Individual Differences in the Perception of Emoji:

Effects of Depression and Self-Esteem

An Honors Thesis (PSYS 499)

by

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Abstract

Depression has been linked with negative interpretations of stimuli and information. When communicating, those with depression have produced negative affect in peers which results in peers rejecting those with depression. Self-esteem is an individual's feelings of self-worth based on self-evaluations that come from acceptance or rejections from peers. The role of depression and self-esteem in digital communication, specifically the use and interpretation of emoji, is under-researched. In this study, I examined effects of the individual differences of depression and self-esteem on emoji perception. Specially, I examined if depression and/or low self-esteem caused a more negative perception of emoji. The results of the study were contradictory. Those with lower self-esteem perceived negative emoji as both more negative and more positive than those with higher scores. Those with higher depression scores perceived negative emoji more negatively but perceived neutral emoji more positively than those with lower scores of depression.

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Process Analysis Statement

My thesis has not been an easy process, but I highly doubt anyone's is. It was a two-semester process. The first semester was comprised of reading the literature surrounding my own. At times this was difficult because there is not much research about emoji and even less about emoji and individual differences. My advisor helped by sending articles that he's used in his previous research to help guide my path. The first semester was also when we applied for IRB approval. I did have to do some corrections and later apply for a modification, but that process was not that stressful compared to what others told me they had to go through. I also applied for a grant to use for participant compensation.

Second semester was mostly about completing the actual research. I had to create my survey and collected data. My advisor and I ran into some trouble when sending mass communication emails. When we first started, we couldn't figure out how to send the emails out to the whole undergraduate population and then towards the end of our collection period, the mass communication email system changed and made it more difficult for participants to find out about my survey. This led to me filing for the previously mentioned modification to put up fliers. Ultimately, those fliers did not bring in a single participant, so I ended my data collection with fewer participants than I had originally anticipated.

Finishing my thesis has been different because all classes have been moved to online and everyone is quarantined. This means that all communication with peers and my advisor have moved almost completely to email. This has been difficult to adjust to during one of the more difficult periods of completing my thesis, analysis. Analyzing my data has been difficult due to a large portion of participants not completing the survey. Overall, I believe the most difficult part of my thesis has motivating myself during the months of March and April. Having to self-

quarantine mostly by myself has made it difficult to work on my thesis and get the little details done for my thesis. However, having the support from my family, friends, and advisor have made the past few months tolerable and have allowed me to continue to make progress on my thesis.

Individual Differences in the Perception of Emoji:

Effects of Depression and Self-Esteem

Digital communication is more prominent than ever before and communicating with others has become easier than ever. When communicating, it is important to consider individual differences as they can alter the way a communication occurs. Those with depression have been found to induce negative affect in others and are then rejected regardless of other personality traits, positive interaction, or rates of responding (Coyne, 1976). Negative communication interactions for those with depression result in more depressive symptoms (Lee et al., 2010). Communication with those who have depression has been a well-researched topic but there has been little research expanding upon digital communication. One aspect of digital communication that has seen little attention by the research community is the use of emoji.

Emoji are small pictorials used in electronic communication; they can be used on multiple platforms including text, email, and social media. Over the years, they have gained popularity and are commonly used to help communicate an idea or sentiment. There are over 3,000 emoji in 2019 that can be used in endless variations and combinations with or without text. On Facebook alone, over five billion emoji are sent each day (emojipedia.com, 2019). However, emoji are susceptible to different perceptions.

Both depression and self-esteem can impact perceptions. Depression can create schemas, a pattern of thought or behavior, which cause increased attention to negative stimuli and negative perceptions of neutral stimuli (Beck, 1976). Those with depression have difficulties disengaging with negative material and have issues using positive memories to interpret current stimuli (Gotlib & Joorman, 2010). Self-esteem is raised and lowered in correspondence to acceptance by others (Leary, 1999). Those with low self-esteem perceive that their peers having rejected them

for one reason or another, and correspondence from peers is likely to be interpreted as more negative. Depression can also be worsened due to rejection from peers as those with depression become sensitized to certain unfavorable life situations (Beck, 1976). When a person with depression or low self-esteem receives an emoji from a peer, are they are more likely to perceive the emoji as more negative than the sender intends? Depression and self-esteem can impact the way a person views themselves and the stimuli around them, yet no one has investigated their effect on the perception and use of emoji.

Emoji play a central role in today's age of digital communication therefore understanding individual differences of their perception can contribute to our understanding of both communication processes and emotional disorders.

Depression

Depression is used in a casual, daily language to describe temporary moods. Most people are not referencing clinically diagnosed depression when they talk about being depressed. Depression is a word that is used in the common vernacular in a way that does not relate to being diagnosed with depression and could be used to express their feelings when someone is sad or upset that they did not do as well on an exam or a work assignment. Diagnostically, depression is a disorder of emotion dysregulation and sustained negative affect (Gotlib & Joormann, 2010). It is among the most prevalent of all psychiatric disorders with approximately 20% of the American population experiencing at least one clinically significant episode of depression during their life and affects the quality of interpersonal relationships (Gotlib & Joormann, 2010).

Depression changes the way those affected view the world. According to the DSM-5, depression is characterized by at least five of the following symptoms occurring almost every day for at least two weeks concurrently: depressed for majority of the day; diminished interest or

pleasure in activities; significant weight loss or weight gain, or significant decrease or increase in appetite; insomnia or hypersomnia; psychomotor agitation or retardation; fatigue or loss of energy; feelings of worthlessness or excessive or inappropriate guilt; diminished ability to think or concentrate, or indecisiveness; and recurrent thoughts of death, recurrent thoughts of suicide with or without a plan (DSM-5; American Psychiatric Association, 2013). These symptoms must impact the person in a significant way that causes impairment or interference with their daily lives. Depression is separated into different categories according to the severity of the impact caused by the symptoms on the individual's life.

