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Borderline Traits in Mothers and Their Adolescent Daughters: Associations Between Emotion Regulation, Relationship Quality, and Social Cognition

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Borderline Traits in Mothers and Their Adolescent Daughters: Associations Between Emotion Regulation, Relationship Quality, and Social Cognition

By

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Abstract

Borderline personality disorder (BPD) is categorized by impairing emotional dysregulation and other difficulties, with traits being more common in females and emerging in adolescence (British Psychological Society, 2009). The mother-daughter relationship has been shown to relate to trait expression (Cheavans et al., 2005), and it is believed social cognition may be impaired in individuals with BPD (Preibler et al., 2010). The current study evaluated how BPD levels, emotion regulation, and social cognition interact within an individual, how similarity between mother and daughter relate to their perception of the relationship, and whether social cognition is a potential moderator between mother and daughter BPD traits and emotion regulation ability. Ninety-five mothers (ages M=45.05, SD=7.97) and daughters (ages M=15.91, SD= 1.4) completed online questionnaires. Mother and daughter frequency of maladaptive emotion regulation use was positively correlated to BPD traits in mothers (r=.75, N=95, p<.001) and daughters (r=.64, N=95, p<.001), respectively. Daughter BPD traits were negatively correlated to adaptive emotion regulation (r=-2.73, N=95, p=.01). Mother and daughter perceived discord was positively correlated to BPD traits in mothers (r=.43, N=95, p<.001) and daughters (r=.39, N=95, p<.001), respectively. The more BPD traits the mother had in comparison to her daughter, the more perceived closeness in mothers (r=.35, N=95, p<0.05) and daughters (r= .3, N=95, p< 0.05). Results suggest that emotion regulation and BPD traits are related, even in non-clinical samples. The mother-daughter relationship likely is influenced by and influences BPD traits, emotion regulation ability, and relationship quality, especially during the adolescent years. Future research should consider observational and experimental conditions to understand the directionality of these relationships.

Introduction

Borderline personality disorder (BPD) is categorized by impaired emotional regulation, unstable perceptions of the self, frequent mood changes, self-harm, and fear of rejection or abandonment (British Psychological Society, 2009). This disorder is diagnosed more frequently in females than males, and oftentimes traits become prominent during adolescence (British Psychological Society, 2009). Estimates of genetic predisposition for borderline traits range from 40-69 percent, which leaves a wide range of environmental factors to consider in the transference of these traits (Amad et al., 2014; Svenn et al., 2000). Factors related to the etiology and maintenance of BPD may include emotion regulation, social cognition, and the mother-daughter relationship. Emotion dysregulation is a key aspect of this disorder, including increased affective responses to negative events and insufficient emotional reactions to positive events, low levels of cognitive reappraisal, and high levels of catastrophizing and avoidance (Kim et al., 2014). There has been some evidence that the emotion regulation strategies and dysregulation in mothers can result in poor emotion regulation in their children (Kaufman et al., 2017). Further, negative communication patterns, such as invalidation in relationships (Bennett et al., 2019), and specifically between daughters and their mothers, have been found to be related to the expression of borderline traits (Cheavens et al., 2005; Whalen et al., 2014).

In addition, communication in relationships may succeed or fail based on the way an individual perceives the situation, or their social cognition of the interaction. In normative mother-child relationships, indirect communication, when the mother gains information through noninvasive methods due to a lack of openness from the child, has been shown to increase problem behavior in teens and negative interactions between mother and child (Rote & Smetana, 2018). Therefore, the child's perception of the mother can influence the child's behaviors and the

relationship they form with their mothers. This may be exceptionally important in a relationship in which the mother or child has BPD traits, as individuals with borderline personality disorder may have impaired social cognition (Preibler et al., 2010). This would lead to dysfunctional interpretations of social interactions and relationships that are formed between mother and child.

The current project is an effort to add support for existing literature as well as explore several other factors within mother and daughter dyads. A non-clinical population was assessed to form generalizable results that relate to the etiology of general traits rather than a BPD diagnosis. Further, current literature supports the concept that even traits in the absence of clinical levels of BPD lead to significant impairment and differences in behavior (Herr et al., 2008; Willis & Nelson-Gray, 2017). Parent-child relationships have been evaluated within BPD literature, including communication (Rote & Smetana, 2018), perceptions of invalidation (Bennett et al., 2019), and parental bonding (Boucher et al., 2017). The formation of BPD traits and emotion regulation development is especially important in the adolescent years of this relationship (Macfie, 2009). No research to date has evaluated the perceived relationship quality between mothers and adolescent daughters and how it may be related to social cognition, emotion regulation, and borderline traits. Overall, this research will expand on previous findings related to BPD traits, emotion regulation, and social cognition while also contributing an understanding of the mother-daughter dyad and their perceptions of their relationship.

Literature Review

Mothers with Borderline Personality Disorder

Research has identified mother-daughter dyads as a critical relationship for the transmission of BPD. Attachment and parenting styles of mothers with BPD have been examined, as well as the implications this has on infants (Steele & Siever, 2010). Other recent literature has begun to measure and evaluate these same relationships in older children (Abela, 2005) as well as adolescents (Barnow et al., 2006). Similarities in the impact of BPD in mothers on infant, older child, and teenage populations have been found regarding the transmission of traits, communication, and attachment styles (Macfie, 2009). Children of mothers with BPD may experience exceptional difficulties, even when compared to children of mothers that have other psychological conditions or difficulties (Feldman et al., 1995; Barnow et al., 2006; Petfield et al., 2015).

There are two main areas of focus in research on BPD in mothers or parents: difficulties in their parenting and emotional functioning in their children (Petfield et al., 2015). BPD causes specific struggles that complicate the parent-child relationship and lead to negative child outcomes. Children experience more traumatic events in households that include mothers with BPD than in homes of mothers with other personality disorders, including more frequent child separation from their mothers in the form of alternative placements, witnessing more suicide attempts by parents, and increased likelihood of parents abusing drugs or alcohol (Barnow et al., 2006; Feldman et al., 1995). Mothers with BPD also exhibited high levels of comorbid mental health problems, including affective and anxiety disorders (Barnow et al., 2006). Children with mothers who had BPD were more likely to be in homes with only one parent compared to mothers with other disorders or no psychiatric conditions (Barnow et al., 2006). Maternal BPD

causes increased difficulties within their homes, which may lead to psychopathology in their children (Abela et al., 2005; Barnow et al., 2006; Feldman et al., 1995; Petfield et al., 2015; Weiss et al, 1996).

Prior to adulthood, children of mothers with BPD are at greater risk to develop emotional and behavioral problems in comparison to normative and other clinical populations (Barnow et al., 2006). For example, children with mothers who have comorbid BPD and major depressive disorder (MDD) are more likely than children with mothers who only have MDD to have cognitive and interpersonal vulnerability to depression (Abela et al., 2005). Children are also more likely to develop several forms of pathology (Weiss et al, 1996), including BPD in adulthood (Feldman et al., 1995), if their mothers have the disorder. Further, children of mothers with BPD perceive their mothers to be more overprotective than other groups, including mothers with depressive disorders, cluster C personality disorders, and no psychiatric conditions (Barnow et al., 2006). Behavior problems occurr at a higher rate in children of mothers with BPD, including attention problems, delinquency, and aggressiveness (Barnow et al., 2006). Older children are found to have increased rates of depression, suicidality, attention deficits, fearfulness, and behavior problems (Petfield et al., 2015). Therefore, a BPD diagnosis in a mother relates to adverse outcomes for her child(ren).

There may be several reasons for the increased emotional and behavioral problems observed in children of mothers with BPD, such as how the mother interacts with the child and views her position as a parent. Mothers with BPD have been found to be more controlling and over-involved in their child's life, limiting their freedom, and dominating communications (Stepp et al., 2012). Further, a mother diagnosed with BPD may view parenting as a burden, experience guilt related to her parenting ability, and fear that her child has similar traits to herself

(Zalewski et al., 2015). Mothers with BPD may lack the insight to alter their communication to improve their relationships. Mothers diagnosed with BPD may be unfamiliar with expectations for typical child development and may fail to recognize the need to adjust parenting techniques over the course of the child's life (Stepp et al 2012). The mother's ability to regulate negative emotions may also play a key role in increasing the quality of the relationship and mental health in the child (Stepp et al., 2012).

Genetic Considerations of BPD

Though there are many environmental considerations in child outcomes, genetic heritability of personality traits, or the genetic transmission of BPD traits and psychopathology to offspring, play an important role. The heritability of personality disorders is generally around 60 percent, though BPD ranges from 40-69 percent (Amad et al., 2014; Svenn et al., 2000). Even at the lowest predicted heritability, genes appear to account for a noticeable portion of the development of BPD in individuals. The genetic predisposition of BPD has been further analyzed, leading to speculation as to specific gene abnormalities prominent within the population, as well as the mechanisms of these polymorphisms relating to the symptomology of BPD (Calati et al., 2013). Genetics play a prominent role in the development of BPD; however, this study focuses on other etiological aspects to consider beyond these heritable aspects, as 31-60 percent of this disorder may be a result of environmental factors or gene-environment interactions.

Borderline Personality Disorder Traits in Mother-Child Relationships

There are limited findings on borderline traits or symptoms and their effects on children, as research tends to focus on clinically diagnosed samples or individuals that meet diagnostic criteria via clinical interview. However, looking at BPD traits may be beneficial, as the criteria

for BPD may lead to excluding individuals based on arbitrary cutoffs or evaluating individuals with expression of different traits within the same group (Herr et al., 2008). Mothers with BPD symptoms had children who self-reported difficulties making friends and increased levels of fearful attachment cognitions (Herr et al, 2008). Higher levels of BPD symptomology in mothers was also related to increased stress within the mother-child relationship and children's perception of their mother as hostile (Herr et al, 2008). These findings are very similar to those found in populations with clinical levels of BPD, such as difficulty with hostility or aggressiveness (Barnow et al., 2006). Therefore, even the presence of BPD symptomology or traits can lead to similar issues to those found in clinical populations.

Macfie and Swan (2009) found that children aged four to seven with high risk of developing BPD tend to show precursors to the disorder, including more role reversal between mother and child, fear of abandonment, and lower relationship expectations for both their mothers and fathers. This research also showed that these children experienced incongruent and shameful representations of the self. Further, these children were more likely to experience a maladaptive relationship with his or her mother, poor self-image, and reduced emotion regulation strategies in the presence of maternal self-harm behaviors.

