are restricted to negative emotions resulting from negative experiences (e.g., Gratz, Tull, Baruch, Bornovalova, Lejuez, 2008; Maughan & Cicchetti, 2002), and might not adequately explain the mechanisms underlying the link between CM and regulation of positive affective states and reactivity to positive experiences. This overwhelming focus on regulation of negative emotions is problematic for

several reasons. First, positive and negative affect are believed to be somewhat overlapping, but conceptually distinct systems (Clark & Watson, 1988; Diener & Emmons, 1985; Diener, Smith & Fujita, 1995; Russell, 1980; Watson & Tellegen, 1985; Zautra, Affleck, Tennen, Reich, & Davis, 2005). Stated in other words, positive affect is not merely the absence or opposite of negative affect; rather, positive affect represents a distinct affective system that uniquely contributes to mental health and well-being through resilience to and recovery from psychological stressors (Clark & Watson, 1988; Cohn et al., 2009; Etter et al., 2013). Second, given that positive events typically outnumber negative events (Gunaydin et al., 2016; Infurna et al., 2015), there are more opportunities to experience positive emotional reactions to enjoyable events. As such, emotional reactions to positive experiences might have a meaningful impact on mental health and well-being. In addition, understanding emotional reactions to desirable social interactions might be especially important given these types of events show a particularly strong link to positive emotions (Clark & Watson, 1988; David, Green, Martin, & Suls, 1997; Infurna et al., 2015; Stone, 1987). This strong positive relationship between desirable social interaction and positive emotional states is posited to be a function of individuals' basic drive for attachment to others (Berenson & Anderson, 2006, Harlow, 1958). According to Waugh and Fredrickson (2006), interpersonal interaction experienced as enjoyable may simultaneously validate and strengthen one's sense of self and increase feelings of "oneness" with others, in turn promoting positive affect. Finally, evidence showing that individuals who experienced CM often demonstrate resilience and positive adaptation (Afifi & MacMillan, 2011; Cicchetti, 2013; Cicchetti & Toth, 2005; Edwards, Probst, Rodenhizer-Stämpfli, Gidycz, & Tansill, 2014), rather than deleterious outcomes (e.g., Berzenski & Yates, 2011; Burns, Jackson & Harding, 2010; Cicchetti, 1989; Cicchetti, 2013; De Bellis, 2001; Silverman, Reinhertz, & Giaconia, 1996),

raises the possibility that CM might have, at least in some cases, contradictory effects on long-term outcomes. That is, CM might degrade certain emotion regulation processes, but it also might enhance others.

As stated above, there has been relatively little research to date focusing on regulation of positive emotions in general, let alone on the role of CM in such processes. Moreover, what has been done to date tends to focus on the role of positive emotions in the stress and coping process (Folkman & Moskowitz, 2000; Lazarus, Kanner, & Folkman, 1980). One prominent framework in this area is Fredrickson's (1998, 2001, 2003) broaden-and-build model. According to this framework, positive emotions have a broadening effect on one's cognitive capacities that then enlarge the subsequent behavioral actions one may take. Negative emotions, on the other hand, are thought to narrow attention and thinking to facilitate responding to fear-inducing, threatening, or stressful situations. More specifically, positive emotions momentarily expand the individual's attention and thinking, permitting expansion of the types of thoughts and courses of action that come to mind (Fredrickson, 1998, 2001). This increased cognitive and behavioral flexibility enables the individual to draw from a wider range of perception and ideas. Over time, this increased flexibility facilitates growth of personal cognitive (e.g., mindfulness), psychological (e.g., resilience, well-being, coping), social (e.g., reciprocal emotional support, relationship development), and/or physical resources (e.g., improved physical health; e.g., Cohn et al., 2009; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Garland et al., 2010). This line of research is further supported by recent research in neuroplasticity that indicates positive emotional states may elicit long-term changes in the structure and function of the brain that foster additional adaptive thoughts and behaviors (Garland & Howard, 2009; Garland et al., 2010). Thus, though positive emotions themselves may be ephemeral, their repeated occurrence

can have a lasting and robust influence by building personal resources that enhance well-being and social connectedness (Fredrickson, 2001; Fredrickson & Joiner, 2002; Garland et al., 2010).

A related framework posits that positive emotions facilitate resilience and recovery through a buffering or undoing effect on negative emotions (Fredrickson, 2001; Garland et al., 2010; Gilbert et al., 2012; Ong et al., 2006; Tugade & Fredrickson, 2004). Tugade and Fredrickson (2004) demonstrated that experiencing positive emotions partially aided individuals' abilities to effectively regulate their emotions in two ways, first, by faster cardiovascular recovery from negative emotional arousal, and second, by finding positive meaning in negative circumstances. Resilient individuals may draw on coping strategies that elicit positive emotions, such as benefit finding, positive appraisal, humor, and finding positive meaning in ordinary events to achieve emotion regulation in negative situations (Affleck & Tennen, 1996; Folkman, Moskowitz, Ozer, & Park, 1997; Ong, Bergeman, & Bisconti, 2004; Ong et al., 2006). According to Lazarus, Kanner, and Folkman (1980), positive emotions may both protect against and mitigate the harmful effects of stressful events by providing a psychological "breather" or respite during coping efforts, sustaining coping efforts (e.g., hopefulness supporting ongoing coping), and restoring resources that have been damaged or depleted by stress. In this way, positive emotions provide a counterbalance that helps to promote adjustment during and following stressful events.

Findings from several studies also support the notion that positive emotions might play a protective role in the stress and coping process, even in the context of dire situations. For example, Wortman and Silver (1987) found that individuals experiencing intense stress related to spinal cord injury and parents who had recently lost a child to sudden infant death syndrome both reported a significantly higher occurrence of positive emotions than negative emotions shortly

after the negative stressful event. Similarly, Westbrook and Viney (1982) found that patients hospitalized with a chronic illness reported more anxiety and depression compared to a healthy control group, but they also reported *more* positive emotions than the control group. Results from both studies demonstrate that occurrence of positive emotions during periods of intense stress might aid in the coping process.

Given the importance of positive emotions in healthy development in general, and the stress and coping process specifically, the relative paucity of research on the possible effects of CM on positive emotion regulation is noteworthy. Indeed, relatively few studies have examined CM and various aspects of positive emotion regulation. Early studies (Bugental, Blue, & Lewis, 1990; Kavanagh, Youngblade, Reid, & Fagot, 1988) using traditional methods for assessing emotion regulation, like observer ratings of behavior, suggested that maltreated children might show less adaptive responses to positive experiences. Bugental et al. and Kavanagh et al. suggested this may be due to abusive parents showing lower levels of positive emotion and higher levels of negative emotion compared to non-abusive parents. More recently, Young and Widom (2014) found that CM was associated with deficits in positive picture recognition in adulthood, and concluded that these individuals may have received and perceived fewer positive emotions during their lives, resulting in difficulty recognizing positive emotions. Using the same picture recall and recognition measure as Young and Widom, Dargis and Newman (2016) specifically examined individuals with a history of childhood neglect and found that they had deficits in recognizing and processing positive affective stimuli. They posited that individuals with CM reacted to the emotionally pleasant stimuli as if they were aversive, reflecting learned responses to early environments in which they experienced withdrawal or an inability to obtain positive rewards following repeated or sustained efforts. This is in line with research

demonstrating that individuals with a history of CM are more likely to bring negative interpretations (e.g., hostile attribution bias, rejection sensitivity) to novel interpersonal situations compared to others (Berenson & Anderson, 2006; Dodge, Pettit, Bates, & Valente, 1995; Feldman & Downey, 1994). Lastly, in Kanai et al.'s (2016) study, adults with a history of CM rated their positive and negative affect (e.g., happiness, life satisfaction, worry, anxiety). Results suggested that CM may be related to the development of depressive temperaments that decrease or blunt positive mood states. Kanai et al. found no evidence that CM was related to the occurrence of recent positive life events in adulthood, but they did not test whether CM moderated the effect of recent positive events on affective states.

Taken together, these findings provide preliminary evidence that CM may have long-term effects on positive emotion regulation in addition to its well-studied effect on negative affect. More specifically, these studies suggest that CM may have a blunting effect on positive emotions, such that individuals experience fewer positive feelings when engaging in enjoyable events. However, reviewed in detail below, more recent research using novel micro-longitudinal methods have documented the potentially contradictory finding that CM leads to increased levels of positive emotion reactivity (Infurna et al., 2015; Teitcher, Ohashi, Lowen, Polcari, & Fitzmaurice, 2015).

Operationalizing and Modeling Emotion Regulation

One problem with the broad literature examining emotion regulation, and the link between CM and emotion regulation specifically, involves differences in the methodological approaches to how emotion regulation is conceptualized and measured (Eisenberg & Sulik, 2012). Many studies have relied on traditional assessments, such as one-time self-reports using multi-item questionnaires asking participants to rate their perceived ability to regulate emotions,

e.g., "When I'm upset, I feel out of control," or "I keep my emotions to myself" (e.g., Berzenski and Yates, 2011; Ehring & Quack, 2010; Gratz, Tull, Baruch, Bornovalova, & Lejuez, 2008). Other studies have used observer ratings of the participant's emotional responses, a method typically employed when working with young children. In such cases, parents, teachers, and/or research assistants rate the child's emotion regulation (e.g., Bugental, Blue, & Lewis, 1990; Cole, Martin, & Dennis, 2004; Maughan & Cicchetti, 2002; Shields & Cicchetti, 1998; Kavanagh et al., 1988). Lastly, several studies previously reviewed utilized positive, negative, and neutral pictures and quantified emotion reactivity as magnitude of eye-blink response or recall and recognition of the pictures (Dargis & Newman, 2016; Young & Widom, 2014).

Although informative, these methods have several limitations. First, they are unable to capture the dynamic temporal nature of emotion processing as it unfolds in everyday life. Emotion regulation can be conceptualized as an ongoing process of affectively adapting and reacting to context. In other words, emotion regulation corresponds to how emotions ebb and flow in relation to life experiences. Many traditional assessment methods (e.g., one-time self-reports of emotion regulation) provide only a snapshot of the complexity of emotional responses and cannot detect within-person variability in affect nor covariation in experiences and affect. They are unable to measure these constantly changing states over time (Bolger, Davis, & Rafaeli, 2003). This is particularly important because childhood trauma may result in global differential susceptibility, meaning that individuals are more sensitive to their environment and therefore may show larger negative responses to negative events as well as larger positive responses to positive events (Infurna et al., 2015). As Infurna et al. suggested, CM may "differentially boost well-being through greater responsiveness to lasting changes that have positive valence" (p. 15). One-time measurements of mood states are unable to recognize these potential differences in

reactivity to context. Second, it is well documented that retrospective recall of experiences is prone to numerous types of bias (e.g., Schwartz & Sudman, 1994; Smyth & Stone, 2003). Recall of past events might be biased by the outcome of those events or other events that occurred following the event to be recalled (Smyth & Stone, 2003). Moreover, recall is also strongly influenced by mood states; that is, it is easier to recall emotionally valenced events that are congruent with one's current mood (Smyth & Stone, 2003).

To assess emotion regulation in a more dynamic fashion, intensive longitudinal research designs (e.g., daily process designs, ecological momentary assessment, experience sampling methodology) have been increasingly used in the past two decades. This approach requires participants to report on emotions and various contextual factors daily or multiple times per day over periods of time ranging from several days to several months (e.g., Bolger et al., 2003; Glaser et al., 2006; Scollon, Kim-Prieto, & Diener, 2003; Smyth & Stone, 2003; Tennen, Affleck, Armeli, & Carney, 2000). Such close-to-real-time assessments help to reduce recall bias and thus provide a more accurate depiction of processes at hand. Using this approach, emotion regulation is commonly operationalized as a regression slope corresponding to the association between individuals' multiple reports of daily events (e.g., stressors or enjoyable activities) and affective states. These reports are assessed either daily or multiples times per day over periods ranging from several days to several months. The slopes are then used as a variable indicating the direction and strength of within-person associations between momentary or daily events and temporally proximal positive or negative affective states (e.g., Almeida, 2005; Infurna et al., 2015; Stawski, Sliwinksi, Almeida & Smyth, 2008).

Consistent with the larger literature that examines emotion regulation in general, as well as the association between CM and emotion dysregulation, daily process investigations have

focused primarily on the association between changes in daily stress and negative affect, i.e., stress reactivity. Findings from these studies focusing on the role of CM indicate that CM is associated with greater stress reactivity, which is in line with the general notion that CM degrades emotion regulation ability (e.g., Glaser et al., 2006; Shields & Cicchetti, 1998; Weltz, Armeli, Ford, & Tennen, 2016). For example, Glaser et al. (2006) used a daily process design in a sample of adults who were asked to report thoughts, current context or situation, appraisal of the situation (e.g., how bothersome a situation a situation was, dislike for the situation), and mood ten times daily for six consecutive days. They found that CM was associated with stronger within-person associations between daily stressors and negative affect. Similarly, Weltz et al. (2016) examined college student drinkers who reported on their negative affect and stress once per day for thirty consecutive days. They found that among a large sample of college students, individuals with specific types of CM (e.g., emotional abuse, neglect) showed stronger within-person associations between daily stress levels and anxious and depressive affect.

To date, only two micro-longitudinal study have examined the association between CM and momentary or daily variation in positive affective states. Interestingly, findings from these studies appear to contradict the previously reviewed blunting role of CM on positive affect found in earlier studies using more traditional methods. For example, Teicher et al.'s (2015) study of a small community sample of maltreated young adults (ages 18-25 years old) assessed positive and negative affect six times daily for one week. CM was assessed via a semi-structured interview (Herman, Perry, & Van Der Kolk, 1989), as well as additional interviews and self-report measures. Teicher et al. found that CM was associated with increased fluctuations in positive affect, but there was no difference in mean levels of positive affect across groups. This finding broadly demonstrates that CM does impact positive affect regulation; however specific

inferences can only be made provisionally without additional research. It is possible that individuals with a history of CM derive stronger benefits, i.e., greater positive affect, following experiencing daily positive events, thus leading to the increased variability in positive affect in this sample. Given that Teitcher et al. did not assess daily events or examine within person covariation between events and affect, this interpretation must be tendered cautiously.

