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Fear of Positive Evaluation and Negative Affect from Inclusion in Cyberball

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by

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ABSTRACT OF THE THESIS

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Fear of positive evaluation (FPE) is a construct related to social anxiety that involves discomfort when receiving positive attention and feedback from others. FPE research has increased over the past decade, and results suggest that it may be an important part of social anxiety for some individuals; however, it is not yet known whether FPE may also include discomfort from being included in social situations. Level of inclusion was hypothesized to moderate the relationship between FPE and negative affect from being over included such that those with high FPE would feel more uncomfortable the more they were included. To test this hypothesis, the present study utilized Cyberball, a virtual ball-tossing game involving one human player and two computerized players. Participants were randomized to one of three conditions varying in the amount of ball tosses they received: (1) equal inclusion, (2) over inclusion, and (3) strong over inclusion. Participants played two trials of Cyberball; all participants played the equal inclusion condition during Trial 1 and the randomized experimental condition during Trial 2. A measure of FPE was collected before the first trial of Cyberball, and measures of negative affect were collected at pre-Cyberball, post-Trial 1, and post-Trial 2.

As expected, a check of the study manipulation suggested a significant difference in reported feelings of inclusion between study conditions. A multiple linear regression examined the relationship between FPE, study condition (i.e., level of inclusion), and the interaction of FPE and study condition on change in negative affect from post-Trial 1 to post-Trial 2. Results of the regression indicated no significant effect for the interaction between FPE and study condition. A number of post hoc exploratory analyses were conducted to investigate possible explanations for the non-significant interaction. Results from these analyses did not suggest alternative explanations, suggesting that the relationship between FPE and level of inclusion does not predict negative affect during inclusion in Cyberball. Theories of FPE are discussed in relation to study outcomes and features of Cyberball.

Introduction

Fear of positive evaluation (FPE) is a construct that includes discomfort when receiving compliments, worry about doing things too well in front of others, and other concerns regarding favorable or positive attention (Weeks, Heimberg, & Rodebaugh, 2008). FPE is posited to be an important part of social anxiety (Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008; Weeks, Jakatdar, & Heimberg, 2010). More specifically, Gilbert (2001) suggests that social anxiety may have developed in humans as a psycho-evolutionary mechanism to avoid conflict with more powerful members of a social group. Under this theory, individuals may fear positive attention because it places them in a position of increased competition with others.

The primary measure of FPE is the Fear of Positive Evaluation Scale (FPES; Weeks, Heimberg, & Rodebaugh, 2008). The FPES correlates strongly with measures of social anxiety (Fergus, Valentiner, McGrath, Stephenson, Gier, & Jencius, 2009; Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, Goldin, & Gross, 2012; Weeks, Heimberg, Rodebaugh, & Norton, 2008). Furthermore, examination of the relationship between FPE and fear of negative evaluation supports conceptualization as separate constructs related to social anxiety (Fergus et al., 2009; Weeks, Heimberg, & Rodebaugh, 2008; Weeks & Howell, 2012).

FPE research has grown over the past decade (Reichenberger & Blechert, 2018), and findings suggest that FPE is positively associated with discomfort when individuals are provided positive feedback (Weeks, Heimberg, Rodebaugh, & Norton, 2008). It seems reasonable that individuals higher in FPE may also evidence negative responses to other positive social situations involving receipt of attention or social inclusion. Experiences of negative affect during positive interactions may have implications for increased loneliness and social isolation, and these outcomes have been associated with increased feelings of anxiety (Weiss, 1973) as well as a number of health problems, including increased cardiovascular disease (Everson-Rose & Lewis, 2005), problems with immune function (Uchino, 2006), and mortality (House, 2001; House, Landis, & Umberson, 1988). Investigation of FPE and its relationship to negative affect from inclusion may ultimately impact important mental and physical health outcomes.

One research paradigm that is commonly used to manipulate feelings of social exclusion and inclusion is Cyberball. The Cyberball paradigm consists of a single human subject playing an online ball-tossing game with two or three others; however, all other players are computerized, and frequency and targets of ball tosses are programmed by the researcher (Williams & Jarvis, 2006). Cyberball has most often been used for studies of social exclusion and rejection by programming the computerized players to decrease throws to the human player (Willams & Jarvis, 2006; Eisenberger et al., 2006). Human subjects tend to respond to Cyberball ostracism with increased distress and lowered self-reported levels of belongingness, and this effect is present even if the subjects are made aware that the other players are scripted by computer (Zadro, Williams, & Richardson, 2004).

