



Afraid of Social Exclusion: Fear of Missing Out Predicts Cyberball-Induced Ostracism

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Abstract

Although social exclusion violates the basic needs of sense of control, self-esteem, meaningful existence, and belongingness, it is unknown if fear of missing out (FoMO) or attachment anxiety contributes to one's sense of ostracism and each of these basic needs. We aimed to identify if baseline scores in attachment anxiety and/or FoMO predict how excluded an individual feels after playing an online ball-tossing game designed to include or exclude them and if these constructs tap into basic needs that ostracism has shown to threaten. A sample of 193 young adults participated in this online study. After completing measures of demographics, FoMO, and attachment anxiety, each participant played Cyberball, a virtual ball-tossing game. Under the guise of playing with two other human participants, this paradigm consists of pre-programmed conditions of either inclusion, which entails receiving 10 of the total 30 ball tosses, or exclusion, which consists of receiving the ball only twice at the beginning of the game. Participants then completed post-measures of state ostracism, basic needs, and attention checks and were debriefed regarding the nature of the Cyberball game. We found that FoMO, but not attachment anxiety, predicted how ostracized one felt. Likewise, FoMO was inversely related to control, belongingness, and meaningful existence. Attachment anxiety did not predict any of the basic needs examined in the study. We conclude FoMO may be less about the experience one misses out on and more about the fear of being excluded. Future research is needed to evaluate if people experience increases in state FoMO while excluded and if baseline mood influences our findings.

Keywords Fear of missing out · Attachment anxiety · Ostracism · Cyberball · Basic needs

Introduction

Ostracism, the feeling of being excluded or ignored from others, is a common experience for individuals. In particular, most people feel socially excluded at least once a day (Nezlek et al., 1997) and can have this experience across a variety of situations/contexts, including at work (Haldorai et al., 2020; Howard et al., 2020) and school (Arslan, 2021), with one's romantic partner (Arriaga et al., 2014), and through digital entities such as text messaging (Smith & Williams, 2004) and social media (Cuadrado-Gordillo & Fernández-Antelo, 2014; Schneider et al., 2017; Tobin et al., 2015). In addition to

being pervasive, prior research has demonstrated ostracism is an aversive experience. For example, the experience of ostracism has been shown to cause areas of the brain attributed to pain detection to activate (Eisenberger, 2015; Eisenberger et al., 2003), suggesting social rejection is physically painful. Similarly, individuals who are ostracized report increased levels of depression (Nolan et al., 2003; Rudert et al., 2021) and aggression (Poon & Teng, 2017) and decreased life satisfaction (Rudert et al., 2020). Also, while individuals have a fundamental need to belong (Baumeister & Leary, 1995), a sensible level of self-esteem (Tesser, 1988), want to feel recognized and valued (Greenberg et al., 1992), and desire a sense of control of their surroundings (Peterson et al., 1993), ostracism has shown to violate each of these basic fundamental needs (Williams, 2009). Individual differences in ostracism sensitivity are important to identify, as it would provide further understanding of human behavior. While it is clear exposure to ostracism can cause maladaptive outcomes and is ubiquitous, more research in identifying factors which predispose individuals to feeling ostracized and their influence

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across the domains of meaningful existence, self-esteem, control, and belonging is needed.

Attachment Anxiety

Attachment anxiety has been conceptualized as a dimension of attachment that reflects the concern of being abandoned (Brennan et al., 1998). Prior research has demonstrated that individuals with higher attachment anxiety have reoccurring apprehensions their partner will leave them (Bartholomew & Horowitz, 1991), are less trusting of others (Collins & Read, 1990), and are more likely to think their partner's actions are threatening to relationship stability (Campbell et al., 2005). Taken together, it would appear that attachment anxiety reflects a negativity bias toward the availability of others, which may, in turn, cause individuals with higher attachment anxiety severity to be more susceptible to feeling left out. Moreover, as it relates to the aforementioned fundamental needs ostracism disrupts, prior research has shown attachment anxiety to be inversely related to self-esteem (Goodall, 2015), meaningful existence (Arriaga et al., 2014), sense of control (Han et al., 2017), and belonging (Øverup et al., 2017). Therefore, it would be expected that if attachment anxiety predicts how ostracized someone feels, it would also predict how an individual feels in these domains after being socially excluded.