Infurna et al. (2015) also used a micro-longitudinal design in which middle-aged adults were asked to rate their daily positive and negative affect, as well as one negative and positive event, each evening for thirty consecutive days. Participants were asked to recall the most positive event that occurred each day and then were asked to identify its domain (e.g., spouse/partner, work, finances). CM was assessed using a self-report measure (Bernstein, Stein, Newcomb, Walker, Pogge, Ahluvalia et al., 2003). Results indicated that the level of CM was related to the degree of both positive and negative emotion reactivity to enjoyable daily experiences. Individuals who reported higher levels of CM were more likely to show increases in positive affect on days when positive experiences were higher. These individuals were also more likely to show increases in negative affect on days when negative experiences were higher. Infurna et al. posited that the experience of childhood trauma causes individuals to be more sensitive to daily experiences later in life, such that they are more reactive to both negative and positive events, however, no mechanism for this process was specified.

The Present Study

The goal of the proposed study was to further our understanding of the association between CM and regulation of positive emotions, or more specifically, positive affect reactivity to positive events. Past findings are somewhat contradictory, as some evidence suggests CM results in blunted positive emotion reactivity, whereas others suggest heightened reactivity. In

addition, these differential findings seem to be confounded with the type of research design used, i.e., heighted reactivity being found using a micro-longitudinal design. Thus, the central aim of the present study was to conceptually replicate and extend Infurna et al.'s (2015) findings showing stronger positive within-person associations between positive daily experiences and positive emotion among individuals with higher levels of CM. The study will advance this area in several ways. First, individuals in Infurna et al. (2015)'s study reported only on their single most positive event across a variety of types of events, both interpersonal and non-interpersonal (e.g., family, work, finances, health). The present study focused primarily on the within-person association between interpersonal interactions and positive emotions. Focusing on interpersonal events is broadly important given the prominent role of such experiences in fostering well-being (Arewasikporn et al, 2018; Lambert et al., 2013; Rohrer et al., 2018). In addition, concentrating on one category of events will provide greater clarity about the processes of interest given that different type of events (e.g., interpersonal, health-related event, financial problems) might elicit distinct appraisal and attribution profiles associated with discrete emotions (Smith & Ellsworth, 1985). In addition, by evaluating the number of daily interpersonal events in addition to mean enjoyment levels derived from such experiences, the present study can disentangle whether CM differentially moderates these distinct processes on positive affect. Given the contradictory finding regarding CM's role in blunting or strengthening the daily event-positive affect association, no prediction is made about the direction of the hypothesized moderating effect of CM.

Second, the present study will focus exclusively on CM that relates to early family conflict. Previous studies utilizing more general assessments of CM (Glaser et al., 2006; Infurna et al., 2015) have not consistently considered the context of the abuse or the relationship between

the perpetrator and the survivor. As noted earlier, CM perpetrated by an individual upon whom the survivor is dependent, such as a trusted parent or family member in the home, is thought to be particularly harmful (Freyd, 1996). The importance of examining CM in the context of early family conflict is also supported by attachment and social-learning theories that emphasize the long-lasting influence of early life interactions on emotion regulation (Bowlby, 1973; Gosnell & Gamble, 2013; Morris et al., 2007).

Third, this study will address the generalizability of previous findings with middle-aged adults (Infurna et al., 2015) to young adults. Individuals in this age group experience significant variability in emotional states, particularly in response to positive stimuli (Gilbert, 2012), and young adults with a history of CM may exhibit more emotional reactivity than is seen in older adult populations (Charles & Carstensen, 2008; Infurna et al., 2015). Interpersonal interactions are particularly important for college-aged students who are going through an intense period of emotional transition toward independence (Kenny & Rice, 1995), and invest heavily in interpersonal interactions (Herres, Ewing, & Kobak, 2016; Weinstein, Mermelstein, Hedeker, Hankin, & Flay, 2006).

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Section II: Empirical Article

Child Maltreatment and Emotion Reactivity to Positive Interpersonal Events

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Child maltreatment (CM) can have a lasting impact on the survivor's mental health and functioning, particularly emotion regulation. There is a dearth of research examining CM's impact on positive emotion regulation, and even fewer studies have explored emotion reactivity to positive events. Past findings are somewhat contradictory, as some evidence suggests CM results in blunted positive emotion reactivity, whereas others suggest heightened reactivity. The purpose of the present study is to examine whether CM was related to the day-to-day associations between positive interpersonal experiences and positive affect using a microlongitudinal (daily) research design. Participants in this study included 1,636 undergraduate students recruited through their introductory psychology research pool. Participants completed a baseline survey that included questions related to physical abuse, emotional abuse, and neglect, and several weeks later they reported on their positive and negative affect and experience of positive interpersonal events over 30 consecutive days. Findings indicated that individuals with higher levels of CM showed weaker positive associations between enjoyable interpersonal experiences and distinct positive affective states, i.e., CM blunted positive affect reactivity. Secondary analyses examining negative affect showed that endorsed higher CM generally reported less of a decrease in negative affect following positive interpersonal experiences. This study is among the first to comprehensively examine the impact of CM on positive emotion reactivity using a daily process study design and results suggest that CM differentially impacts associations between interpersonal exchanges and emotion reactivity. Results extend the extant body of literature on CM and emotion reactivity

and offers a foundation for future exploration of emotion reactivity that might impact our understanding of the long-term socioemotional experiences of survivors of CM.

Introduction

Child maltreatment (CM) – which includes physical, sexual and emotional abuse, and neglect – is a pervasive problem that affects over 700,000 children in the United States each year (U.S. Department of Health & Human Services, 2014). CM, which is intrinsically interpersonal in nature, frequently occurs in the context of problematic or aversive home environments (Felitti et al., 1998; Repetti, Taylor, & Seeman, 2002; Taylor, Lerner, Sage, Lehman, & Seeman, 2004). The experience of CM not only has a detrimental impact during childhood and adolescence (e.g., Langevin, Hebert, Allard-Dansereau, & Bernard-Bonnin, 2016), but can also have long-term negative consequences on the survivor's mental health and functioning, particularly emotion regulation (e.g., Felitti et al., 1998; Malinosky-Rummell & Hansen, 1993; Miller, Chen & Parker, 2011; Mullen, Martin, Anderson, Romans, & Herbison, 1996; Silverman, Reinherz & Giaconia, 1996). Whereas much of this research has focused on CM's detrimental effects on regulating negative emotions, relatively little, in comparison, has examined whether it is related to regulation of positive emotions, and even fewer studies have explored emotion reactivity to positive events. The present study utilized a micro-longitudinal (daily) research design to examine whether CM was related to the day-to-day associations between positive interpersonal experiences and positive affect – variables thought to be central to adaptive functioning (Arewasikporn, Sturgeon & Zautra, 2018; Fredrickson, 1998; Miller, Adams, Esposito-Smythers, Thompson & Proctor, 2014).

Child Maltreatment and Emotion Regulation

Emotion dysregulation is broadly defined as difficulty in identifying, modulating, expressing, and responding to emotions effectively (e.g., Berzenski & Yates, 2011; Burns, Jackson & Harding, 2010; Infurna, Rivers, Reich & Zautra, 2015). Difficulty regulating

emotions has been posited as a primary pathway through which CM influences long-lasting consequences for psychopathology, mental health, and interpersonal functioning (e.g. Briere & Rickards, 2007; Cicchetti, 1989; Cloitre, Miranda, Stovall-McClough & Han, 2005). Studies have shown links between CM and numerous problematic emotional outcomes, including but not limited to: depression (Briere, Evans, Runtz, & Wall, 1988; Cutuli, Raby, Cicchetti, Englund & Egeland, 2013; Hopfinger, Berking, Bockting & Ebert, 2016), anxiety (Briere et al., 1988; Zlotnick et al., 1996), anger (Briere et al., 1988; Browne & Finkelhor, 1986), higher levels of alexithymia (Cloitre, Scarvalone, & Difede, 1997; McLean, Toner, Jackson, Desrocher, & Stuckless, 2006), and heightened and dysregulated reactivity to stress (Glaser, Van Os, Portegijs & Myin-Germey, 2006; Infurna et al., 2015; Weltz, Armeli, Ford, & Hennen, 2016). Although emotional trauma experienced at any age may result in impaired emotion regulation, trauma in childhood is posited to be particularly detrimental (Cicchetti & Toth, 2005; De Bellis 2001; Etter, Gauthier, McDade-Montez, Cloitre, & Carlson, 2013). Indeed, evidence from multiple studies demonstrate CM is a stronger predictor of emotion dysregulation than similar traumas occurring later in life (e.g., Bunce, Larsen, & Peterson, 1995; Ehring & Quack, 2010).

From a biological perspective, the developing brain is especially sensitive to neuroendocrine changes associated with CM (Cicchetti & Toth, 2005; Kasanova et al., 2016). For example, CM can lead to alterations in the developing hypothalamic-pituitary-adrenal (HPA) axis, which can negatively impact one's reactivity to events in their environment by changing the amount or regulation of cortisol production (Bugental, Martorell & Barraza, 2003; Tarullo & Gunnar, 2006; Teicher, Anderson, Polcari, Anderson, Navalta, & Kim, 2003). It has also been shown that deprivation of crucial interpersonal and sensory experiences (i.e., neglect) and over-activation of neural systems implicated in fear and stress responses (i.e., abuse) negatively

influences brain development when they occur during this vulnerable period (Twardosz & Lutzker, 2010). These biological processes are believed to affect subsequent learning, emotional response, and interpersonal behaviors, with secondary effects on emotional development (Cicchetti, 2013; Miller et al., 2011; Glaser et al., 2006; Twardosz & Lutzker, 2010).

Social learning-based and attachment theories also highlight the considerable impact that early adverse experiences with caregivers can have on regulation of emotions. According to these models, children who have poor parental modeling of emotion regulation or are unable to form secure attachments due to traumatic caregiver-child interactions may experience negative consequences such as impaired emotion regulation and coping abilities (Bowlby, 1973; Cicchetti, Rogosch, & Toth, 2006; Ehring & Quack, 2010; Langevin et al., 2016; Van Der Kolk & Fisler, 1994). Indeed, several studies have shown associations between insecure attachment styles and the development of psychopathology (Alink, Cicchetti, Kim, & Rogosch; 2009; Toth & Cicchetti, 1996).

Child Maltreatment and the Regulation of Positive Emotions

Most theories concerning CM and emotion dysregulation focus on management of negative emotions, particularly those that result from negative experiences (Glaser et al., 2006; Gratz, Tull, Baruch, Bornovalova, Lejuez, 2008; Maughan & Cicchetti, 2002), while placing relatively less emphasis on positive emotion regulation. This unbalanced focus is problematic for several reasons. First, positive and negative affect, though somewhat overlapping, are conceptually distinct systems that uniquely relate to mental health and well-being (Clark & Watson, 1988; Diener & Emmons, 1985; Diener, Smith & Fujita, 1995; Russell, 1980; Watson & Tellegen, 1985; Zautra, Affleck, Tennen, Reich, & Davis, 2005). Second, positive events typically outnumber negative events, suggesting more opportunities to experience positive

emotional reactions to enjoyable events (e.g., Gunaydin et al., 2016; Infurna et al., 2015; Rehm, 1978). Lastly, numerous studies have demonstrated a strong relationship between positive experiences such as enjoyable interpersonal interactions, positive emotions, psychological well-being and resilience (e.g., Bonanno, 2004; Cohn, Fredrickson, Brown, Mikels, & Conway, 2009; Fredrickson, 1998, 2001, 2003; Ong, Bergeman, Bisconti, & Wallace, 2006; Tugade & Fredrickson, 2004).

The need to understand the possible role of CM in the regulation of positive emotions is also consistent with the increasing focus on strength-based approaches (e.g., positive psychology) for understanding human behavior (Seligman & Csikszentmihalyi, 2000) and positive functioning in daily life (e.g., Fredrickson 1998, 2001, 2003; Garland, Fredrickson, Kring, Johnson, Meyer, & Penn, 2010). For example, Frederickson's (1998, 2001) broaden-and-build model asserts that positive emotions have a broadening effect on one's cognitive capacities, i.e., momentary expansion of the types of thoughts and courses of action that come to mind (Fredrickson, 1998, 2001) that in turn facilitates growth of personal, psychological, social, and/or physical resources, ultimately enhancing well-being and social connectedness (e.g., Cohn et al., 2009; Fredrickson, Cohn, Coffey, Pek, & Finkel, 2008; Garland et al., 2010). Positive emotions also facilitate resilience and recovery through a buffering or undoing effect on negative emotions (Garland et al., 2010; Lazarus, Kanner, & Folkman, 1980; Ong et al., 2006; Tugade & Fredrickson, 2004). According to these frameworks, positive emotions may both protect against and mitigate the harmful effects of stressful events by providing a psychological "breather" or respite during coping efforts, sustaining coping efforts (e.g., hopefulness supporting ongoing coping), and restoring resources that have been damaged or depleted by stress.

Most studies examining the link between CM and positive emotion regulation – independent of its protective role in the stress and coping process – used more traditional methods, such as such as one-time self-reports of various emotion-regulation constructs (e.g., Gratz et al., 2008) and observer ratings of the participant's emotional responses (e.g., Bugental, Blue, & Lewis, 1990; DePierro, D'Andrea, Frewen, & Todman, 2018; Kavanagh, Youngblade, Reid, & Fagot, 1988; Maughan & Cicchetti, 2002). For example, using observer ratings of children's behavior in lab-based settings in which the parent and child briefly interacted, Bugental et al. (1990) and Kavanagh et al. (1988) both found that maltreated children showed less adaptive responses to positive interpersonal experiences; i.e., children of maltreating parents displayed greater unresponsiveness, inappropriateness, and positive conversation as compared with non-abused children. Young and Widom (2014) used a picture recognition task and found that CM was associated with difficulty in recognizing positive emotions. DePierro et al. (2018) found that for individuals with PTSD, negative affect leads to blunted arousal to positive stimuli. Furthermore, several studies have found that individuals with a history of CM are more likely to bring negative interpretations (e.g., hostile attribution bias, rejection sensitivity) to novel interpersonal situations compared to others (Berenson & Anderson, 2006; Dodge, Pettit, Bates, & Valente, 1995; Feldman & Downey, 1994), which likely results in less fulfilling interpersonal exchanges and thus fewer opportunities to derive positive affect. In general, studies using more traditional research paradigms tend to show that CM may have a blunting effect on positive emotions, such that individuals experience fewer positive emotions or they react less positively to positive stimuli.