Cyberball has been less extensively used in social inclusion paradigms. Most typically, inclusion conditions have involved roughly equal proportions of throws to all three players, and these conditions have most often served as contrast or control conditions when investigating social exclusion (Hillebrandt, Sebastian, & Blakemore, 2011; Ruggieri, Bendixen, Gabriel, & Alsaker, 2013). A literature search revealed only a few studies that investigated social over inclusion involving greater than average proportions of throws to the human player. For example, in a study of ostracism over the internet, 1486 participants from 62 countries played an online virtual tossing game (Williams, Cheung, & Choi, 2000). Notably, this study did not utilize Cyberball, but rather a computerized game that involved disc tossing. This paradigm differed from Cyberball in that parameters were set so that the human participants would receive the disc at certain probabilities. The conditions were overinclusion (67% probability), inclusion (33% probability), partial ostracism (20% probability), and complete ostracism (0% probability). This paradigm also differed from Cyberball in several other ways. For example, participants were led to believe that they were playing the game with two other human players, and animations in this paradigm were accompanied with messages that allowed for variability in success of throws. Results from this study indicated that over inclusion was not aversive to participants, but it did make them feel conspicuous. Furthermore, more ostracism in this study was related to greater reports of feeling bad. This study, however, did not report on participants' clinical symptoms, and it is possible that negative reactions to over inclusion may be more commonly found among individuals with high FPE or social anxiety.

A second study that also examined over inclusion focused more specifically on Cyberball in a clinical sample. In this study, feelings of rejection were examined in individuals with borderline personality disorder (BPD; De Panfilis, Riva, Preti, Cabrino, & Marchesi, 2015). Results from this study indicated that those with BPD felt greater levels of rejection than healthy controls in Cyberball inclusion and exclusion conditions, but they experienced a reduction in negative emotions in an over inclusion condition. Participants with BPD reported feeling less socially connected than controls in every experimental condition. It is notable that this study included individuals with clinical symptoms, but findings focused specifically on individuals with BPD, whose symptoms contributed to feelings of rejection even when socially included. Available evidence suggests that results may differ among individuals with other clinical disorders. For example, individuals with high levels of social anxiety experience both fear of rejection and fear of being too heavily praised (Weeks, Heimberg, Rodebaugh, & Norton, 2008), and so these individuals may prefer a more balanced and moderate level of inclusion that lies somewhere in between exclusion and over inclusion. Although use of over inclusion conditions in Cyberball are limited, research has indicated that software-based paradigms are capable of affecting feelings of inclusion that influence participant reports of negative emotions. Cyberball may be a suitable paradigm for investigating the relationship between FPE and social inclusion on negative affect.

The present study examines the relationship between FPE, negative affect, and levels of inclusion as manipulated via Cyberball. The primary hypothesis is that FPE will predict change in negative affect in the Cyberball task as moderated by experimental condition (i.e., level of inclusion). More specifically, it is predicted that level of inclusion will moderate the relationship between FPE and negative affect from being over included such that those with higher FPE will feel more uncomfortable the more they are over included.

Method

Power Analysis

A medium effect size was assumed in the present study based on previous research of individuals' discomfort from receiving positive evaluation (Weeks, Heimberg, Rodebaugh, & Norton, 2008). Power analysis revealed a suggested sample size of 89 participants ($f^2 = .15$; $\alpha = .05$; power = .95); however, a larger sample was obtained in order to compensate for a potentially smaller effect size than was expected.

Participants

Participants in the present study were undergraduate students enrolled at Washington University in St. Louis (*N* = 150). All participants received partial course credit for their participation in this study. Eight individuals were dropped from analyses due to errors in condition ordering (*n* = 4), incomplete data due to premature dropout (*n* = 3), and not understanding the game instructions (*n* = 1). Of the remaining 142 participants, 64.08% were female and 56.34% were Caucasian. The average age among participants was 19.90 years (*SD* = 1.39). See Table 1 for more detailed reporting of demographics.

Measures

All participants completed a battery of measures. Only measures of interest in the present study are reported below.

Fear of Positive Evaluation Scale (FPES; Weeks, Heimberg, & Rodebaugh, 2008). The FPES measures self-reported fear of positive evaluation. The FPES consists of 10 items rated on a Likert scale from 0 (*not at all true*) to 9 (*very true*). An example of an item from the FPES includes: *I generally feel uncomfortable when people give me compliments*. Respondents are instructed to respond to each item as though it involves people that they do not know very well. Two reverse-scored items are included in the scale; however, these items are not included in the total score. Psychometric examinations of this scale have evidenced good internal consistency among undergraduates (αs > .80; Weeks, Heimberg, & Rodebaugh, 2008; Weeks, Heimberg, Rodebaugh, & Norton, 2008) as well as clinical samples (αs > .85; Weeks et al., 2012; Fergus et al., 2009). The FPES demonstrates good test-retest reliability after five weeks (two-way random intraclass correlation coefficient = .70, *p* < .001; Weeks, Heimberg, & Rodebaugh, 2008) and it has good convergent validity with measures of social anxiety (Weeks, Heimberg, Rodebaugh, & Norton, 2008; Weeks, Heimberg, & Rodebaugh, 2008; Weeks et al., 2012; Fergus et al., 2009). The FPES had good internal consistency in the current sample (α = .82).