Fear of Missing Out

Fear of missing out (FoMO) describes the apprehension one is missing out on rewarding experiences (Przybylski et al., 2013). Much of the existing FoMO literature pertains to the context of social media use. As noted in Holte and Ferraro (2020), individuals have long missed out on enjoyable activities; however, social media has simply made individuals aware others are having better experiences. Przybylski et al. (2013) additionally suggests FoMO relates to the extent individuals yearn for constant connection and frequent updates of other's experiences. In other words, individuals with higher FoMO severity are more inclined to log onto social networking sites (SNS) to confirm or refute their concern that they are missing out on an enjoyable experience. This has been demonstrated in the empirical literature as prior works have found FoMO is related to social media overuse (Blackwell et al., 2017; Fabris et al., 2020; Franchina et al., 2018).

Although FoMO is often studied through the concern of enjoyable experiences one is absent from and how these apprehensions prompt SNS use, existing research has suggested other matters which may cause the experience of FoMO. For example, prior works have incorporated a fear of being excluded in their conceptualizations of FoMO

(Salem, 2015; Zhang et al., 2020). That is, instead of having a concern of missing out on an enjoyable time, people may fear that others are having fun without them, which may indicate that they are excluded from their social group. In addition, Zhang et al. (2020) used a self-concept perspective in suggesting FoMO intensifies when one perceives threats to their self-concept. Specifically, they advocate FoMO occurs as a result of one's fear they were absent from an experience which could help in the management or enhancement of one's private or social self. This work was important as it underlined how it may not be the experience itself that people are concerned about missing, rather the ability to improve one's private or social self. It is viable when individuals miss out on the opportunity for gains in either of these selves, they may experience deficits in self-esteem, sense of control, meaningful existence, and belongingness. Thus, it would be expected individuals who have higher FoMO severity would report lower levels of belonging, control, meaningful existence, and self-esteem when they are excluded from an opportunity to maintain their self-concept.

The Current Study

The purpose of the current study is to evaluate if FoMO and/or attachment anxiety predicts how ostracized someone feels and how they score in basic fundamental needs of belongingness, control, meaningful existence, and self-esteem after completing a game designed to either include or exclude them. Although Salem (2015) and Zhang et al. (2020) suggest FoMO is related to concerns of social exclusion, both of these works were theoretical and did not examine this empirically. Moreover, while attachment anxiety is a widely studied concept, to our knowledge, prior works have not examined if it makes individuals more inclined to feeling ostracized. We hypothesize scores in FoMO (H1) and attachment anxiety (H2) will predict how ostracized an individual feels. In addition, both FoMO (H3a–d) and attachment anxiety (H4a–d) will predict scores of belonging (a), control (b), meaningful existence (c), and self-esteem (d). Lastly, we expect the interaction of FoMO and inclusion/exclusion condition and the interaction of inclusion/exclusion condition and attachment anxiety will both predict ostracism (H5a) and each of the basic needs listed above (H5b–e).

Methods and Materials

Participants

The sample originally consisted of 217 undergraduate students from a large Midwestern university in the United States. A total of 24 participants were removed for reasons

such as failing attention checks or skipping a measure ($n = 21$), having prior Cyberball game experience ($n = 1$), or knowledge about the study's purpose ($n = 2$). Thus, an effective sample of 193 was obtained. The two conditions examined in this study included an inclusion condition and exclusion condition. The generic term “condition” in sections that follow will refer to this binary condition variable. In our study, 97 participants were randomly assigned to the exclusion condition, while 96 were in the inclusion condition. The average age was 19.41 years old ($SD = 1.68$, range 18–30). The sample was primarily female (67.36%), White (93.26%), and first-year college students (46.1%) (see Table 1). For their participation, each participant received course credit toward their psychology course.

Materials

Demographics

Participants provided a response to questions regarding their sex, age, race/ethnicity, and class standing.

Experiences in Close Relationships—Relationship Structures Global (ECR-RSG)

The ECR-RSG (Fraley et al., 2015) was used to examine attachment anxiety. This measure examines relationships in general and does not specify a particular type of attachment figure (e.g., romantic partner or parent). Specifically, it measures the two orthogonal dimensions of attachment: avoidance and anxiety (Bartholomew & Horowitz, 1991). For the purpose of this study, only the attachment anxiety

subscale was used. This subscale consists of 3 items pertaining to attachment anxiety cognitions (e.g., “I’m afraid that other people may abandon me.”). This subscale uses a Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) and displayed good internal consistency ($\alpha = 0.84$) in the current study.