Cognition is the primary route for emotion regulation as cognitive appraisals determine whether an emotion is experienced and which emotion is experienced (Gotlib & Joormann, 2010). Dr. A. T. Beck believed that negative thoughts brought about by dysfunctional beliefs are the cause of depression which is the cognitive theory of depression. Beck hypothesized that depression is characterized by the cognitive triad which is "a negative conception of the self, a negative interpretation of life experiences, and a nihilistic view of the future," (Beck, 1976, p. 84). The cognitive theory of depression hypothesizes that those with depression create a schema that is based off of irreversible loss which includes separation, failure, worthlessness, and rejection (Beck, 1976). This creates an autonomous and systematic bias in their processing of stimuli from the environment. Those with depression pay more attention to negative stimuli in their environment more so than other stimuli and interpret neutral stimuli in a way that conforms to their schema, called a negative attentional bias. This schema continues even after a depressive episode has passed but abates after treatment for depression (Beck, 1976).

Denny and Hunt (1992) found that those with depression favored negative words in a recall test and that those without depression favored positive words. Participants were given a list

containing 24 words, 12 positive and 12 negative, and were told to rate on a Likert scale how well the words described themselves. After completing a task that involved filling in missing letters of words, the participants were asked to recall as many of the words from the original list as possible. Those with depression were not able to recall as many positive words as negative words while those without depression were able to recall as many negative words and more positive words than those with depression. When memory was explicitly tested, the difference in recall between those with and without depression disappeared.

In a study conducted by Bargh and Tota (1988), participants were asked to make judgments about themselves and others while doing a task that required them to use their working memory. Working memory is what allows people to carry out cognitive tasks by storing small amounts of information that are readily available for use (Cowan, 2014). Bargh and Tota (1988) found that with those who are depressed, a task using their working memory slowed judgments about positive but not negative content. It takes those with depression less time to process negative information. Anderson et al (1992, as cited by Mathews & MacLeod, 1994) completed a follow-up study by having participants make judgments as to whether negative events could happen to them in the future. They found that those with high levels of depression did not have slowed reaction times as a result of completing tasks using the working memory while those with minimal or no depression took more time to make those decisions. Having higher levels of depression made it easier to decide if those negative events would happen to them meaning that they made automatic judgments. These judgments become more automatic as the depression worsens or becomes chronic.

Some researchers argue that depression tends to have a greater effect on later stages of processing rather than on automatic processing. (Gotlib & Joormann, 2010). And while there has

been a consensus that anxious individuals tend to "favor negative interpretations of ambiguous stimuli" and do so in a way that this operates on an automatic level, there has been debate as to whether those with depression operate the same way (Gotlib & Joormann, 2010, pg. 293).

Butler and Matthews (1983) concluded those with depression favor negative interpretations of ambiguous stimuli. They recruited clinically depressed participants and nondepressed participants and presented them with ambiguous scenarios and found that when compared to nondepressed participants, depressed participants ranked negative interpretations of the scenario higher than any other possible interpretations. Depression is associated with difficulty disengaging from negative material (Gotlib & Joormann, 2010). This difficulty prevents those with depression from utilizing positive memories in interpretation of incoming stimuli.

Self-Esteem

Self-esteem is an individual's feelings of self-worth. We determine our self-worth through self-evaluations based on our behavior or skills and how we feel about them (Leary & Baumeister, 2000). Over the course of a lifetime, self-esteem does not tend to fluctuate within a person but has small changes over the course of a life due to environment and life transitions such as puberty, the gain and loss of wealth, and so on (Harris, 2018). Through twin studies, self-esteem has been found to be partly due to genetics and nonshared experiences in environments (Harris, 2018). Those with low self-esteem tend to experience more negative moods and fewer positive moods than those with higher self-esteem (MacDonald & Leary, 2012), and suffer distress longer after negative feedback than those with high self-esteem (Brown, 2010).

There are two different expressions of self-esteem, implicit and explicit (Jordan & Zeigler-Hill, 2018). Implicit self-esteem is an automatic self-evaluation that does not require

thought. In contrast, explicit self-esteem refers to the conscious evaluations of the self that one reports. Implicit self-esteem has been thought of as the strength of the cognitive association between a person's self-concept or self-worth and positive or negative self-evaluations. Implicit self-esteem is further divided into two categories which are trait and state self-esteem. Trait self-esteem is relatively stable and enduring while state self-esteem is prone to fluctuations due to time and circumstances (Jordan et al., 2015). Implicit and explicit self-esteem can be different as those with low implicit self-esteem can report having high or at least higher-than-experienced explicit self-esteem (Jordan & Zeigler-Hill, 2018). Typically, implicit and explicit self-esteem are not correlated as it is thought that when individuals have the cognitive capacity to override their automatic self-evaluations, they report more rational self-evaluations. Implicit and explicit self-esteem are more closely related when cognitive resources have been drained or when individuals go with their intuition when reporting (Jordan & Zeigler-Hill, 2018). Implicit self-esteem is how a person feels and explicit self-esteem is how a person reports feeling.

Self-esteem is connected to many psychological disorders. There are two hypotheses as to why that is (Zeigler-Hill et al., 2013). The first is the vulnerability model of low self-esteem which suggests that having low self-esteem is a risk factor of developing a psychological disorder. The other is called the scar model which suggests that self-esteem is not the cause of a disorder but a consequence (Zeigler-Hill et al., 2013). By having a disorder, the individual feels rejected by their peers which lowers their self-esteem. One support for this hypothesis is the sociometer theory. Leary (1999) hypothesized that self-esteem is used as a gauge of social acceptance. According to the sociometer theory, psychological disorders and low self-esteem are brought on by low relational value to others. This theory is based on the human need to have strong, interpersonal relationships and self-esteem is affected by the sociometer, a mechanism

that determines if the individual is being accepted or rejected by other people. Acceptance by others raises self-esteem and rejection lowers it. Low self-esteem indicates the individual believes that they are not likely to be socially included.