Social Phobia Scale and Social Interaction Anxiety Scale (SPS and SIAS; Mattick & Clark, 1998). The SPS is a measure of anxiety related to performance or being observed during daily activities (e.g., writing, standing in lines, eating in front of others, etc.). The SIAS is a measure of anxiety during social interactions with others (e.g., making eye contact, mixing in a group, making friends, etc.). Both measures consist of 20 items rated on a five-point Likert scale from 0 (*Not at all characteristic or true of me*) to 4 (*Extremely characteristic or true of me*). The SIAS includes three reverse-scored items that were dropped from analyses due to findings indicating that reverse-scored items hinder psychometric performance of the measure (Rodebaugh, Woods, & Heimberg, 2007). In this sample, both the SIAS and SPS scores had excellent internal consistency (αs = .93 and .91, respectively). These scales have evidenced good convergent validity with other measures of social anxiety, including the Liebowitz Social Phobia Scale, Social Avoidance and Distress Scale, and Fear of Negative Evaluation Scale; however, the SIAS has stronger relationships to measures of social interaction anxiety (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992; Mattick & Clark, 1998). Scores from both scales were standardized and combined into a single composite measure of social anxiety. Internal consistency of this composite was excellent at .96 (Nunnally & Bernsetin, 1994).

Brief State Anxiety Measure (BSAM; Berg, Shapiro, Chambless, & Ahrens, 1998). The BSAM was administered as a component measure of state negative affect. The BSAM consists of six items (i.e., *relaxed*, *steady*, *strained*, *comfortable*, *worried*, and *tense*) taken from the State-Trait Anxiety Inventory (STAI; Spielberger, 1983). Respondents are instructed to rate each item for how they feel at the present moment. This measure is rated on a four-point Likert scale from 1 (*Not at all)* to 4 (*Very much so)*. Berg et al. (1998) found that this brief measure was highly correlated with the full 20-item STAI (r = .93). Scores on the BSAM evidenced good internal consistency at each time point (αs > .81).

Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1998). The PANAS was administered as a component measure of state negative affect. The PANAS consists of 20 items that describe feelings and emotions. The schedule consists of two scales of 10 items each – one scale describes positive emotions (e.g., *interested*, *strong*, *inspired*) and the other describes negative emotions (e.g., *upset*, *irritable*, *afraid*). Only negative scale items (i.e., PANAS-N) were included in the composite score for state negative affect. Respondents are instructed to indicate the extent they feel each item in the present moment. Responses are measured on a five-point Likert scale from 1 (*very slightly or not at all*) to 5 (*extremely*). The PANAS-N scores had fairly good internal consistency in this sample at each time point (αs > .77).

State Negative Affect Composite – All participants completed the Brief State Anxiety Measure (BSAM) and the Positive and Negative Affect Schedule (PANAS) three times during the study. Scores from the BSAM and the negative affect scale of the PANAS (PANAS-N) were standardized and combined into a single composite measure of state negative affect for each of the three time points. Internal consistency of the negative affect composite was good at each time point (reliabilities > .88; Nunnally & Bernstein, 1994).

Debriefing Questionnaire – This measure was completed after the final trial of Cyberball and includes qualitative questions regarding participants' thoughts about the game and feelings of inclusion. Participants were asked to explain any differences they may have noticed between Trial 1 and Trial 2. Two quantitative questions also asked participants to rate their inclusion during Trial 1 and Trial 2 on a seven-point Likert scale from 1 (*Extremely under included*) to 7 (*Extremely over included*). A response of 4 indicated that the individual felt "*Equally included.*"

Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983). The BFNE is a measure of worry and negative affect related to perceived negative evaluation by others. This measure consists of 12 items rated on a Likert-type scale from 1 (*Not at all characteristic of me*) to 5 (*Extremely characteristic of me*). Four reverse-scored items are included in this measure; however, these items were dropped from analyses because the straightforwardly worded items have demonstrated significantly stronger convergent validity than the reverse-worded items (Rodebaugh et al., 2004; Weeks et al., 2005; Duke, Krishnan, Faith, & Storch, 2006). The BFNE had excellent internal consistency in the current sample ($\alpha = .93$).

Procedure

Participants completed a battery of questionnaires including some not described here. Questionnaires were completed via Qualtrics prior to completing two trials of Cyberball. Each trial of Cyberball consisted of 50 total throws between the human participant and two computerized players. The total throw count was increased from the default of 30 throws in order to allow for differentiation between study conditions. Human participants in possession of the ball could throw it to either of the two computerized players, and computerized players could throw it to either the human player or the other computerized player depending on the pre-set schedule of throws. With 50 total throws, the maximum number of throws a human participant could receive is 25 throws (i.e., 50%), and that would only occur if the computerized players always threw the ball to the human player.