FoMO Scale

To examine fear of missing out, the FoMO scale (Przybylski et al., 2013) was used to examine the degree participants are concerned they miss out on gratifying experiences. This is a 10-item measure that uses a Likert scale ranging from 1 (*not at all true of me*) to 5 (*extremely true of me*) to respond to questions such as “I fear others have more rewarding experiences than me.” For our study, this measure had good internal consistency ($\alpha = 0.87$).

Cyberball

To invoke a state of social exclusion, the Cyberball (Version 5.4.0.2; Downing & Hales, 2019) virtual ball-tossing paradigm originally designed by Williams and Jarvis (2006) was used. In this 2D online computer-based game, participants are believed to be playing the ball-tossing game with other human participants. Upon receiving the ball, the participant is able to select who they would like to toss the ball to. In reality, participants are not playing with other humans; rather, the tosses they receive are pre-programmed based on the experimental condition they are in. For our study, participants in the exclusion condition received the ball two times during the first 5 throws, after which they did not receive the

Table 1 Demographic statistics

	Exclusion condition	Inclusion condition	Total (%)
Race/ethnicity			
White	91	88	179 (92.75%)
Hispanic or Latino	3	3	6 (3.11%)
Black or African American	2	2	4 (2.07%)
Asian or Pacific Islander	1	6	7 (3.63%)
Native American or American Indian	4	2	6 (3.11%)
Sex			
Male	32	31	63 (32.64%)
Female	65	65	130 (67.36%)
Class standing			
Freshman	43	46	89 (46.11%)
Sophomore	26	28	54 (27.98%)
Junior	20	16	36 (18.65%)
Senior	8	5	13 (6.74%)

Frequency values for race/ethnicity exceed the total sample size as 9 participants endorsed multiple categories of race/ethnicity

ball again for the remaining 25 throws. In contrast, participants in the inclusion condition received the ball 10 out of the 30 ball tosses, and these tosses were distributed throughout the duration of the game. A meta-analysis of 120 Cyberball studies conducted by Hartgerink et al. (2015) found the differences in state ostracism severity between inclusion and exclusion condition participants were high (Cohen's $d > 1.4$), and prior research has illustrated that the inclusion condition is an appropriate control condition (Dvir et al., 2019). Moreover, multiple research projects with the Cyberball paradigm found that individuals in the exclusion condition scored significant less in the basic fundamental needs of self-esteem, meaningful existence, control, and belonging (Carter-Sowell et al., 2008; Eisenberger et al., 2003; Lakin et al., 2008; Williams et al., 2000). Thus, this paradigm is well-equipped to induce feelings of ostracism and influence the basic fundamental needs examined in this work.

State Ostracism

To measure how ostracized each participant felt after the Cyberball game, each participant completed two items designed to measure how ignored and excluded they felt. This included the questions “While playing Cyberball today, how ignored did you feel” and “While playing Cyberball today, how excluded did you feel?” Prior research by Dvir et al. (2019) used these two items to identify the extent individuals felt ignored and excluded to examine if their Cyberball game was efficacious in making individuals feel ostracized. Scores on the two items were summed to create a composite score of ostracism. Participants answered these two questions on a Likert scale ranging from 1 (*not at all*) to 5 (*extremely*), and they displayed good internal consistency ($\alpha = 0.95$).

Need-Threat Scale

The need-threat scale (Williams, 2009) was used to assess how satisfied participants were across the four basic needs of belonging (“I felt like an outsider”; $\alpha = 0.88$), control (“I felt the other players decided everything”; $\alpha = 0.70$), self-esteem (“I felt good about myself”; $\alpha = 0.87$), and meaningful existence (“I felt important”; $\alpha = 0.87$). In total, this measure consisted of 20 items, with each factor having 5 items, and used a Likert scale ranging from 1 (*not at all*) to 5 (*extremely*). Higher scores indicated higher levels of basic need competency.

Post Survey

After completing the Cyberball game, participants completed a post survey that asked participants about their experience. This includes attention check questions pertaining

to the Cyberball experience (i.e., “What percentage of ball tosses did you receive?” and “Did you see an image of Kermit the Frog appear?”). Participants were also asked if they had played Cyberball before, if a friend/classmate told them what the study was about, and what they thought the purpose of the study was. Any participant who indicated they didn't see Kermit the Frog appear, had prior Cyberball experience, or were told what the study was about was removed from data analyses on the basis of not paying attention (i.e., Kermit the Frog question) or having prior knowledge which may weaken the saliency of the ostracism paradigm.