Daily Process Studies of Child Maltreatment and Emotion Regulation

Over the last several decades, researchers have increasingly turned to daily process designs (e.g., intensive micro-longitudinal research designs) to assess the dynamic processes inherent in emotion regulation. This approach requires participants to report on emotions and various contextual factors daily or multiple times per day over periods of time ranging from several days to several months (e.g., Bolger, Davis, & Rafaeli, 2003; Glaser et al., 2006; Scollon et al., 2003; Smyth & Stone, 2003; Tennen, Affleck, Armeli, & Carney, 2000). The most commonly examined aspect of emotion-regulation examined using this approach is stress-reactivity, which is conceptualized as the within-person association between daily (or within-day) deviations in contextual factors (e.g., stressors, interpersonal events) and negative emotions. The strengths of this approach include reduced recall bias given close to real time reporting, disentanglement of within- and between- person processes, and the increased ecological validity associated with assessing these processes as they unfold in everyday life.

To our knowledge, only two daily process investigations have examined the association between CM and momentary or daily variation on positive affective states (Infurna et al., 2015; Teicher et al., 2015). Interestingly, unlike findings from studies using more traditional methods that indicate CM may have a blunting effect on positive emotion-reactivity, daily studies show contradictory effects in that CM is associated with increased levels of positive emotion reactivity. For example, in a small community sample of maltreated young adults Teicher et al., (2015) assessed positive and negative affect six times daily for one week and assessed CM via a semi-structured interviews and self-report measures. They found that individuals high in CM, compared to lower levels, had greater variability in positive affect, but did not differ in mean levels. However, Teicher et al. (2015) did not assess daily positive events and thus could not examine within-person covariation between events and affective states. Infurna et al.'s (2015)

micro-longitudinal study of middle-aged adults evaluated associations between CM and both positive and negative event emotion reactivity to daily events. Specifically, for thirty consecutive days participants rated their positive and negative affect and the single most positive and negative event. Results showed a relationship between CM and the both positive and negative emotion reactivity to daily enjoyable experiences. Specifically, individuals who reported higher levels of CM were (a) more likely to show increased positive affect on days characterized by higher levels of positive experiences and (b) more likely to show increased negative affect on days characterized by higher levels of negative experiences. Infurna et al. posited that the experience of childhood trauma causes individuals to be more sensitive to daily experiences later in life, such that they are more reactive to both negative and positive events.

The Present Study

The goal of the present study was to further understanding of the association between CM and positive emotion regulation, or more specifically, positive affect reactivity to positive events. Past findings are somewhat contradictory, as some evidence suggests CM results in blunted positive emotion reactivity, whereas others suggest heightened reactivity. In addition, these differential findings seem to be confounded with the type of research design used, i.e., heighted reactivity being found using a micro-longitudinal design. Thus, the central aim of the present study was to conceptually replicate and extend Infurna et al.'s (2015) findings showing stronger positive within-person associations between positive daily experiences and positive emotion among individuals with higher levels of CM. The present study advanced this line of research in several ways. First, individuals in Infurna et al. (2015)'s study reported only on their single most positive event across a variety of types of events, both interpersonal and non-interpersonal (e.g., family, work, finances, health). The present study focused primarily on the within-person

association between interpersonal interactions and positive emotions. Focusing on interpersonal events is broadly important given the prominent role of such experiences in fostering well-being (Arewasikporn, Sturgeon & Zautra, 2018; Lambert, Gwinn, Baumeister, Strachman, Washburn, Gable, & Fincham, 2013; Rohrer, Richter, Brümmer, Wagner, & Schmukle, 2018). In addition, concentrating on one category of events will provide greater clarity about the processes of interest given that different type of events (e.g., interpersonal, health-related event, financial problems) might elicit distinct appraisal and attribution profiles associated with discrete emotions (Smith & Ellsworth, 1985). In addition, by evaluating the number of daily interpersonal events in addition to mean enjoyment levels derived from such experiences, the present study can disentangle whether CM differentially moderates these distinct processes on positive affect. Given the contradictory finding regarding CM's role in blunting or strengthening the daily event-positive affect association, no prediction is made about the direction of the hypothesized moderating effect of CM.

Consistent with attachment and social learning theory, the present study will advance previous research by focusing on CM in the context of adverse family environments. Previous studies utilizing general assessments of CM (Glaser et al., 2006; Infurna et al., 2015) have not consistently considered the context of the abuse or the individual's relationship with the perpetrator. CM perpetrated by an individual upon whom the survivor is dependent, such as a trusted parent or family member in the home, is thought to be particularly harmful to both mental and physical health (Freyd, 1996). The present study also examined negative emotions to test whether any observed relationship between CM and positive emotion-reactivity is unique to this affective system. Infurna et al. assessed broad measures of positive and negative affect, whereas the present study assessed discrete emotions (i.e., joviality, serenity, sadness, anxiety, anger).

Focusing on individual emotions will provide detail of the underlying processes of interest given that they are associated with unique aspects of social functioning (Rivers, Brackett, Katulk & Salovey, 2007) and varying antecedents and outcomes, such as appraisals and attribution profiles (Smith & Ellsworth, 1985).

Finally, this study will address the generalizability of Infurna et al.'s (2015) findings with middle-aged adults to young adults. These aims were examined in a large sample of college students in early adulthood, a developmental period characterized by heightened emotion reactivity (Gilbert, 2012) and emotional investment in interpersonal interactions (Herres, Ewing, & Kobak, 2016; Weinstein, Mermelstein, Hedeker, Hankin, & Flay, 2006).

Method

Participants

The sample was recruited as part of a larger study of daily well-being and alcohol use among college students. Participants were recruited from a northeastern public university via an introductory psychology research pool and campus-wide broadcast messages. Students who were at least 18 years old and reported drinking alcohol at least twice in the past month during prescreening were eligible to participate. Those who reported having sought treatment for drinking problems were excluded from the study. Of the 1,818 students recruited over five years, 182 were excluded from the final sample due to completing less than 15 daily entries or missing data on CM. Comparisons between excluded participants and the sample used for this study indicated that excluded individuals were more commonly men (67.7% vs. 46.3%), χ^2 (1) = 19.87 $p < .01$. There was no difference in age, t (1815) = -.106; p = .915, race, χ^2 (1) = .420 p =.517, or year in school χ^2 (4) = 3.15 p = .533. The sample used in this study therefore consisted

of 1,636 individuals who were primarily women (53.7%), Caucasian (79.5%), and freshmen or sophomores (73.1%). Mean age was 19.22 years (*SD* = 1.49).

Procedure

Participants provided informed consent through a secure website. They then completed a survey that included demographic items and the RFQ. Several weeks later, participants accessed a secure website each day for 30 days and completed a brief survey between 2:30 and 7:00PM. This time interval was selected to coincide with the most common end of the undergraduate school day and before commencement of evening activities when they might be under the influence of alcohol. Participants received small monetary compensation for both the initial survey and diary portions of the study. Each day, participants completed a measure of positive interpersonal events and reported on their positive and negative affect.

Measures

Child Maltreatment. CM was measured at baseline using the Risky Families Questionnaire (RFQ; Felitti et al., 1998; Taylor et al., 2004), a retrospective self-report measure of family environment during ages 5 through 15. The present study utilized three items that explicitly reflected (a) emotional abuse ("*How often did a parent or other adult in the household swear at you, insult you, put you down, or act in a way that made you feel threatened?")*; (b) physical abuse/family violence ("*How often did a parent or other adult in the household push, grab, shove, or slap you?"*); and (c) neglect ("*How often would you say you were neglected while you were growing up, that is, left on your own to fend for yourself?"*). Responses were made on a 5-point scale (1 = *not at all* to 5 = *very often*). All items were averaged so higher scores reflected greater levels of CM. Cronbach's alpha for the three items was .74.

Daily Positive and Negative Affect. Participants reported on their affective states using items adapted from the Positive and Negative Affect Schedule-Expanded (PANAS-X; Watson & Clark, 1994) and Larsen and Diener's (1992) mood circumplex. Participants rated the extent to which they felt positive (e.g., cheerful, excited, energetic) and negative states (e.g., nervous, dejected, hostile) that day. Items were answered on a 5-point response scale, ranging from 1 (*not at all*) to 5 (*extremely*). Jovial was assessed with the items "cheerful," "happy," "excited," "enthusiastic," and "energetic"; serenity was assessed with the items "relaxed," "content," and "calm"; anxiety was assessed with the items "nervous," "anxious," and "tense"; sadness was assessed with the items "dejected," "sad," and "unhappy"; and anger was assessed with the items "irritable," "hostile," and "angry." Cronbach's alpha was .91 for joviality, .85 for serenity, .79 for anxiety, .83 for sadness, and .80 for anger.

Positive Interpersonal Events. In the daily survey, participants were asked to rate "how enjoyable was…" for experiences that occurred both the previous night (after the previous day's survey) and today (up to reporting time). The items were: "*the time spent with friends"*, "*the time spent with romantic other"*, "*the time spent with family"*, and "*telephone/email/text messaging/"IMing" (i.e., communication) with others."* Responses were made on a 4-point scale (1 = *not at all* to 4 = *very*). Participants marked "*did not spent time with…*" to designate when an event did not occur. I tems were developed specifically for this study and reflect commonly endorsed interpersonal events (David et al., 1997; Infurna et al., 2015; Stone, 1987). Analyses examined each item separately (but averaged across last night and today) along with a composite score reflecting mean enjoyment across all items. In addition, the occurrence of each item was examined by recoding each event as 0 = did not occur or 1 = occurred. A sum for each item (across last night and today) was created along with a total sum across all items.

Results

Descriptive Statistics

The majority (58.9%) of participants reported at least one of the three CM experiences. Emotional abuse was reported by 46.8% of the participants, 35.1% reported physical abuse/family violence, and 27.1% reported neglect. For the daily data, participant adherence was high; they completed an average of 26.30 (SD = 3.88) of the 30 possible daily reports (i.e., 87% adherence).

Descriptive statistics and correlations for the person-level and aggregated daily variables are shown in Table 1. As expected, both mean levels of joviality and serenity were positively correlated with each other, as well as with all mean enjoyment ratings, and mean number of friend and communication events. Mean sadness, anxiety, and anger were positively correlated with one another and negatively correlated with all mean enjoyment ratings. Mean sadness showed a negative correlation with the mean number of friend events, but positive associations with the number of family and partner events. Mean anxiety was positively associated with the mean number of family, partner and communication events and mean anger was positively associated with the mean number of family and partner events.

CM was negatively correlated with the positive affect variables and positively correlated with negative affect variables. CM was also negatively associated with all enjoyment ratings. CM was negatively related to the number of friend events. Sex was positively correlated with all affect variables, other than serenity, total number of interpersonal events, and all enjoyment variables, with women reporting higher levels of each variable of interest. Sex was also

associated with CM, with men showing higher levels. Sex was included in all regression models as a control variable.

Multilevel Regressions Results

Given the non-independent nature of the daily data, we used multilevel regression analyses (e.g., Schwartz & Stone, 1998; Snijers & Bosker, 1999). For all models, the day-level predictors (enjoyment scores and number of events) were mean centered to examine within-person associations of interest (e.g., how relative changes in enjoyment ratings predict affect). At the person-level of the model, CM and the aggregate value of the relevant daily predictor were person mean-centered; sex was coded 0 = male and 1 = female. Models were estimated in two steps. First, the daily- and person-level variables were entered not including the product term for the interaction of interest. In a second step, the product term for CM and the relevant day-level predictor was included. All models included variance components for the level 1 intercepts and slopes; all were significant in the final models.

Table 2 shows the results from the model predicting joviality. The top of the table shows the results from the number of events as predictors; the bottom of the table shows the results from enjoyment ratings as predictors. As shown in step 1, individuals reported higher levels of joviality on days with relatively more interpersonal events (across all the event predictors; top of table) and on days when events (all types) were rated as relatively more enjoyable (bottom of table). At the person level, sex was a unique predictor of joviality (with women reporting higher levels) in the models using number of events as predictors, except when controlling for total number of events and communication events. Sex was not significant in the models using enjoyment ratings. Mean number of events and mean enjoyment ratings were positively related with joviality in all models. Finally, higher levels of CM was associated with lower levels of

joviality in all models. Results from step 2 testing the interaction of interest showed that CM moderated the association between the number of family events and joviality, daily total enjoyment and joviality, and daily enjoyment ratings of friend events and joviality. The form of these interactions is shown in Figures 1-3. For all figures, high and low CM correspond to plus/minus 1 standard deviation from the mean; low and high on the *x*-axis represents the 5th to 95th percentile. The figures indicate a stronger positive association between all three predictors and joviality for those lower in CM.

Table 3 shows the results from the model predicting serenity. As shown in step 1, individuals reported higher levels of serenity on days with more interpersonal events (across all the event predictors; top of table) and on days when all types of events (bottom of table) were rated as relatively more enjoyable. At the person level, sex was not significant in the models using number of event as predictors. Sex was a unique predictor of serenity in all models controlling for mean enjoyment ratings, with men being more serene. Mean number of events was positively related with serenity in models of total number of events, friend events, and communication events. Mean enjoyment was positively related with serenity in all models. Higher levels of CM was associated with lower levels of serenity in all models. Results from step 2 showed that CM moderated the relationship between the total number of interpersonal events and serenity (top of table; see Figure 4), with a stronger positive association between total interpersonal events and serenity for those lower in CM. CM also moderated the association between the number of family events and serenity (see Figure 5), again, with a stronger positive association family events and serenity for those lower in CM. Lastly, CM moderated the association between daily enjoyment ratings of partner events and serenity (bottom of table; see Figure 6). Here, the effect is in the opposite direction, with individuals with higher CM levels

showing a stronger positive association between daily enjoyment from partner relationship events and serenity.

Table 4 shows the results from the model predicting sadness. As shown in step 1, individuals reported lower levels of sadness on days with relatively more interpersonal events (top of table), other than partner events, and on days when events were rated as relatively more enjoyable (bottom of table). At the person level, sex was a unique predictor of sadness (with women reporting higher levels), except when controlling for partner enjoyment. Mean enjoyment was negatively related with sadness in all models. Mean number of events was positively related with sadness in models of total number of interpersonal events, partner events, and family events. Higher levels of CM was associated with higher levels of sadness in all models. CM did not moderate the relationship between daily events and sadness in any model.

