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INFLUENCE OF SOCIAL REJECTION AND BORDERLINE PERSONALITY
FEATURES ON EMOTION PERCEPTION

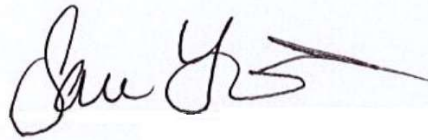
by

Ashmita Ghosh

A Thesis Submitted in Partial Fulfillment
Of the Requirements for the
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The University of South Dakota
May 2021

The members of the Honors Thesis Committee appointed
to examine the thesis of Ashmita Ghosh
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ABSTRACT

Influence of Social Rejection and Borderline Personality Features on Emotion Perception

Ashmita Ghosh

Director: Sara Lowmaster, Ph.D.

Deficits in interpersonal functioning are a core component of borderline personality disorder. Borderline personality disorder is generally associated with misperceptions of social cues including a tendency to perceive others as unfair and rejecting. There is evidence that individuals with subsyndromal borderline personality features also experience these negative outcomes. Furthermore, there is mixed evidence regarding whether individuals with borderline personality disorder have enhanced abilities or deficits in accurately identifying emotions. Therefore, this project examines how social context and borderline personality features affects an individual's ability to accurately perceive emotions. Participants were randomly assigned to a Cyberball group (inclusion, rejection, overinclusion) and completed a series of self-report measures and an emotion perception task as well as played the Cyberball game. There was no significant main effect of Cyberball condition or borderline status on emotion perception and borderline personality features did not moderate the relationship. Although the findings of this study were not significant, looking at this model in a clinical sample might be beneficial.

KEYWORDS: Borderline Personality Features, Borderline Personality Disorder, Rejection, Emotion Perception, Cyberball

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CHAPTER ONE

Influence of Social Rejection and Borderline Personality Features on Emotion Perception

Emotion perception is crucial to the social functioning of an individual, and the ability to perceive emotions of others has been evolutionally important for the survival of humans. The ability to accurately perceive emotions can be impacted by both external factors and individual characteristics. Certain social factors such as stressful life events (Vosk et al., 1983) and past experiences (Lerche et al., 2019) are associated with inaccurate perceptions of emotion. For example, when a person faces a stressor like rejection, their ability to correctly interpret social situations might be impacted. Individual characteristics, including certain psychological disorders, are also associated with distorted emotion perception. These disturbances in emotion recognition impact a person's social abilities, and more specifically, their social relationships which play an important role in maintaining people's physical and mental health (House, 1988). If an individual is unable to correctly identify the emotions of others in a social interaction, they might misconstrue the situation and behave inappropriately. Thus, it is important to consider how these stressors and personal characteristics can impact an individual's ability to correctly perceive emotions.

During a social interaction, people depend on verbal and non-verbal cues to understand the motives of the other person and react accordingly. Emotion perception requires an integration of contextual information from facial expressions, gestures, and speech to assist in an important part of that process. A study by Abramson et al. (2017)

found that emotion perception based on isolated faces without other cues often led to the misinterpretation of emotions. This study examined the source of affective signals, taking into account isolated facial expressions, body language, and a combination of both in two different conditions. Specifically, Abramson et al. (2017) compared the two different stimulus sets that they labeled real-life and instructed stimuli. The real-life stimuli set included people showing emotions in real life situations using images from different events whereas the instructed stimuli set were constructed using prototypical faces and bodies (i.e., a typical expression of the emotion). There was a substantial difference in emotion recognition between the two sets with more errors in the real-life situation when identifying fearful expressions. The study found that in real-life situations, the participants relied heavily on the combination of the contextual cues from the body in addition to the face to correctly identify and recognize the specific emotions. Facial expressions along with body language play a significant role in understanding the message the speaker is trying to convey. In addition to non-verbal emotional cues, studies have found that verbal cues such as vocal expression of emotions are linked to more complex emotion perception abilities (Davis et al., 2020). It is important for a person to decode the emotions of others to interpret social situations using verbal and non-verbal cues. While properly identifying emotions within social interactions is crucial to understanding social situations, the perception of emotions can also be hindered by the social experience itself.

Stressful social experiences, such as rejection, can cloud an individual's ability to process social and emotional cues. The role rejection stress plays on social interactions can impact a person's ability to process social cues and perceive emotions. Social

rejection is associated with many negative outcomes including increased aggression and decreased prosocial behavior (Rajchert et al., 2018). Rejection can interfere with emotional responses, impairing an individual's capacity for empathic understanding of others, leading people to lose the inclination to help (Twenge et al., 2007). Rejection not only has an impact on their social behavior but also how they process internal cues regarding social needs. Reducing the involvement of a person, in turn induces a sense of rejection, that activates an internal neural alarm system signaling a threat to their fundamental social needs (Niedeggen, 2014). The negative impact rejection has on an individual and their interpersonal interactions make it important to study how it might impact people's perceptions. According to the sociometer theory, when humans sense cues associated with rejection and experience the negative affect associated with it, they engage in behaviors to reduce the negative feelings and attempt to enhance acceptance by others (Leary, 2005). This would suggest that when rejected, individuals would be more sensitive to social cues to improve their social interactions.

An important aspect of interpreting social cues is interpreting the emotions of others. Studies on the role of rejection in social interactions have found difference in performances based on the nature of emotions. Some studies have found that individuals who are sensitive to rejection are also more sensitive to emotional expressions signaling rejection but not to other negative or threatening emotions (Burklund, 2007). This could suggest that rejection plays an important role in the perception of certain emotions. Lerche et al. (2019) found that individuals who feared rejection were able to quickly gather cues regarding negative emotional information. Further, the study found that if people had previously experienced rejection, they experienced increased fear of emotion

which could impact their perception of emotion. On the other hand, research has also indicated that rejected individuals performed worse in identifying emotions than people who felt accepted (Vosk et al., 1983). The conflicting findings about the impact of rejection on perception of emotional raises the question of how rejection would impact emotion recognition in a dynamic situation considering not only facial expressions, but body language and verbal cues as well.