Social exclusion is further expanded upon in a study conducted by Leary et al. (1995). They conducted three studies in which they used the sociometer theory to examine self-esteem. The second study they conducted was to determine how feelings of exclusion impacted self-esteem. Participants were asked to write about a time that they felt one of eight emotions that corresponded to either being included or excluded then answer questions about feelings of inclusion or exclusion felt. Afterwards, they were asked how they felt about themselves and to give a reason as to why they felt that way. The study concluded that social exclusion was correlated with lower self-esteem. Explicit indications of social exclusions tend to be the most detrimental to self-esteem (Leary & Baumeister, 2000).

Self-esteem is highly correlated with measures of depression such as the Patient Health Questionnaire 9 ($r = -.67$) (Adewuya et al., 2006), and those with low self-esteem demonstrate cognitive biases similar to those with depression (McDermott & Dozios, 2015). As with depression, low self-esteem is thought to be a self-perpetuating cycle and is also a diagnostic criterion for Major Depressive Disorder according to the DSM-5 (DSM-5; American Psychiatric Association, 2013). In both depression and low self-esteem, the individual views themselves negatively.

Emoji

Facial expressions convey emotional states in response to antecedent events that others can respond to (Ekman, 1993). When texting, emailing, or using any other form of nonverbal, indirect communication, facial expressions cannot be communicated, and emotional states are

not as easily perceived. Emoji help fill that void by serving two main functions which are to provide emotional or social context and to reduce ambiguity (Kaye et al., 2016). Emoji are able to add expressiveness to a text or email that is unable to be communicated purely through words. They facilitate nonverbal communication (Derks et al., 2008) and there is evidence that they can activate the fusiform face area in the brain (Yuasa et al., 2011, as cited in WeiB et al., 2018). The fusiform face area processes facial recognition which could mean that emoji are perceived similar to faces. Otherwise stated, the brain perceives some emoji as faces. Emoji reduce ambiguity by providing contextual clues as to the state of mind or emotion the sender is in so the receiver can interpret the message accordingly (Taylor et al., 2019). However, this result is controversial as emoji are widely regarded as highly ambiguous, even when paired with text (Miller et al., 2017).

Kelly and Watts (2015) conducted a study that investigated how emoji are appropriated in conversations by asking participants how they used emoji in their text messages. Appropriated is defined as using an emoji in such a way that goes beyond its original intent. Emoji can continue a conversation that does not have much left to say as they are a "low-cost means" of continuing a conversation and can also end a conversation depending on the interpretation (Kelly & Watts, 2015, pg. 5). A person receiving a text requires a response but does not warrant a lengthy reply or a continuation of the conversation can send an emoji in order to communicate that they saw the message from the other person. Emoji can convey meaning that is not explicit, that is, acknowledging they are receiving a message but do not have much to say themselves. Participants were interviewed about how they utilize technology and later on, when it was noted that emoji were a commonality, the focus shifted to emoji usage (Kelly & Watts, 2015). The interview was constructed of a priori questions as well as questions that came up naturally during

the interview. They stated that emoji can have different interpretations within different relationships (Kelly & Watts, 2015). If you send an emoji to your sister, it will have a different meaning than if you send it to your boss. If you send your sister this emoji "🤢" without any other context then it could mean that you want to tell her that what she sent you is gross or that you think she's gross. However, if you sent that emoji to your boss, you are most likely telling them that you are sick. Emoji are relative to each individual and the interpretation of an emoji is dependent on the relationship you have with the recipient.

Marengo et al. (2017) conducted a study that investigated the correlation between self-identification with emoji, whether they believed the emoji represented who they were as a person, and personality traits. Using pre-selected emoji, the survey was comprised of rating the emoji on a Likert scale and the Ten-item Personality Inventory (TIPI) which measures the Big-Five personality traits: extraversion, agreeableness, conscientiousness, emotional stability, and openness to new experiences. Extraversion, emotional stability, and agreeableness are typically linked with emotions and "affective processing" and conscientiousness and openness to experience are typically linked with "general cognitive ability" (Marengo et al., 2017, pg. 77). They found that self-identification with certain emoji was related to the traits of extraversion, emotional stability, and agreeableness. Specifically, identifying with negative emoji was negatively correlated with the trait emotional stability, associating yourself with positive emoji had a significant positive correlation with extraversion, and identifying with the blushing face emoji was positively correlated with agreeableness (Marengo et al., 2017).

Present Research

Marengo et al. (2017) found that associating oneself with negative emoji was correlated with poorer emotional stability which is linked with depression. They also found that associating

yourself with positive emoji was correlated with higher extraversion scores which are linked to self-esteem scores. If you view yourself negatively and identify with negative emoji, you could be more likely to rate negative and neutral emoji as more negative because of your self-image.

In the current research, we are examining if individual differences in depression and/or self-esteem is related to perceptions of emoji. Emoji are small pictorials which could be representative of objects, faces, or animals that can be used on a multitude of platforms. There are over 3,000 different emoji (emojipedia.com, 2019) and they are used to aid in conversations by providing emotional and social context and reducing ambiguity (Kaye et al., 2016). However, when used in different contexts, emoji can have different meanings (Kelly & Watts, 2015). Those meanings could be interpreted in different ways due to individual differences such as variability in levels of depression and self-esteem. Specifically, those with depression process information more negatively and those with low self-esteem view their peers as rejecting them. I expect those with high scores on a depression measure to perceive emoji more negatively than those with lower scores on a depression measure and those with low self-esteem scores to perceive emoji more negatively than those with high self-esteem.

In order to test my hypotheses, I will have participants take measures that score for depression, Patient Health Questionnaire, and self-esteem, Rosenberg Self-Esteem Scale as well as completing an emoji valence survey.

Method

Participants

Participants were recruited through Ball State University's mass communication email system that was be sent to all undergraduate students. A total of 359 participants began the survey. Participants were compensated through the opportunity to obtain one of six $50 gift

cards. The age range of participants was between 18 and 52 with a mean age of 20.15 and a standard deviation of 3.053. Majority of participants were female (n = 272) followed by male (n = 67) then nonbinary (n = 11). The study was limited to those with 20/20 corrected vision.