Table 5 shows the results from the model predicting anxiety. As shown in step 1, individuals reported lower levels of anxiety on days with relatively more interpersonal events (top of table) and relatively more interpersonal event enjoyment (bottom of table). At the person level, sex was a unique predictor of anxiety (with women reporting higher levels) in all models. Mean number of events was positively related with anxiety in all model, except friend events; however mean enjoyment ratings were negatively related with anxiety in all models. Higher levels of CM was associated with higher levels of anxiety across all models. Finally, at the day-level of analysis, higher relative levels of daily interpersonal events were associated with lower levels of daily anxiety, except in the model of communication events. Results from step 2 testing the interaction of interest showed that CM moderated the association between anxiety and the total number of events, communication events, daily total enjoyment, enjoyment ratings of friend events, and daily enjoyment ratings of family events (Figures 7-11). Individuals high in

CM showed a stronger positive association between communication events and anxiety, meaning they experienced a higher degree of anxiety on days with relatively more interpersonal communication compared with those low in CM. Aside from communication events, the form of the other interactions consistently showed high CM individuals showing less negative associations between event frequency and enjoyment and anxiety.

Lastly, table 6 shows the results from the model predicting anger. Step 1 shows that individuals reported lower levels of anger on days with relatively more interpersonal events, except family events, and relatively more interpersonal enjoyment. However, higher relative levels of daily interpersonal events was associated with higher, not lower, levels of daily anger in the model using partner events as the predictor. At the person level, sex was a unique predictor of anger (with women reporting higher levels) in all models, except when controlling for total number of events, total enjoyment, partner event enjoyment and family enjoyment. Mean enjoyment ratings were negatively related with anger in all models; interestingly, however, mean number of events was positively related with anger in models of total number of interpersonal events, partner events, and family events. Higher levels of CM was associated with higher levels of anger in all models. Results from step 2 testing the interaction of interest showed that CM moderated the association between anger and the total interpersonal events, partner events, total enjoyment, and both the number of family events and daily enjoyment ratings of family events. The forms of these interactions are shown in Figures 12-16. With regard to total interpersonal events, total enjoyment ratings, and family enjoyment ratings, the form of the interaction showed low CM individuals report greater negative associations between the predictor and anger; in other words, they endorsed stronger reductions in anger following interpersonal experiences. In

contrast, greater CM was associated with stronger links between both partner and family and anger.

Discussion

The goal of the present study was to examine whether CM moderated the relationship between positive interpersonal experiences and affective states. This goal was partially supported by the current results. Findings indicated that individuals with higher levels of CM showed weaker positive associations between enjoyable interpersonal experiences and distinct positive affective states, i.e., CM blunted positive affect reactivity. Secondary analyses examining negative affect showed that those who endorsed higher CM generally reported less of a decrease in negative affect following positive interpersonal experiences.

Child Maltreatment and Positive Affect Reactivity

CM was related to overall lower levels of positive affect—both joviality and serenity—which is consistent with prior research (Dargis & Newman, 2016, Etter et al., 2013; Wingo et al., 2017). More central to the study aims, CM was related to several of the within-person associations between enjoyable interpersonal experiences and positive affect, i.e., positive affect reactivity. Specifically, CM moderated the within-person association between the number of family events and both joviality and serenity, total enjoyment and joviality, enjoyment ratings of friend events and joviality, and total number of interpersonal events and serenity. The general trend was that individuals with higher levels of CM showed weaker positive associations between interpersonal experiences and positive affect. In other words, individuals who experienced higher CM derived less positive affect from these subtypes of enjoyable interpersonal interactions.

These results are consistent with previous literature – derived mainly from laboratory settings – linking CM to deleterious changes in regulating positive emotions (Bugental et al., 1990; DePierro et al., 2018; Kavanagh et al., 1988; Young & Widom, 2014), however they did not replicate findings from Infurna et al.'s (2015) daily process study. In fact, results from the present study were opposite to Infurna et al. who found evidence of heightened positive affect reactivity among high CM individuals. These contradictory findings might be due to differences in daily reporting procedures and/or sample demographics across the studies. First, Infurna et al. asked participants to rate their single most positive event each day, as compared to the present study that had participants rate multiple events. Moreover, participants in Infurna et al.'s study were only asked to choose an event category and did not make any quantitative rating of their experience in the event. It is possible that Infurna et al.'s results are an artifact of comparing days when interpersonal events were the most positive event versus days when other types of events were more positive. Results from the present study are less ambiguous in terms of how within-person relative ratings of positive interpersonal events relate to positive mood states. Second, participants in Inferna et al. were, on average, middle-aged adults, whereas the present study examined college-aged students. Early adulthood is a time marked by heightened emotion reactivity (Gilbert, 2012) and emotional investment in interpersonal interactions (Herres, Ewing, & Kobak, 2016; Weinstein, Mermelstein, Hedeker, Hankin, & Flay, 2006). One possibility is that the importance and influence of positive interpersonal interaction on affective states – and how this process is related to CM – changes with age. Future studies assessing these daily processes across different developmental phases are needed to further test this hypothesis.

The blunted reactivity findings from the present study can be broadly interpreted through the lens of social learning theory. It has been suggested that maltreating parents show less

positive emotion and more negative emotion when compared with non-abusive parents (Bugental et al., 1990; Kavanagh et al., 1988). Bugental et al. (1990) for example showed that abusive mothers display lower rates of sincere facial happiness; non-abusive mothers smiled at twice the rate as that of abusive mothers. This in turn may offer the child fewer models of positive and effective emotional expression (Salzinger, Kaplan, and Artemyeff, 1983). Additionally, in the context of experiencing inconsistent and/or punitive caregiving, children may have difficulty predicting outcomes for his/her behavior and thus demonstrate deficits in emotional recognition and processing (Dadds & Salmon, 2003; Pollak, Cicchetti, Hornung & Reed, 2000). It is possible that individuals who experience CM exhibit less effective social engagement, which may lead to decreased ability to derive and sustain positive affect from these exchanges.

Contrary to the general blunting effect of CM, the relationship between enjoyment ratings of partner events and serenity was actually stronger in the positive direction among high CM individual – consistent with Infurna et al. (2015). It is difficult to discern what may be driving the contradictory moderating effect and it might simply be a spurious effect. However, several explanations are possible. First, few studies have examined the relationship between CM and the discrete feeling of serenity (i.e., "serene," "calm," "content," "relaxed") (Banford Witting & Busby, 2018; Hasmi et al., 2017; Kapeleris & Paivio, 2011; Martin & Beezley, 1977) and there is a lack of consensus on whether serenity represents positive affect or another affective state (Grühn, Kotter- Grühn, Röcke, 2010; Lewis Harter, Erbes, & Hart, 2000). Thus, this finding might be specific to the partner-serenity relationship. Second, previous studies have shown that CM can lead to difficulties with intimate partner relationships (Dilillo et al., 2001) and it has been suggested that CM would result in reduced, not increased, states of serenity (Banford Witting & Busby, 2018; Kapeleris & Paivio, 2011; Lewis Harter et al., 2000). For example,

Kapeleris and Paivio (2011) found that emotional abuse and neglect were associated with lack of contentment, as well as feelings of worthlessness, and fear of rejection and abandonment. It is possible though that given the increased likelihood of problematic romantic relationships, when these interactions *are* enjoyable, individuals with high CM histories experience a greater boost in their serenity. Future research would benefit from examining the quality of partner relationships as it relates to specific aspects of daily socioemotional experiences.

Child Maltreatment and Negative Affect Reactivity

CM was related to overall higher levels of negative affect, supporting the well-researched links between CM and depressive symptoms (Briere et al., 1988; Cutuli et al., 2013; Hopfinger et al., 2016), anxiety (Gallo, Munhoz, Loret de Mola, & Murray, 2018; Malinosky-Rummell & Hansen, 1993), and both anger and aggression (Cicchetti & Toth, 2005; Salzinger, Feldman, Hammer, & Rosario, 1993). Contrary to Infurna et al. (2015) who found no association between CM and negative affect reactivity to positive events, results from the present study found numerous instances where CM moderated this association. Several of these interactive effects were the exact inverse of the findings with positive affect as the dependent variable (i.e., with total interpersonal events, total enjoyment ratings, friend enjoyment rating, family events as predictors), thus might be due to the distinct, yet correlated nature of positive and negative affect. However, several of the effects did not parallel the positive affect findings (i.e., family enjoyment rating, partner events, communication events). In all but one of the observed interactions (i.e., overall enjoyment rating and anger), those who endorsed higher CM generally reported less of a decrease in negative affect following positive interpersonal events, suggesting that experiencing enjoyable interpersonal experiences is less protective against negative affect for these individuals.

These findings paint a picture that high CM individuals are not only deriving less positive affect (i.e., less benefit) from positive interpersonal experiences, they are also experiencing fewer reductions in negative affect. Indeed, in a study by Perlman, Kalish, and Pollak (2008), maltreated children interpreted positive events as being potential causes of negative affect, likely due to the unpredictability of their social environments. Together with CM's moderating effect on positive affect, these results support the literature asserting that positive and negative affect, though partially overlapping, are distinct systems that often have dissimilar relationships with mental health and well-being (Clark & Watson, 1988; Diener et al., 1985; Diener, Smith & Fujita, 1995; Russell, 1980; Watson & Tellegen, 1985; Zautra et al., 2005). Moreover, this provides further evidence that both negative and positive affective systems can be dysregulated, both in the context of CM or otherwise (Cole, Michel & Teti, 1994; Teitcher et al., 2015).

Findings related to experiencing weaker reductions in negative affect from enjoyable interpersonal interactions appear to be in line with research showing CM negatively impacts the reciprocity of social relationships, empathy, and theory-of mind (e.g., Salzinger et al., 1993). Children who experience maltreatment may learn that it is unacceptable or unsafe to share their feelings, especially negative ones, and thus they may have subsequent difficulty making sense of their own and others socioemotional experiences (Cicchetti & Toth, 2005). Individuals who experience CM may have more difficulty understanding the experience of others and thus receive fewer benefits (i.e., smaller reductions in negative affect) when engaging in positive interpersonal exchanges (Luke & Banjeree, 2012).

Focusing on the relationship between interpersonal experiences and anxiety specifically, one possible explanation could be that both acute and chronic exposure to danger, as is often the case in CM, has been found to be associated with anxiety in adulthood (Chaby, Cavigelli,

Hirrlinger, Caruso, & Braithwaite, 2015; Gallo et al., 2018). Individuals who experience CM often become more hypervigilant of their surroundings and find themselves constantly on the lookout for danger in their environment. These individuals may continue to carefully scan their environments for threats, even once they have no longer in the maltreating environment, which may lead to misreading these clues or misinterpreting their own or others' behaviors or experiences (Gosnell & Gamble, 2013). Thus, it might be difficult for high CM individuals to experience as strong of a decrease in anxiety subsequent to enjoyable interpersonal interactions. Future research should examine correlates of CM in such models, such as anxiety disorders, to further test these possibilities.

Regarding the findings related to anger, one possibility is that maltreating parents often display anger, therein increasing the likelihood for their children to feel and perhaps even express feelings of anger towards others with whom they are close. Indeed, studies have shown that physically abused children demonstrate a response bias to angry emotional expressions (Pollak et al. 2000). Studies suggest (Pollak & Sinha, 2002; Pollak & Kistler, 2002) that physically abused children can detect facial expressions of anger more accurately and at lower levels of perceptual intensity in comparison to other emotions. Moreover, these children show problematic differences in their social cognition when compared with non-abused peers, or the ways they think about interpersonal relationships (Salzinger et al., 1993), including displaying higher rates of hostile attributions to relationships and rejection sensitivity (Downey, Khouri, & Feldman, 1997; Price & Glad, 2003; Richey, Brown, Fite, & Bortolato, 2016). The relationship between CM and these cognitive biases can be understood through social learning and attachment theories, as the difficult and often inconsistent home environments both render it challenging for children to understand and predict their parents' behavior and send messages of

rejection (Bowlby, 1973; Cicchetti, Rogosch, & Toth, 2006). This may in turn contribute to negative beliefs about non-parent relationships, such as peers and significant others (Downey et al., 1997; Luke & Banjeree, 2012).

Limitations and Future Research

The present study has several key limitations. First, CM was retrospectively self-reported and might be subject to recall biases (Schwartz & Sudman; Widom & Morris, 1997; Widom & Shepard, 1996). Future studies using official records or informant reports to corroborate individuals' self-reported experiences may provide more certainty in the accuracy of the information. Second, the present study used only subset of three items assessing trauma that did not specifically identify sexual trauma. It is possible that there may be a different relationship between sexual trauma and emotion reactivity. Third, the assessment of CM focused only on family environments, thus traumatic experiences occurring with non-family members were not captured. Future research should capture all sources of trauma in addition to evaluating the nature of the relationship between the individual and the perpetrator, as this has been shown to be an important variable in this process (Edwards, Freyd, Dube, Anda, & Felitti, 2012; Freyd, Klest, Allard, 2005; Gamache, Van Ryzin, & Dishion, 2016). Lastly, the present study is correlational in nature, so conclusions about causality must be tempered. Findings showing that high CM individuals benefitted less from family interactions, for example, could indicate that high levels of present family conflict strengthen recall of early childhood adversity, which in turn is related to the processes of interest. These limitations notwithstanding, abundant research shows that the immediate family environment plays a large role in healthy child development, and that children who grow up in maltreating family environments are at risk for socioemotional deficits (Taylor et al., 2004).