Current research supports the notion that maternal BPD is related to negative outcomes and adverse effects on children. Several connections have been formed between emotion regulation strategies, communication, and attachment styles for mothers with borderline traits or diagnosed BPD and their children. Those with BPD show a unique trend of transmission of traits to their children both through genetics and aspects of child-rearing. Therefore, the communication and understanding of social context of both mother and child play a role in trait

expression and development of BPD. Another important aspect of BPD and the mother-child relationship is an individual's ability to regulate his or her emotion.

Adaptive and Maladaptive Emotion Regulation

Emotions are a natural response to situations, as is the response to control these emotions through regulation (Gross, 2014). Strategies used to regulate emotions have varying levels of success and may be classified as adaptive or maladaptive (Aldao & Hoeksema, 2010). Adaptive emotion regulation strategies yield positive, or favorable, outcomes while maladaptive emotion regulation strategies yield negative, or harmful outcomes (Aldao & Hoeksema, 2010). Emotion regulation strategies can be further divided into specific techniques used.

Two adaptive strategies are problem-solving, or trying to alter or limit the negative consequences of the aversive situation, and reappraisal, which relates to changing the individual's view of the situation into a positive experience (Aldao & Hoeksema, 2010). Other strategies such as thought suppression and rumination are often categorized as maladaptive (Aldao & Hoeksema, 2010). Thought suppression is the repression of unpleasant cognitions, while rumination involves persistent recurring thoughts about the negative emotions associated with the event, the event itself, and consequences of the event (Aldao & Nolen-Hoeksema, 2010). Adaptive emotion regulation strategies may protect against psychopathology, while maladaptive strategies may cause or increase the tendency for an individual to experience psychopathology or other emotional difficulties (Aldao & Nolen-Hoeksema, 2010; Aldao & Nolen-Hoeksema, 2012).

Emotion Regulation in Teenage Populations

Adolescence is a time of great emotional growth. Emotion regulation is highly dependent on parental influence in infancy and early childhood (Eisenberg et al., 2010; Schäfer et al., 2017;

Stegge & Meerum Terwogt, 2007; Thompson & Goodman, 2010). High-level executive functioning and complex cognitive abilities become more prominent by the time an individual reaches the age of 13 and continues into adulthood (Blakemore & Robbins, 2012; Dumontheil, 2014; Schäfer et al., 2017; Somerville & Casey, 2010). Adolescents undergo many changes during this time, including hormonal, cognitive, and stress-response changes (de Veld et al., 2012; Schäfer et al., 2017; Spear, 2009). Stress and negative emotions also become more common, which causes a rise in prominence of adaptive or maladaptive emotion regulation strategies (Ahmed et al., 2015; Schäfer et al., 2017). It has been shown that adaptive emotion regulation strategies, including distraction, acceptance, and reappraisal have short-term positive effects for young adolescents (Wante et al., 2018) and emotion regulation training has been utilized in teens with BPD symptomatology (Schuppert et al., 2012). Adolescence is, therefore, crucial for emotion regulation development with important implications, as individuals utilizing adaptive emotion regulation strategies may prevent psychopathology (Wante et al., 2018).

Emotion Regulation in Adults with BPD

Emotion regulation and distress is a recurrent theme in BPD research, as the dysfunction of emotional control is a key aspect of this disorder. Emotion regulation may be addressed in terms of adaptive and maladaptive strategies in individuals with BPD (Fletcher et al., 2014). Emotion dysregulation, the failure to successfully regulate emotion or the utilization of maladaptive emotion regulation strategies, has been noted throughout BPD literature (Bornovalova et al., 2008; Gratz et al., 2006; Putnam & Silk, 2005). Difficulties in emotion regulation partially mediates the relationship between higher external locus of control (believing a low degree of autonomy) and higher BPD features (Hope et al., 2018). Therefore, maladaptive emotion regulation difficulty may both directly and indirectly relate to BPD traits. However,

adults with BPD are capable of using adaptive strategies correctly and effectively to reduce self-reported emotion reactivity and physiological response when instructed and trained to do so (Kuo et al., 2016). This shows promise for teaching those with BPD proper techniques for controlling their emotional responses, which would improve their emotion dysregulation symptomatology.

Emotion Regulation in Mothers with BPD

Emotion regulation has been identified as an area of interest in research of mothers with BPD symptomology and child outcomes (Herr et al., 2008). Parents with BPD are less likely to utilize adaptive emotion regulation strategies and more likely to use maladaptive emotion regulation strategies compared to parents with bipolar disorder (Fletcher et al., 2014). Problems with emotion regulation have been identified as a pathway in which parents transmit BPD, as maternal BPD symptoms predict behavior problems in children directly and indirectly from emotion dysregulation (Kaufman et al., 2017). In addition, older children that have mothers with BPD have been shown to have difficulty with emotion regulation and dysregulation (Macfie & Swan, 2009). Specifically, emotion dysregulation scores increased in children as their mothers' identity confusion, poor relationships, and self-harming behavior increased (Macfie & Swan, 2009). Therefore, the absence of adaptive or positive emotion regulation strategies and use of maladaptive strategies both play a vital role in the etiology of BPD.

This pathway may even be seen in teens, as clinical inpatient adolescent emotion regulation strategies related to parental attachment security in a sample of teens involved in an Adolescent Treatment Program that specialized in treating those who were not helped by previous treatments (Kim et al., 2014). However, in parents that utilized negative, or maladaptive, emotion regulation strategies, a secure attachment style did not protect their child

from developing BPD traits (Kim et al., 2014). Thus, parental emotion regulation ability influences child BPD symptomology and emotion regulation, perhaps even more than other factors, such as attachment security to the parent.

Interpersonal Communication and Relationships in BPD

Studies that have evaluated interpersonal communication have observed populations of individuals with BPD, romantic partners, parent-child pairs, and therapy communication or clinical interviews. A study in which participants with BPD, depression, or no psychiatric condition were asked to judge individuals from 10 second video segments showed that individuals with BPD judged others as more negative or aggressive (Barnow et al., 2009). Individuals with BPD also self-reported more hostile dominance, cold, socially avoidant, and intrusive behavior when completing an interpersonal problems questionnaire (Barnow et al., 2009). Another study found that individuals with BPD are more likely to engage in dichotomous thinking, or making extreme judgements about other people, rather than focusing on negative aspects of other individuals exclusively (Arntz & Haaf, 2012).

Romantic relationships of individuals with BPD have been evaluated in a variety of populations. When communicating in two stressful discussion conditions with heterosexual romantic partners, women with diagnosed BPD were shown to have higher levels of stress than controls (Miano et al., 2017). These women were also more hostile during tasks than their partners, as well as doubted their relationship stability in stressful conditions (Miano et al., 2017). Other studies have found that individuals with BPD in romantic relationships have higher relationship instability, increased chance of partners also having a personality disorder, and higher rates of insecure attachment (Bouchard et al., 2009). Adolescents with BPD symptomology experience similar difficulties in romantic relationships, including more romantic

partners, greater importance placed on the relationships, and greater relationship insecurity (Lazarus et al., 2019). Negative communication and relationship aspects are likely present in other relationships for individuals with BPD or BPD symptomology, especially those between parent and child, or mother and daughter.

Communication between parent and child is related to the quality of the relationship. Communication between parent and child pairs in normative populations show that intrusive dyads, or those in which the mother displayed information solicitation and snooping while the child displayed avoidance behaviors, had more negative interactions (Rote & Smetana, 2018). In BPD, the context of mother-daughter relationships has become increasingly apparent.

Results of a conflict discussion task of nonclinical, at-risk mother-daughter dyads showed that positive affective behaviors displayed by the mother in the dyadic interaction resulted in decreased teen symptoms over time (Whalen et al., 2014). However, negative affect was not associated with symptom change over time (Whalen et al., 2014). Therefore, negative affect in teens with BPD symptoms may maintain the same level of symptoms if their mother has negative affective patterns, while positive behaviors may have positive effects for the adolescent. Additionally, adolescent girls' negative affect was associated with BPD severity over time when their mothers had low support/validation and high problem solving (Dixon-Gordon et al., 2016). Maternal validation was not strongly associated with daughter BPD trait maintenance (Dixon-Gordon et al., 2016). Therefore, more positive communication tends to relate to more positive outcomes for teens, though this relationship may be complex. Mother and daughter communication and relationships play key roles in the development and maintenance of borderline traits.

Social Cognition and Related Terms

Social interactions are comprised of observing and interpreting social signals and then responding and emitting social signals (Roepke et al., 2012). Social cognition specifically involves the interpretation of the social signals of others. Social cognition can include diction, facial expressions, tone, and body language (Roepke et al., 2012). The ability to correctly identify the emotions and feelings of others is vital to reacting appropriately, and by extension, forming bonds between people (Roepke et al., 2012). Therefore, appropriate social cognition is a vital component to forming healthy relationships throughout development. This ability forms throughout the lifespan, with adolescence showing an increase in social awareness due to psychosocial, hormonal, genetic, and brain development and changes (Burnett & Blakemore, 2009).

The concepts of theory of mind and empathy are often used in combination or interchangeably with social cognition (Blair, 2005; Roepke et al., 2012). Empathy refers to an individual's emotional response to another's situation, while theory of mind is a person's ability to know another person's thoughts, perceptions, beliefs, and intentions (Blair, 2005). Theory of mind not only allows us to understand other people's thoughts, but also to predict behaviors (Blair, 2005). It is expected that, due to the similarities in these three concepts, research using one of these factors is likely related to the other two.

Another term that is commonly associated with the concept of social cognition is emotional intelligence. Emotional intelligence describes an individual's ability to recognize and express emotion, experience feelings related to cognitive thought, as well as to understand and regulate emotional response (Mayer and Salovey, 1997). Emotional intelligence includes aspects of social cognition in a more generalist perspective. Social cognition is distinct in that it deals

with the thinking and understanding of social constructs (interactions, facial expressions, and other non-verbal communications) (Roepke et al., 2012).

Social Cognition in BPD

Current research has focused on both the emittance and interpretation of social signals to better understand the interactions of those with BPD (Roepke et al., 2012). However, findings are inconclusive and additional studies are needed to form definitive claims about social cognition in BPD populations. It was originally believed that those with BPD had enhanced cognitive empathy abilities. Patients with BPD have been found to have higher rates of sensitivity to nonverbal cues (Frank & Hoffman, 1986) and higher levels of empathy (Ladisich & Feil, 1988) compared to others. However, recent research has found normal levels or even impairment in social cognition for those with BPD. This discrepancy may be due to the development of more sensitive measurements of social cognition that are better able to identify social impairments in patients with BPD (Preibler et al., 2010; Roepke et al., 2012).