Research also suggests personal factors, including mental health disorders, negatively affect emotion perception skills. One such disorder, borderline personality disorder (BPD), can also have an impact on emotion perception. BPD is defined as a cluster of symptoms that include disturbances in affect, identity, interpersonal behavior, and impulse control (American Psychiatric Association [APA], 2013). BPD is a serious mental health condition that impacts 1.6% of the general population (Salters-Pedneault, 2020), 9.3% of psychiatric outpatients (Zimmerman et al., 2005), and 20% of psychiatric inpatients (Gross et al., 2002). Borderline personality features are associated with a range of social impairments ranging from difficulties establishing and maintaining relationships in college students (Trull et al., 2010) to more serious outcomes, such as suicidal behaviors (Schultebrucks et al., 2020). The chronic instability of these symptoms interferes with interpersonal relationships, self-image, and emotion regulation, which are prevalent across life domains (Trull et al., 1997). Individuals with BPD experience a range of negative outcomes including difficulty regulating emotions, social maladjustment, and poor academic achievement (Bagge et al., 2004; Dixon-Gordon et al., 2011). Research also suggests sub-syndromal BPD, or borderline personality features, is also related to similar negative outcomes (Bagge et al., 2004; Trull, 1995; Trull et al.,

1997). Some individuals exhibit less severe variations of borderline personality features without meeting diagnostic criteria for borderline personality disorder, but they also experience functional impairments similar to those with BPD. Thus, it is important to consider how these features impact social behaviors and interactions. Individuals with BPD and borderline personality features experience emotion dysregulation and often misinterpret social cues (Putnam & Silk, 2005). Further, individuals with borderline personality disorder often misinterpret social situations and lack the ability to correctly infer information from a social interaction (Kleindienst et al., 2019).

Because of their inability to process emotional and social information correctly, individuals exhibiting borderline personality features may show a deficit in emotion perception. Past research indicates that individuals with BPD exhibit deficits in interpreting facial expressions and the most common source of these errors was in misinterpreting neutral emotions as negative (Daros et al., 2014). Further support emotion perception deficit amongst individuals with BPD stems from neurobiological studies which indicate individuals with BPD exhibit higher amygdala activation when exposed to facial expressions compared to individuals without BPD (Baer et al., 2012; Donegan et al., 2003; Minzenberg et al., 2007). Because of the role the amygdala plays in the activation of negative emotional states, greater activation might lead to heightened sensitivity to social cues generally and more specifically, individuals perceiving neutral stimuli as negative. Assessing neutral emotions as negative can lead to further disturbances in social relationships amongst those with BPD. The negative bias can cause individuals with higher borderline personality features to be more suspicious of others and misinterpret their intentions. If individuals with BPD perceive neutral emotional

expressions as negative, individuals with higher borderline personality features might react to it negatively which may strain their interpersonal relationships.

Interestingly, despite research suggesting that there is a deficit in emotion perception among individuals with borderline personality disorder, there are also contrasting findings suggesting individuals with BPD were more sensitive in identifying emotions than a healthy control group (Lynch et al., 2006). If these findings are true, people with higher borderline personality features may in fact be more sensitive to the emotions of others. This would contradict the research linking borderline personality features with deficits in emotion recognition. It is also important to take into consideration the nature of the emotion as the previous research (Daros et al., 2014) supports that individuals with BPD mostly showed impairment when perceiving neutral emotions. It is possible that while those with BPD struggle with identifying neutral facial expressions, they might be more sensitive to more negative emotions. This discrepancy merits further research looking at how personal characteristics such as borderline personality features truly impact emotional perception and in turn social interactions.

In addition to impacting emotion perception, BPD might also influence how individuals respond to stressors. If a person is under extreme stress, their ability to function well in social settings might be negatively impacted, which could be exacerbated by their personal characteristics. This can be seen in individuals with borderline personality features. Rejection stressors negatively impacts all individuals resulting in higher emotional reactivity, increased negative affect, maladaptive coping strategies such as lack of awareness, understanding, and acceptance of emotions, unwillingness to

experience emotional distress, and deficits in the modulation of emotional arousal (Chapman et al., 2014; Dixon-Gordon et al., 2011; Gratz et al., 2013).

Further, social stressors can be more salient to those with BPD and thus lead to differences in emotion perception. Studies have found that even when individuals with BPD have been objectively included, they often experience feelings of exclusion (Staebler et al., 2011). This suggests that individuals with higher borderline personality features might misinterpret social situations, leading to feelings of rejection even when being included and that can further impact their ability to infer social situations correctly.

Beyond the interference caused by rejection, there are other factors that also influence emotion perception. Research has found that individuals with BPD personally experience increased negative emotions and anticipate social threat even in socially neutral situations (Deckers et al., 2015). This anticipation of a negative experience might bias their social interactions. For example, individuals with BPD might anticipate rejection in a situation, biasing their perception of others' emotions and in turn negatively affecting the social interaction. The feeling of rejection experienced can further add to the deficit in their ability to correctly perceive emotional cues. Past research has also found that individuals with BPD have subtle deficits in inferring emotions in vocal cues in addition to perception of facial expressions (Minzenberg, et al., 2007). This further warrants the use of a dynamic emotion perception task rather than just using a static task.