Procedure

Prior to data collection, research protocol and procedures were approved by the Institutional Review Board (IRB). Data recruitment took place during the Fall 2020 semester. The study was posted on the SONA research participant recruitment website at the host university with the name entitled “Mental Visualization in the Virtual Environment,” and data collection took place completely online on Qualtrics. Each participant completed the study entirely on their own computer. Prior to consenting to participate in the research, each participant read an informed consent page outlining any risks involved with the study. Then, participants completed measures of demographics, attachment anxiety, and FoMO. Next, each participant was randomly assigned to either the inclusion or exclusion experimental conditions and played Cyberball consisting of 30 total throws. After, participants responded to measures of state ostracism, basic needs, and a post survey. Lastly, participants were debriefed. All measures in each section were presented in counterbalanced order with the use of the randomizer block component of Qualtrics. It took participants an average of 13.45 min ($SD = 3.94$, range 5.08–23.33) to complete the study.

Results

Preliminary Analyses

All analyses were conducted with IBM Statistical Package for the Social Sciences (Version 27) developed by IBM Corp (2020). There was limited missing data as frequencies ranged from 0 to 0.01%. Little's MCAR test revealed that data was missing at random ($\chi^2 = 16.94$, $df = 41$, $p = 1.00$); thus, missing items were imputed with the use of expectation maximization (Dempster et al., 1977). *T*-tests were used to examine if groups were statistically different in terms of our predictor and outcome variables. Bivariate correlations were conducted within each of the two experimental conditions. To test our hypotheses, first, a hierarchical multiple regression was conducted on ostracism scores. Next, a multivariate multiple regression

Table 2 Descriptive statistics and group differences of baseline variables and outcomes after Cyberball

	Exclusion (SD)	Inclusion (SD)	<i>t</i>	<i>d</i>
Fear of missing out	24.02 (8.07)	23.44 (7.13)	0.53	0.08
Attachment anxiety	13.99 (4.63)	13.52 (4.36)	0.72	0.11
Estimated percent of throws received	7.49 (4.30)	28.87 (11.40)	−17.28***	2.48
Ostracism	7.58 (2.10)	4.31 (2.09)	10.81 ***	1.56
Basic needs—control	8.27 (2.78)	12.29 (3.53)	−8.79 ***	1.27
Basic needs—meaningful existence	11.53 (4.59)	17.12 (3.59)	−9.43 ***	1.36
Basic needs—self-esteem	10.22 (4.00)	14.17 (3.65)	−7.17 ***	1.03

*** $p < 0.001$

was conducted on the four basic needs. We chose to use a multivariate multiple regression to minimize type 1 error rates and to examine the relationships of each predictor and dependent variable (Lutz & Eckert, 1994). Additionally, we controlled for multicollinearity by mean-centering all continuous predictor variables for both analyses. Effect sizes were calculated for the multivariate multiple regression using partial eta-squared, whereas 0.01 indicates a small effect, 0.06 a medium effect, and 0.14 a large effect (Cohen, 1988).

Main Analyses

As shown in Table 2, groups did not differ in baseline FoMO or attachment anxiety, suggesting the participants in each experimental condition are suitable to compare in our analyses. Furthermore, this table outlines that groups differed significantly on each outcome variable, suggesting the Cyberball manipulation had the intended effect. In addition, Table 3 displays correlational statistics for participants in both the inclusion and exclusion Cyberball conditions. A significant correlation between FoMO and ostracism was found for both participants in the inclusion ($p < 0.001$) and exclusion conditions ($p < 0.001$), although the only significant correlation between attachment anxiety and ostracism was found among the exclusion condition participants ($p < 0.001$) as the correlation between these concepts was

insignificant for inclusion condition participants ($p = 0.225$). In addition, for exclusion condition participants, FoMO was significantly correlated with all of the basic fundamental needs with the exception of control ($p = 0.19$), while there was a significant correlation between FoMO and all of the basic needs with the exception of self-esteem ($p = 0.28$) for inclusion condition participants. For participants in the exclusion condition, attachment anxiety was significantly correlated with all of the basic fundamental needs with the exception of control ($p = 0.09$), while there was no significant correlation between attachment anxiety and any of the fundamental needs in the inclusion condition. These results provide preliminary support that ostracism may be related to FoMO and attachment anxiety. In addition, these findings could suggest FoMO, although not attachment anxiety, may tap into basic fundamental needs. However, the use of multiple regression techniques is needed to provide a more detailed look of the relations between these constructs.