Materials

Patient Health Questionnaire 9 (PHQ-9) (10 Items). The PHQ-9 is a self-assessment measure used in clinical practices and is composed of nine questions regarding symptoms of depression with a follow-up question that asks whether any of the symptoms affected their daily lives (Kroenke et al., 2001). These questions are rated on a four-point Likert scale from zero to three which denote choices from *not at all* to *nearly every day* when describing how often the patient has been bothered by the symptoms listed. Points from each question are tallied into a severity score which falls into one of five categories: Minimal (0-4), Mild (5-9), Moderate (10-14), Moderately Severe (15-19), and Severe (20-27). The PHQ-9 has been tested and found to have high validity and reliability. Reliability has been shown to have Cronbach alphas of 0.86 and 0.89 in two separate patient groups (Adewuya et al., 2006). Internal consistency is 0.85 (Adewuya et al., 2006). It also has good correlation with the Beck Depression Inventory ($r = .67$, $p < .001$) (Adewuya et al., 2006). All measures, including the PHQ-9, can be found in the appendix.

Rosenberg Self-Esteem Measure (10 Items). The Rosenberg Self-Esteem Measure is a self-assessment measure used to assess positive and negative self-feelings. It is composed of 10 questions (Rosenberg, 1965). Each question is rated on a four-point Likert scale from *strongly disagree,* which is one point, to *strongly agree,* which is four points. Half of the items are reverse scored. The higher the score, the higher the self-esteem. Internal consistency reliability had a

Cronbach alpha of .91 (Sinclair et al., 2010). Item discriminant validity was statistically significant with *p* < .05 (Sinclair et al., 2010).

   Emoji Valence Survey (84 Items). Emoji were chosen from the Lisbon Emoji and Emoticon Database (LEED) (Rodrigues et al., 2018). Participants were shown subsets of emoji and were then asked to rate emoji or emoticon on a seven-point Likert scale based on one of the randomly assigned rating categories, such as valence and aesthetic appeal (Rodrigues et al., 2017). In the current survey, only emoji were used. In the LEED, valence was categorized into three categories: high, moderate, and low. Categories were determined using 95% confidence intervals and the mid-point of the Likert scale. If the emoji had a confidence level that included the middle rating of the seven-point scale, it was labeled as moderate. If the emoji had a confidence level with the low-end above the middle rating, it was labeled high. And lastly, if the emoji had a confidence level with the high-end below the middle rating, it was labeled low. The high category translates to positively rated emoji, moderate is neutral emoji, and low is negatively rated emoji.

   A total of 21 face-based emoji were included in the survey: 7 negative, 7 neutral, and 7 positive. Non-face-based emoji were excluded from selection. All emoji were iOS system emoji. Emoji were pulled from the LEED appendix using the valence rating means. Emoji were sorted into low, moderate, and high categories. The top seven highest means within the high category were selected as the positive emoji. The bottom seven lowest means within the low category were selected as the negative emoji. The seven neutral emoji included in the survey were selected as they were the only seven moderate-rated emoji. Emoji images were pulled from https://unicode.org/emoji/charts/full-emoji-list.html as they have all emoji variations from different operating systems including iOS.

After viewing each emoji, the participant answered four questions. The first was a question about valence with a seven-point Likert scale ranging from *very positive* to *very negative.* This question mirrored the Rodrigues et al. (2017) study and read "To what extent do you think this stimulus refers to something positive/pleasant or negative/unpleasant." The next question had participants give emotions they associated with the emoji. They put up to three emotions and were told to rank the emotions in the order that they associated them with the emoji. They were then be asked "How willing would you be to use this emoji?" and "How frequently do you currently use this emoji?" Choices were based on a seven-point Likert scale from *extremely willing/frequent* to *extremely unwilling/infrequent.*

Procedure

The study was conducted using the Qualtrics software. Participants were invited to participate in the survey about emoji and depression through an email sent out to all students at Ball State University via the Communication Center. Once they clicked on the hyperlink, participants were directed to the survey and presented with an informed consent page. Afterwards, they were asked demographic questions about age and gender. Participants then completed the emoji valence survey followed by the PHQ-9 and Rosenberg Self-Esteem Measure which were counterbalanced in order to prevent order effects. Prior to each section, the participants were given instructions on how to complete the following questions. Once participants finished the survey, they were directed to a separate Qualtrics survey that instructed them to give their name and BSU email address in order to be considered for one of the six $50 gift cards.

Results

Data cleaning

There were 171 participants that were excluded out of 359. Those participants did not complete the PHQ or Rosenberg Self Esteem scale, so I was unable to analyze answers, if any, for the emoji questionnaire section. For the PHQ, participants were only supposed to answer question 10 if they responded with a 2 or higher on a scale of 1 to 4 on questions 1 through 9. If a participant put "1" for all of the first nine questions, question 10 was marked as "0." Questions 1 through 10 were then summed. The PHQ had 79 participants who did not fill out question number 10 so the average of questions 1 through 9 were used to fill in the missing data. PHQ questions were then summed. Questions 2, 5, 6, 8, and 9 on the Rosenberg Self Esteem scale were reverse coded. The Rosenberg Self Esteem questions 1 through 10 were then summed. For the emoji questionnaire, the emoji were separated into three groups: positive, neutral, and negative. Each grouping of emoji had four categories: valence perception, willingness to use, frequency of use, and emotion word valence. The scores for each of those categories were summed. The scores for the emotion word valence were based on valence scores from Warriner et al. (2013). While participants were given the option to put up to 3 words per emoji, only the first word was used as it was the primary emotion. There were words participants used that were not included in Warriner et al. (2013) so participants who were missing three or more scores out of the possible seven per grouping were excluded from that group. Missing values were replaced with an average of the available scores.