Participants were randomized to one of three conditions that differed in the range of possible throws to the participant: (1) equal inclusion (32-36%), (2) over inclusion (38-42%), or (3) strong over inclusion (44-48%). Participants and researchers were blinded to conditions. The following instructions were displayed prior to each trial of Cyberball:

> *In the upcoming experiment, we test the effects of practicing mental visualization on mood. Thus, we need you to practice your mental visualization skills. We have found that the best way to do this is to have you play a ball tossing game on the computer.*
>
> *In a few moments, you will be playing a ball tossing game with two computerized players. The game is very simple. When the ball is tossed to you, simply click on the name of the player you want to throw it to. When the game is over, the experimenter will give you additional instructions.*
>
> *What is important is not your ball tossing performance, but that you MENTALLY VISUALISE the entire experience. Imagine what the others look like. What sort of people are they? Where are you playing? Is it warm and sunny or cold and rainy? Create in your mind a complete mental picture of what might be going on if you were playing this game in real life.*
>
> *Okay, ready to begin? Please click on the following button to begin.*

To set a baseline for comparison, all participants played the equal inclusion condition during Trial 1 and the experimental condition during Trial 2. Measures of state negative affect (i.e., PANAS-N and BSAM) were collected immediately before Trial 1 (pre-Cyberball) and after Trials 1 and 2 (post-Trial 1 and post-Trial 2, respectively).

Participants were asked to estimate their feelings of inclusion during Trials 1 and 2 after completing the second trial of Cyberball. These ratings were collected after Cyberball completion in order to limit potential for expectancy effects.

Results

Participant Characteristics

Of the 142 participants who completed the study, 45 were randomized to equal inclusion, 49 to over inclusion, and 48 to strong over inclusion. Chi-squared analyses indicated no significant differences between conditions for gender, race, and ethnicity. Analysis of variance (ANOVA) revealed no significant differences in fear of positive evaluation, $F(2, 139) = 0.98$, $p = .379$, $\eta^2 = .01$, and social anxiety, $F(2, 139) = 1.51$, $p = .225$, $\eta^2 = .02$, between conditions.

Manipulation Check

Quantitative data from the Debriefing Questionnaire were examined to check for differences in self-reported inclusion among the three experimental conditions. As expected, ANOVA revealed no significant differences in reported inclusion for Trial 1, $F(2, 139) = 2.94$, $p = .056$, $\eta^2 = .04$; however, significant differences were reported in reference to Trial 2, $F(2, 139) = 29.76$, $p < .001$) , $\eta^2 = .30$. Miles and Shelvin (2001) recommend that an eta-squared equal to or greater than .14 is considered a large effect, suggesting that the manipulation in the present study was very successful in inducing varying levels of over inclusion among participants (see Figure 1).

Primary Analysis for Change in Negative Affect, Inclusion, and FPE

A multiple linear regression was calculated to predict change in negative affect based on fear of positive evaluation (FPE), study condition (i.e., level of inclusion), and the interaction between FPE and study condition. Study condition (i.e., equal inclusion, over inclusion, or strong over inclusion) was centered and standardized and entered into the regression as an interval variable. Three changes in negative affect were of potential interest in this study: (1) pre-

Cyberball to post-Trial 1, (2) pre-Cyberball to post-Trial 2, and (3) post-Trial 1 to post-Trial 2. The primary analysis included change in negative affect from post-Trial 1 to post-Trial 2 in order to examine how negative affect changed after all participants were provided a common comparative baseline for inclusion during Trial 1. The multiple linear regression was not significant, multiple $R^2 = .01$, $F(3, 138) = .35$, $p = .789$. Similarly, the interaction between FPE and condition was not predictive of change in negative affect (see Table 2).

Exploratory Analyses

Several exploratory analyses were conducted to examine whether data limitations may have influenced statistical outcomes. These post hoc analyses were conducted after the primary analyses. To start, FPE was correlated with the composite measure for social anxiety to examine whether the constructs were related as was theorized. FPE had a moderate correlation with social anxiety ($r = .69$, $p < .001$). Additionally, FPE was correlated with negative affect at pre-Cyberball. This correlation was calculated to examine how FPE may have been related to negative affect when initially facing Cyberball, a new and unknown social situation. FPE had a weak correlation with negative affect at pre-Cyberball ($r = .31$, $p < .001$).