The hierarchical multiple regression on ostracism is depicted in Table 4. The initial model of condition (coded 0, inclusion; 1, exclusion) was statistically significant ($F(1, 191) = 116.90, p < 0.001$) and accounted for 38% of ostracism. In this model, condition was a significant predictor ($\beta = 0.62, t = 10.81, p < 0.001$). Step 2 consisted of condition, FoMO, and attachment anxiety and was also statistically significant (F

Table 3 Correlational diagnosis

	FoMO	AA	Ostracism	BNS—Control	BNS—ME	BNS -Belonging	BNS-SE
FoMO	-	.53***	.37***	−.13	−.38***	−.38***	−.26*
AA	.30**	-	.38***	−.17	−.30**	−.40***	−.34**
Ostracism	.37***	.13	-	−.55***	−.73***	−.78***	−.64***
BNS—Control	−.32**	−.18	−.53***	-	.56***	.54***	.57***
BNS—ME	−.28**	−.05	−.72***	.61**	-	.74***	.75***
BNS -Belonging	−.34**	−.10	−.73***	.66***	.79***	-	.77***
BNS-SE	−.11	−.07	−.49***	.47***	.68***	.62***	-

Data above the diagonal is from exclusion condition participants, while those in the inclusion condition are below it

FoMO fear of missing out, AA attachment anxiety, BNS basic needs scale

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Table 4 Hierarchical multiple regression predicting ostracism

Predictors	<i>R</i>	<i>R</i> ²	ΔR^2	<i>F</i>	<i>Sig</i>	<i>B</i>	SEB	β	<i>t</i>	<i>Sig</i>
Step 1	0.62	0.38		116.90	0.000					
Condition (1, exclusion; 0, inclusion)						3.27	0.30	0.62	10.81	0.000
Step 2	0.69	0.47	0.09	56.21	0.000					
Condition (1, exclusion; 0, inclusion)						3.19	0.28	0.60	11.36	0.000
FoMO						0.09	0.02	0.25	4.25	0.000
Attachment anxiety						0.06	0.04	0.10	1.65	0.100
Step 3	0.69	0.48	0.01	34.39	0.000					
Condition (1, exclusion; 0, inclusion)						3.19	0.28	0.60	11.38	0.000
FoMO						0.11	0.03	0.30	3.62	0.000
Attachment anxiety						0.01	0.05	0.01	0.16	0.88
FoMO × condition						−0.05	0.04	−0.10	−1.09	0.28
Attachment anxiety × condition						0.11	0.07	0.14	1.57	0.12

(2, 189) = 56.21, $p < 0.001$). With the addition of FoMO and attachment anxiety, an additional 9.2% of variance was explained. In step 2, the only significant predictors were FoMO ($\beta = 0.25$, $t = 4.25$, $p < 0.001$) and condition ($\beta = 0.60$, $t = 11.36$, $p < 0.001$). In step 3, the interaction terms of FoMO × condition and attachment anxiety × condition were added. Although this model was statistically significant ($F(2, 187) = 34.39$, $p < 0.001$) and accounted for 47.9% of ostracism scores, the addition of the interaction terms did not result in a significant F value change ($p = 0.26$). With this model, FoMO ($\beta = 0.30$, $t = 3.62$, $p < 0.001$) and condition ($\beta = 0.60$, $t = 11.38$, $p < 0.001$) were significant predictors. No issues with multicollinearity was identified as all variables had variance inflation factors below 10 and tolerance greater than 0.10.

Table 5 depicts the multivariate multiple regression on the four basic fundamental needs. This model was statistically significant (Pillai's trace = 0.59, $F(20, 748) = 6.50$, $p < 0.001$, $\eta_p^2 = 0.15$). At the multivariate level, condition (Pillai's trace = 0.42, $F(4, 184) = 32.95$, $p < 0.001$, $\eta_p^2 = 0.41$) and FoMO (Pillai's trace = 0.08, $F(4, 184) = 4.46$, $p = 9.002$, $\eta_p^2 = 0.09$) were significant predictors. Specifically, FoMO was inversely related with sense of belonging, control, and meaningful existence. In addition, condition (coded 0, inclusion; 1, exclusion) was inversely related with belongingness, meaningful existence, self-esteem, and control, suggesting the participants in the exclusion condition had lower scores in these variables. Aside from the interaction term of FoMO × condition being a marginally significant predictor of control ($p = 0.06$), attachment anxiety and the interaction term of attachment anxiety × condition were not significant predictors of any fundamental need.