Descriptive Statistics

The PHQ had a Cronbach's alpha of .903. The mean was 19.18 with a standard deviation of 7.11. The minimum was 9 and the maximum was 40. The Rosenberg Self Esteem scale had a Cronbach's alpha of .840. The mean was 26.34 with a standard deviation of 5.17. The minimum

was 15 and the maximum was 40. The mean, standard deviation, minimum, and maximum for each emoji group and category can be found in Table 1.

Table 1

Descriptive statistics for all variables

	Mean	St. Dev.	Minimum	Maximum	Cronbach's Alpha
PHQ	19.19	7.11	9	40	.903
Rosenberg	26.34	5.17	15	40	.840
Positive Valence	44.46	3.24	31	49	
Neutral Valence	28.76	2.83	22	40	
Negative Valence	40.86	4.31	15	48	
Positive Frequency	31.39	8.68	7	49	
Neutral Frequency	27.35	8.07	7	48	
Negative Frequency	26.67	8.55	7	48	
Positive Willing	38.23	7.01	14	49	
Neutral Willing	36.51	5.81	13	49	
Negative Willing	34.40	7.25	7	48	
Positive Emotion	54.46	3.32	40.23	59.15	
Neutral Emotion	36.99	4.28	26.01	48.94	
Negative Emotion	19.08	3.84	15.51	45.79	

Note. St. Dev. = Standard Deviation; Valence = Valence Perception; Frequency = Frequency of Use; Willing = Willingness to Use; Emotion = Emotion Word Valence

Hypothesis Tests

I expected those with high scores on a depression measure to perceive emoji more negatively than those with lower scores on a depression measure (PHQ). I expected those with lower self-esteem scores to perceive emoji more negatively than those with higher self-esteem scores (Rosenberg Self-Esteem Scale).

To see if there was a relationship between depression and emoji valence perception, emoji valence perception was analyzed using a one-tailed correlation. Table 2 provides a summary of these results. The results showed that there was not a significant correlation between depression and positive, neutral, or negative emoji (all *ps* > .05). To see if there was a relationship between depression and emotion word valence, emotion word valence was analyzed using a one-tailed correlation. Table 2 provides a summary of these results. The results showed that there was no significant correlation between positive and depression (*p* > .05). There was a marginally significant positive correlation between neutral emoji word valence and depression, *r* = .064, *p* <.1, r^2 = .004, and a significant negative correlation between negative emoji word valence and depression, *r* = -.121, *p* <.05, r^2 = .015. As the depression score increased, the negative emoji emotion word valence decreased which supports the hypothesis.

Table 2

Correlations between emoji perception measures and depression and self-esteem

	PHQ	Rosenburg
Positive Emoji Valence	-.037	-.076
Neutral Emoji Valence	.078	-.092
Negative Emoji Valence	-.044	-.125*
Positive Emoji Emotion	-.007	-.074
Neutral Emoji Emotion	.064**	-.006

	PHQ	Rosenberg
Negative Emoji Emotion	-.121*	.131*

Note. Valence = Valence Perception; Emotion = Emotion Word Valence

*Significant at the 0.05 level (1-tailed).

** Marginally significant at the 0.10 level (1-tailed).

To see if there was a relationship between self-esteem and emoji valence perception, emoji perception was analyzed using a one-tailed correlation. Table 2 provides a summary of these results. The results showed there was no significant correlation between positive emoji and self-esteem or neutral emoji and self-esteem ($p > .05$). There was a significant negative correlation between self-esteem and negative emoji, $r = -.125$, $p < .05$, $r^2 = .015$. The higher the self-esteem score, the more negatively the negative emoji were perceived. This is the opposite of what was predicted. To see if there was a relationship between self-esteem and emotion word valence, emotion word valence was analyzed using a one-tailed correlation. Table 2 provides a summary of these results. The results showed that there was no significant correlation between positive or neutral emotion word valence and self-esteem but there was a significant positive correlation between negative emoji emotion word valence and depression, $r = .131$, $p < .05$, $r^2 = .017$. As the self-esteem score decreased, emotion word valence decreased which supports the hypothesis.

Exploratory Tests

To see if there was a relationship between depression and frequency of use of emoji, frequency of use was analyzed using a two-tailed correlation. Table 3 provides a summary of these results. The results were not significant (all *ps* > .05). To see if there was a relationship between self-esteem and the frequency of use of emoji, frequency of use was analyzed using a

correlation. Table 3 provides a summary of these results. The results were not significant (all *ps* > .05).

To see if there was a relationship between depression and willingness to use of emoji, willingness to use was analyzed using a two-tailed correlation. Table 3 provides a summary of these results. The results show there was a significant negative correlation between willingness to use neutral emoji ($p < .05$) and there was no significant correlation between willingness to use and positive or negative emoji ($p > .05$). For neutral emoji, as depression scores increased, the willingness to use neutral emoji declined, $r = -.171$, $p < .05$, $r^2 = .029$.

Table 3

Correlations between emoji usage and depression and self-esteem

	PHQ	Rosenburg
Positive Frequency	-.035	-.066
Neutral Frequency	-.056	-.006
Negative Frequency	.020	-.045
Positive Willing	-.081	-.073
Neutral Willing	-.171*	.058
Negative Willing	-.058	-.028

Note. Frequency = Frequency of Use; Willing = Willingness to Use

*Significant at the 0.05 level (2-tailed).

Discussion

Prior research has demonstrated that those with depression create schemas that cause an autonomous and systematic bias in processing stimuli (Beck, 1976) which causes them to interpret negative stimuli more quickly (Bargh & Tota, 1988) as it conforms with their schema

and have a negative attentional bias, interpreting neutral stimuli more negatively (Beck, 1976; Butler & Matthews, 1983). The cognitive theory of depression states that depression is characterized by a negative conception of the self, a negative interpretation of life experiences, and a nihilistic view of the future (Beck, 1976). Another way to phrase a negative conception of the self is low self-esteem. The way that you view yourself and the world affects the way you interact with others (Coyne, 1976). Emoji are used to convey your tone and meaning in nonverbal communication (Taylor et al., 2019) and identifying with emoji is linked with self-image (Marengo et al., 2017).