As discussed before, individuals with higher borderline personality features could perceive inclusion as rejection due to misinterpretation of social cues and an increased sense of suspiciousness. The perception of rejection even in fair conditions suggests that there might be other underlying mechanisms at work. De Panfilis et al. (2015)

hypothesized that individuals with BPD might react as if they were ostracized even in inclusion scenarios because the reciprocal interpersonal exchanges violate their expectations for extreme social inclusion. The study suggests that individuals with BPD long for a situation of overinclusion and often experience negative affect when that expectation is not met, thus suggesting BPD is characterized by alternatively idealizing and devaluing relationships. Other studies have corroborated that being fairly included still made individuals with BPD feel more ostracized compared to a healthy control group, but overinclusion reduced this feeling of ostracism (Weinbrecht et al., 2018). The general expectation of individuals with BPD to feel excluded results in the feeling of exclusion among individuals with BPD in a fair situation. However, studies have also found that individuals with BPD felt less social connection to their peers regardless of the fairness of the situation, including when they were overincluded in social interactions (De Panfilis et al., 2015). The lack of social connection could result in more impairments in emotion recognition among individuals with higher borderline personality features. Thus, it is important to consider the impact of overinclusion on social perception amongst people with higher borderline personality features because of their distorted views of fair interactions. This study also considers an overinclusion condition in which the individual is included in the interaction more than others involved in the interaction.

Examining how borderline personality features can impact the perceptions of social stressors helps us better understand if individual characteristics moderate the relationship between situational stressors impacts a person's ability to infer social cues. It also helps us clarify if emotion recognition is impaired by higher borderline personality features or if individuals with higher borderline personality features are more accurate

because of increased sensitivity in emotion perception. We also examined the different types of emotions to see if there is any difference between perceptions of positive emotions, negative emotions, and neutral emotions.

The purpose of this project was to examine how social rejection affects an individual's ability to accurately identify another person's emotions in a dynamic situation. Using a dynamic emotion perception task allowed us to observe the differences in more than just interpretation of facial expression and takes into account factors like body language and verbal cues. The inconsistencies in the findings regarding the impact of rejection on emotion perception are important to examine, especially considering the adverse effect rejection has on individuals with higher borderline personality features. Further, the inconsistent findings regarding the impact of borderline personality features' impact on emotion perception warranted a look at how rejection impacts emotion perception in individuals with higher borderline personality features. Specifically, the current study examined whether individuals with higher borderline personality features (High BOR) would differ in their ability to accurately perceive emotions compared to those with lower borderline personality features (Low BOR) across the different social inclusion conditions. Previous studies have not looked at the emotion perception is influenced by various social conditions like rejection, inclusion, and overinclusion into account and how borderline personality features impact the accuracy in emotion perception in those conditions. Further, gaining a better understanding of how borderline personality features impact understanding of social cues and emotions, could lead to the development of treatments to alleviate the social disruptions seen in BPD and improve their quality of life. Thus, this project also looks at whether borderline personality

features moderate the relationship between social rejection and emotion perception. Looking at the impact overinclusion has on emotion perception in the High BOR is also important because of the tendency of individuals with BPD to feel a lack of social connectedness even when they perceive a sense of inclusion. This could suggest that there would be a difference in emotion perception between the High and Low BOR groups even in the overinclusion group even if they perceive the level of inclusion to be the same. This study evaluated the following hypotheses:

Hypothesis 1: There will be a significant difference in emotion perception based on social condition. Specifically, rejection will be associated with less accurate emotion perception compared to the inclusion and overinclusion conditions for individuals in both High and Low BOR groups.

Hypothesis 2: Individuals with higher borderline personality features will perform worse on the emotion perception task than individuals with lower borderline personality features.

Hypothesis 3: Borderline personality feature will be a moderator in the relationship between social rejection and emotion perception.

CHAPTER TWO

Pilot Study

A pilot study was conducted to determine which version of the Cyberball paradigm (i.e., number of ball tosses) would most effectively manipulate the sense of exclusion, inclusion, and overinclusion for the study.

Methods

Participants

Thirty participants were recruited online using Prolific which is an online research platform. The participants were screened to include self-reported biological females from the United States between the ages of 18 and 45. This study only includes biological females because different types of stress can have different effects on men and women when considering emotion perception. Men appear to have a higher stress response to achievement stressors and women have a higher reaction to social rejection (Stroud et al., 2002). Of the 30 participants, about 93% self-identified as female and 7% as male. The participants recruited were between the ages of 19 and 41 ($M = 26.7$, $SD = 5.28$). Approximately 3% of the participants completed some high school education, 3% had high school diplomas, 30% completed some college education, 33% had a Bachelor's Degree, 3% had completed some graduate level studies, 23% had a Master's Degree, and 3% had a Doctoral level degree. The majority of the participants self-identified as Caucasian (56.7%), 23.3% as Black or African American, 20% as Asian or Asian American, and 3.3% as Native American.

Measures

Demographics. Participants completed a self-report questionnaire that asked about age, gender, ethnicity, relationship status, and level of education (see Appendix A).

Emotional State. The emotional states of individuals were assessed between tasks by using the Self-Assessment Manikin (SAM; Bradley & Lang, 1994). The measure includes three numeric response items with images to assess various components of emotional state, including valence, arousal, and dominance. Participants select a response on a scale of one to nine. In this study we used the valence and the arousal items to determine if the Cyberball paradigm impacts the emotional state of individuals.

Manipulation Checks. Manipulation checks (Williams et al., 2000) were conducted after the Cyberball game to assess the participant's perception of inclusion and exclusion. Participants were asked to estimate perceived percentage of throws received (ranging from 0 to 100%) and provide two ratings 1) how excluded they felt in the task and 2) how included they felt in the task on a numeric response item ranging from 1 (not at all) to 9 (very much so).