In addition, the mechanisms of social cognition may be more complex than previously assumed (Dinsdale & Crespi, 2013). A review of 28 studies found that those with BPD have a hypersensitivity to emotional stimuli, yet experience pathological symptomology in the emotion regulation and interpretation process (Dinsdale & Crespi, 2013). While this review helps clarify social cognition in those with BPD, more research needs to detangle the exact mechanisms and deficits, or enhancements, in social cognition for those that have BPD.

Problems in social cognition have been found in adolescents with symptoms of BPD as well, particularly in the area of hypermentalization, or overthinking about social situations (Sharp et al., 2011). This leads to an altered perception of the situation and impairs their ability to accurately draw conclusions (Sharp et al., 2011). Further, these adolescents create complex

explanations for emotional contexts, leading to excessive interpretation of social signals (Sharp et al., 2011). This hypermentalization may interact with emotion dysregulation leading to BPD symptomology in adolescents (Sharp et al., 2016).

Differences in social cognitive abilities between those with BPD and those without BPD can be seen even on the neuronal level. Though behavioral differences were not observed, individuals with BPD have been found to have hypoactivation in mirror neuron systems and hyperactivation in amygdala function when compared to healthy controls (Meir et al., 2013). It is suggested that this hypo- and hyperactivation represents an enhanced emotional approach that relates to deficits in real-world applications (Meir et al., 2013). Another neuroimaging study evaluating empathy and social cognition in patients with BPD found hypoactivation in the left superior temporal sulcus and gyrus and hyperactivation in the right middle insular cortex when comparing them to healthy controls (Dziobek et al., 2011). The conflicting findings of previous social cognition literature, then, may also be partially due to hyper- and hypoactivation of different brain regions.

Methods

Research Questions and Hypotheses

The current study examines BPD traits, adaptive and maladaptive emotion regulation, and social cognition in an effort to better understand the etiology of BPD via the mother-daughter relationship. Previous research has found that individuals with BPD have decreased emotion regulation ability. Research on the relationship between BPD and social cognition are inconclusive. Further, the relationship between parent and child is likely important in the etiology and maintenance of BPD, particularly in the mother-daughter relationship. Therefore, the evaluation of emotion regulation, social cognition, BPD traits, and perceived relationship quality between mothers and daughters in a non-clinical population adds needed clarification to the literature.

Aim 1: This study will determine how BPD traits, maladaptive and adaptive emotion regulation, perceived relationship closeness and discord, and social cognition correlate within an individual.

Hypotheses: It was expected that higher levels of BPD would correlate with more frequent use of maladaptive emotion regulation and lower use of adaptive emotion regulation strategies. Further, higher levels of BPD traits would be negatively correlated to social cognition ability. Higher levels of BPD traits were expected to positively correlate with perception of mother-daughter relationship discord and negatively correlate to perceived closeness.

Aim 2: This study will examine how similarity and superiority between mothers and daughters influence mother and daughter perceptions of the relationship. Two main similarities were assessed and correlated to outcome variables in both mothers and daughters: similarity of mother and daughter BPD trait levels and similarity of mother and daughter social cognition

ability on perceived relationship closeness and discord. Superiority between mothers in comparison to daughters on BPD traits, maladaptive and adaptive emotion regulation, and social cognition were correlated to perceived relationship closeness and discord in mothers and daughters.

Hypotheses: Similarity between mother and daughter scores on BPD traits were expected to relate to perceived relationship quality of daughters and mothers. It was expected that the more similar mothers and daughters are on BPD trait levels the better the daughter will perceive the relationship, including higher perceived closeness and lower perceived discord for both mothers and daughters. Further, the more similar mothers and daughters are on social cognition ability, the better mothers and daughters will perceive the relationship, including higher perceived closeness and lower perceived discord.

It was expected that mother superiority, or the extent to which mothers are higher than their daughters on BPD traits, maladaptive and adaptive emotion regulation, and social cognition will correlate to perceived relationship closeness and discord. First, it is expected that level of mother superiority on BPD traits will relate to daughters and mothers perceiving the relationship as less close and more discordant.

Also, mother superiority on frequency of maladaptive emotion regulation is expected to correlate to mother and daughter perception of lower closeness and higher discord. Mother superiority on adaptive emotion regulation is expected to correlate to daughter perception of less closeness and more discord. Mother superiority on adaptive emotion regulation is expected to correlate to maternal perception of more closeness and less discord.

Mother superiority on social cognition is expected to be negatively correlated to daughter’s perception of closeness and positively correlated with her daughter’s perception of

discord. However, mothers are expected to perceive the relationship as having higher closeness and lower discord.

Aim 3: This study aims to examine how social cognition may act as a moderator in the relationship between both mother and daughter BPD trait levels, adaptive emotion regulation, and maladaptive emotion regulation.

Hypotheses: Due to previous literature, it was expected that the daughter's social cognition abilities would moderate the relationship between mother and daughter BPD trait levels as well as mother and daughter emotion regulation abilities (both adaptive and maladaptive). Daughters with successful social cognition were expected to have a weaker association between her level of BPD traits and maternal BPD traits as well as between maternal use of adaptive and maladaptive emotion regulation strategies and her own use of these strategies. While daughters with poor social cognition would have a stronger association between maternal BPD traits and her own trait levels, as well as a stronger association between maternal use of adaptive and maladaptive emotion regulation strategies and her own use of these strategies.

Participants

Ninety-five adolescent females (M=15.91, SD=1.4) and their mothers (M=45.05, SD=7.97) were included in analyses. Inclusionary criteria included daughters aged 14-18 and their mothers completing the questionnaires. Exclusionary criteria included failing to complete the questionnaire, being a part of an unmatched data set (i.e., the mother completed the survey but her daughter failed to do so), daughters falling outside of the age range, and failure of attention and/or speed checks. Five hundred fifty-five respondents began the survey. Two hundred and seventy-one participants failed to answer the attention checks correctly, and another

185 failed the speed check by answering randomly or failing to have the survey completed (surveys would be flagged via the speeding check if only the mother completed her portion, as the time of completion would be very low) and were removed from analysis. One dyad was excluded for falling outside of the appropriate age range for daughters (indicated an age of 19). The final sample included 95 dyads of daughters aged 14-18 and their mothers.

Respondents were predominantly white and of high-income status (See Table 1). Some respondents reported mental health diagnosis and took medication for their diagnosis (Table 2). The percentage of respondents that reported a mental health diagnosis related to prevalence that occurs in the general population. Mothers in this sample had a 28% prevalence of mental health diagnosis while the National Institute of Mental Health reports adult women in the general population have a prevalence rate of 22.3% (NIHM, 2019). The adolescent females in our sample actually had a lower rate of mental health disorders, as this sample had a rate of 20%, while nationally it is 49.5% (NIHM, 2019). Only one participant claimed to have an unspecified personality disorder. Overall, this sample is fairly well representative of the prominence of mental health difficulties that occur in the general population. Three mothers and 3 daughters may qualify for a BPD diagnosis based on their responses to the PAI-BOR, as these participants had a total score of 58 or above (Morey, 1991).

Procedure

Recruitment was conducted through multiple forums including social media (Facebook, Reddit, and Craigslist), flyers sent virtually or dispersed in various physical locations, including business, universities, and clubs that adolescent females or their mothers frequent, and through Qualtrics recruitment services. Mothers were required to begin the survey prior to the daughter to ensure that consent was given for both the mother and the adolescent. Mothers were assigned a

random identification number that was generated by Qualtrics. The mother was then instructed to record the identification number and share it with her daughter. This number was used to pair mother and daughter data without collecting personal information. Daughters assented/consented prior to beginning their survey. After completing all parts of the survey, participants were redirected to a separate survey to enter their email address for a chance to win one of three $100 Amazon gift cards. In the specific case of Qualtrics recruitment, mothers completed the survey followed by the completion of the daughter within the same link. These participants were compensated by Qualtrics directly.

Measures

Demographic Questionnaire. A demographic questionnaire was created to assess participants' racial and ethnic backgrounds based on NIH standards. Income, mental health diagnoses, and medications that relate to mental health were also evaluated.

Borderline Personality Disorder. The Personality Assessment Inventory for Borderline Personality Disorder (PAI-BOR; Morey, 1991) was used to evaluate the levels of BPD traits in participants. The PAI is a well-established measure used to identify personality traits and dysfunction, while the PAI-BOR focuses solely on aspects for BPD. This measure is comparable to a structured clinical interview based on DSM criteria (Jacobo et al., 2007) and other forms of self-report measures (Gardner & Qualter, 2009). The PAI-BOR has been used in normative populations and clinical populations (Bell-Pringle et al., 1997). Reliability for this measure is α =.93 (Bell-Pringle et al., 1997) and it ranks superior to other measures in incremental validity (Gardner & Qualter, 2009). This measure is designed to be applicable across cultures and be able to be understood by individuals at or above a fourth-grade reading level (Morey & Ambwani, 2008).

This measure consists of 4 different subsections, including affective instability (BOR-A), identity problems (BOR-I), negative relationships (BOR-N), and self-harm (BOR-S). A higher score on the measure represents a higher rate of borderline traits, while higher scores in each domain reflects an increased prominence for that particular symptomatology. Each subsection consists of six statements that relate to that specific symptomatology, and respondents must respond on a 4-point Likert scale (not at all true to very true). One example of a statement is: "My mood can shift quite suddenly," to which participants must indicate the truthfulness of that statement in relation to their personal experience and understanding of themselves. The current study had acceptable reliably for mothers (α =.86) and daughters (α =.9).[1]

Perceived Relationship Quality. The Network of Relationships Inventory-Relationship Qualities Version (NRI-RQV; Furman & Buhrmester, 2008) was used to evaluate several dimensions of relationships via communication between two people, including five negative (conflict, criticism, pressure, exclusion and dominance) and five positive (companionship, disclosure, emotional support, approval, and satisfaction) features. Though originally used to assess multiple relationships between the individual answering the questionnaire and other important members of their lives, it can be shortened to evaluate only one of these relationships. This measure has good reliability, based on McDonald's coefficient ($\omega > .70$) and is valid in comparison to similar self-report questionnaires (Ackermann et al., 2018).