Normality of residuals. Normality of residuals is a key assumption of linear regression (Jarque & Bera, 1980). Examination of the residuals for the primary regression revealed a violation to the assumption of normality. Normality of FPE and change in negative affect from post-Trial 1 to post-Trial 2 were further examined. Shapiro-Wilk Normality Tests indicated that the null hypothesis was rejected for each (ps $< .05$), suggesting non-normality of the variables. Examination of Q-Q Plots also suggest non-normality of each variable. Additionally, normality of SPS total, SIAS total, social anxiety composite, negative affect composite at each time point, and change in negative affect between each pair of time points were all non-normal. Together, non-normality of the primary variables of interest may have contributed to the violation of normality of the residuals. The primary regression was re-analyzed in Mplus with the MLR estimator, a technique that is more robust to violations to normality (Muthén & Muthén, 2017). As shown in Table 3, the interaction between FPE and condition did not predict change in negative affect from post-Trial 1 to post-Trial 2.

Polynomial relationship. Although a linear relationship could not be established between the study variables and negative affect, the residuals of the primary regression suggested the possibility that a curvilinear component may improve the model. A multiple linear regression was calculated for FPE, FPE^2, condition, FPE x condition, and FPE^2 x condition predicting change in negative affect from post-Trial 1 to post-Trial 2. As shown in Table 4, the regression was not significant, multiple $R^2 = .02$, $F(5, 136) = .48$, $p = .794$, and curvilinear FPE was not predictive of change in negative affect from post-Trial 1 to post-Trial 2.

Examination of FPE data. It is possible that only individuals with clinical levels of FPE may respond with increased negative affect as a result of being overly included, and so FPE score characteristics were examined to determine whether high FPE may have been underrepresented among the sample. FPES scores ranged from 0 to 65 (max possible = 72, M = 27.32, SD = 13.19) with a median score of 26. A majority of participants (n = 89; 62.68%) had FPES scores greater than or equal to 22, the suggested cutoff score for individuals with social anxiety disorder (Weeks et al., 2012). This result suggests that high FPE was adequately represented among the sample.

Examination of social anxiety data. Social anxiety scores were similarly examined to determine whether high social anxiety was properly represented among the data. SIAS scores ranged from 1 to 58 (max possible = 68, $M = 23.54$, $SD = 13.21$) with a median score of 22. Nearly one-third of participants ($n = 47$; 33.10%) had SIAS scores greater than or equal to 28, a suggested cutoff score for individuals with social anxiety disorder (Rodebaugh et al., 2011). It is possible that scores were elevated as a result of using an undergraduate sample comprised of individuals in their late teens and early 20s, especially given that college-aged samples tend to report higher levels of social anxiety than other age groups (Fehm, Beesdo, Jacobi, & Fiedler, 2008). Elevated SIAS scores of 50 and greater were found among 4.93% ($n = 7$) of participants. SPS scores ranged from 0 to 51 (max possible = 80, $M = 17.49$, $SD = 12.42$) with a median score of 14.50. ANOVA revealed no significant differences in the social anxiety composite between conditions, $F(2, 139) = 1.51$, $p = .225$, $\eta^2 = .02$. These data suggest that this sample includes an adequate range of individuals with low, moderate, and severe symptoms of social anxiety and that social anxiety did not significantly differ between study conditions.

Examination of negative affect data. Negative affect was examined to further investigate whether the study manipulation may have been limited in its ability to induce noticeable changes in reported state negative affect. This manipulation was examined via comparison to other studies with similar aims of manipulating negative affect. One study of emotion suppression used the PANAS to measure state negative affect after viewing an aversive film clip (Campbell-Sills, Barlow, Brown, & Hofmann, 2006). This study found a mean of 12.02 ($SD = 7.52$) among individuals with clinical depression and anxiety and 7.31 ($SD = 5.86$) for nonclinical participants. Negative affect did not significantly differ between groups after taking into account negative affect reported prior to the study manipulation. Notably, Campbell-Sills et al. (2006) utilized a range of 0 to 4 instead of the typical range of 1 to 5 for this measure. It is unknown whether this range shift may influence participant responding, but assuming it does not, total scores would be 10 points higher for comparison purposes. Another study asked participants with problematic levels of social anxiety to bring to mind a recent social situation in which they felt distressed, anxious, or embarrassed; after thinking about this social situation, all participants completed the PANAS (Rodebaugh, Jakatdar, Rosenberg, & Heimberg, 2009). This study found negative affect ratings of 25.86 (SD = 9.37) and 28.12 (SD = 10.75) for the two study conditions after initially bringing the social situation to mind. As seen in Table 5, the mean PANAS-N score in the present study is much lower than those found among comparison studies, suggesting that Cyberball overall produced less negative affect than other negative affect manipulations described.

Analysis of variance indicated that there were no significant differences in PANAS-N or BSAM mean scores between conditions. Notably, t-tests indicate that PANAS-N and BSAM mean scores were significantly higher at pre-Cyberball than at either post-Trial 1 or post-Trial 2 (ps $< .001$), potentially suggesting that uncertainty regarding the study paradigm may have induced greater negative affect than actual participation in Cyberball. T-tests also indicate a significant difference in PANAS-N and BSAM scores between post-Trial 1 and post-Trial 2 (ps $< .05$), suggesting that the experimental trial was able to produce significantly greater mean negative affect than the equal inclusion condition experienced by all participants during Trial 1.