The purpose of this research was to examine the effects of individual differences of depression and low self-esteem on the perception of emoji. Emoji can be interpreted in a myriad of ways due to differences in context or individuals. Those with depression process information more negatively than those without (Butler & Matthews, 1983) and those with low self-esteem interpret interactions with peers negatively (Leary, 1999).

In general, I found that depression and self-esteem were not indicator of more negative perceptions of positive emoji. With neutral emoji, the emotion word valence increased as depression scores increased but with negative emoji, the emotion word valence decreased as depression scores increased. With negative emoji and self-esteem, perception of valence and emotion word valence have contradicting results. With perception of valence, valence scores of negative emoji decreased as self-esteem scores increased and with emotion word valence, valence scores increased as self-esteem increased. As depression scores increased, willingness to use neutral emoji scores decreased.

The results were contradictory, and both supported and did not support my hypotheses. Positive emoji perception and emotion word valence might not differ due to depression or self-

esteem because the emojis selected are overly positive and interpretations of them are not ambiguous which make it difficult to interpret them more negatively. With self-esteem and negative emoji, perception valence and emotion word valence have contradictory results that did not and did support my hypothesis respectively. Perception valence is the valence reported by the participant and emotion word valence is the valence that is determined by the word they gave to describe the emoji. Perception valence increased as self-esteem decreased, and it was the opposite for emotion word valence. This can be likened to implicit and explicit self-esteem (Jordan & Zeigler-Hill, 2018). Explicit self-esteem is perception valence as it is how the participant reports feeling about the emoji. Implicit self-esteem would be emotion word valence because it is how the participant feels about the emoji as it is the first word that comes to mind when the person thinks about the emoji. Participants with depression may feel the need to report they view negative emoji more positively because they feel that they should like with explicit self-esteem but actually view the emoji more negatively than others as shown by the emotion word valence scores. Neutral emoji were viewed more positively by those with higher scores of depression compared to those with lower scores. This may have something to do with the usage of those emoji. Emoji are used for a variety of contexts (Kelly & Watts, 2015). Neutral emoji can be used the sugarcoat messages with more negative intent than the sender wishes to convey. Because of this connotation, neutral emoji can be viewed more negatively. Those with higher scores of depression perceived neutral emoji more positively than those with lower scores of depression potentially because those with higher scores of depression are less willing to use them. Butler and Matthews (1983) found that those with depression tend to favor negative interpretations of ambiguous stimuli. This may alter the way those with depression use ambiguous stimuli like neutral emoji. Those with depression may not be willing to use neutral

emoji because they initially view it more negatively and don't want the receiver of the message to misconstrue their message. This unwillingness to use neutral emoji may cause those with depression to view them more positively because of their infrequent usage as those without depression use neutral emoji in more negative contexts. They don't initially view them as negatively as those with depression but after time, their use causes a more negative perception. Those with depression view negative emoji more negatively because of their negative schema. Negative emoji are more negative because they view themselves and their world more negatively (Beck, 1976).

Understanding how others interpret stimuli is a part of effective communicating. If we cannot predict how someone with interpret our message, our message has a higher likelihood of being misinterpreted. The knowledge that those with higher depression scores and lower self-esteem scores rate negative emoji more negatively can be useful when communicating with others and help prevent misinterpretations.

There were several limitations to this study. It was limited in sample size and diversity as majority of the participants were college-aged and female which can make it difficult to generalize to a larger population. Approximately half of the participants did not complete the survey or did not follow directions. And when coding the emotion word valence, there were words that were unable to be coded using valence scores from Warriner et al. (2013) because participants were allowed to use any word they wanted.

In the future, more diverse studies could be completed to include different age groups or genders. This would help with the generalizability of the information. A shorter survey or potentially in-person study could be done in order to help with the completion rate as well as

help participants follow or clear up directions. Other researchers might investigate if there are other individual differences that affect emoji perceptions such as race or even religion.

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Appendix A

Patient health questionnaire

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression

severity measure. *Journal of general internal medicine*, *16*(9), 606–613.

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PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME:_____ DATE:_____

Over the last *2 weeks*, how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite —being so figety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns _____ + _____ + _____

(Healthcare professional: For interpretation of TOTAL, please refer to accompanying scoring card).   TOTAL: _____

10. If you checked off *any* problems, how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Appendix B

Rosenberg self-esteem scale

Rosenberg, M. (1965). Society and the adolescent self-image. Princeton University Press.

Instructions:

Below is a list of statements dealing with your general feelings about yourself. Please indicate

how strongly you agree or disagree with each statement.

1. On the whole, I am satisfied with myself.

Strongly Agree   Agree   Disagree   Strongly Disagree

2. At times I think I am no good at all.

Strongly Agree   Agree   Disagree   Strongly Disagree

3. I feel that I have a number of good qualities.

Strongly Agree   Agree   Disagree   Strongly Disagree

4. I am able to do things as well as most other people.

Strongly Agree   Agree   Disagree   Strongly Disagree

5. I feel I do not have much to be proud of.

Strongly Agree   Agree   Disagree   Strongly Disagree

6. I certainly feel useless at times.

Strongly Agree   Agree   Disagree   Strongly Disagree

7. I feel that I'm a person of worth, at least on an equal plane with others.

Strongly Agree   Agree   Disagree   Strongly Disagree

8. I wish I could have more respect for myself

Strongly Agree   Agree   Disagree   Strongly Disagree

9. All in all, I am inclined to feel that I am a failure.

Strongly Agree   Agree   Disagree   Strongly Disagree

10. I take a positive attitude toward myself.

Strongly Agree   Agree   Disagree   Strongly Disagree

Scoring:

Items 2, 5, 6, 8, 9 are reverse scored. Give "Strongly Disagree" 1 point, "Disagree" 2 points, "Agree" 3 points, and "Strongly Agree" 4 points. Sum scores for all ten items. Keep scores on a continuous scale. Higher scores indicate higher self-esteem.