The NRI-RQV presents respondents with a statement and then asks a ranking of their relationship with this other person on 5-point Likert scale, ranging from 1, never or hardly at all, to 5, always or extremely much. Each dimension consists of three statements, such as, "How happy are you with your relationship with this person?" Scores for each dimension are derived

[1] All alpha values for the current study representing reliability are Cronbach's alpha.

from averages of the scores of the three statements that coincide with that dimension. Further, two factors can be calculated: closeness and discord. Closeness can be calculated by averaging all positive domain scores while discord can be calculated by averaging all negative domains. This questionnaire has been used with children, adolescents, and adults. The current study had acceptable reliability for perceived closeness in mothers (α =.91) and daughters (α =.96), as well as perceived discord in mothers (α =.93) and daughters (α =.93).

Emotion Regulation. The Cognitive Emotion Regulation Questionnaire (CERQ; Garnefski, Kraaij, & Spinhoven, 2002) was used to evaluate emotion regulation. The CERQ is a 36-item self-report measure that evaluates different emotion regulation techniques, including: personal tendencies toward self-blame, acceptance, focus on thought/rumination, positive refocusing, refocus on planning, and positive reappraisal. Subjects respond on a scale from 1, almost never, to 5, almost always, to describe the extent to which the coping strategy relates to them. Four items relate for each strategy, of which the sum of these responses indicates the frequency of use from 4, infrequently, to 20, extremely often. This measure has been well-established in adolescent and adult populations and shows acceptable reliability (Cronbach's α=.75) (Garnefski & Kraaij, 2007). Responses on the subscales of rumination, self-blame, catastrophizing, and lack of positive reappraisal relate to symptoms of psychopathology in both adolescents and adults (Garnefski & Kraaij, 2007). The CERQ is effective at drawing valid conclusions related to adaptive and maladaptive emotion regulation strategies in a wide-range of populations and contexts. For the purposes of this study, maladaptive emotion regulation refers to the total score of strategies that are identified as associated with psychopathology, including self-blame, rumination, and catastrophizing. Adaptive emotion regulation included frequency of strategy use that related to having better emotional well-being or lower symptoms of

psychopathology, including acceptance, positive refocusing, refocus on planning, and positive reappraisal. The current study had acceptable reliability for frequency of maladaptive emotion regulation use in mothers (α =.92) and daughters (α =.89) and for frequency of adaptive emotion regulation use in mothers (α =.89) and daughters (α =.91).

Social Cognition. The Social Attribution Task (SAT) was inspired by the work of Fritz Heider (Heider & Simmel, 1944). Participants are asked to watch a short film lasting less than 2 minutes in which one large triangle and two smaller geometric shapes move in various patterns around a fixed-position rectangle. Following the film, participants are asked several questions relating to the feelings, motives, and relationships the shapes have with one another. The multiple-choice version of this measure decreases the limitations of verbal ability and eliminates the issue of inter-rater reliability (Johannesen et al., 2018). The SAT-MC has been used in various samples, including children with autism spectrum disorder (Klin & Jones, 2006) and normative adults (Johanneson et al., 2018). The SAT-MC is highly correlated to other measures of social cognition and has good internal consistency (Bell et al., 2010). A previous study found the measure to have distinguishing properties between those with and without schizophrenia (Bell et al., 2010). Therefore, the SAT-MC may be used in a variety of contexts across age groups, language and intellectual abilities, and psychological pathologies. Reliability was low in the current study for this measure for both mothers (α =.22) and daughters (α =.29).

Analysis and Results

Analysis

Prior to conducting other analyses, tests for normality were conducted. Two common tests for normality are the Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk test (S-W) (Ghasemi & Zahediasl, 2012). It is suggested that K-S has low power and is highly conservative, though Lilliefors correction aids in alleviating this concern (Ghasemi & Zahediasl, 2012). Both tests were considered when assessing for normality. Many of the values assessed yielded significant values which signals a non-normal distribution (see Table 4). Each of these values that were identified as non-normal were visually inspected to identify the nature and severity of the abnormality. Cases that appeared to be non-normal due to extreme values had outliers removed and then were re-evaluated for normality.

Mother BPD trait levels were positively skewed, though no values were outside of the interquartile range. Frequency of maladaptive emotion regulation in mothers were also positively skewed, though the removal of two outliers[2] that fell outside of the interquartile range aided in this problem. Still, both K-S and S-W remained significant (p<.001). Similarly, mother-perceived discord was positively skewed and three outliers[3] were removed to aid in this problem, though this did not make the distribution normal (K-S p=.01, S-W p<.001). Daughter-perceived closeness did not appear to be skewed in either direction, though 3 outliers[4] fell outside of the interquartile range and were removed. The distribution remained non-normal with the removal of these outliers. Mother's social cognition ability was negatively skewed, though no values fell

[2] One of the outliers in this case was a participant that may qualify for a BPD diagnosis based on her PAI-BOR score.
[3] One of these outliers was one point away from possibly qualifying for a BPD diagnosis based on her PAI-BOR score.
[4] One of these outliers was one point away from possibly qualifying for a BPD diagnosis based on her PAI-BOR score.

outside of the interquartile range. There was no obvious skewness for daughter social cognition scores, and no values fell outside of the interquartile range.

Maladaptive emotion regulation signed difference scores were not skewed in either direction. However, eight values fell outside of the interquartile range. The removal of these outliers made the distribution normal (K-S p=.05, S-W *p*=.21). Social cognition signed difference scores were also not skewed. The removal of three outliers made the distribution normal (K-S *p*=.09, S-W *p*=.23). Unsigned difference scores for BPD trait levels were extremely positively skewed and remained non-normal after the removal of 3 outliers ($p<.001$). Unsigned difference scores for social cognition were also positively skewed. The removal of three outliers aided in this problem, though this did not make the distribution normal ($p<.001$).

This apparent violation of the normal distribution assumption was addressed by comparing some of the most extremely skewed values nonparametric test (Spearman's rho) to its parametric counterpart (Pearson correlation). In the case of correlating mother borderline traits to frequency of maladaptive emotion regulation strategy use found similar results when comparing Spearman's rho $r_s(N=95)=.71$, $p<.01$ to the Pearson correlation ($r=.75$, $N=95$, $p<.01$). Further, when correlating levels of daughter BPD traits and daughter perception of closeness, Spearman's rho ($r_s= -.36$, $N=95$, $p<.01$) and Pearson correlation ($r= -.34$, $N=95$, $p<.01$) were similar in nature. Lastly, when comparing the correlation coefficients for unsigned BPD difference scores and daughter perceived relationship closeness, Spearman's rho ($r_s= -.11$, $N=95$, $p=.28$) and Pearson correlation ($r= -.13$, $N=95$, $p=.21$) were extremely similar. Due to the highly similar results found between parametric and nonparametric tests even when assessing the most severely skewed variables, it was elected to use parametric tests for the remainder of analyses. Correlations were considered with the entire sample (95 dyads), though the removal of outliers was also practiced

throughout (results after the removal of outliers are recorded in footnotes). Several of the extreme values signaled individuals that may qualify for a diagnosis of BPD, and so it is important to consider them throughout these analyses.

Hypothesis 1

Correlational analyses assume that members of the sample are independent. Dyads can be considered either distinguishable or indistinguishable (Kenny et al., 2006). The current project presents a case of distinguishable dyads, as members are able to be distinguished by their roles. This is distinct from indistinguishable dyads in which each member is assigned an arbitrary label, such as a pair of roommates being referred to as roommate 1 and roommate 2 (Kenny et al., 2006). In either case, a test of nonindependence using a Pearson product-moment correlation can determine whether or not each dyad member should be evaluated separately, in which the current project would separate mothers and daughters for individual levels of analysis (Kenny et al., 2006).

A test of nonindependence found that mother BPD traits and daughter BPD were significantly correlated (r=.38, N=95 p<.001). This significant result reflects a lack of independence between mothers and daughters. Therefore, mothers and daughters will be analyzed separately throughout the analysis of the first hypothesis. Regression analyses were used to evaluate five relationships between BPD trait levels and other variables, both for mothers and daughters. BPD traits were correlated with use of maladaptive emotion regulation strategies, adaptive emotion regulation strategies, social cognition, perceived discord in the relationship, and perceived closeness in the relationship.

Hypothesis 2

Difference scores were utilized to determine if the difference between two dyad members on one variable were able to predict an outcome variable. The current study utilized both unsigned and signed (superiority) difference scores, as it could have been true that some relationships were not reliant on one dyad having a higher score than another while others likely are reliant on this information. A superiority model in dyadic research suggests that there is significance in the first member of the pair exceeding the level of the other pair member on the same variable (Griffin et al., 1999). Unsigned difference scores for BPD trait levels were calculated and correlated to daughter and mother perceived closeness and discord. Unsigned differences scores for social cognition were also used to correlate between mother and daughter perceived closeness and discord. Signed difference scores were used to evaluate if mother superiority on several measures correlated with several outcome variables. Signed scores were calculated for differences in mother and daughter BPD trait levels, frequency of maladaptive emotion regulation strategies, frequency of adaptive emotion regulation strategies, and social cognition ability. Each of these signed scores were correlated to mother and daughter perceived closeness and discord of the relationship.

Hypothesis 3

Three moderation models were created to determine if daughter social cognition ability can be identified as a moderator between mother and daughter BPD trait levels and emotion regulation ability. Moderation allows conclusions to be drawn as to whether a third variable (i.e., moderator) affects the strength of the relationship between an independent and dependent variable (Hayes, 2012). Moderation is typically understood as a form of interaction between predictor variables, and moderating variables can be continuous or discrete (Hayes & Rockwood,

2017). All moderation models were developed through the use of PROCESS, a freely available software that aids in the creation of moderation and mediation models (Hayes, 2012).

Exploratory Analyses

A correlation matrix was used to evaluate potential correlations that were not originally addressed by the hypotheses. Further, paired samples *t* tests evaluated whether the means of mother and daughter scores on each measure were significantly different. These analyses provided important information for later mother-daughter dyadic research and in the interpretation of results pertaining to this study.

Results

See Table 3 for a comparison of possible and obtained values of mothers and daughters for each measure in the current sample.

Hypothesis 1

Frequency of maladaptive emotion regulation strategy use was positively correlated with BPD trait levels in mothers (r=.75, N=95, p<.001) and daughters (r=.64, N=95, p<.001).[5] Therefore, the more BPD traits an individual had, the more often that individual used maladaptive emotion regulation strategies. The frequency of adaptive emotion regulation strategy use was not related to BPD trait levels in mothers.[6] However, frequency of adaptive emotion regulation strategies was negatively correlated to BPD trait levels in daughters (r= -.27, N=95, p=.01). Daughters with higher levels of BPD traits were using adaptive emotion regulation strategies less often. There was not a significant relationship between social cognition and BPD trait levels in mothers or daughters.