Clinical and Practical Implications

The clinical implications of the present study should be evaluated in the context of the stated limitations and what are small effect sizes. Regarding the strength of the effects, CM related differences in affective states on days characterized by high and low levels of enjoyable events was small. However, these small daily differences, over many days and years, could have a meaningful overall impact on well-being. Given this possibility, several clinical implications can be made. First, results indicate that individuals with histories of CM have lower overall levels of positive emotions and blunted positive emotion reactivity to positive interpersonal experiences. Thus, therapeutic interventions may need to be tailored based on the history of the individual. Positive emotions have their roots in strength-based approaches (e.g., positive psychology), however they have largely been excluded from traditional psychological therapies (Lambert & Erekson, 2008). More recently, a shift has occurred in which positive emotions are increasingly considered as having additive benefit to psychological interventions (Lambert & Erekson, 2008; Morris, Simpson, Sampson, & Beesley, 2014). Moreover, there has been a call to integrate the study of positive functioning into clinical psychology rather than it exist in isolation, as positive and negative characteristics and emotions also cannot be studied or modified in isolation (Wood & Tarrier, 2010). Dialectical Behavioral Therapy, for example, first developed for adults and later adapted for adolescents, was created to treat people with borderline personality disorder and chronical suicidality and its effectiveness has also been shown for individuals with depression and other mood disorders, high emotion dysregulation, and post-traumatic stress disorder (Bohus et al., 2013; Kliem, Kröger, & Kosfelder, 2010; Linehan, 1993; Lynch, Morse, Mendelson, & Robins, 2003; Neacsiu, Eberle, Kramer, Wiesmann, & Linehan, 2014; Neacsiu, Rizvi, & Linehan, 2010). Importantly, research has

linked each of these diagnoses with histories of CM (e.g., Brodbeck, Fassbinder, Schweiger, Fehr, Späth, & Klein, 2018; Messman & Bhuptani, 2017). DBT includes interventions to specifically target emotion dysregulation and interpersonal ineffectiveness, amongst other core difficulties, and includes behavioral techniques for increasing positive emotions. Depending on the diagnosis or history of the individual in treatment, our findings suggest that the clinician should consider the relative capacity and individual differences in one's ability to derive enjoyment and lasting positive affect from interpersonal experiences.

Conclusions

These limitations notwithstanding, results from the current study extend the extant body of research on CM and emotion reactivity. This study is among the first to comprehensively examine the impact of CM on positive emotion reactivity using a daily process study design. Results suggest that CM might differentially impact associations between interpersonal exchanges and emotion reactivity. The present study offers a foundation for future exploration of emotion reactivity that might impact our understanding of the long-term socioemotional experiences of survivors of CM.

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Tables and Figures

Table 1
Descriptive Statistics and Correlations

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. CM	1.5711	.730																
2. Sex	1.54	.499	-.056*															
3. Joviality	2.457	.644	-.167**	.083**														
4. Serenity	2.6934	.680	-.167**	.020	.741**													
5. Sadness	1.4076	.432	.257**	.087**	-.072**	-.179**												
6. Anxiety	1.697	.529	.191**	.144**	.066**	-.132**	.742**											
7. Anger	1.3731	.407	.235**	.042	.012	-.123**	.793**	.703**										
8. Total Interpersonal Events	3.9519	1.105	-.008	.060*	.275**	.190**	.082**	.096**	.162**									
9. Friend Events	1.5173	.453	-.059*	-.048	.279**	.220**	-.055*	-.036	.001	.537**								
10. Family Events	0.3193	.355	.031	.012	.048	-.017	.165**	.126**	.229**	.492**	-.023							
11. Partner Events	0.5188	.633	.041	-.017	.045	.012	.066**	.053*	.141**	.610**	-.082**	.247**						
12. Communication Events	1.5965	.483	-.041	.196**	.273**	.225**	.032	.092**	.017	.625**	.416**	.089**	-.019					
13. Total Enjoyment	2.1356	.475	-.186**	.157**	.519**	.464**	-.271**	-.163**	-.224**	.113**	.182**	-.104**	.020	.138**				
14. Friend Enjoyment	2.2473	.475	-.182**	.155**	.489**	.450**	-.273**	-.170**	-.246**	.050*	.139**	-.147**	-.044	.150**	.898**			
15. Partner Enjoyment	2.2042	.729	-.177**	.140**	.309**	.303**	-.236**	-.135**	-.225**	.121**	.048	-.142**	.114**	.200**	.596**	.507**		
16. Family Enjoyment	2.3395	.647	-.262**	.203**	.370**	.334**	-.209**	-.109**	-.200**	.036	.112**	-.155**	-.058*	.170**	.610**	.570**	.529**	
17. Communication Enjoyment	1.959	.571	-.146**	.173**	.479**	.422**	-.199**	-.104**	-.146**	.153**	.177**	-.042	-.020	.241**	.912**	.744**	.534**	.542**

Note: $*p \leq 0.05$; $**p \leq 0.01$

Table 2
Multi-level Regression Models Predicting Overall Joviality

		Variable	*B*	*SE*	*p*	*95% LLCI*	*95% ULCI*
Total Interpersonal Events	Step 1	Daily Events	.118	.004	<.001	.110	.126
		Mean Daily Events	.164	.014	<.001	.137	.190
		CM	-.141	.021	<.001	-.181	-.100
		Sex	.058	.030	.057	-.002	.117
	Step 2	Daily Events x CM	-.010	.006	.065	-.022	.001
Friend Events	Step 1	Daily Events	.149	.008	<.001	.132	.165
		Mean Daily Events	.387	.033	<.001	.322	.453
		CM	-.129	.021	<.001	-.170	-.089
		Sex	.111	.030	<.001	.051	.170
	Step 2	Daily Events x CM	.008	.011	.496	-.014	.029
Partner Events	Step 1	Daily Events	.124	.009	<.001	.106	.142
		Mean Daily Events	.050	.025	.046	.001	.098
		CM	-.147	.022	<.001	-.189	-.104
		Sex	.095	.031	.002	.034	.157
	Step 2	Daily Events x CM	-.009	.012	.458	-.034	.015
Family Events	Step 1	Daily Events	.123	.008	<.001	.107	.139
		Mean Daily Events	.104	.044	.019	.017	.191
		CM	-.144	.021	<.001	-.186	-.102
		Sex	.087	.031	.006	.025	.148
	Step 2	Daily Events x CM	-.028	.012	.022	-.051	-.004
Communication Events	Step 1	Daily Events	.075	.009	<.001	.057	.092
		Mean Daily Events	.353	.032	<.001	.290	.415
		CM	-.138	.021	<.001	-.179	-.098
		Sex	.026	.031	.400	-.035	.087
	Step 2	Daily Events x CM	.020	.012	.091	-.003	.044
Total Enjoyment	Step 1	Daily Enjoyment	.568	.010	<.001	.548	.588
		Mean Daily Enjoyment	.645	.028	<.001	.590	.700
		CM	-.053	.018	.003	-.088	-.018
		Sex	-.080	.026	.002	-.131	-.029
	Step 2	Daily Enjoyment x CM	-.045	.014	.001	-.071	-.018
Friend Enjoyment	Step 1	Daily Enjoyment	.402	.009	<.001	.385	.418
		Mean Daily Enjoyment	.604	.029	<.001	.547	.661
		CM	-.065	.018	<.001	-.101	-.028
		Sex	-.028	.027	.294	-.081	.025
	Step 2	Daily Enjoyment x CM	-.031	.011	.006	-.053	-.009
Partner Enjoyment	Step 1	Daily Enjoyment	.344	.012	<.001	.320	.367
		Mean Daily Enjoyment	.417	.027	<.001	.363	.470
		CM	-.064	.024	.009	-.112	-.016
		Sex	-.010	.037	.783	-.082	.062
	Step 2	Daily Enjoyment x CM	.015	.015	.328	-.015	.045
Family Enjoyment	Step 1	Daily Enjoyment	.254	.016	<.001	.222	.287
		Mean Daily Enjoyment	.551	.029	<.001	.494	.608
		CM	-.057	.026	.026	-.107	-.007
		Sex	.002	.036	.951	-.068	.072
	Step 2	Daily Enjoyment x CM	.003	.021	.880	-.039	.045
Communication Enjoyment	Step 1	Daily Enjoyment	.324	.009	<.001	.305	.342
		Mean Daily Enjoyment	.521	.025	<.001	.472	.569
		CM	-.088	.019	<.001	-.125	-.051
		Sex	-.051	.028	.064	-.106	.003
	Step 2	Daily Enjoyment x CM	-.009	.012	.458	-.034	.015

Note: Daily Events/Enjoyment = person mean centered daily levels; Mean Daily Events/Enjoyment = overall mean levels across all days

Table 3
Multi-level Regression Models Predicting Overall Serenity

		Variable	*B*	*SE*	*p*	*95% LLCI*	*95% ULCI*
Total Interpersonal Events	Step 1	Daily Events	.088	.004	<.001	.080	.097
		Mean Daily Events	.122	.015	<.001	.093	.151
		CM	-.151	.022	<.001	-.195	-.107
		Sex	-.012	.033	.714	-.076	.052
	Step 2	Daily Events x CM	-.014	.006	.014	-.026	-.003
Friend Events	Step 1	Daily Events	.102	.008	<.001	.085	.119
		Mean Daily Events	.313	.036	<.001	.243	.383
		CM	-.143	.022	<.001	-.187	-.100
		Sex	.024	.033	.457	-.040	.088
	Step 2	Daily Events x CM	-.002	.011	.873	-.024	.021
Partner Events	Step 1	Daily Events	.074	.009	<.001	.056	.093
		Mean Daily Events	.021	.026	.429	-.031	.072
		CM	-.156	.023	<.001	-.200	-.111
		Sex	.011	.033	.731	-.054	.077
	Step 2	Daily Events x CM	-.002	.013	.859	-.027	.022
Family Events	Step 1	Daily Events	.105	.008	<.001	.089	.121
		Mean Daily Events	-.014	.047	.757	-.106	.077
		CM	-.152	.023	<.001	-.197	-.107
		Sex	.007	.033	.841	-.059	.072
	Step 2	Daily Events x CM	-.030	.012	.011	-.053	-.007
Communication Events	Step 1	Daily Events	.066	.009	<.001	.048	.084
		Mean Daily Events	.316	.034	<.001	.249	.383
		CM	-.148	.022	<.001	-.192	-.104
		Sex	-.048	.033	.146	-.113	.017
	Step 2	Daily Events x CM	.012	.012	.336	-.012	.036
Total Enjoyment	Step 1	Daily Enjoyment	.481	.010	<.001	.460	.501
		Mean Daily Enjoyment	.627	.031	<.001	.565	.688
		CM	-.083	.020	<.001	-.122	-.044
		Sex	-.126	.029	<.001	-.183	-.069
	Step 2	Daily Enjoyment x CM	-.005	.014	.694	-.032	.022
Friend Enjoyment	Step 1	Daily Enjoyment	.335	.009	<.001	.318	.353
		Mean Daily Enjoyment	.622	.032	<.001	.559	.684
		CM	-.086	.020	<.001	-.126	-.046
		Sex	-.090	.030	.003	-.148	-.031
	Step 2	Daily Enjoyment x CM	-.011	.011	.343	-.033	.012
Partner Enjoyment	Step 1	Daily Enjoyment	.320	.013	<.001	.295	.345
		Mean Daily Enjoyment	.427	.029	<.001	.370	.484
		CM	-.084	.026	.001	-.135	-.032
		Sex	-.074	.039	.058	-.151	.002
	Step 2	Daily Enjoyment x CM	.045	.016	.005	.014	.077
Family Enjoyment	Step 1	Daily Enjoyment	.252	.017	<.001	.218	.285
		Mean Daily Enjoyment	.495	.031	<.001	.435	.556
		CM	-.097	.027	<.001	-.149	-.044
		Sex	-.092	.038	.015	-.166	-.018
	Step 2	Daily Enjoyment x CM	.031	.022	.154	-.012	.074
Communication Enjoyment	Step 1	Daily Enjoyment	.272	.009	<.001	.254	.291
		Mean Daily Enjoyment	.496	.027	<.001	.443	.549
		CM	-.110	.021	<.001	-.150	-.070
		Sex	-.113	.030	<.001	-.173	-.054
	Step 2	Daily Enjoyment x CM	.015	.013	.238	-.010	.039

Note: Daily Events/Enjoyment = person mean centered daily levels; Mean Daily Events/Enjoyment = overall mean levels across all days

Table 4

Multi-level Regression Models Predicting Overall Sadness

		Variable	*B*	*SE*	*p*	*95% LLCI*	*95% ULCI*
Total Interpersonal Events	Step 1	Daily Events	-.023	.003	<.001	-.029	-.017
		Mean Daily Events	.033	.009	<.001	.015	.051
		CM	.158	.014	<.001	.131	.185
		Sex	.075	.020	<.001	.035	.115
	Step 2	Daily Events x CM	.007	.004	.073	-.001	.015
Friend Events	Step 1	Daily Events	-.052	.006	<.001	-.063	-.040
		Mean Daily Events	-.036	.022	.106	-.080	.008
		CM	.154	.014	<.001	.126	.181
		Sex	.078	.020	<.001	.038	.118
	Step 2	Daily Events x CM	.001	.008	.897	-.014	.016
Partner Events	Step 1	Daily Events	.000	.007	.944	-.013	.014
		Mean Daily Events	.038	.016	.019	.006	.070
		CM	.154	.014	<.001	.127	.182
		Sex	.088	.021	<.001	.047	.128
	Step 2	Daily Events x CM	.012	.009	.206	-.006	.030
Family Events	Step 1	Daily Events	-.015	.006	.006	-.026	-.004
		Mean Daily Events	.191	.029	<.001	.134	.247
		CM	.153	.014	<.001	.125	.180
		Sex	.086	.020	<.001	.046	.126
	Step 2	Daily Events x CM	.014	.008	.079	-.002	.030
Communication Events	Step 1	Daily Events	-.020	.006	.002	-.033	-.008
		Mean Daily Events	.015	.022	.481	-.027	.058
		CM	.156	.014	<.001	.129	.184
		Sex	.085	.021	<.001	.044	.127
	Step 2	Daily Events x CM	.010	.009	.259	-.007	.027
Total Enjoyment	Step 1	Daily Enjoyment	-.325	.010	<.001	-.345	-.306
		Mean Daily Enjoyment	-.262	.020	<.001	-.301	-.222
		CM	.113	.013	<.001	.088	.138
		Sex	.061	.019	.001	.024	.097
	Step 2	Daily Enjoyment x CM	-.024	.013	.076	-.050	.002
Friend Enjoyment	Step 1	Daily Enjoyment	-.202	.008	<.001	-.217	-.187
		Mean Daily Enjoyment	-.275	.021	<.001	-.315	-.235
		CM	.118	.013	<.001	.092	.143
		Sex	.079	.019	<.001	.042	.117
	Step 2	Daily Enjoyment x CM	-.010	.010	.329	-.030	.010
Partner Enjoyment	Step 1	Daily Enjoyment	-.233	.014	<.001	-.260	-.207
		Mean Daily Enjoyment	-.235	.020	<.001	-.275	-.196
		CM	.124	.018	<.001	.089	.159
		Sex	.032	.027	.239	-.021	.084
	Step 2	Daily Enjoyment x CM	-.006	.017	.713	-.041	.028
Family Enjoyment	Step 1	Daily Enjoyment	-.128	.015	<.001	-.157	-.099
		Mean Daily Enjoyment	-.183	.021	<.001	-.225	-.142
		CM	.133	.018	<.001	.097	.169
		Sex	.081	.026	.002	.031	.132
	Step 2	Daily Enjoyment x CM	.026	.019	.183	-.012	.064
Communication Enjoyment	Step 1	Daily Enjoyment	-.210	.009	<.001	-.227	-.193
		Mean Daily Enjoyment	-.162	.018	<.001	-.197	-.127
		CM	.135	.013	<.001	.109	.162
		Sex	.074	.020	<.001	.035	.113
	Step 2	Daily Enjoyment x CM	-.010	.011	.387	-.032	.013