Discussion

The initial aims of this paper were to understand if attachment anxiety and/or FoMO predicts how ostracized someone will feel after completing a game of Cyberball, an online ostracism paradigm. Additionally, we desired to determine if either of these constructs taps into basic fundamental needs of sense of control, belongingness, meaningful existence, and self-esteem. Although FoMO has long been considered as the concern one is absent from an enjoyable experience (Przybylski et al., 2013), in our study, FoMO was a significant predictor of self-reported ostracism. While it has been theorized individuals experience FoMO due to a concern of social exclusion (Salem, 2015; Zhang et al., 2020), this work is the first, to our knowledge, to provide empirical support. The present work is an important first step in identifying that the threat of social exclusion may be the primary reason for why individuals experience FoMO. Provided social connectedness is a key aspect to one's health (Cruwys et al., 2013) and longevity (Giles et al., 2012), it is reasonable some fear they are excluded from social groups which could provide future social support. Thus, the FoMO experienced after seeing friends having an enjoyable experience without oneself on SNS may be just as much about concerns of social exclusion, as it is about the experience missed out on.

Moreover, this work validated the findings of prior research. Similar to how Przybylski et al. (2013) found psychological need satisfaction (i.e., autonomy, competence, and relatedness) was inversely related to FoMO, we found an inverse relationship between FoMO and one's sense of control, meaningful existence, and belonging. Since our interaction of FoMO and condition was

Table 5 Multivariate multiple regression results for basic fundamental needs

Variables	Belonging			Control			Meaningful existence			Self-esteem		
	β	SE	t	η_p^2	β	SE	t	η_p^2	β	SE	t	η_p^2
Predictors												
Condition	-5.97***	0.56	-10.67	0.38	-3.94***	0.44	-8.87	0.30	-5.47***	0.56	-9.76	0.34
AA	-0.002	0.10	-0.03	0.00	-0.07	0.08	-0.93	0.01	0.03	0.10	0.34	0.00
FoMO	-0.20**	0.06	-3.37	0.06	-0.14**	0.05	-3.08	0.05	-0.15*	0.06	-2.48	0.03
AA × condition	-0.24	0.14	-1.73	0.02	-0.02	0.11	-0.14	0.01	-0.16	0.14	-1.16	0.01
FoMO × condition	0.08	0.08	0.93	0.01	0.12	0.07	1.88	0.00	-0.03	0.08	-0.39	0.00
Overall R^2	0.45				0.34				0.40			
Overall R^2_{adj}	0.44				0.33				0.39			

AA Attachment Anxiety, FoMO Fear of Missing Out; Condition: 0 – Inclusion, 1 – Exclusion

* $p < .05$; ** $p < .01$; *** $p < .001$

not statistically significant, it appears regardless of how included or excluded someone is, FoMO appears to dictate how ostracized they feel. Our results are divergent in the sense while Przybylski et al. (2013) found these associations between trait FoMO and trait psychological needs satisfaction, we found that trait FoMO predicted state feelings of similar constructs. Collectively, these findings further extend the FoMO literature by highlighting emotions and feelings individuals experience when they have FoMO. Alternatively, we did not find support that FoMO predicts self-esteem. It appears how one feels about oneself is less instrumental in how prone someone is to experience FoMO than anticipated. However, since it is viable that individuals scoring low in the domains of control, belongingness, and meaningful existence may have lower self-esteem as well, it is important for future FoMO research with self-esteem to include these factors to get a more authentic depiction of this relationship.

However, our results did not support our hypothesis that attachment anxiety would be a significant predictor of ostracism and basic fundamental needs. One reason why attachment anxiety was not a significant predictor of either construct could be due to the nature of how participants believed they were playing with two strangers in lieu of individuals close to them. Although people have dispositional attachment which influences their interactions with others (Bowlby, 1973), it is possible since the participants were not playing with individuals that constitute as an attachment figure (i.e., parent, romantic partner, or close friend), their sense of social exclusion may not have tapped into their fear of abandonment from close others which is likened to attachment anxiety (Bartholomew & Horowitz, 1991). Future research is encouraged to customize the likeness (e.g., name, appearance) of each Cyberball character to that of close others of the participant. It is possible the thought close others are excluding oneself may produce results different from those of the current study.