Procedure

The study was approved by the Institutional Review Board at the University of South Dakota. Participants were screened and recruited from Prolific. After the informed consent, the participants completed self-report questionnaires. They then completed an attention check followed by the first series of the SAM. After the SAM, the participants arrived at a screen telling them they had to wait for other players to join their game of Cyberball (Williams et al., 2000; Williams & Jarvis, 2006), which the participants were told were told was a mental visualization task. The participants were told that they were

playing against three other individuals online and had to click on the person they would want to throw the ball. A 2x3 (Throw Condition x Cyberball Condition) was constructed where the participants were randomly assigned into one of six conditions, with the 30 and 45 throw conditions consisting of inclusion, rejection, and overinclusion (Cyberball Conditions) each. In the inclusion condition, the participant was equally included in the game, receiving approximately 33% of the throws. In the rejection condition, the participant was not included in the game, receiving approximately 10% of the throws in the 30-throw condition and 9% of throws in the 45-throw condition. Finally, in the overinclusion condition, the participant received 50% of the throws. Both the 30 and 45 throw versions of the game took less than 5 minutes. After the Cyberball paradigm, the participants completed the SAM and the manipulation checks described above. Finally, the participants were debriefed about the deception and told that they were playing the Cyberball game against computerized players. The participants were compensated \$9.50 for an hour of online participation at the end of the study.

Results

The mean of the responses on the manipulation checks of the 30 and 45 throws group was compared for each of the manipulation check questions. Table 1 shows the mean responses of participants on the manipulation checks for the perceived percentage of ball throws received as well as perceived feelings of exclusion and inclusion.

Table 1*Comparison of Perception of Inclusion and Exclusion Between 30 Throws and 45 Throws*

Cyberball Conditions	Number of Throws	N	% of Throws Received		Feeling of Exclusion		Feeling of Inclusion	
			M	SD	M	SD	M	SD
Rejection	30	5	10.20	5.31	8.00	1.00	3.00	0.71
	45	4	13.00	11.22	8.00	1.41	6.00	3.56
Inclusion	30	4	29.25	8.88	3.25	3.86	6.67	2.63
	45	6	26.67	11.69	5.50	1.64	4.33	1.03
Overinclusion	30	5	37.40	9.81	1.20	0.45	7.60	3.13
	45	6	58.17	30.59	2.00	2.45	8.17	2.04

Note. Feeling of exclusion and inclusion are on the scale of 1 = not at all to 9 = very much so

An ANOVA was also conducted to see if there was a main effect of Cyberball condition (Rejection, Inclusion, and Overinclusion) and number of throws (30-Throws and 45-Throws) on perceived number of throws received. there was no interaction between Cyberball condition and number of throws ($F(2,29) = 1.43, p = 0.26$). Further, there was a main effect of the Cyberball condition ($F(1,29) = 12.04, p < 0.001$) but no main effect on perceived number of throws on the number of throws condition ($F(2,29) = 1.32, p = 0.26$). The lack of main effect for number of throws is suggests that there was not a difference between the 30 and 45 throw condition and thus we can use the 30-Throws condition.

The main take-home message is that the perceived number of throws received aligned with condition. The assigned Cyberball condition aligned with their perception of number of throws received and there was no difference between the 30 and 45-throw conditions suggesting the 30-throw condition would be effective in inducing the specific feelings of inclusion and exclusion. Based on this data we can conclude that the pilot

study suggests the use of the 30 throws condition would be most appropriate for all the conditions.

CHAPTER THREE

Primary Study

Method

Participants

One hundred and seventy-two participants were recruited online using Prolific, an online research platform, and the undergraduate research participant pool at the University of South Dakota. The participants were screened to include only self-reported biological females from the United States between 18 and 45 years ($M = 24.08$, $SD = 6.51$). Of the 171 participants, about 98% self-identified as female, .5% as male, .5% as transgender, .5% as agender, and .5% as non-binary. Approximately 1% of the participants completed some high school education, 17% had high school diplomas, 46% completed some college education, 4% had an Associate Degree, 20% had a Bachelor's Degree, 2% had completed some graduate level studies, 9% had a Master's Degree, and .6% had a Doctoral level degree. The majority of participants self-identified as Caucasian (71.3%), 12.3% as African American or of African descent, 10.5% as Asian or Pacific Islander, 10.5% as Hispanic, and 1.2% as Native American or Alaskan Native.

Materials

Demographics. Participants completed a self-report questionnaire that asked about age, gender, ethnicity, relationship status, and level of education (see Appendix A).

Borderline Personality Features. Borderline personality features were assessed using the Personality Assessment Inventory-Borderline Scale (PAI-BOR; Morey, 1991). The PAI-BOR scale is a 24-item self-report measure that is comprised of four subscales

that measure core characteristics of BPD, including affective instability, identity problems, negative relationships, and self-harm. Item responses are on a 4-point numeric response items ranging from 0 (*False*) to 3 (*Very true*). The PAI-BOR scale demonstrates good sensitivity to BPD diagnosis (Bell-Pringle et al., 1997). In this study, the High BOR levels are indicated by a score of 65T or more and low BOR levels are indicated by a score of 64T or less. The internal consistency of the scale in this study was high ($\alpha = .90$). The PAI-BOR demonstrates significant correlations with BPD diagnosis and adequate criterion related validity, including in college samples (Stein et al., 2007; Trull, 1995).

Emotion Perception. Emotion perception was assessed using Part 1 of the Assessment of Social Inference Test (TASIT; McDonald et al., 2003). The TASIT is a rating-task that measures emotion and social inference. Part 1 of the TASIT measures emotion perception by showing a series of 28 vignettes portraying social interactions. The participant is asked to select one of six basic emotions listed that correctly captures the emotion demonstrated in the video. Scale scores represent the total number of correct responses, with higher scores indicating more accurate emotion perception. The internal consistency for TASIT Part 1 was $\alpha = .67$. Significant positive correlations with social perception measures provide construct validity for the TASIT (McDonald et al., 2007).