Note: Daily Events/Enjoyment = person mean centered daily levels; Mean Daily Events/Enjoyment = overall mean levels across all days

Table 5
Multi-level Regression Models Predicting Overall Anxiety

		Variable	*B*	*SE*	*p*	*95% LLCI*	*95% ULCI*
Total Interpersonal Events	Step 1	Daily Events	-.046	.004	<.001	-.054	-.038
		Mean Daily Events	.045	.011	<.001	.022	.067
		CM	.151	.017	<.001	.118	.185
		Sex	.142	.025	<.001	.093	.191
	Step 2	Daily Events x CM	.017	.005	.001	.007	.027
Friend Events	Step 1	Daily Events	-.047	.007	<.001	-.062	-.033
		Mean Daily Events	-.018	.028	.524	-.073	.037
		CM	.144	.017	<.001	.110	.179
		Sex	.162	.025	<.001	.112	.212
	Step 2	Daily Events x CM	.010	.010	.322	-.010	.029
Partner Events	Step 1	Daily Events	-.036	.008	<.001	-.052	-.020
		Mean Daily Events	.043	.020	.032	.004	.082
		CM	.144	.017	<.001	.110	.178
		Sex	.160	.025	<.001	.110	.210
	Step 2	Daily Events x CM	.011	.011	.316	-.010	.032
Family Events	Step 1	Daily Events	-.085	.006	<.001	-.097	-.072
		Mean Daily Events	.185	.035	<.001	.116	.255
		CM	.144	.017	<.001	.110	.177
		Sex	.153	.025	<.001	.104	.203
	Step 2	Daily Events x CM	.016	.009	.102	-.003	.034
Communication Events	Step 1	Daily Events	.006	.008	.418	-.009	.022
		Mean Daily Events	.079	.027	.003	.026	.131
		CM	.146	.017	<.001	.112	.180
		Sex	.150	.026	<.001	.100	.201
	Step 2	Daily Events x CM	.024	.011	.023	.003	.045
Total Enjoyment	Step 1	Daily Enjoyment	-.305	.010	<.001	-.325	-.284
		Mean Daily Enjoyment	-.223	.026	<.001	-.275	-.171
		CM	.127	.017	<.001	.094	.160
		Sex	.145	.025	<.001	.097	.193
	Step 2	Daily Enjoyment x CM	.033	.014	.018	.006	.060
Friend Enjoyment	Step 1	Daily Enjoyment	-.214	.009	<.001	-.231	-.197
		Mean Daily Enjoyment	-.236	.027	<.001	-.289	-.183
		CM	.131	.017	<.001	.098	.165
		Sex	.161	.025	<.001	.112	.210
	Step 2	Daily Enjoyment x CM	.038	.011	.001	.016	.060
Partner Enjoyment	Step 1	Daily Enjoyment	-.151	.013	<.001	-.177	-.126
		Mean Daily Enjoyment	-.208	.025	<.001	-.257	-.159
		CM	.090	.022	<.001	.046	.134
		Sex	.102	.033	.002	.037	.168
	Step 2	Daily Enjoyment x CM	.024	.017	.152	-.009	.057
Family Enjoyment	Step 1	Daily Enjoyment	-.094	.015	<.001	-.124	-.065
		Mean Daily Enjoyment	-.150	.025	<.001	-.199	-.101
		CM	.132	.022	<.001	.089	.175
		Sex	.123	.030	<.001	.064	.183
	Step 2	Daily Enjoyment x CM	.050	.020	.011	.012	.089
Communication Enjoyment	Step 1	Daily Enjoyment	-.161	.009	<.001	-.178	-.143
		Mean Daily Enjoyment	-.130	.023	<.001	-.175	-.085
		CM	.139	.017	<.001	.105	.173
		Sex	.152	.025	<.001	.102	.202
	Step 2	Daily Enjoyment x CM	.016	.012	.179	-.007	.039

Note: Daily Events/Enjoyment = person mean centered daily levels; Mean Daily Events/Enjoyment = overall mean levels across all days

Table 6
Multi-level Regression Models Predicting Overall Anger

		Variable	*B*	*SE*	*p*	*95% LLCI*	*95% ULCI*
Total Interpersonal Events	Step 1	Daily Events	-.011	.003	<.001	-.017	-.006
		Mean Daily Events	.059	.009	<.001	.042	.077
		CM	.134	.013	<.001	.108	.160
		Sex	.037	.019	.058	-.001	.075
	Step 2	Daily Events x CM	.009	.004	.016	.002	.017
Friend Events	Step 1	Daily Events	-.027	.005	<.001	-.038	-.017
		Mean Daily Events	.016	.022	.462	-.026	.058
		CM	.133	.013	<.001	.107	.159
		Sex	.045	.020	.021	.007	.084
	Step 2	Daily Events x CM	-.004	.007	.562	-.018	.010
Partner Events	Step 1	Daily Events	.016	.007	.015	.003	.029
		Mean Daily Events	.084	.015	<.001	.054	.114
		CM	.128	.013	<.001	.102	.154
		Sex	.051	.019	.008	.013	.089
	Step 2	Daily Events x CM	.021	.009	.017	.004	.038
Family Events	Step 1	Daily Events	-.006	.005	.220	-.017	.004
		Mean Daily Events	.251	.027	<.001	.199	.304
		CM	.127	.013	<.001	.102	.153
		Sex	.045	.019	.020	.007	.082
	Step 2	Daily Events x CM	.032	.008	<.001	.017	.047
Communication Events	Step 1	Daily Events	-.012	.006	.050	-.023	.000
		Mean Daily Events	.011	.021	.586	-.029	.052
		CM	.133	.013	<.001	.107	.160
		Sex	.044	.020	.028	.005	.083
	Step 2	Daily Events x CM	.006	.008	.420	-.009	.022
Total Enjoyment	Step 1	Daily Enjoyment	-.251	.009	<.001	-.268	-.234
		Mean Daily Enjoyment	-.198	.020	<.001	-.238	-.159
		CM	.101	.013	<.001	.076	.126
		Sex	.033	.019	.079	-.004	.069
	Step 2	Daily Enjoyment x CM	-.023	.012	.048	-.046	.000
Friend Enjoyment	Step 1	Daily Enjoyment	-.165	.007	<.001	-.179	-.151
		Mean Daily Enjoyment	-.227	.020	<.001	-.267	-.188
		CM	.101	.013	<.001	.076	.126
		Sex	.045	.019	.017	.008	.081
	Step 2	Daily Enjoyment x CM	-.009	.010	.322	-.028	.009
Partner Enjoyment	Step 1	Daily Enjoyment	-.177	.012	<.001	-.200	-.154
		Mean Daily Enjoyment	-.216	.021	<.001	-.256	-.175
		CM	.117	.018	<.001	.081	.153
		Sex	-.011	.028	.698	-.065	.043
	Step 2	Daily Enjoyment x CM	-.020	.015	.169	-.050	.009
Family Enjoyment	Step 1	Daily Enjoyment	-.102	.014	<.001	-.129	-.074
		Mean Daily Enjoyment	-.159	.020	<.001	-.199	-.119
		CM	.135	.018	<.001	.100	.170
		Sex	.037	.025	.140	-.012	.086
	Step 2	Daily Enjoyment x CM	.035	.018	.053	.000	.071
Communication Enjoyment	Step 1	Daily Enjoyment	-.150	.007	<.001	-.164	-.135
		Mean Daily Enjoyment	-.106	.017	<.001	-.140	-.072
		CM	.118	.013	<.001	.092	.144
		Sex	.041	.019	.034	.003	.079
	Step 2	Daily Enjoyment x CM	-.009	.010	.347	-.029	.010

Note: Daily Events/Enjoyment = person mean centered daily levels; Mean Daily Events/Enjoyment = overall mean levels across all days

Figure 1. *CM as a Moderator Between Number of Family Events and Joviality*

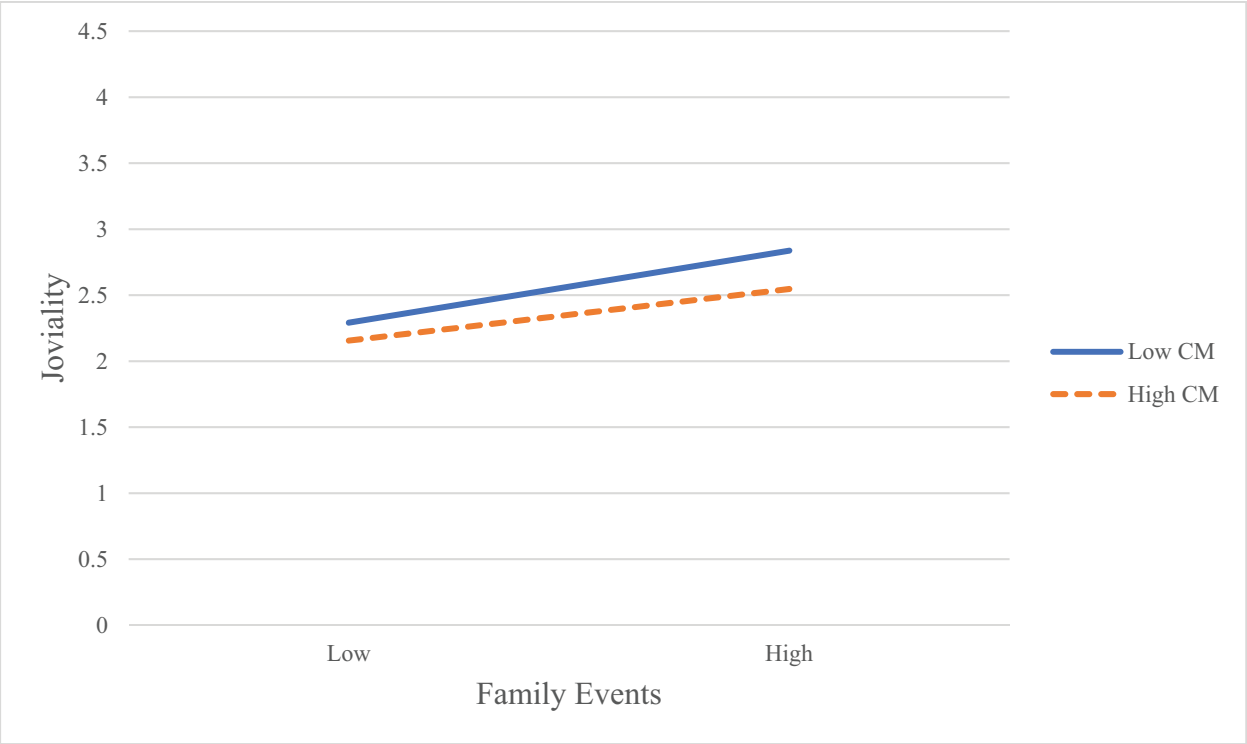

Figure 2. *CM as a Moderator Between Total Enjoyment Rating and Joviality*

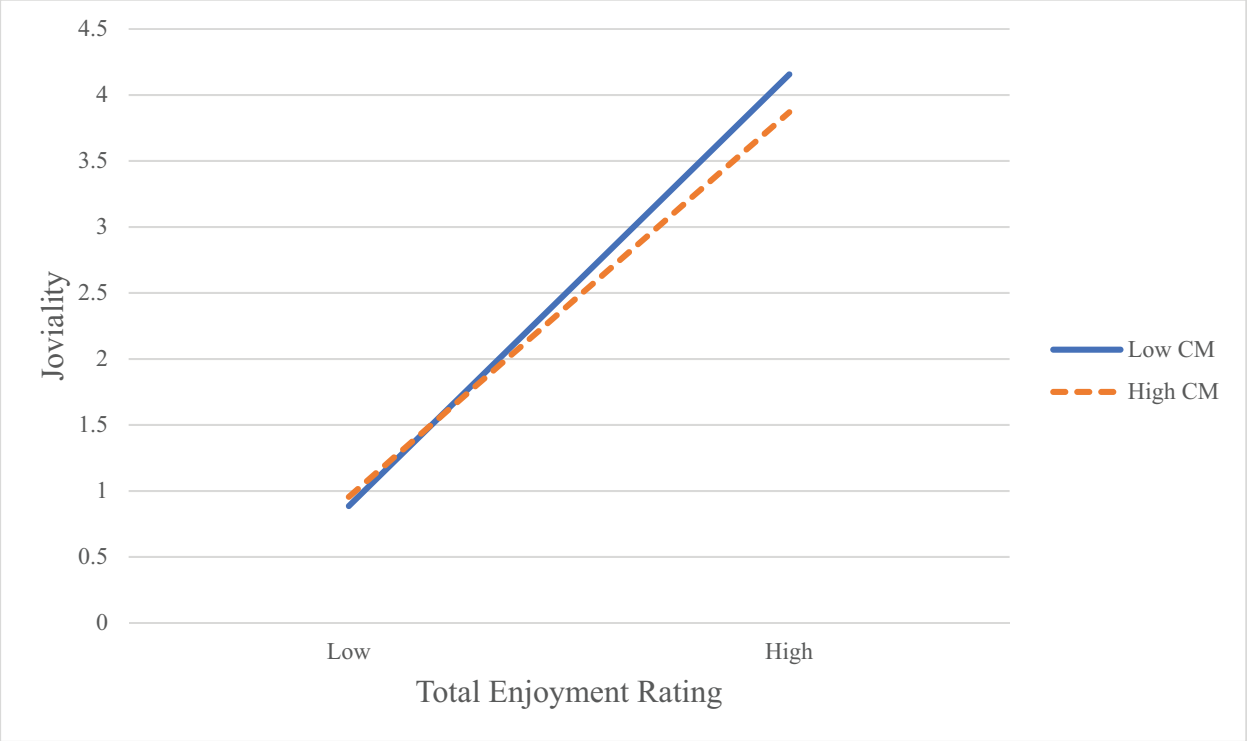

Figure 3. *CM as a Moderator Between Friend Enjoyment Rating and Joviality*

Figure 4. *CM as a Moderator Between Total Number of Interpersonal Events and Serenity*