On a similar note, it is important to address how FoMO is inherently related to social information regarding the experiences one’s friend group does in their absence. Thus, to find FoMO severity predicted how ostracized people felt after they interacted with what they thought were strangers is fascinating. Similar to how customizing the likeness of Cyberball characters to that of attachment figures, altering the design of these characters so participants think they are playing with their social group may cause divergent results. Although it could be expected our results are more salient when individuals think their own friend group is excluding them, research by Iannone et al. (2014), to their surprise, found that participants felt worse when being excluded from Cyberball participants they thought were strangers than when they were close friends that excluded them. Thus, it is not straightforward to expect our findings to be stronger

in the event participants feel excluded from their friend group. More research is needed to understand the dynamics between ostracism and FoMO, specifically when considering the influence of being excluded from one's friend group.

Lastly, while inclusion/exclusion condition was a significant predictor of ostracism and each of the four fundamental needs, we did not find a significant interaction of FoMO and condition nor attachment anxiety and condition. Our interpretation of this finding is that while individuals in the ostracism condition reported feeling more ostracized and having worse sense of fundamental needs, it is possible that individuals in the inclusion condition who scored higher in FoMO desired more ball tosses than the 10 they received. While they did not, in a sense, “miss out” on the experience of the game, it may not have matched their desired quantity of ball tosses. In other words, they wanted more experience of tossing and receiving the ball to the other players than they received, and this discrepancy between desired and reality caused increases in ostracism and threatened three of the four basic needs assessed in this study.

Limitations

Despite that this study used a robust experimental paradigm for ostracism, there are some limitations to address. First, the sample consisted of primarily female and Caucasian undergraduate students. Future research should examine our findings with a sample that better reflects the demographics of society. Second, data was collected during the Coronavirus disease (COVID-19) global pandemic. Albeit it is not expected participating in this study during this time period would influence the results, it is important to address how COVID-19 impacted the lives of many, and the results of this study may have been indirectly affected. Third, while we explored the influence of individual differences in FoMO and attachment anxiety, we did not account for baseline mood in playing Cyberball which could have provided further understanding of our findings. Specifically, participants with negative emotions may have felt more excluded in comparison to participants with a positive mood. Fourth, although we found dispositional FoMO predicted ostracism scores, we did not examine if individuals experience FoMO after or while they are ostracized. Future research that incorporates a state measure of FoMO after Cyberball would further our understanding of ostracism and FoMO. Namely, do individuals experience FoMO when ostracized, or is it simply individuals with higher FoMO severity are more prone to experience ostracism? Validation for the former would further establish FoMO is not just a concern of missing out on rewarding experiences, but an apprehension one is socially excluded.

Fifth, although FoMO was found to account for variance in many of the concepts measured after the Cyberball

paradigm, it is important to note there still remains unexplained variance that future research is needed to identify. Sixth, while experimental condition (i.e., exclusion and inclusion) was a significant predictor of ostracism severity and each of the basic fundamental needs, we did not ask participants if they truly felt they were playing with human participants. It is possible our findings may have been different had we excluded participants who did not believe the tosses they received were from humans. Future research is encouraged to examine if the believability of the computer confederates being humans influences how excluded someone feels.

Conclusion

Limitations aside, the current study provides initial support that FoMO may not just be a concern of missing out on enjoyable experiences but may also reflect the underlying concern of social exclusion. Furthermore, this study contributed to the FoMO literature by indicating FoMO severity is inversely related with one's sense of control, belongingness, and meaningful existence. By understanding sentiments associated with FoMO, future research can continue to understand this phenomenon and, in turn, increase knowledge of human behavior.

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Author Contribution Alex J. Holte: Conceptualization, methodology, formal analysis, investigation, writing—original draft, and project administration. Wendy N. Fisher: Writing—review and editing and formal analysis. F. Richard Ferraro: Supervision and writing—review and editing.

Declarations

Ethics Approval and Consent to Participate All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all participants.

Conflict of Interest The authors declare no competing interests.

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