Emotional State. Participants' emotional states were assessed before and after the social rejection paradigm using the Self-Assessment Manikin (SAM; Bradley & Lang, 1994). It uses a series of numeric response items with images to assess the emotional state. The measure is scored on a scale of one to nine and measures valence, arousal, and dominance. Participants select a response on a scale of one to nine. In this study we used the valence and the arousal items to determine if the Cyberball paradigm

impacts the emotional state of individuals. A study looking at valence and arousal ratings of SAM in younger and older adults found that the internal consistency for valence ($\alpha = .63$ for the younger group and $\alpha = .82$ for the older group) was lower than that of arousal ($\alpha = .98$; Backs et al., 2005).

Manipulation Checks. Manipulation checks (Williams et al., 2000) were conducted after the Cyberball game to assess the participant's perception of inclusion and exclusion. Participants were asked to estimate perceived percentage of throws received (ranging from 0 to 100%) and provide two ratings 1) how excluded they felt in the task and 2) how included they felt in the task on a numeric response items ranging from 1 (not at all) to 9 (very much so).

Procedure

Participants were screened based on biological sex (female) and age (between the ages of 18 and 45 years) and recruited for the current study from Prolific and the undergraduate research pool at the University of South Dakota. Those who were eligible were directed to the Qualtrics survey platform to complete informed consent and the study procedures.

After providing informed consent, participants completed self-report questionnaires including demographics and PAI-BOR. They then completed an attention check followed by the first series of the SAM. After the SAM, the participants arrived at a screen telling them they had to wait for other players to join their game of Cyberball (Williams et al., 2000; Williams & Jarvis, 2006), which the participants were told was a mental visualization task. The real goal of the Cyberball paradigm was to induce feelings of rejection, inclusion, and overinclusion. The participants were told that they were

playing against three other individuals online who were represented by animated figures and had to click on the person they would want to throw the ball to. The Cyberball task was used because it could be conducted online and did not require confederates. The Cyberball paradigm is also relatively customizable allowing us to control the number and order of throws received by the participant for each condition. Further, it has previously been used in studies to successfully induce feelings of rejection (Gratz et al., 2013). The participants were randomly assigned to one of three conditions: inclusion, rejection, or overinclusion. In the inclusion condition, the participant was equally included in the game, receiving around 33% of the throws. In the rejection condition, the participant received the ball from the two computerized players once in the first few round of passing the ball and once towards the end of the game, receiving approximately 10% of the throws. Finally, in the overinclusion condition, the participant received 50% of the throws. After the Cyberball paradigm, the participants completed the SAM and the manipulation checks. Then participants completed the TASIT. Finally, all participants were debriefed about the deception and told that they were playing the Cyberball game against computerized players. After the debrief, the participants were given the choice to withdraw their data from the study and six participants chose to not be included in the study. The Prolific participants were compensated \$9.50 for an hour of online participation and the SONA participants received 6 SONA credits at the end of the study, which was approved by the Institutional Review Board at the University of South Dakota.

CHAPTER FOUR

Results

Data were initially screened for outliers and assumptions. To investigate outliers in our data, we used Mahalanobis distance, which indicated one multivariate outlier that we excluded from our analysis, leaving 171 responses for analyses. Chi-square analysis comparing participants across age, gender, race, and education did not find any statistically significant differences in these distributions across groups.

The raw BOR scores were converted to T-scores using scale norms ($M = 59.64T$, $SD = 12.36$). The median split was performed at 60T to create high and low BOR groups. Those with scores of 60T or above were classified as “high BOR” ($N = 88$) and those with scores below 60T were classified as “low BOR” ($N = 83$). On the TASIT, participants had scores ranging from 14 to 28 with majority of the participants scoring on the higher end ($M = 24.12$, $SD = 2.77$). The participants also completed the SAM where they rated how happy-unhappy (valence) and excited-calm (arousal) they were feeling before and after the Cyberball. Normality checks were carried out on the residuals for both arousal and valence which were approximately normally distributed. Before the Cyberball paradigm, the participants reported a mean score of 4.06 ($SD = 1.76$) for valence and 6.48 ($SD = 1.77$) for arousal.

Manipulation Check

To determine whether the Cyberball task effectively invoked perceptions of rejection, inclusion or overinclusion, participants were asked to estimate the perceived

percentage of ball tosses received on a scale of 0% to 100%. All participants received at least three tosses, so the percentage of tosses received would always be above 0%.

A one-way ANOVA was conducted with the manipulation check that looked at the perceived percentage of throws received as the dependent variable and the Cyberball condition (inclusion, rejection, and overinclusion) as the independent variable. The results indicate that the Cyberball condition had a significant main effect on the perceived percentage of throws received ($F(2,170) = 176.11, p < .001$). Those who were in the overinclusion criteria perceived higher percentage of throws received ($M = 59.91, SD = 20.91$) than those in the inclusion ($M = 31.11, SD = 13.07$) condition ($d = 1.65$). The participants in the inclusion condition perceived a higher percentage of throws received than those in the rejection ($M = 10.02, SD = 5.31$) condition ($d = -2.16$). Finally, those in the rejection condition perceived receiving lower number of throws when compared to the overinclusion condition ($d = 3.34$). This suggests that participants perceived different levels of participation based on the Cyberball condition they were assigned.

A repeated measures ANOVA was conducted to examine the impact the manipulation had on the emotional state of the participant. The participant rated how they were feeling on the SAM. We assessed how happy or unhappy (valence) they were feeling before and after the manipulation as well as how excited or calm (arousal) they were feeling. The within-subjects factor was the pre- and post- Cyberball ratings on the SAM and the three Cyberball conditions were considered to be the between subjects factors. Table 2 shows the change in emotional state on both valence and arousal items.