Appendix C

Emoji valence survey

Emoji were pulled from:

Rodrigues, D., Prada, M., Gaspar, R., Garrido, M. V., & Lopes, D. (2018). Lisbon emoji and

emoticon database (LEED): Norms for emoji and emoticons in seven evaluative

dimensions. *Behavior Research Methods, 50*(1), 392-405.

Participants are asked demographic questions.

Age: _____

Gender

- o   Male

- o   Female

- o   Nonbinary

- o   Other

All participants are asked to answer four questions for each individual emoji. One emoji was

presented with the questions per page.

Instructions:

On the following pages, you'll be shown one emoji per page along with follow-up questions

about that emoji. There are no right or wrong answers, or trick questions.

Questions:

To what extent do you consider this stimulus refers to something positive/pleasant or

negative/unpleasant.

- o   Very negative

- o   Moderately negative

o   Slightly negative

o   Neither negative nor positive

o   Slightly positive

o   Moderately positive

o   Very positive

What emotions do you link to this emoji? You may use between 1 and 3 emotions.

Please list the emotions from most to least relevant.

#1 Emotion   _____

#2 Emotion   _____

#3 Emotion   _____

How willing would you be to use this emoji?

o   Extremely unwilling

o   Moderately unwilling

o   Slightly unwilling

o   Neither unwilling nor willing

o   Slightly willing

o   Moderately willing

o   Extremely willing

How frequently do you currently use this emoji?

o   Extremely infrequent

o   Moderately infrequent

o   Slightly infrequent

o   Neither infrequent nor frequent

- ○ Slightly frequent

- ○ Moderately frequent

- ○ Extremely frequent

    Emoji:

Positive Emoji (labels were not shown to participants)

Grinning face

Smiling face with open mouth

Smiling face with open mouth and smiling eyes

Smiling face with smiling eyes

Smiling face with heart-shaped eyes

Face throwing a kiss

Face with stuck-out tongue

Neutral Emoji (labels were not shown to participants)

Grinning face with smiling eyes

Thinking face

Face without mouth

Face with rolling eyes

Face with open mouth

Hushed face

Flushed face

Negative Emoji (labels were not shown to participants)

Tired face

Frowning face

Face with steam from nose

Crying face

Loudly crying face

Pouting face

Angry face

Appendix D

Informed consent form

INDIVIDUAL DIFFERENCES IN THE PERCEPTION OF EMOJI

(IRB #1535578-1)

Study Purpose and Rationale

The purpose of this research project is to examine how individual differences can affect the

perceptions of emoji. Emoji have become a commonly-used addition within most digital

communication. They also have a wide variety of uses and interpretations. Interpretations can be

different based on a variety of factors including cognitive mindsets. Findings from this research

may help researchers understand how emoji perception is altered due to different cognitive

mindsets.

Inclusion/Exclusion Criteria

To be eligible to participate in this study, you must be 18 or older, a student at Ball State

University, and 20/20 corrected vision.

Participation Procedures and Duration

For this project, you will be asked to complete a series of questionnaires about emojis,

depression levels, and self-esteem levels. It will take approximately 10 minutes to complete the

questionnaires. By participating in this study, you will have the equal opportunity to be entered to win one of six $50 gift cards.

Data Confidentiality or Anonymity

All data will be maintained as confidential and no identifying information such as names will be collected or appear in any publication or presentation of the data.

Storage of Data

Data will be stored on the researcher's password-protected computer indefinitely. Only the researcher and faculty supervisor will have access to the data.

Risks or Discomforts

There is no anticipated risk or discomfort associated with this survey. You may choose to not answer any question that makes you uncomfortable and may quit the survey at any point.

Voluntary Participation

Your participation in this study is completely voluntary and you are free to withdraw your permission at anytime for any reason without penalty or prejudice from the investigator.

IRB Contact Information

For one's rights as a research subject, you may contact the following: Office of Research Integrity, Ball State University, Muncie, IN 47306, (765) 285-5070, irb@bsu.edu.

Researcher Contact Information

Principal Investigator: Faculty Supervisor:

Olivia R. Hovermale, Undergraduate Student   Thomas Holtgraves, Ph.D.

Psychological Science   Psychological Science

Ball State University   Ball State University

Muncie, IN 47306   Muncie, IN 47306

Telephone: (765) 661-0539   Telephone: (765) 285-1716

Email: orhovermale@bsu.edu   Email: 00t0holtgrav@bsu.edu

Appendix E

IRB Form

BALL STATE UNIVERSITY

Office of Research Integrity
Institutional Review Board (IRB)
2000 University Avenue
Muncie, IN 47306-0155
Phone: 765-285-5052
Email: orihelp@bsu.edu

DATE:	December 30, 2019
TO:	Olivia Hovermale
FROM:	Ball State University IRB
RE:	IRB protocol # 1535578-1
TITLE:	Individual Differences in the Perception of Emoji
SUBMISSION TYPE:	New Project
DECISION:	APPROVED
PROJECT STATUS:	EXEMPT
DECISION DATE:	December 30, 2019
REVIEW TYPE:	Exempt Review

The designated reviewer for the Institutional Review Board (IRB) reviewed your protocol and determined the procedures you have proposed are appropriate for exemption under the federal regulations. As such, there will be no further review of your protocol, and you are cleared to proceed with the procedures outlined in your protocol. As an exempt study, there is no requirement for continuing review. Your protocol will remain on file with the IRB as a matter of record. All research under this protocol must be conducted in accordance with the approved submission and in accordance with the principles of the Belmont Report.