[5] This held true for daughters even with the removal of one outlier (r=.62, n=94, p<.001).
[6] (p=.63)

Perception of discord in the mother-daughter relationship was positively correlated with BPD trait levels in mothers (r=.43, N=95, p<.001)[7] and daughters (r=.39, N=95, p<.001).[8] The more BPD traits an individual had, the more discord was perceived by the individual. A significant positive correlation between mother BPD trait levels and the mother's perception of closeness was found (r=.23, N=95, p=.02).[9] In daughters, perceived relationship closeness was negatively correlated to BPD traits (r= -.34, N=95, p<.001).[10] For mothers, the more BPD traits she had, the more closeness she perceived in the mother-daughter relationship. However, daughters with higher BPD traits perceived the relationship as less close.

Hypothesis 2

Unsigned difference scores of mother and daughter BPD similarity were not correlated to daughter perceived relationship closeness[11] or discord.[12] Similarity on BPD traits between mothers and daughters were also unrelated to the mother's perception of closeness[13] or discord.[14] Overall, being more or less similar on BPD trait levels did not reflect a more or less close or discordant relationship for mothers or daughters.

Unsigned difference scores of mother and daughter similarity on social cognition was significantly correlated with daughter perceived relationship closeness (r=.18, N=95, p=.04).[15] The more dissimilar daughter and mothers were on social cognition, the more daughters perceived the relationship as close. Mother and daughter social cognition similarity scores were

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[7] Three values in the mothers' perception of relationship discord were found to fall outside of the interquartile range and were identified as outliers. After removing these outliers, a positive correlation was still observed (r=.34, n=92, p=.02).
[8] This held true even with the removal of one outlier (r=.36, n=94, p<.001).
[9] After the removal of two outliers, results maintained a significant positive correlation (r=.23, n=93, p=.03).
[10] This held true after the removal of three outliers (r=-.29, n=92, p<.01).
[11] (p=.1); results remained insignificant even when three outliers were removed (p=.43).
[12] (p=.39); results remained insignificant even when one outlier was removed (p=.47).
[13] (p=.11) After the removal of two outliers, results remained non-significant (p=.37).
[14] (p=.07) After the removal of 3 outliers, results remained non-significant (p=.07).
[15] which held true with the removal of 3 outliers (r=.20, n= 92, p=.03).

not correlated to mother perception of relationship closeness.[16] Mother and daughter social cognition similarity scores were negatively correlated to daughter perceptions of discord (r= -.19, N=95, p=.04)[17]. Unsigned difference scores of mother and daughter social cognition were negatively correlated to mothers' perception of relationship discord (r= -.308, N=95, p=.001).[18] For both mothers and daughters, the more similar social cognition ability was for the pair, the more discord was perceived.

Signed difference scores were used to see if mothers scoring higher than daughters on various measures had an effect on perceived relationship quality in either mothers or daughters. BPD trait level signed difference scores were significantly correlated to daughter perception of relationship closeness (r=.3, N=95, p< 0.05) and mother perception of relationship closeness (r=.35, N=95, p<0.05). Therefore, in cases in which mothers had more BPD traits than daughters, both mothers and daughters perceived the relationship as having more closeness. However, there was not a significant correlation between signed BPD difference scores and daughter or mother perception of discord. Mothers having more BPD traits than daughters did not relate to the relationship having more perceived discord for either mothers or daughters. Signed difference scores for frequency of maladaptive emotion regulation use was not correlated to mother or daughter perception of closeness or discord. Mothers using more maladaptive emotion regulation strategies than their daughters did not relate to the closeness or discord experienced by mothers or daughters.

Signed difference scores for frequency of adaptive emotion regulation was negatively correlated to daughter perception of closeness (r= -.33, N=95, p< 0.01) but not mother perceived

[16] (p=.24) After the removal of two outliers this result remained nonsignificant (p=.42).
[17] The removal of one outlier made this relationship nonsignificant (p=.06).
[18] This significant relationship was maintained following the removal of 3 outliers (r= -.29, n=92, p<.01).

closeness. Therefore, mothers' more frequent use of adaptive emotion regulation in comparison to their daughters[19] related to daughters perceiving the relationship as less close. Signed difference scores for frequency of adaptive emotion regulation were not correlated to daughter or mother perceived discord. Mother use of adaptive emotion regulation in comparison to her daughter did not relate to either member of the dyad perceiving discord. Signed difference scores for social cognition ability was not correlated to daughter or mother perceived closeness or discord. Mothers having higher scores on social cognition compared to her daughter did not have an effect on either member of the pair's perception of discord or closeness.

Hypothesis 3

The first moderation model assessed assumed mother BPD trait levels as the independent variable (X) predicting daughter BPD trait levels as the dependent variable (Y) while daughter's social cognition ability served as a moderator (W). The overall model was significant $F(3, 91)=5.31$, $p< 0.01$, $r^2=.15$. The interaction was not significant, however; therefore, daughter social cognition ability did not serve as a moderating variable between mother and daughter BPD trait levels.

The second model once again assumed daughter social cognition as a moderator variable. Similarly, this model did not reveal daughter's social cognition to act as a moderator between mother frequency of maladaptive emotion regulation strategy use as an independent variable and daughter frequency of maladaptive emotion regulation strategy use as a dependent variable. The model overall was significant, where $F(3, 91)=10.95$, $p<0.01$, $r^2=.27$. Therefore, mother frequency of maladaptive emotion regulation did significantly contribute to the model $b=.46$, $t(91)=2.04$, $p=.04$, meaning that as mother frequency of maladaptive emotion regulation use

[19] The effect size in comparison of mother and daughter mean maladaptive emotion regulation use is $d=.21$.

increases, daughter frequency of maladaptive emotion regulation use also increases. However, adding daughter social cognition ability into the model did not predict the effect mother maladaptive emotion regulation had on daughter maladaptive emotion regulation.

The final moderation model evaluated daughter social cognition ability as moderator in which mother adaptive emotion regulation predicted daughter adaptive emotion regulation. The model was overall significant, where $F(3, 91)=7.65$, $p<0.01$, $r^2=0.2$. However, neither predictor or interaction term was significant. Therefore, daughter social cognition did not serve as a moderator in this model.

Exploratory Analyses

Correlation Matrix

In an effort to identify potential trends that may be valuable to future research, two exploratory analyses were completed. The first was a correlation matrix to assess for unexpected relationships between variables (see Table 5). The second were paired samples *t* tests to determine if mothers and daughters significantly differed on the variables assessed.

The correlation matrix revealed several trends. For one, mothers and daughters were positively correlated on every measure evaluated.[20] Mother and daughter BPD trait levels were positively correlated, as were their frequency of maladaptive and adaptive emotion regulation use, perception of discord and closeness, and social cognition ability. Another unexpected trend that was found after running a correlation matrix was a positive correlation between mother maladaptive emotion regulation strategy use and daughter BPD trait levels ($r=.33$, $N=95$, $p<.01$). The more the mother used maladaptive emotion regulation strategies, the more BPD traits the daughter had.

[20] All correlations were significant at $p<.01$. See Table 5 for correlation coefficients.

Another surprising finding from the correlation matrix was that mother perception of discord and closeness was related to daughter maladaptive and adaptive emotion regulation, respectively. However, this trend was not found in daughter perception of closeness and discord related to mother emotion regulation. Specifically, mother perception of discord was positively correlated to daughter frequency of maladaptive emotion regulation strategy use (r=.28, N=95, p<.01). The more discord was perceived by the mother, the more frequently daughters used maladaptive emotion regulation strategies. Daughters did not perceive more discord the more frequently mothers used maladaptive emotion regulation strategies. Mother perception of closeness was correlated to daughter adaptive emotion regulation strategy use (r=.35, N=95, p<.01). The more the mother perceived the relationship as close, the more the daughter used adaptive emotion regulation strategies. Once again, daughters did not perceive the relationship as closer when mothers used more frequent adaptive emotion regulation strategies.

Paired* t *tests

The first paired samples *t* test evaluated if the means of mother and daughter BPD trait levels were significantly different from one another. A paired samples *t* test[21] indicated that the mean BPD trait level of mothers (M=24.6, SD=14.64) was not significantly different than the mean BPD trait level of daughters (M=26.88, SD=14.66).[22] Similarly, a paired samples *t* test found that mother mean frequency of maladaptive emotion regulation use (M=30.78, SD=10.66) was not significantly different from daughters mean frequency of maladaptive emotion regulation use (M=30.64, SD=9.55).[23] A paired samples *t* test indicated that mean frequency of

[21] All paired samples *t* tests were conducted at alpha level of .05. All effect sizes (*d)* are calculated based on Kenny et al. (2006) recommended calculations.
[22] $t(94)$= -1.36, p=.18, two-tailed. The mean difference between groups was -2.28, 95% CI [-5.62, 1.05], d=.2 See Figure 1
[23] $t(94)$=.13, p=.9, two-tailed. The mean difference between groups was .14, 95% CI [-2.04. 2.31], d=.02. See Figure 2.

adaptive emotion regulation use in mothers (*M*=47.69, *SD*=11.33) was not different from mean frequency of adaptive emotion regulation use in daughters (*M*=45.87, *SD*=11.96).[24]

A paired samples *t* test indicated that mean perception of mother discord (*M*=2.2, *SD*=.76) was not significantly different from daughter mean perception of discord (*M*=2.28, *SD*=.73).[25] However, a paired samples *t* test indicated that mean perception of mother closeness (*M*=3.29, *SD*=.68) was significantly lower than perception of daughter closeness (*M*=3.71, *SD*=.83); *t*(95)= -5.46, *p*<.05, two-tailed. The mean difference between groups was .41 points, 95% CI [-.56, -.26], *d*=.79 (See Figure 5). Lastly, a paired samples *t* test indicated that the mean of social cognition for mothers (*M*=11.7, *SD*=3.87) was significantly higher than social cognition for daughters (*M*=8.57, *SD*=3.96); *t*(95)=7.28, *p*<.05, two-tailed. The mean difference between groups was 3.14 points, 95% CI [2.28, 3.99], *d*=1.06 (See Figure 6).

[24] *t*(94)=1.44, *p*=.15, two-tailed. The mean difference between groups was 1.82, 95% CI [-.68, 4.33], *d*=.21. See Figure 3.
[25] *t*(94)= -1.38, *p*=.17, two-tailed. The mean difference between groups was -0.08, 95% CI [-.2, .04], *d*=.2. See Figure 4.