Table 2*Emotional Valence and Arousal Ratings Pre-Cyberball and Post-Cyberball*

		Pre-Cyberball		Post-Cyberball	
		M	SD	M	SD
Emotional Valence	Rejection	4.20	1.95	5.72	1.76
	Inclusion	3.89	1.71	4.15	1.80
	Overinclusion	4.07	1.59	3.79	1.59
Emotional Arousal	Rejection	6.56	1.66	5.49	1.81
	Inclusion	6.33	1.86	6.15	1.84
	Overinclusion	6.54	1.83	5.93	1.88

The first repeated measures ANOVA looked at the pre- and post-SAM for change in valence. A repeated measures ANOVA with a Greenhouse-Geisser correction showed a significant interaction between the Cyberball condition and the Time ($F(2,168) = 22.27$, $p < 0.001$). The valence rating also differed significantly pre- and post-Cyberball ($F(1,168) = 18.66$, $p < 0.001$). We also found that the Cyberball condition significant main effect on the valence rating ($F(1,168) = 7.79$, $p = 0.001$). As shown in Table 2, individuals in the inclusion condition responded similarly before and after the manipulation, individuals in the overinclusion condition reported that they were happier, and individuals in the rejection condition stated they were less happy after the Cyberball paradigm. A Tukey post hoc test revealed that the self-reported happiness on the SAM was statistically significantly lower after the Cyberball for inclusion ($p = .005$) and overinclusion ($p = .001$) conditions compared to the rejection condition. There was no statistically significant difference between the inclusion and overinclusion conditions ($p = .95$).

A second repeated measures ANOVA looked at the pre- and post-SAM for change in arousal. A repeated measures ANOVA with a Greenhouse-Geisser correction

showed a significant interaction between the Cyberball condition and Time ($F(2,168) = 3.17, p = 0.45$). The arousal rating also differed significantly pre- and post-Cyberball ($F(1,168) = 18.59, p < 0.001$). However, the Cyberball condition did not have a significant effect on self-reported arousal ($F(1,168) = .367, p = 0.69$). As shown in Table 2, individuals in the inclusion and rejection conditions responded similarly before and after the manipulation but individuals in the overinclusion condition reported that they were calmer. A Tukey post hoc test revealed that the self-reported arousal on the SAM was not statistically significantly changed after the Cyberball for inclusion ($p = .74$) and overinclusion ($p = .75$) conditions compared to the rejection condition or between inclusion and overinclusion conditions ($p = 1.00$).

Emotion Perception

Emotion perception was measured by the TASIT score which indicated the number of correctly identified emotions. A 2 (BOR status) by 3 (Social rejection, inclusion, overinclusion) between subjects analysis of variance was conducted to determine whether these features significantly impact emotion perception. We did not find a significant main effect of the Cyberball condition ($F(2,170) = .233, p = .79$) or borderline status ($F(1,170) = .178, p = .67$). There was also not a significant interaction ($F(2,170) = .564, p = .57$), therefore, borderline personality features did not moderate the relationship. Accuracy in emotion perception was also considered by emotion type (positive, negative, and neutral) because previous research suggested a negative bias in perception of neutral emotions. Table 3 shows the number of accurately identified emotions for individuals in the three Cyberball conditions. There were 28 items in total with 8 positive emotions, 15 negative emotions, and 3 neutral emotion items.

Table 3*Number of Correctly Identified Emotions by Cyberball Conditions by Emotion Type*

Condition	Emotion Type	Number of Correctly Identified Emotions	
		M	SD
Rejection	All Emotions	24.31	2.65
	Positive Emotions	7.51	.74
	Negative Emotions	12.97	2.02
	Neutral Emotions	3.00	.66
Inclusion	All Emotions	24.09	2.79
	Positive Emotions	7.43	.66
	Negative Emotions	13.07	1.94
	Neutral Emotions	2.78	.77
Overinclusion	All Emotions	23.93	2.92
	Positive Emotions	7.32	.79
	Negative Emotions	12.73	2.24
	Neutral Emotions	3.00	.71

Further analyses were conducted by looking at accuracy in emotion perception based on emotion type. A series of three separate 2x3 ANOVAs were repeated for each emotion type as dependent variables (negative, neutral, positive). There was no significant interaction ($F(2,170) = .446, p = .64$) nor significant main effects of Cyberball condition ($F(2,170) = .952, p = .39$) or borderline status ($F(1,170) = .077, p = .78$) when looking at emotion perception of positive emotions. Further, there were also no significant interaction ($F(2,170) = .805, p = .45$) nor significant main effects of the Cyberball condition ($F(2,170) = .325, p = .72$) or borderline status ($F(1,170) = .364, p = .54$) when looking at emotion perception of negative emotions. Finally, there was no significant interaction ($F(2,170) = .296, p = .74$) nor any significant main effects of the Cyberball condition ($F(2,170) = 1.871, p = .16$) or borderline status ($F(1,170) = .303, p = .58$) when looking at neutral emotions.

CHAPTER FIVE

Discussion

The purpose of this study was to explore the impact of social stressors, such as rejection, inclusion, and overinclusion, on emotion perception and the role borderline personality features played in the relation. Despite previous studies looking at how rejection impacts individuals with high borderline personality features, there have not been any studies looking at how overinclusion impacts emotion perception in a dynamic situation especially among individuals with high borderline personality features. The present study examined the hypothesis that rejection would negatively impact an individual's ability to accurately perceive the emotions of others in a dynamic situation. Further, it was hypothesized that borderline personality features would moderate the impact rejection has on emotion perception, specifically that individuals with high borderline personality features who are rejected would have the worst emotion perception. We did not find a significant main effect of the rejection or overinclusion conditions. Further, individuals in the High BOR group did not have a significant difference in accuracy in emotion perception either.