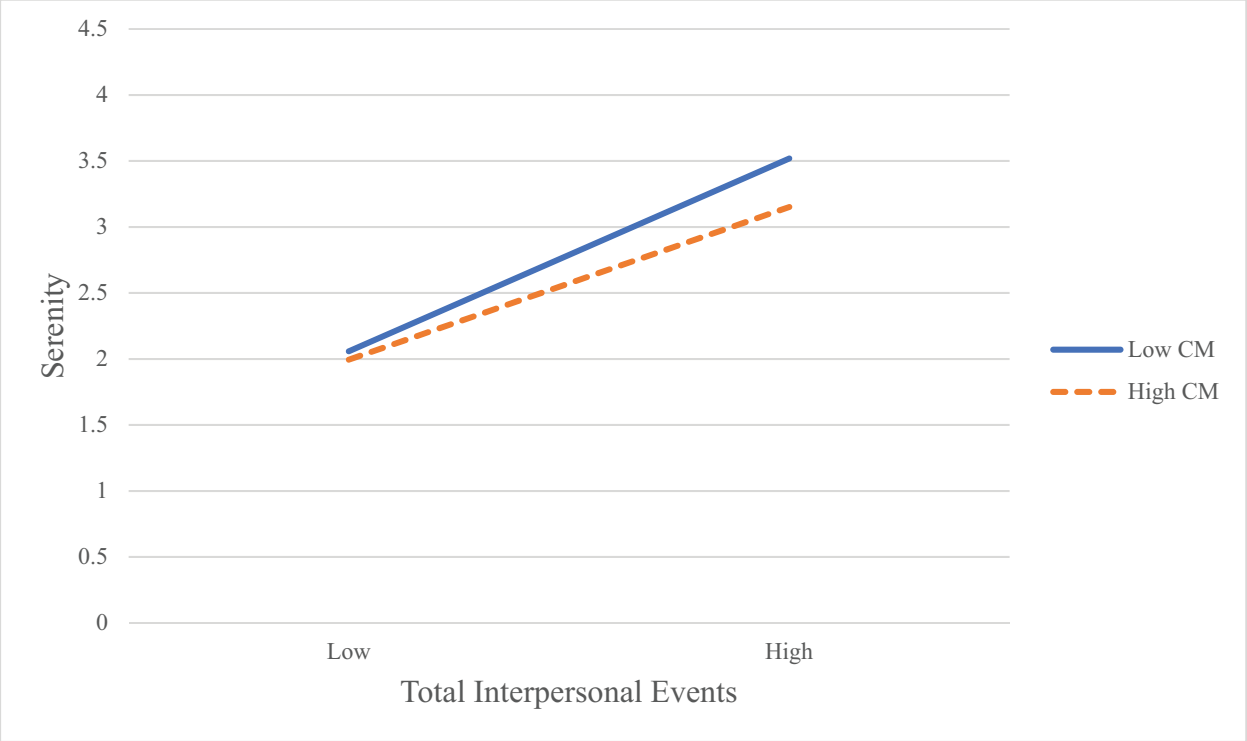

Figure 5. *CM as a Moderator Between Number of Family Events and Serenity*

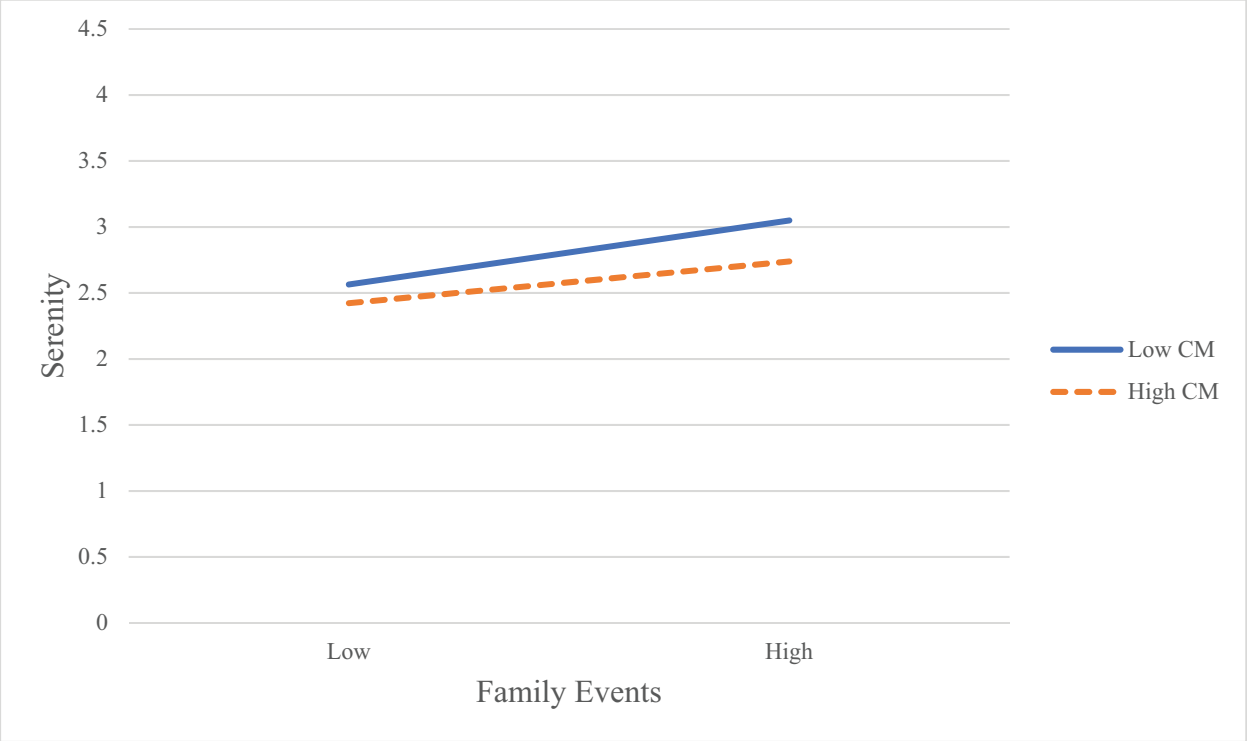

Figure 6. *CM as a Moderator Between Partner Enjoyment Rating and Serenity*

Figure 7. *CM as a Moderator Between Total Number of Interpersonal Events and Anxiety*

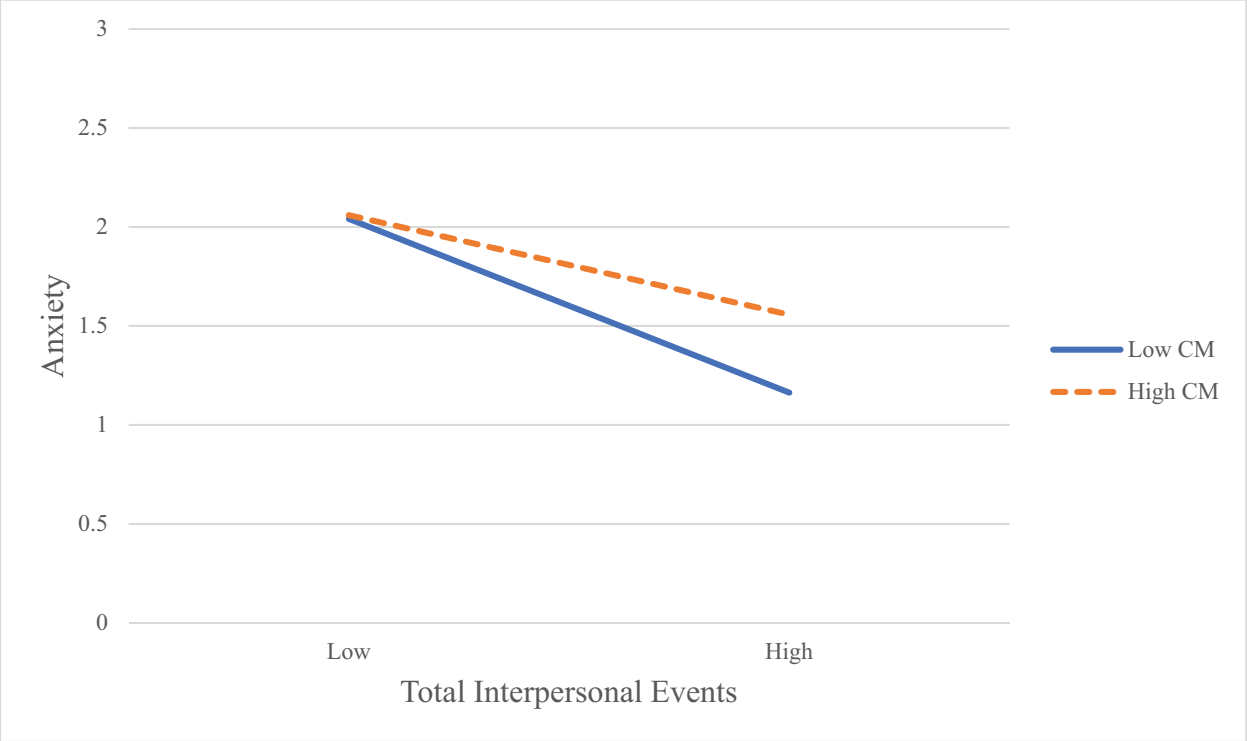

Figure 8. *CM as a Moderator Between Number of Communication Events and Anxiety*

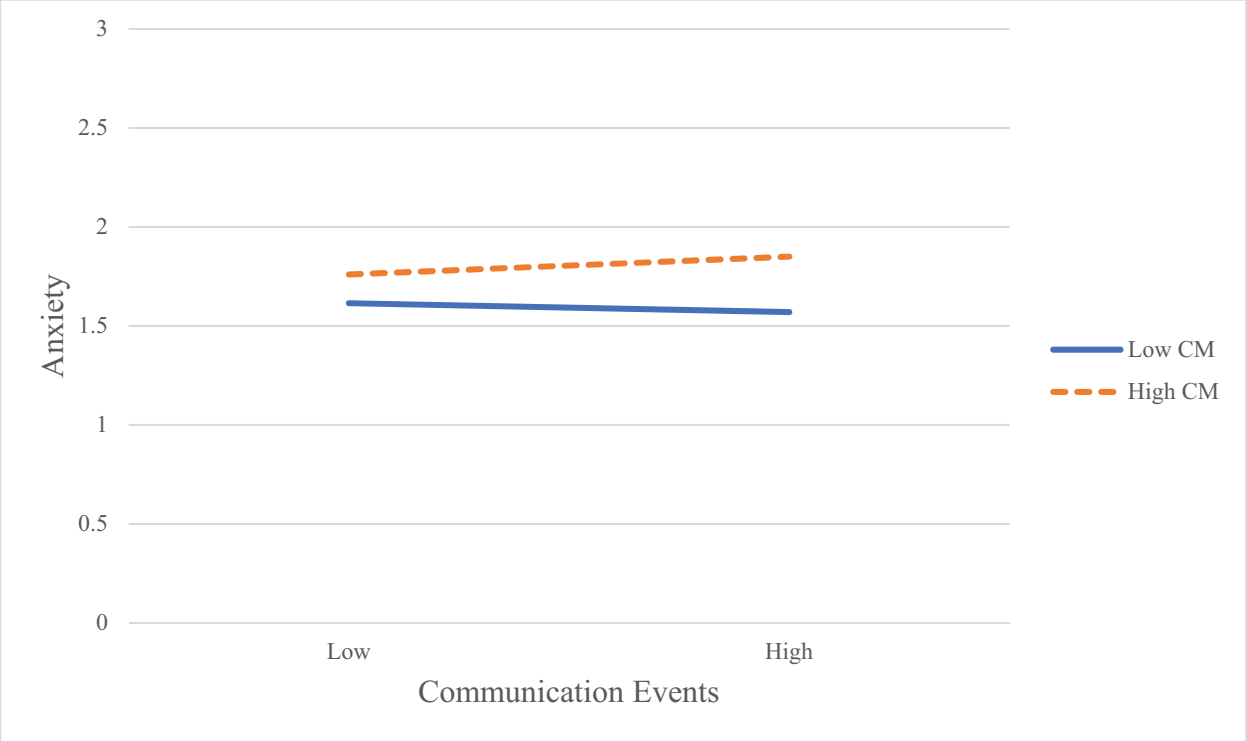

Figure 9. *CM as a Moderator Between Total Enjoyment Rating and Anxiety*

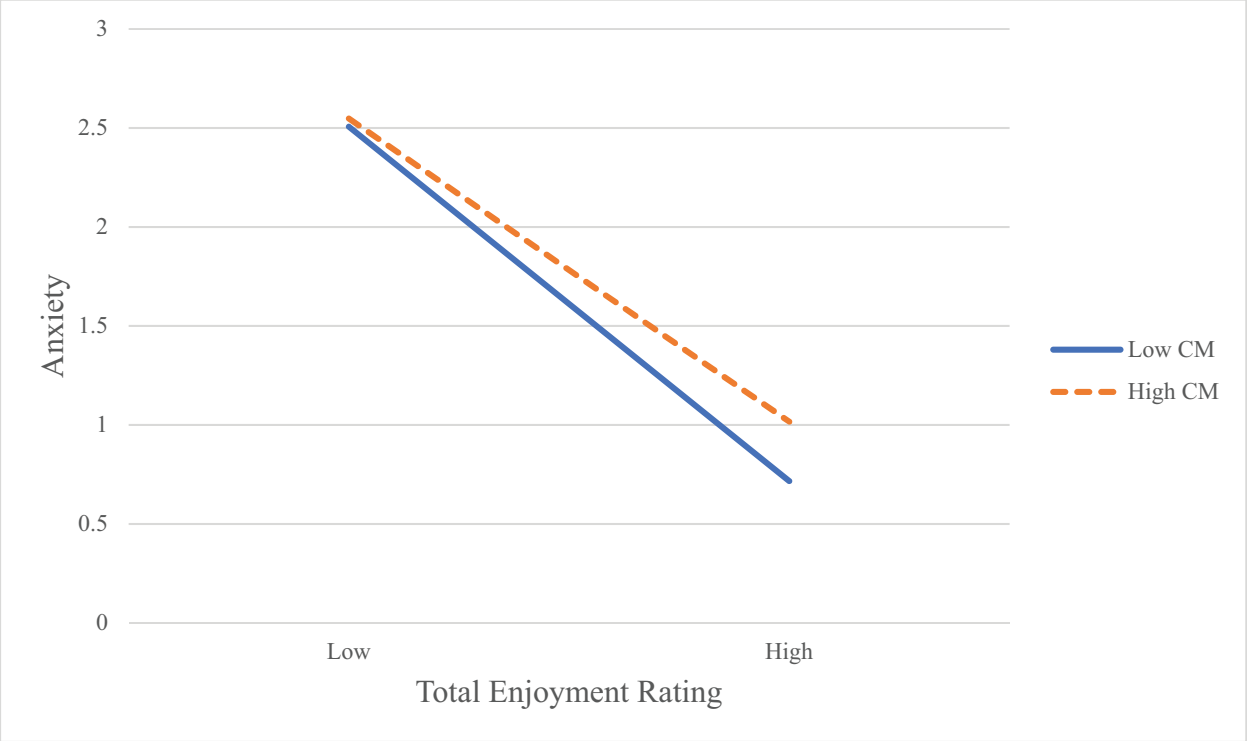

Figure 10. *CM as a Moderator Between Friend Enjoyment Rating and Anxiety*

Figure 11. *CM as a Moderator Between Family Enjoyment Rating and Anxiety*

Figure 12. *CM as a Moderator Between Total Number of Interpersonal Events and Anger*