Exempt Categories:

	Category 1: Research conducted in established or commonly accepted educational settings, that specifically involves normal educations practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.
i	**Category 2:** Research that only includes interactions involving educational test (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met: (i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (ii) Any disclosure of the human subjects' responses outside

	the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (iii) The information obtained is recorded by the investigator in such a manner that the identity of the humans subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 46.111(a)(7).
	Category 3: Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met: (A) The information obtained is recorded by the investigator in such a manner that the identity of human subjects cannot be readily ascertained, directly or through identifiers linked to the subjects; (B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (C) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can be readily ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make the determination required by 46.111(a)(7).
	Category 4: Secondary research for which consent is not required.
	Category 5: Research and demonstration projects that are conducted or supported by a Federal department or agency, or otherwise subject to the approval of department or agency heads, and that are designed to study, evaluate, improve, or otherwise examine public benefit or service programs, including procedures for obtaining benefits or services under those programs, possible changes in or alternatives to those programs or procedures, or possible changes in methods or levels of payment for benefits or services under those programs.
	Category 6: Taste and food quality evaluation and consumer acceptance studies, (i) if wholesome foods without additives are consumed or (ii) if a food is consumed that contains a food ingredient at or below the level found to be safe, by the Food and Drug Administration or approved by the Environmental Protection Agency or the Food Safety and Inspection Service of the U.S. Department of Agriculture.
	Category 7: Storage or maintenance for secondary research for which broad consent is required: Storage or maintenance of identifiable private information or identifiable biospecimens for potential secondary research use if an IRB conducts a limited IRB review and makes the determinations required by 46.111(a)(8).
	Category 8: Secondary research for which broad consent is required: Research involving the use of identifiable private information or identifiable biospecimens for secondary research use, if the following criteria are met: (1)Broad consent for the storage, maintenance, and secondary research use of the identifiable private information or identifiable biospecimens was obtained in accordance with §46.116(a)(1) through (4), (a)(6), and (d); (2) Documentation of informed consent or waiver of documentation of consent was obtained in accordance with §46.117; and (3) An IRB conducts a limited IRB review and makes the determination required by §46.111(a)(7) and makes the determination that the research to be conducted is within the scope of the broad consent referenced in paragraph (d)(8)(i) of this section; and (iv) The investigator does not include returning individual research results to participants as part of the study plan. Note: This provision does not prevent an investigator from abiding by any legal requirements to return individual research results.

Ball State Specific Exempt Categories

	Category 9: Research involving publicly observable online behavior. Any online behavior that requires a person's permission to access is considered private and does not fall under this category. Information that cannot be accessed by the general population would also be considered private.

	Category 10: Research involving BSU students who are under 18 but have legal authority over their FERPA protected information. Only studies that fall into another exempt category except for sampling from BSU students who are under 18 can be considered exempt in this category.

While your project does not require continuing review, it is the responsibility of the P.I. (and, if applicable, faculty supervisor) to inform the IRB if the procedures presented in this protocol are to be modified or if problems related to human research participants arise in connection with this project. **Any procedural modifications must be evaluated by the IRB before being implemented, as some modifications may change the review status of this project.** Please contact Grace Yoder at (765) 285-5034 or gmyoder@bsu.edu if you are unsure whether your proposed modification requires review or have any questions. Proposed modifications should be addressed in writing and submitted electronically to the IRBNet as a "Modification/Amendment" for review. Please reference your IRB protocol number 1535578-1 in any communication to the IRB regarding this project.

In the case of an adverse event and/or unanticipated problem, you will need to submit written documentation of the event to IRBNet under this protocol number and you will need to directly notify the Office of Research Integrity (http://www.bsu.edu/irb) **within 5 business days.** If you have questions, please contact Grace Yoder at (765) 285-5034 or gmyoder@bsu.edu.

Reminder: Even though your study is exempt from the relevant federal regulations of the Common Rule (45 CFR 46, subpart A), Ball State has elected to hold you accountable to these regulations to encourage best research practices. You and your research team are not exempt from ethical research practices and should therefore employ all protections for your participants and their data which are appropriate to your project.

B A L L S T A T E
U N I V E R S I T Y

Office of Research Integrity
Institutional Review Board (IRB)
2000 University Avenue
Muncie, IN 47306-0155
Phone: 765-285-5052
E-mail: orihelp@bsu.edu

DATE:	February 21, 2020
TO:	Olivia Hovermale
FROM:	Ball State University IRB
RE:	IRB protocol # 1535578-2
TITLE:	Individual Differences in the Perception of Emoji
SUBMISSION TYPE:	Amendment/Modification
ORIGINAL APPROVAL DATE:	December 30, 2019
ACTION:	APPROVED
PROJECT STATUS:	EXEMPT
DECISION DATE:	February 21, 2020
EXPIRATION DATE:	
REVIEW TYPE:	Administrative Review

The Institutional Review Board (IRB) has reviewed your Amendment/Modification for Individual Differences in the Perception of Emoji. Your project was deemed MINIMAL RISK and approved on December 30, 2019. The changes you requested were reviewed at the Administrative Review level and were approved on February 21, 2020. Your project has been reviewed at the Exempt level per category 2.

Editorial Notes:

1. Approved.

As a reminder, it is the responsibility of the P.I. and/or faculty sponsor to inform the IRB in a timely manner:

- when the project is completed,
- if the project is to be continued beyond the approved end date (if applicable),
- if the project is to be modified further,
- if the project encounters problems, or
- if the project is discontinued.

Generated on IRBNet

Any of the above notifications should be addressed in writing and submitted electronically to IRBNet (www.irbnet.org). Please reference the IRB protocol number 1535578-2 in any communication to the IRB regarding this project. Be sure to allow sufficient time for review and approval of requests for modification or continuation. If you have questions, please contact Sena Lim at (765)285-5034 or slim2@bsu.edu.

In the case of an adverse event and/or unanticipated problem, you will need to submit written documentation of the event to IRBNet under this protocol number and you will need to directly notify the Office of Research Integrity (http://www.bsu.edu/irb) **within 5 business days**. In case of any emergency do not wait 5 days to submit the report, contact the office at once. If you have questions, please contact Sena Lim at (765)285-5034 or slim2@bsu.edu.

Please note that all research records must be retained for a minimum of three years after the completion of the project or as required under Federal and/or State regulations (ex. HIPAA, FERPA, etc.). Additional requirements may apply.