Discussion

The current project aimed to provide further support for the evaluation of the mother-daughter relationship's role in the etiology of BPD traits, as well as to explore other possible relationships between variables in these dyads. A relationship between maladaptive emotion regulation and BPD trait levels was found, which replicated previous findings (Bornovalova et al., 2008; Gratz et al., 2006; Putnam & Silk, 2005). More closeness was perceived in both mothers and daughters the more BPD traits mothers had in comparison to their daughters, though daughters perceived less closeness the more frequently mothers use adaptive emotion regulation compared to their daughters. Social cognition remains poorly understood within the context of BPD based on the findings of this study. In fact, the results of this study suggest that social cognition and BPD traits are not directly or indirectly related via correlation or moderation models.

The first research question addressed individual-level analysis of correlations between BPD trait levels, emotion regulation ability, social cognition, and perceived relationship quality. Both mothers and daughters showed that as maladaptive emotion regulation increased so did BPD trait levels. This was to be expected based on the nature of BPD and previous research that found poor emotion regulation to be associated with BPD (Bornovalova et al., 2008; Gratz et al., 2006; Putnam & Silk, 2005). Based on the results of this analysis, the increased use of maladaptive emotion regulation strategy may be related to increased BPD trait levels, even in adolescence or in the absence of a clinical BPD diagnosis.

It was expected that more frequent use of adaptive emotion regulation strategies would relate to fewer BPD trait levels. For daughters, frequency of adaptive emotion regulation was negatively correlated to BPD trait levels, meaning that this hypothesis was supported. However,

this trend was not found in mothers. There are several possible reasons this discrepancy could have occurred. For one, the frequency of adaptive emotion regulation is partially reliant on a wider range of strategy usage. This would mean that individuals that only use one or two adaptive strategies effectively may score lower than individuals that would use all of the adaptive strategies evaluated. It is possible that in adolescence, as emotion regulation ability is being formulated and refined (Ahmed et al., 2015; Schäfer et al., 2017), that teens would be more likely to use a wider-range of emotion regulation strategies, as opposed to mothers, who likely rely on fewer effective strategies to manage their emotional response.

Social cognition was not found to be related to BPD trait levels in either mothers or daughters. However, the correlation matrix (Table 5) shows that mother and daughter social cognition is positively correlated. This relationship was not originally addressed in the research questions for this study. Still, this correlation provides support for the mother-daughter relationship as a possible etiological consideration for future research. There may be several reasons why social cognition did not specifically relate to BPD traits. One possible explanation is that hypermentalizing (Sharp et al., 2011) was not measured with the SAT-MC. It has been suggested that research findings for social cognition in BPD is highly related to the type of measure used to evaluate it (Roepke et al., 2012). It may be that, though the SAT-MC includes video representations which are intended to simulate interactions, this measure was not sensitive enough to identify differences in social cognition ability in this non-clinical sample. Further, the low reliability score for both mothers and daughters on this subscale may suggest that this measure was not assessing the variable of interest in the current study.

Relationship quality and BPD traits were related in both mothers and daughters. In both groups, the higher the individual was on BPD traits, the more that individual perceived discord.

This was to be expected, as BPD symptomology should relate to conflict and discord in a relationship. However, it was unexpected for BPD traits to be positively correlated to closeness for mothers. In other words, the more BPD traits mothers had, the more likely they were to rate their relationship with their daughter as close. This may relate to previous findings about role-reversal (Macfie & Swan, 2009), as a mother with high BPD traits may try to befriend her daughter by disclosing and seeking approval and emotional support from her daughter. The NRI-RQV (Furman & Buhrmester, 2008) includes disclosure, approval, and emotion support in the measure of closeness. This result may support previous research related to role-reversal in mothers with BPD. This relationship was not found in daughters, as the less BPD traits a daughter had the closer she perceived the relationship. This would mean that daughters with increased BPD perceived the relationship as less close. This was expected, as several aspects of BPD symptomology relate to poor relationships, as romantic partners tend to express more hostility when diagnosed with BPD (Miano et al., 2017). The difference between mothers and daughters on perceived relationship closeness may relate to the nature of the mother and daughter relationship and the manifestation of BPD. Where mothers' expression of BPD may be viewed positively by herself, a daughter may be more likely to view the relationship negatively when having higher BPD traits.

The more dissimilar mothers and daughters were on social cognition, the closer daughters perceived the relationship. This finding was unexpected, and possibly further complicated by the lack of relationship between maternal social cognition and daughter-perceived closeness. This suggests that when mothers and daughters are dissimilar on social cognition, the daughter may view the relationship more positively. It may be that when there is a strong discrepancy between social cognition abilities, one member of the pair takes on the role of understanding the other

person and reacting in a way that increases closeness. However, this does not explain why this trend exists in daughters but not mothers. Future research should be conducted to understand the reasons this relationship emerges in daughters but not in mothers (i.e., age/developmental, mediating or moderating variables, etc.). Increased similarity in social cognition ability was associated with more discord for mothers and daughters. It is possible that when mothers and daughters are able to interpret social situations to a similar extent that both members of the dyad hold one another to the same standards in interactions. This would mean that conflict and criticism, both of which as measured by the NRI-RQV within discord, would be more prominent.

Both mothers and daughters perceived the relationship as closer when mothers had more BPD traits than daughters. This may be a result of the nature of BPD, as mothers with high BPD may fear abandonment, and so may try to befriend their daughters. Further, the mothers' acts of controlling their child's life, limiting their freedom, and dominating communications (Stepp et al., 2012) may relate to the daughter feeling closer to the mother as a result. In addition, mothers with more frequent use of adaptive emotion regulation in comparison to their daughters related to daughters perceiving the relationship as less close. This may be because daughters may perceive their mothers being able to regulate their emotions as a lack of caring. The mother using adaptive emotion regulation may seem like down-playing the situation to the daughter, who is already at risk for perceiving the relationship less favorably due to less use of effective emotion regulation strategies.

Social cognition did not act as a moderator between mother and daughter BPD traits, adaptive emotion regulation ability, or maladaptive emotion regulation ability. This result may be due to the measure used to evaluate social cognition; a more sensitive measure or a measure evaluating different aspects of social cognition may have changed this relationship. However, the

results of this study indicate that social cognition does not function as a moderator in mother and daughter BPD traits or emotion regulation ability.

Exploratory analyses revealed several possible areas for future research and some room for tentative conclusions to be drawn. Mother and daughter BPD trait levels were positively correlated, as were their frequency of maladaptive and adaptive emotion regulation use, perception of discord and closeness, and social cognition ability. This means that there was a clear relationship between the traits, perceptions, and abilities of mothers and daughters. This provides further support for the mother-daughter relationship playing a role in the development of these traits and abilities in daughters. However, it is important to recognize that correlation cannot determine causation, and so this relationship may be bidirectional in nature or due to variables that were not included in this study (e.g., genetics). In addition, the more mothers used maladaptive emotion regulation strategies, the more BPD traits daughters had. It may be that poor emotion regulation in mothers relates to the development of BPD traits in daughters. Emotion regulation is highly reliant on care-giver influence, especially in childhood (Eisenberg et al., 2010; Schäfer et al., 2017; Stegge & Meerum Terwogt, 2007; Thompson & Goodman, 2010). As the development of emotion regulation is reliant on parents, and emotion dysregulation is a major characteristic of BPD, it makes sense for maternal emotion regulation to relate to the development of BPD in daughters. This is similar to previous findings in which negative maternal affective behavior predicted higher BPD traits in daughters (Whalen, 2014).

Further, the mother's perception of discord and closeness was related to daughter maladaptive and adaptive emotion regulation, respectively. Yet this trend was not found in daughter perception of closeness and discord related to mother emotion regulation. The more frequently daughters used maladaptive emotion regulation strategies, the more discord was

perceived by the mother; similarly, the more the daughter used adaptive emotion regulation strategies, the more the mother perceived the relationship as close. Yet maternal emotion regulation did not relate to daughters' perception of closeness or discord. Social cognition was significantly lower in daughters compared to mothers in this population, which may relate to social cognition development occurring in teenage populations via psychosocial and neurological growth (Burnett & Blakemore, 2009). This may mean that mothers are more likely to recognize the emotion regulation of the pair and relate that to the relationship. Future research should consider the relationship between daughter emotion regulation ability and mother perception of the relationship.

The paired samples *t* tests had several possible implications. A majority of the variables assessed were not significantly different between groups. However, means of perceived relationship closeness and social cognition ability were significantly different between mothers and daughters. Mothers' perception of closeness was significantly lower than daughters' perception of closeness. This may be a function of age, or it may be more likely that the role of being a mother is typically associated with less perceived closeness than that of her daughter. The NRI-RQV includes companionship, disclosure, emotional support, approval, and satisfaction within the closeness category. It is likely that mothers are less willing to disclose personal information or receive approval from their daughters. The difference between groups on social cognition ability may relate to age or experience, as mothers had, on average, better social cognition ability compared to daughters. Adolescence is a time of development, so this skill may still be developing in this population (Burnett & Blakemore, 2009).

Limitations and Future Directions

There are several limitations to the current study. For one, all information was collected using online using self-report. Though several measures were taken to ensure that participants were responding carefully (use of attention checks and a speeding check), it is possible that individuals were not responding to questions with the utmost diligence. Limited conclusions can be drawn from self-report, as it lacks objective observational components. Further, the measure used to assess emotion regulation related to frequency of use of different types of cognitive strategies. It has been noted that some strategies, such as acceptance, can be maladaptive in certain situations (Garnefski & Kraaij, 2007). This may account for some variance in how "adaptive" the emotion regulation strategies were within the confines of this study. Future research may benefit from being able to evaluate individuals' ability to regulate their emotions in an actual situation rather than relying on the participants' self-report. This would also allow researchers to determine if the strategy is being used in a maladaptive or adaptive way.

Further, the measure used for social cognition had very low internal consistency for mothers (α =.22) and daughters (α =.29). This was unexpected based on the variety of populations that have been evaluated using this measure (Johanneson et al., 2018; Klin & Jones, 2006) and previous findings of acceptable reliability (Bell et al., 2010). Nonetheless, this low reliability presents a limitation within the current study. Previous literature has been mixed on social cognition in BPD, with some claiming increased abilities (Frank & Hoffman, 1986; Ladisich & Feil, 1988) and others finding decreased real-world applications of social cognitive abilities (Dinsdale & Crespi, 2013; Sharp et al., 2011). There have already been calls for more sensitive measures of social cognition in BPD research (Preibler et al., 2010; Roepke et al.,

2012). The current study further suggests that more reliable measures of social cognition should be created and utilized in research of BPD traits.