Rejection can result in increased asocial behaviors which can be detrimental to social relationships and might also impact a person's interpretation of situations (Rajchert et al., 2018). The Cyberball paradigm has been successfully used in previous studies to induce feelings of rejection (Williams et al., 2000). Correctly interpreting social cues is crucial to optimal functioning in a social situation. Results from the present study did not find a significant impact of rejection, inclusion, and or overinclusion on emotion

perception. The participants were randomly assigned to one of three conditions to look at how rejection, inclusion, and overinclusion would impact their ability to perceive emotion. We found the performance of individuals on the emotion perception task comparable across all three conditions. Further, there were no significant differences in emotion perception regardless of the type of emotion. These findings are inconsistent with previous studies that suggest rejection can negatively impact emotion perception (Vosk et al., 1983). Further, some studies suggested that individuals who had been rejected often became more sensitive to emotional cues, specifically negative emotional cues, and had become more accurate in identifying them (Lerche et al., 2019). While this was not seen in this study, it is possible that using a dynamic emotion perception task allowed the participants to use cues other than facial expressions to improve their accuracy in emotion perception even when rejected. The holistic approach to emotion perception allowed the participant to depend on vocal tones, body language, and other cues in addition to facial expression, which might have helped them better understand emotions (Martinez et al., 2015).

Furthermore, borderline personality features did not impact accuracy of emotion perception. We used a median split to divide participants into high and low BOR groups and found that this personal characteristic had no effect on emotion perception. Past research has suggested that individuals with borderline personality disorder exhibit deficits in interpreting facial expressions (Daros et al., 2014). Specifically, individuals with borderline personality disorder often incorrectly perceive neutral expressions of emotions as negative. This negative bias can result in higher suspicion amongst those

with high borderline personality features which might impact how people behave in social situations.

We hypothesized that those in the rejection condition with higher borderline personality features would demonstrate the lowest accuracy in emotion recognition but there were no significant differences based on borderline status or social inclusion or rejection, thus there was no interaction between borderline personality features and social inclusion. Since there is a tendency of individuals with BPD to misperceive objectively fair situations as negative, it was important to see how this bias impacted their ability to identify emotions accurately (De Panfilis et al., 2015). Thus, the overinclusion condition was added to see if there was a significant difference between the conditions as it might be possible that the negative bias among individuals with borderline personality disorder might lead them to perceive inclusion as rejection (Deckers et al., 2015; De Panfilis et al., 2015; Weinbrecht et al., 2018). Despite these prior findings, we did not find an interaction between borderline status and Cyberball condition.

Although there was not any significant main effect of Cyberball condition on emotion perception, the participants in the different conditions did report difference in perception of throws they received. We also found that the Cyberball condition impacted the emotional state of the participant. There was a significant change in happiness and affective arousal in response to being included and excluded. The individuals in the rejection conditions on average reported that they were more unhappy after the manipulation, which aligns with how they might feel if they were experiencing rejection.

Limitations & Future Direction

One limitation of this study is the use of a nonclinical sample rather than a clinical diagnostic group. Despite this limitation, similar studies have used non-clinical groups and have found that they experience negative outcomes, including in interpersonal arenas, comparable to clinical groups (Trull et al., 1997). Future studies could explore the impact borderline personality disorder has on the relationship between social rejection and emotion perception by focusing on a clinical sample. It is possible that there may be a difference in accuracy of emotion perception if the borderline personality features were more severe. Thus, comparing individuals with BPD to a nonclinical sample would look at whether there is a difference in emotion perception based on a severe enough presentation of borderline features. Future studies could also compare High BOR groups to Low BOR groups by dividing the participants into thirds and excluding the middle groups. By including the two extremes, they might be able to look more closely at the differences between the groups.

Further, the participants performed well on the TASIT regardless of Cyberball condition or BOR status. This would suggest that the variability for the TASIT scores is low and could explain why there was no main effect of Cyberball condition or BOR status. As mentioned before, the accuracy on the TASIT could be because a dynamic stimulus allows the participants to rely on multiple cues to accurately assess the emotions expressed. One potential solution to this limitation would be to use another dynamic emotion perception measure to assess accuracy in emotion perception. Another limitation of this study is the lack of ecological validity of this study because of its experimental design. It is possible because the participant believed they were interacting with others

online the impact of the rejection may not resemble the impact of rejection in real life if being online allows them to detach from the situation.

Further, conducting this study online raised further limitations. Due to the COVID-19 pandemic, the original in-person study had to be transformed into an online study. Thus, it was not possible to ensure the participants completed the study in one sitting. Although the participants were told to complete the study in one sitting and avoid distractions, we were unable to provide a distraction-free environment to ensure ideal conditions for the study. Further, it was not possible to ascertain if or when they took a break during the study. If the participants took a break between the Cyberball game and emotion perception task, the effect of the manipulation may have worn off. Creating a similar study in-person might be able to help overcome some of these drawbacks, especially if confederates are used or if the participants are run in groups.

Despite these limitations, this project is significant because it attempts to understand the effect of social rejection emotion perception, specifically in individuals with higher borderline personality features. This study allows us to understand and clarify the social deficits caused by BPD.

Conclusion

The present study examined how social stressors affect emotion perception and whether borderline personality features moderate this relationship. The results suggest that neither inclusion, overinclusion, nor rejection had a significant effect on the participants' ability to recognize emotion. Further, we did not find an effect of borderline personality status on emotion perception either. Despite this, rejection has previously been linked to negative outcomes and borderline personality disorder is a serious mental

health condition that negatively impacts a person's social relationships. This makes future research looking at the impact rejection has on emotion perception in a clinical sample crucial. This study does not support the hypothesis that social stress and individual factors have a significant impact on emotion perception.