Although the change in negative affect from post-Trial 1 to post-Trial 2 was of primary interest in the present study, changes from pre-Cyberball to post-Trial 1 and pre-Cyberball to post-Trial 2 were also examined to investigate whether differences may exist between groups with regard to initial responses to the research paradigm or overall change from start to end of the research paradigm. ANOVA indicated that all PANAS-N and BSAM change scores were not significantly different between conditions with the exception of the BSAM change score from pre-Cyberball to post-Trial 2, $F(2, 139) = 4.95$, $p = .008$, $\eta^2 = .07$. Tukey's Honest Significance Test suggested that the difference exists between the over inclusion and strong over inclusion conditions ($p = .006$). Further examination of change in negative affect from pre-Cyberball to post-Trial 2 revealed that the mean BSAM score for the over inclusion condition decreased by 1.76; however, the mean score for the strong over inclusion condition was identical at both time points, suggesting that individuals in this condition ended Cyberball at roughly the same negative affect as before they started Cyberball.

Regression without equal inclusion condition. Previous regressions were calculated with condition as an interval variable, but it is uncertain whether the effects of each condition may truly lie at equally spaced intervals between one another. It is also possible that level of inclusion may need to reach a particular threshold in order to increase negative affect. The results above suggest there exists a significant difference between over inclusion and strong over inclusion with regard to negative affect as reported via the BSAM, and so the primary analysis was run again after dropping all data for equal inclusion participants. As shown in Table 6, this regression indicated that the interaction of FPE and condition continued to not be predictive of change in negative affect from post-Trial 1 to post-Trial 2.

Analyses with fear of negative evaluation. A recent study published after the present study was designed suggests that inclusion in Cyberball may be related to negative evaluation as opposed to positive evaluation (Weinbrecht, Niedeggen, Roepke, & Renneberg, 2018). This study is described in more detail in the Discussion. In the current data, fear of negative evaluation (FNE) had a moderate correlation with negative affect at pre-Cyberball ($r = .42$, $p <$

.001). A multiple linear regression was calculated to predict change in negative affect from post-Trial 1 to post-Trial 2 based on fear of negative evaluation (FNE), study condition, and the interaction between FNE and study condition. The regression indicated no significant effects of the interaction between FNE and study condition (see Table 7). Similar to primary analyses involving FPE, this analysis does not suggest there exists a particular relationship between the interaction of FNE and level of inclusion on negative affect during Cyberball.

Results above suggest that participating in Cyberball under an inclusion condition may decrease negative affect by decreasing uncertainty regarding the research paradigm. Given this consideration, it is possible that people with high FNE may be especially reassured by early inclusion during the present study. A simple regression was calculated for FNE predicting change in negative affect from pre-Cyberball to post-Trial 1 to examine whether FNE may have predicted negative affect after participants experienced equal inclusion during the first trial of Cyberball. This regression was significant, $R^2 = .08$, $F(1, 140) = 12.69$, $p < .001$, suggesting that greater FNE at baseline results in a larger drop in negative affect after experiencing inclusion in Cyberball (see Table 8). This finding is consistent with previous analyses suggesting that participants may have felt more negative affect when faced with the uncertainty of the Cyberball paradigm as compared to after they had already completed a trial of the game.

Discussion

FPE is a construct that involves discomfort and concern when receiving positive attention and judgment from others. In consideration of this relationship, it was suggested that higher ratings of FPE may be related to increased negative affect during over inclusion in social situations. More specifically, the interaction between fear of positive evaluation and level of over inclusion was hypothesized to predict changes in negative affect between a baseline trial of equal inclusion and a randomly assigned experimental trial of Cyberball.

Cyberball has often been utilized in social exclusion research; however, it has been used much less frequently to promote feelings of inclusion. Results suggest that the experimental manipulation was successful, and participants reported significantly different levels of inclusion based on their condition randomization. These results suggest that Cyberball may hold promise as a useful tool in research designed to induce feelings of inclusion.