Future research should continue to evaluate the role social cognition plays in BPD etiology, as this study does not support social cognition as a moderator for mother and daughter BPD or emotion regulation. However, the conflicting findings of previous social cognition research suggests that this construct plays some role in BPD. In addition, it would be beneficial for research to evaluate these relationships in real-world or observational settings. For example, video-taping mother-daughter interactions as previous researchers have (Whalen et al., 2014) to further understand how the mother-daughter relationship relates to BPD and emotion regulation ability. In this context, it may be helpful to evaluate how individuals with varying levels of BPD may relate to interactions that present varying levels of stress as previous romantic partner research has done (Miano et al., 2017). Of course, there is extensive value in creating experimental designs that evaluate the efficacy of treatments for individuals with BPD. Based on the findings of this and other research, it may be wise to formulate therapeutic interventions that specifically address the mother and daughter relationship and interactions, especially when BPD traits or emotion dysregulation is present.

Implications

Several implications for treatment and intervention may be derived from the current study. For one, adolescents displaying BPD features and maladaptive emotion regulation strategies should enter early intervention programs or therapy to improve outcomes. Previous research has shown that individuals with BPD can be trained to utilize adaptive emotion regulation strategies (Kuo et al., 2016) and emotion regulation training has been used in adolescents with BPD symptomology (Schuppert et al., 2012). Intervention is important for

adults as well; however, intervening during the development of emotion regulation may be even more valuable to adolescents.

Previous research has suggested that parenting may be a target for intervention (Stepp et al., 2012; Zalewski et al., 2015) and that family therapy can benefit mothers with BPD (Macfie & Swan, 2009). The results of this study further support the idea of supporting mothers via mental health treatment. Maternal scores on BPD traits, emotion regulation, social cognition, and perception of closeness and discord was related to their daughter's abilities in these same areas. Therefore, an at-risk youth would likely benefit from therapy and coaching to better emotion regulation, but also would benefit from her mother improving in these areas as well. This may relate to modeling, such that daughters may observe better emotional control in their mothers and then adopt those herself. Families of mothers that struggle with BPD and emotion regulation difficulty would benefit from family therapy, due to both the improvements made by the mother in emotional functioning and by gaining knowledge of the therapeutic process of change. Since mother-daughter interactions likely relate to the maintenance or decrease of BPD traits (Whalen et al., 2014), it is especially important for mothers and daughters to support one another during treatment.

Conclusions

In conclusion, the results presented here replicate previous findings. The relationship between maladaptive emotion regulation strategies and BPD trait levels replicated previous research (Bornovalova et al., 2008; Gratz et al., 2006; Putnam & Silk, 2005) while social cognition findings conflicted with previous research (Roepke et al., 2012; Sharp et al., 2011). BPD trait levels seem to negatively influence the mother daughter relationship in most cases, though higher maternal BPD traits in comparison to daughters was related to increased

perceptions of closeness. Implications for these findings suggest benefits for early intervention in adolescents displaying BPD traits or maladaptive emotion regulation strategy usage and family therapy in the presence of maternal BPD and emotion regulation difficulty. The mother-daughter relationship likely is influenced by and influences BPD traits, emotion regulation ability, and relationship quality, especially during the adolescent years.

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Table 1: Sample demographic information

	Mother	Daughter
Race		
White	81%	78%
Black/African American	13%	13%
American Indian or Alaskan Native	3%	2%
Asian	5%	8%
Prefer not to answer	2%	1%
Income		
Less than $25,000	14%	17%
$25,001-$45,000	15%	8%
$45,001-$65,000	16%	11%
Above $65,000	53%	29%
Prefer not to answer/Unsure	3%	35%
Diagnosed mental illness		
Yes	28%	20%
No	72%	80%
Take medication for mental illness		
Yes	28%	18%
No	72%	82%

Note: All values are percentages of N=95. Participants were permitted to select more than one race or select prefer not to answer.

Table 2: Sample demographic information (continued)

	Mothers	Daughters
Mental health illness or ailments		
Anxiety	4%	2%
Bipolar	1%	3%
Anxiety and depression	6%	2%
OCD	0%	2%
Depression	9%	1%
PTSD/ADD/Anxiety	1%	0%
Personality disorder	0%	1%
ADHD	0%	2%
Eating disorder/anxiety	0%	1%
Cyclothymia	1%	0%
Medications		
Abilify	1%	0%
Bupropion	1%	0%
Buspar	1%	1%
Celexa (citalopram)	1%	1%
Cymbalta	2%	0%
Lamictal	1%	1%
Lisinopril	1%	0%
Prozac	1%	1%
Prozac and adderall	1%	0%
Prystiq	1%	0%
Seroquel	2%	0%
Strattera	0%	1%
Trintellix	1%	0%
Viibrya	1%	0%
Vyvanse (vivance)	0%	3%
Xanax duloxitine	1%	0%
Zoloft (sertraline)	2%	2%
Zoloft, Wellbutrin, and clonazepam	1%	0%
Zoloft and Vistaril	0%	1%

Note: Medication names may be listed by brand name based on participant reporting. Participants were given “prefer not to answer” options in both conditions.

Table 3: Descriptive statistics for measures completed by both mothers and daughters.

Measures	Possible Range	Obtained Range		Mean		SD	
		M	D	M	D	M	D
PAI-BOR	0-72	3-66	2-62	24.60	26.88	14.64	14.66
CERQ (adaptive)	16-80	23-75	22-79	47.69	45.87	11.33	11.96
CERQ (maladaptive)	12-60	14-60	13-56	30.78	30.64	10.66	9.55
SAT-MC	0-19	2-17	0-18	11.71	8.57	3.87	3.96
NRI-RQV (Closeness)	1-5	1.6-4.73	1.47-5	3.29	3.71	.68	.83
NRI-RQV (Discord)	1-5	1-4.73	1.13-4.6	2.2	2.28	.76	.73

Note: *SD* = standard deviation, *M* and *D* represent mother and daughter data, respectively. PAI-BOR values represent the individual's level of BPD traits. CERQ values represent a composite score that reflects the frequency an individual uses adaptive or maladaptive cognitive emotion regulation strategies. SAT-MC reflects the individual's social cognition ability. NRI-RQV values for closeness and discord express an averaged value of the individual's perceived closeness or discord with their mother or daughter.

Table 4: Tests for normality.

Variable Assessed	Kolmogorov-Smirnov (p)	Shapiro-Wilk (p)
Mother BPD trait level	.03*	.00*
Daughter BPD trait level	.08	.01*
Mother maladaptive ER	.00*	.00*
Daughter maladaptive ER	.16	.09
Mother adaptive ER	.20	.55
Daughter adaptive ER	.17	.16
Mother-perceived discord	.00*	00*
Daughter-perceived discord	.18	.00*
Mother-perceived closeness	.20	.55
Daughter-perceived closeness	.00*	.01*
Mother social cognition	.00*	.00*
Daughter social cognition	.02*	.05
BPD difference scores (signed)	.20	.46
Maladaptive ER difference scores (signed)	.01*	.03*
Adaptive ER difference scores (signed)	.08	.05*
Social cognition difference scores (signed)	.04*	.05*
BPD difference scores (unsigned)	.00*	.00*
Social cognition (unsigned)	.00*	.00*

Notes: Asterisk (*) Represent a significant result. *ER* = emotion regulation.

Table 5: Correlation Matrix of Assessed Variables (n=95)

	M BPD	D BPD	M malER	D malER	M adER	D adER	M DISC	D DISC	M CLO	D CLO	M SC	D SC
M BPD	1.00	--										
D BPD	.38**	1.00										
M malER	.75**	.33**	1.00									
D malER	.34**	.64**	.45**	1.00								
M adER	-.05	-.02	.22*	.21*	1.00							
D adER	.15	-.27**	.26*	.13	.44**	1.00						
M DISC	.43**	.25*	.14	.28**	.14	.02	1.00					
D DISC	.27*	.39**	.16	.38**	.03	-.04	.71**	1.00				
M CLO	.23**	-.17	.19	.07	.25*	.35**	.06	-.05	1.00			
D CLO	-.01	-.34**	-.01	-.17	.17	.5**	-.3**	-.27**	.54**	1.00		
M SC	-.15	.00	-.04	.02	.03	-.06	-.27**	-.18	-.05	.15	1.00	
D SC	-.01	.08	-.06	.23*	-.2	-.03	-.09	.00	.11	.04	.24**	1.00

Notes: M = mother, D = daughter, BPD = PAI-BOR score, malER = frequency of maladaptive emotion regulation strategies (as measured by CERQ, adER = frequency of adaptive emotion regulation strategies measured by CERQ, DISC = perceived relationship discord as measured by the NRI-RQV, CLO = perceived relationship discord as measured by the NRI-RQV, SC = social cognitive ability as measured by SAT-MC.
*p< 0.05, **p < .01
All tests were two-tailed Pearson correlation coefficients.