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Appendix A

Demographic Questionnaire

Age: _____

Gender:

_____ male

_____ female

_____ transgender

_____ Other (please specify): _____

Please try to be as accurate as possible when answering the following questions. If necessary, please look back into your calendar for information that might help you answer these questions.

1. Are you currently on any hormonal contraceptives (e.g., birth control pills, patches, IUDs, Depo-Provera)?

_____ no

_____ yes, birth control pills : name (if known): _____

_____ yes, birth control patches : name (if known): _____

_____ yes, IUD

_____ yes, Depo-Provera

_____ yes, other Please specify: _____

2. Have you taken any hormonal contraceptives (e.g., birth control pills, patches, IUDs, Depo-Provera) in the last 3 months?

_____ yes

_____ no

3. How many days typically occur between your menstrual cycles (not how long your period lasts)? We want to know how many days occur from the first day of a given menstrual cycle (the first day of your period = Day 1) to the first day of your next cycle, or simply put, how often do you get your period? For example, if the first day of my period is December 1st, that is Day 1 of my cycle. If my next period begins on December 29th, my cycle would be 28 days.

_____ # of days

4. By referring to a calendar, please write the first day of your most recent menstrual period (i.e., the day you most recently began bleeding. That day could have occurred during the past several weeks up through today.

_____ start date of most recent menstrual period

5. By referring to your calendar, please write what you anticipate to be the first day of your next menstrual period (i.e. the day you expect to begin your next period, or the day you expect to begin bleeding).

_____ anticipated start date of next menstrual period

Race/Ethnic Background:

_____ Native American/American Indian or Alaskan Native

_____ Asian or Asian American

_____ Black or African American

_____ Native Hawaiian or Other Pacific Islander

_____ Hispanic or Latino

_____ White (Non-Hispanic)

_____ Other (please specify): _____

Relationship Status:

_____ Never married

_____ Married

_____ Separated

_____ Divorced

_____ Widowed

_____ Living with partner (not currently married or separated from someone)

What is the highest level of education you have completed?

_____ 8th grade or less

_____ Some high school

_____ High School Diploma

_____ Graduate Equivalency Degree (GED)

_____ Some college

_____ Associate or other technical 2-year degree

_____ Bachelor's degree or 4-year college degree

_____ Some graduate or professional studies (completed Bachelor's but not graduate degree)

_____ Master's degree

_____ Doctoral degree or equivalent professional degree

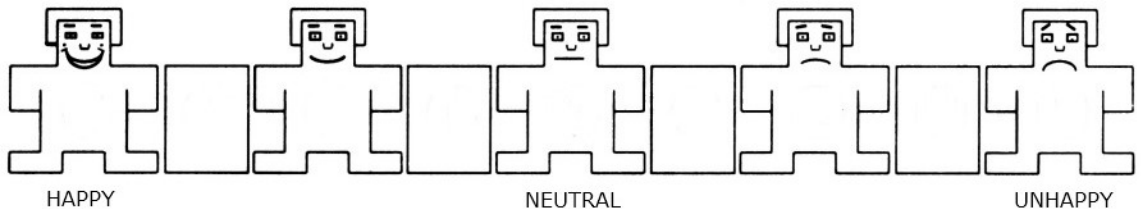
Appendix B

Self-Assessment Manikin

Item 1: Valence Rating

If you look below, you will see a set of 5 figures, arranged along a continuum. We call this set of figures SAM, and you will be using these figures to rate how you are feeling RIGHT NOW.

You can see that each SAM figure varies along each scale. In this illustration, the first SAM scale is the happy-unhappy scale, which ranges from a smile to a frown. At one extreme of the happy vs. unhappy scale, you feel happy, pleased, satisfied, contented, hopeful. If you feel completely HAPPY RIGHT NOW, you can indicate this by pressing the button under this figure at the right of the row labeled '1'. The other end of the scale is when you felt completely unhappy, annoyed, unsatisfied, melancholic, despaired, and bored. You can indicate feeling completely UNHAPPY RIGHT NOW, by pressing the button below this figure labeled '9'. The figure also allows you to describe intermediate feelings of pleasure, by pressing any of the buttons below any of the other pictures. If you feel completely NEUTRAL, neither happy nor unhappy, you will press the button below the middle figure labeled '5'. If in your judgment, your feeling of pleasure or displeasure falls BETWEEN two of the pictures, then press the button below the box between the two figures. This permits you to make a more finely graded rating of how excited or calm you feel RIGHT NOW.



Item 2: Arousal Rating

If you look below, you will see a set of 5 figures, arranged along a continuum. We call this set of figures SAM, and you will be using these figures to rate how you are feeling RIGHT NOW.

The excited vs. calm dimension is the type of feeling displayed here. At one extreme of the scale you CURRENTLY feel stimulated, excited, jittery, wide-awake, aroused. If you feel completely AROUSED RIGHT NOW, press the button under the figure at the left of the row labeled '1'. On the other hand, at the other hand of the scale, you feel completely relaxed, calm, sluggish, dull, sleepy, unaroused. You can indicate that you feel completely CALM RIGHT NOW by pressing the button under this figure at the right of the row labeled '9'. As with the happy-unhappy scale, you can represent intermediate levels by pressing the button under any of the other figures. If you are not at all excited nor at all calm RIGHT NOW, press the button under the middle figure of the row labeled '5'. Again, if you wish to make a more finely tuned rating of how excited or calm you feel RIGHT NOW, press the button below the box between the two figures.