Although the study manipulation worked as expected, the primary multiple regression indicated that the interaction between fear of positive evaluation and level of inclusion did not predict change in negative affect from post-Trial 1 to post-Trial 2. A number of exploratory analyses did not suggest particular issues with data quality, and so theoretical issues related to FPE and the study paradigm may provide further insight regarding current findings. For example, it is possible that perceived competition and the possibility of failure may be vital components of FPE that are not addressed in the Cyberball paradigm. FPE has been posited to be related to an evolutionary fear of being in competition with more powerful others and needing to defend a newly obtained social status (Gilbert, 2001); in Cyberball, however, the human participant is never able to drop the ball, miss a catch, or improperly throw the ball, and there is no competitive aspect inherent to the game. Furthermore, FPE involves concern about being evaluated, and participants in the present study were made aware that the other players were operated by a computer. In the Cyberball paradigm, it is possible participants may feel included without feeling as though they are evaluated. Together, these aspects of the paradigm may suggest that FPE cannot be sufficiently activated by Cyberball. A future study may implement a software that allows for more skill-based play and opportunities for failure, such as that found in the Williams and colleagues disc throwing paradigm (2000). Alternatively, another study may further examine FPE via a paradigm involving a live game of catch with two human confederates and a human participant.

Notably, recent research offers an alternative explanation for results found in the present study. Weinbrecht and colleagues (2018) examined neurophysiological response to Cyberball among patients with borderline personality disorder (BPD), social anxiety disorder (SAD), and healthy controls. Participants in this study completed an inclusion trial (33% ball receipt) followed by an over inclusion trial (45% ball receipt). Participants were informed they were playing with two other co-players over the Internet. Patients with SAD reported increased ostracism and negative mood compared to healthy controls after inclusion, but not after over inclusion. This suggests that individuals with SAD may require higher than average levels of inclusion in order to feel included and that lower levels of inclusion may be perceived as ostracism; this interpretation might suggest that equal inclusion is interpreted as negative and that strong over inclusion is interpreted as neutral for those with clinical levels of social anxiety. Such a relationship may be characterized by fear of negative evaluation among socially anxious individuals.

To examine this relationship, the primary regression for the present study was re-analyzed with FNE in place of FPE. Results from this regression indicated that the interaction between FNE and level of inclusion did not predict change in negative affect. An additional simple regression was calculated for FNE predicting negative affect from pre-Cyberball to post-Trial 1, and results from this analysis indicated a significant predictive relationship. Although these findings do not suggest that FNE and inclusion interact to produce greater negative affect, they do suggest that individuals higher in FNE may start the paradigm with increased concern about being negatively evaluated or judged. It is plausible that once individuals higher in FNE participated in the study, their concerns were ameliorated as a consequence of being included during the Cyberball trials.

The present study has several strengths. Power analysis recommended a total sample size of 89 participants if expecting a moderate effect size; however, this study included 142 participants in analyses. Improvements in power would have increased chances to find a predictive relationship between study variables even if the effect were to be smaller than initially expected. Additionally, variability in social anxiety and FPE severity appeared to be well-represented in the data across conditions.

This study also has several limitations that were discovered and addressed during exploratory analyses. These analyses revealed that the residuals of the primary regression violated expectations of normality. To address this violation, an additional regression was calculated with the more robust MLR estimator, and results were unchanged. Additionally, exploration of negative affect variables indicated that Cyberball was able to bring about feelings of negative affect, but mean negative affect was much lower than is typically found among other studies in which negative affect is induced. It is possible that limited variance in negative affect may have affected ability to detect differences between conditions, and including an exclusion condition in the paradigm may have provided a useful comparison that may have also increased variance in negative affect.

Results from the present study suggest that there does not exist evidence for a significant relationship between FPE, inclusion, and negative affect. This finding may point to the notion that FPE is a more nuanced construct that does not necessarily include fear of all types of positive evaluation. More specifically, competition and potential for failure were not components in the present study, nor are they aspects inherent to inclusion; it is possible that these aspects may be key components that are necessary to activating FPE. Additional research in this area may improve understanding of complexities of FPE as a construct that is related to, but distinct from, social anxiety.

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Figures and Tables

Figure 1. Self-reported inclusion by study condition as reported for Cyberball Trial 2, including means and standard errors