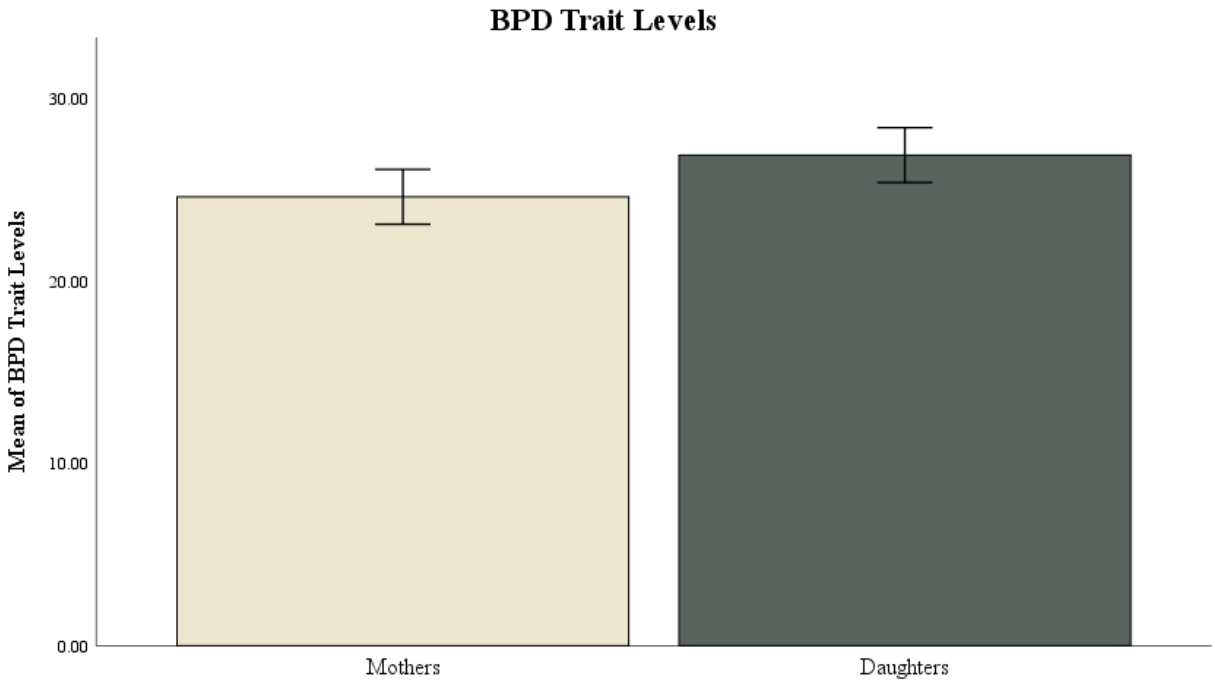

Figure 1. Comparison of mean for mother BPD trait level to mean for daughter BPD trait level. Error bars represent standard error of the mean. Means were not significantly different between groups.

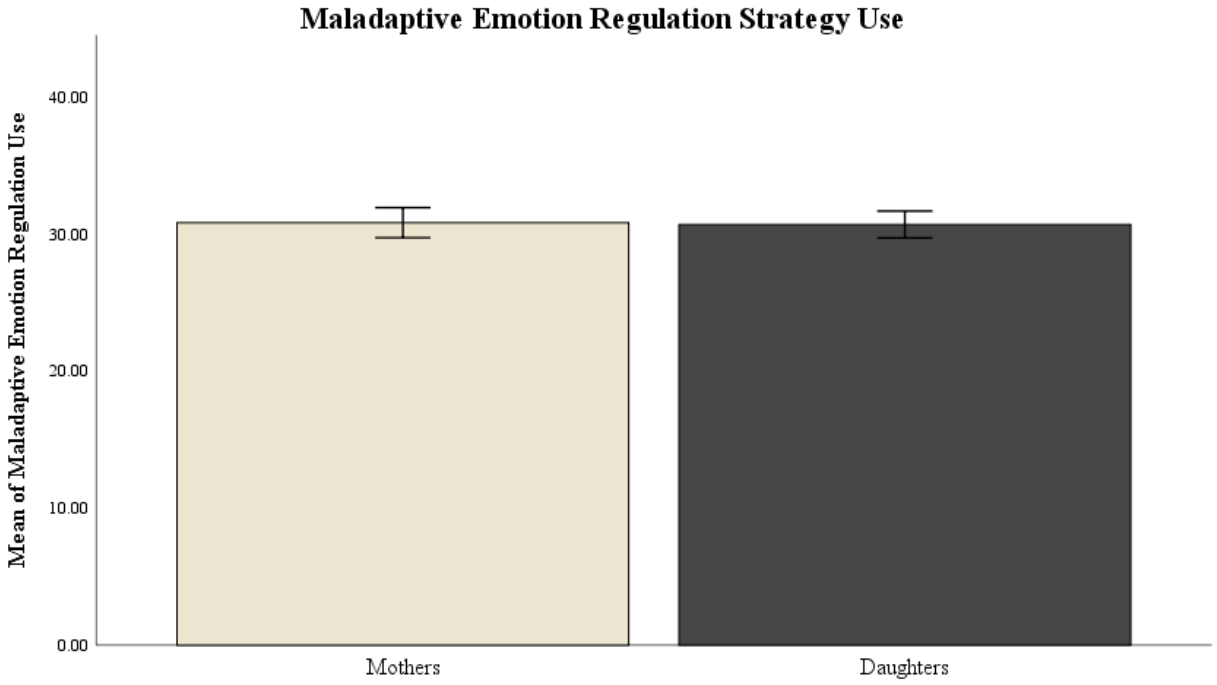

Figure 2. Comparison of mean for frequency of mother maladaptive emotion regulation use to mean for frequency of daughter maladaptive emotion regulation use. Error bars represent standard error of the mean. Means were not significantly different between groups.

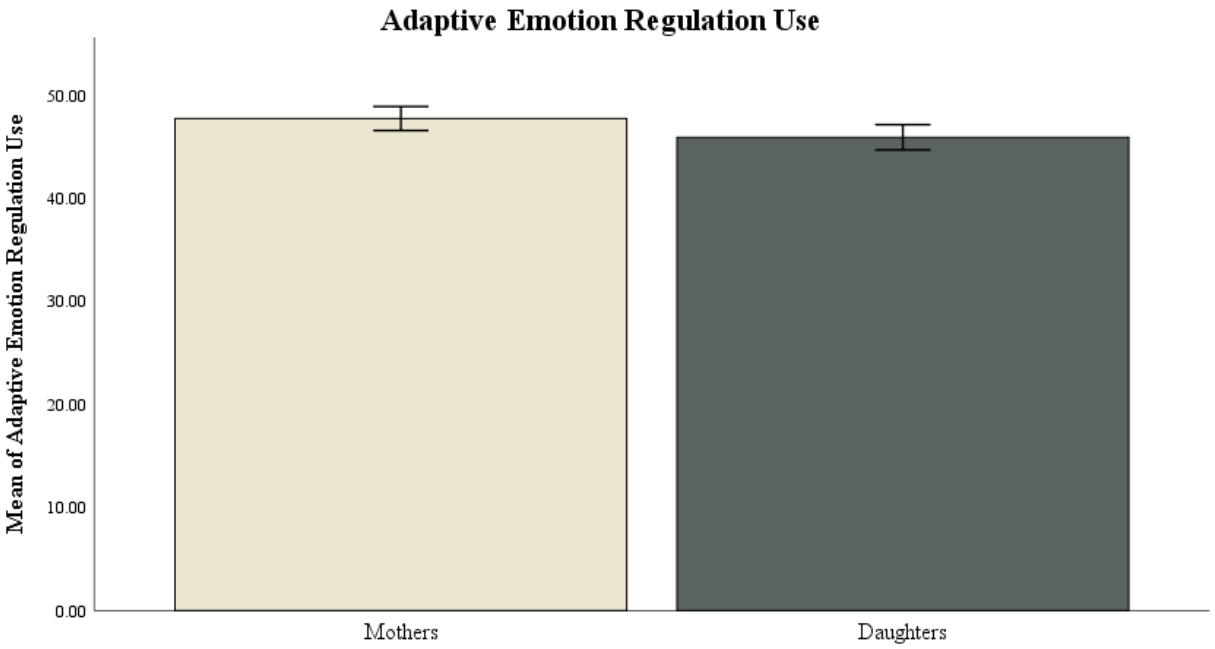

Figure 3. Comparison of mean for frequency of mother adaptive emotion regulation use to mean for frequency of daughter adaptive emotion regulation use. Error bars represent standard error of the mean. Means were not significantly different between groups.

Figure 4. Comparison of mean for mother perceived relationship discord to mean of daughter perceived relationship discord. Error bars represent standard error of the mean. Means were not significantly different between groups.

Figure 5. Comparison of mean for mother perceived relationship closeness to mean of daughter perceived relationship closeness. Error bars represent standard error of the mean. Means were significantly different between groups.

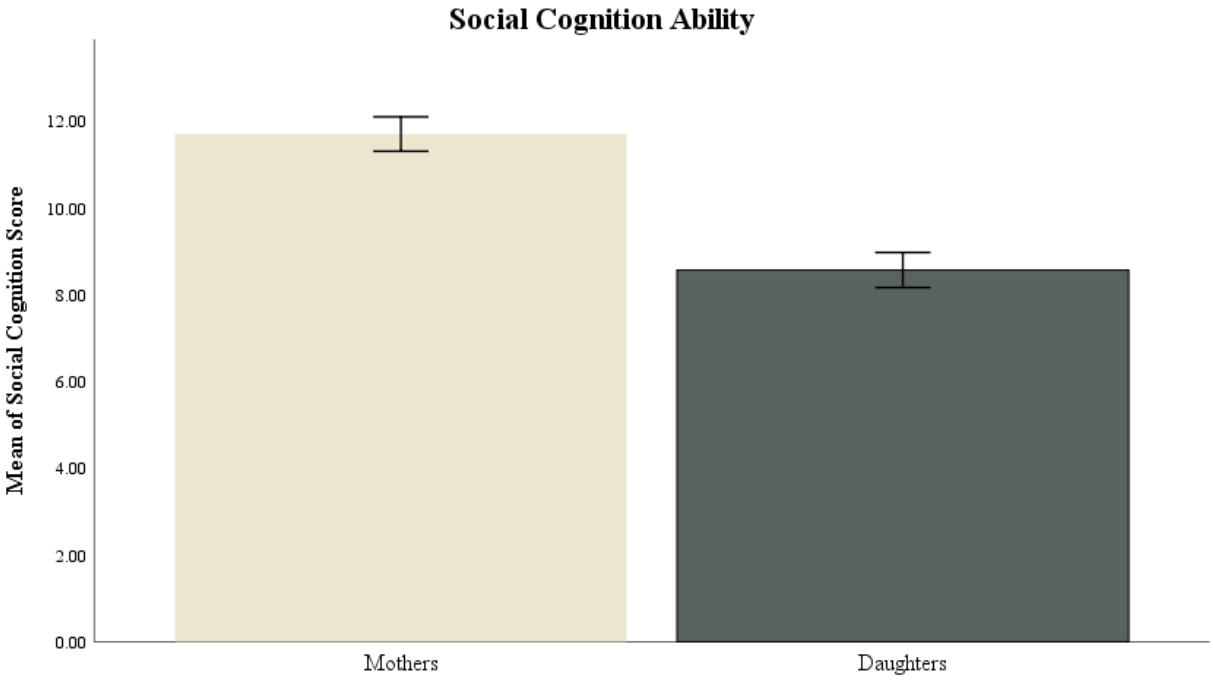

Figure 6. Comparison of mean for mother social cognition ability to mean of daughter social cognition ability. Error bars represent standard error of the mean. Means were significantly different between groups.