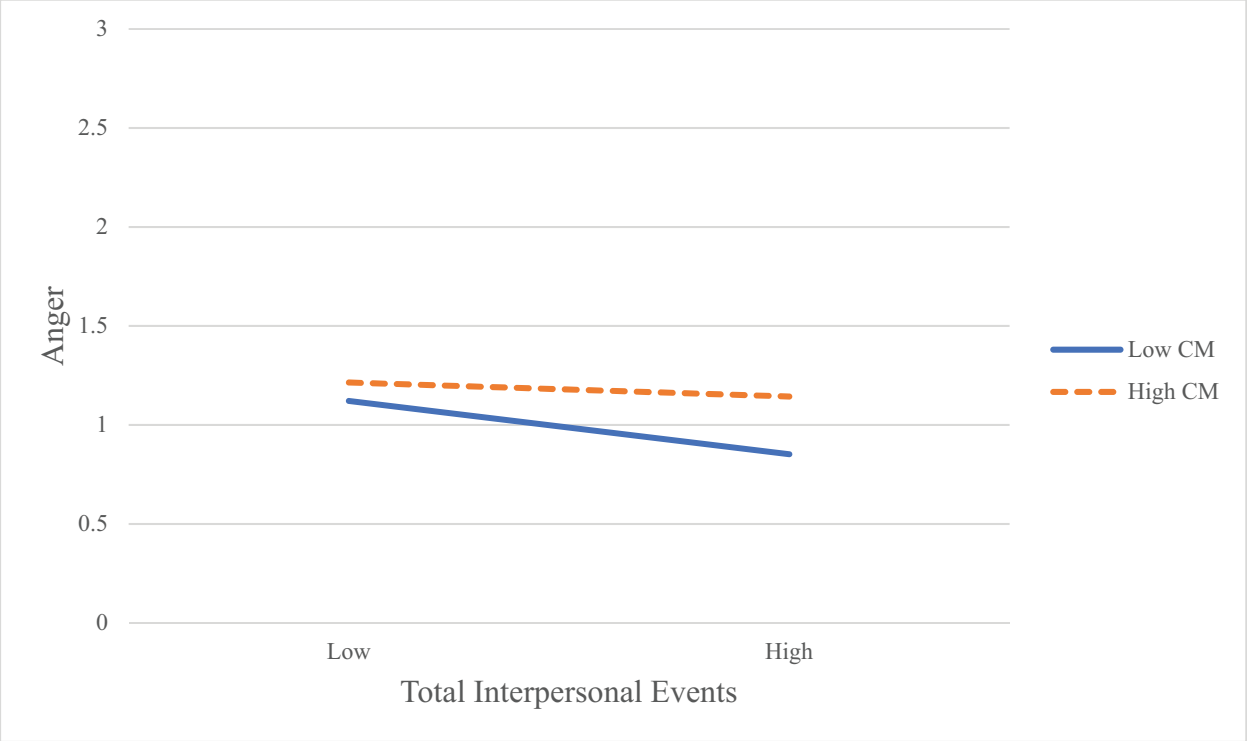

Figure 13. *CM as a Moderator Between Number of Partner Events and Anger*

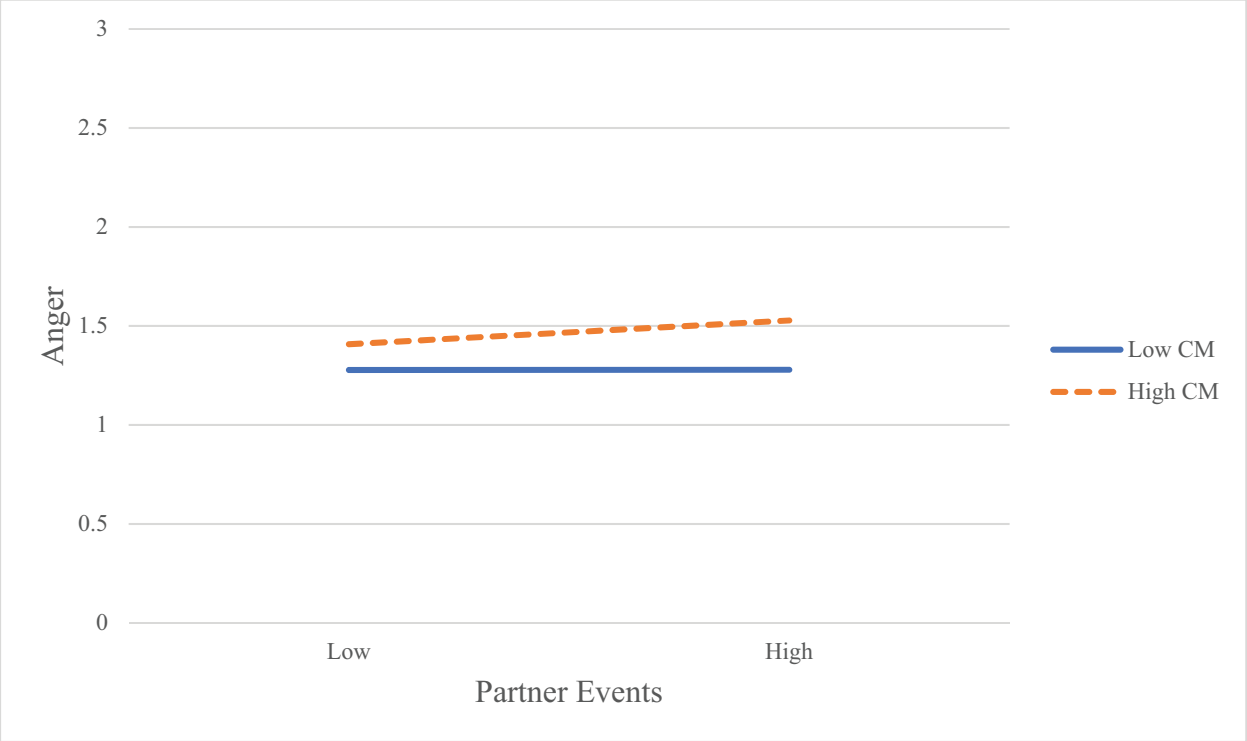

Figure 14. *CM as a Moderator Between Number of Family Events and Anger*

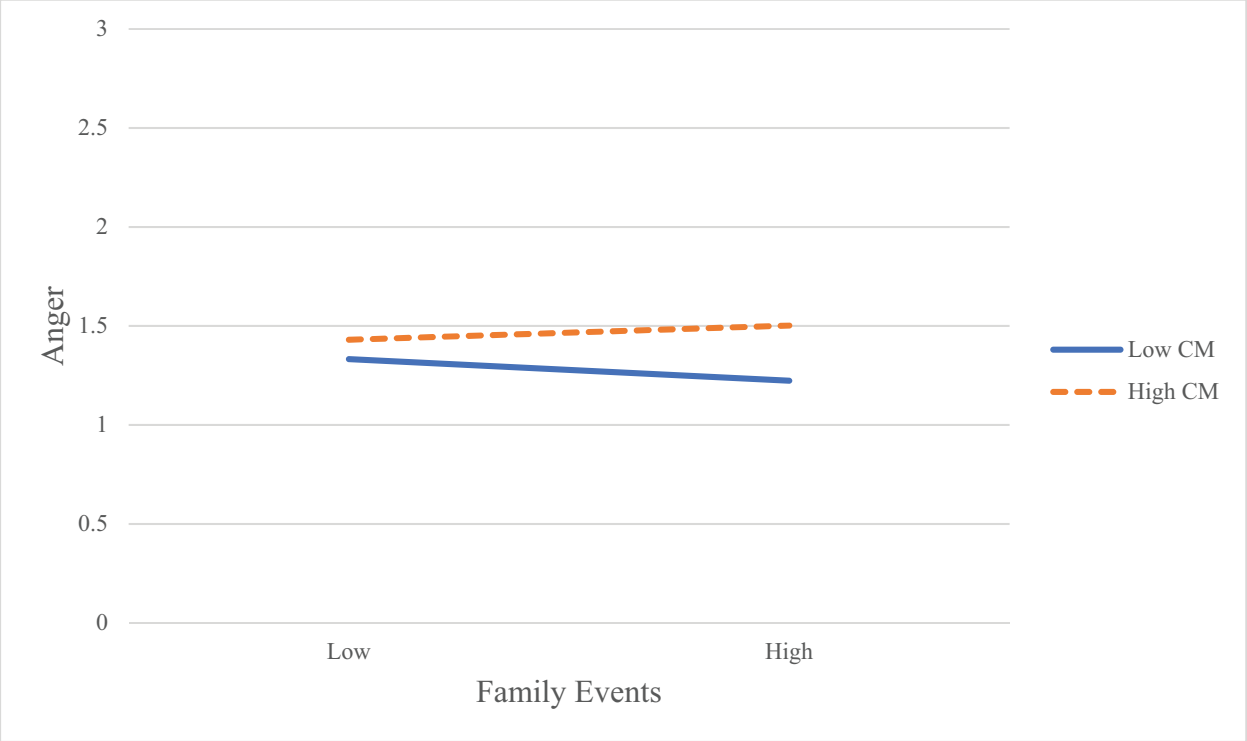

Figure 15. *CM as a Moderator Between Total Enjoyment Rating and Anger*

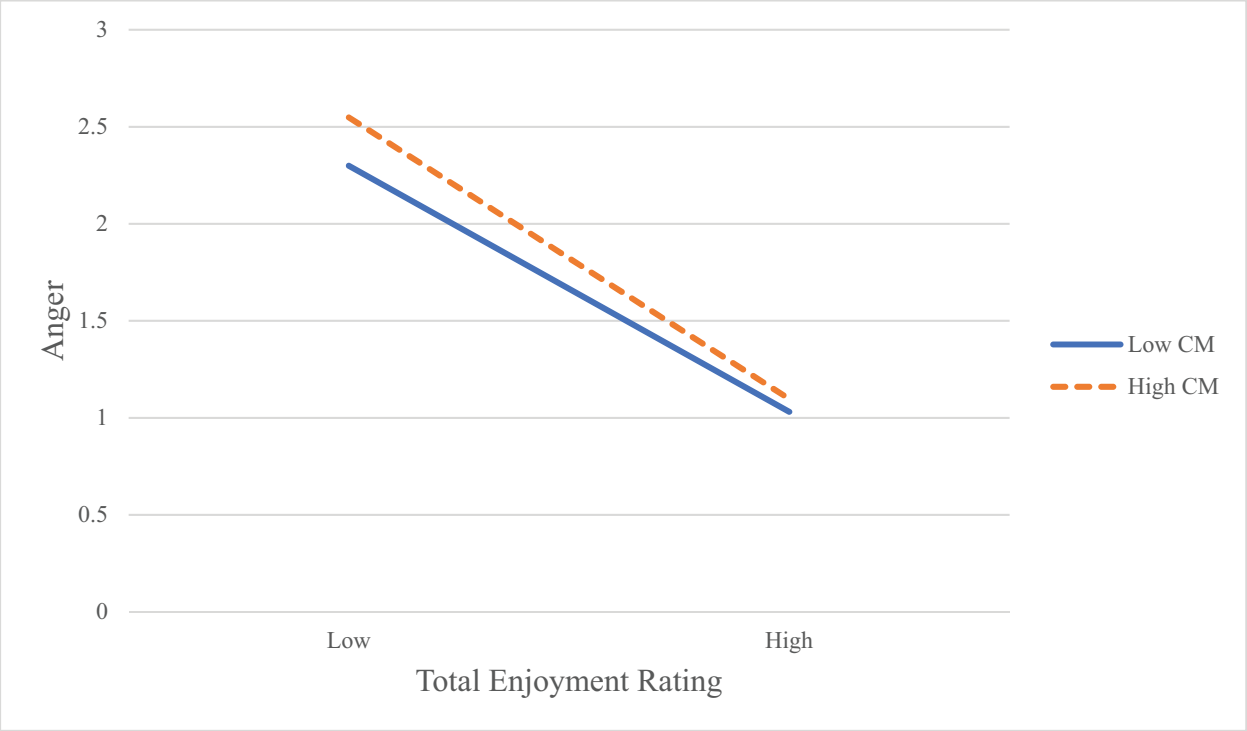

Figure 16. *CM as a Moderator Between Family Enjoyment Rating and Anger*