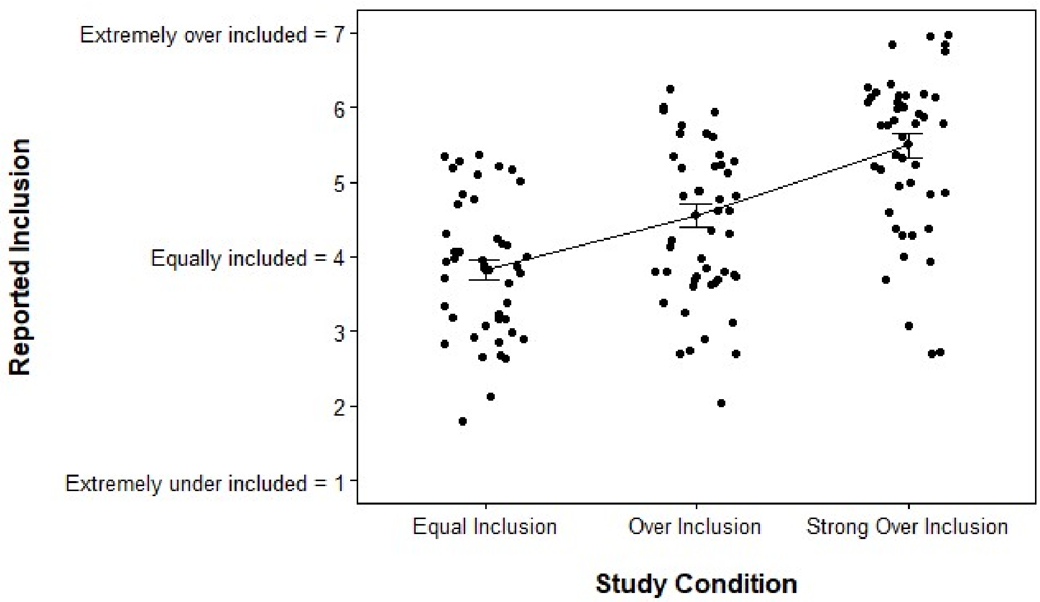

Table 1. Demographics

Characteristic	*n* (%)
Gender	
Female	91 (64.08)
Male	51 (35.92)
Race	
White	80 (56.34)
Asian or Asian-American	36 (25.35)
Black, African-American, or African origin	16 (11.27)
Multiracial	7 (4.93)
Other	2 (1.41)
Unreported	1 (0.70)
Ethnicity	
Not of Hispanic origin	130 (91.55)
Hispanic or Hispanic origin	12 (8.45)

Table 2. Primary multiple linear regression for variables predicting change in negative affect from post-Trial 1 to post-Trial 2

Variable	Estimate	Std. Error	*t*	*p*
(Intercept)	0.01	0.51	0.03	.980
FPE	0.10	0.10	0.99	.323
Condition	0.13	0.52	0.25	.801
FPE x Condition	0.02	0.10	0.21	.834

Table 3. Primary regression with MLR estimator

Variable	Estimate	Std. Error	*p*
(Intercept)	0.01	0.51	.979
FPE	0.10	0.10	.336
Condition	0.13	0.52	.802
FPE x Condition	0.02	0.10	.829

Table 4. Primary regression including curvilinear component for FPE

Variable	Estimate	Std. Error	*t*	*p*
(Intercept)	-0.09	0.68	-0.13	.897
FPE	0.12	0.10	1.16	.249
FPE^2	0.00	0.02	0.17	.862
Condition	-0.38	0.69	-0.56	.579
FPE x Condition	-0.01	0.11	-0.10	.922
FPE^2 x Condition	0.02	0.02	1.14	.255

Table 5. PANAS and BSAM score descriptives

Variable	Mean	SD	Min	Max	*F*	*p*	
PANAS							
Pre-Cyberball	15.08	4.90	10	31	0.14	.866	
Post-Trial 1	12.13	2.90	10	25	0.45	.639	
Post-Trial 2	12.56	3.26	10	26	0.34	.711	
Change from Pre-Cyberball to Post-Trial 1	-2.94	3.45	-16	3	0.61	.546	
Change from Pre-Cyberball to Post-Trial 2	-2.52	3.91	-19	5	0.46	.633	
Change from Post-Trial 1 to Post-Trial 2	0.42	2.04	-6	7	0.00	1.000	
BSAM							
Pre-Cyberball	12.28	3.93	6	22	2.68	.072	
Post-Trial 1	10.90	3.22	6	21	0.68	.509	
Post-Trial 2	11.32	3.56	6	23	1.00	.372	
Change from Pre-Cyberball to Post-Trial 1	-1.38	2.47	-10	5	2.93	.057	
Change from Pre-Cyberball to Post-Trial 2	-0.96	2.86	-11	9	4.95	.008	*
Change from Post-Trial 1 to Post-Trial 2	0.42	2.34	-8	11	1.10	.335	

Note. F values refer to differences between study conditions as tested by ANOVA.

Table 6. Primary regression without equal inclusion participants

Variable	Estimate	Std. Error	*t*	*p*
(Intercept)	-0.03	0.67	-0.04	.969
FPE	0.12	0.12	0.97	.336
Condition	0.25	0.67	0.37	.709
FPE x Condition	-0.09	0.12	-0.70	.488

Table 7. Primary regression with FNE in place of FPE

Variable	Estimate	Std. Error	*t*	*p*
(Intercept)	-0.01	0.51	-0.03	.979
FNE	0.08	0.08	1.01	.316
Condition	0.07	0.51	0.14	.886
FNE x Condition	-0.06	0.08	-0.72	.476

Table 8. Simple regression for FNE predicting change in negative affect from pre-Cyberball to post-Trial 1

Variable	Estimate	Std. Error	*t*	*p*	
(Intercept)	0.00	0.53	0.00	1.000	
FNE	-0.28	0.08	-3.56	.001	*