Psicothema

Article

The Association Between Dispositional Mindfulness and Need Threat Following Ostracism in Spanish Adolescents: The Moderating Role of Age

Estíbaliz Royuela-Colomer[1], Izaskun Orue[1], Dongning Ren[2], and Liria Fernández-González[1]
[1] University of Deusto, and [2] Tilburg University (The Netherlands)

Abstract

Background: Ostracism –being ignored and excluded– entails risks for adolescent mental health. Less is known about the factors that are negatively associated with the adverse consequences of ostracism. This study explored the association between dispositional mindfulness and need threat following social exclusion using the Cyberball paradigm. Sex and age were included as moderators of the relationship between dispositional mindfulness and need threat. Additionally, the factor structure of the Need Threat Scale (NTS) was analyzed in Spanish adolescents. **Method:** Participants (N = 750, 52.4% female; mean age = 14.51) completed a mindfulness questionnaire, were ostracized in the Cyberball game, and reported their need threat during this game. **Results:** Dispositional mindfulness was negatively associated with need threat only in older adolescents (>15 years old). Although girls reported higher levels of need threat than boys, sex did not moderate the association between mindfulness and need threat. **Conclusions:** This research suggests that dispositional mindfulness is only associated with NTS in older adolescents and girls are more vulnerable to the negative consequence of ostracism.

Keywords: Ostracism, mindfulness, Cyberball, adolescents, Need-Threat model.

Resumen

La Asociación Entre el Rasgo de Mindfulness y la Amenaza Percibida tras el Ostracismo en Adolescentes Españoles: el papel Moderador de la Edad. **Antecedentes:** el ostracismo –ser ignorado y excluido– conlleva riesgos para la salud mental de los adolescentes. Se sabe menos sobre los factores que se asocian negativamente con las consecuencias adversas del ostracismo. Este estudio exploró la asociación entre el rasgo de mindfulness y la amenaza percibida tras una situación de exclusión social utilizando el paradigma experimental Cyberball. Se incluyeron el sexo y la edad como moderadores de la relación entre el rasgo de mindfulness y la amenaza percibida. Adicionalmente, se analizó la estructura del cuestionario de Amenaza Percibida (NTS) en adolescentes españoles. **Método:** los participantes (N = 750, 52,4% chicas; edad media = 14,51) completaron un cuestionario de mindfulness, fueron excluidos en el Cyberball e indicaron la amenaza percibida tras el juego. **Resultados:** el rasgo de mindfulness se asoció negativamente con la amenaza percibida solo en los adolescentes más mayores (>15años). Aunque las chicas reportaron mayores niveles de amenaza percibida, el sexo no moderó la asociación entre mindfulness y amenaza percibida. **Conclusiones:** esta investigación sugiere que el rasgo de mindfulness solo se asocia con la amenaza percibida en los adolescentes mayores y que las chicas son más vulnerables a las consecuencias negativa del ostracismo.

Palabras clave: ostracismo, mindfulness, Cyberball, adolescentes, modelo Necesidad-Amenaza.

Social interactions with peers are essential for psychological development in youth (Sroufe et al., 2009). Ostracism —i.e., being ignored and excluded (Williams, 2007)— is a harmful experience, leading to a range of negative consequences, including negative emotions, threat to fundamental needs, anxiety, depression, and suicidal thoughts (Abrams et al., 2011; Chen et al., 2020; Ruggieri et al., 2013; Timeo et al., 2019). Situations of ostracism are common among young people, who are especially vulnerable to the negative consequences of social rejection (Abrams et al.,

2011; Pharo et al., 2011). Despite the benefits of the internet and social media as a means of communication and socializing among adolescents, they also pose risks and can promote victimization during which adolescents are ignored, excluded, or rejected online (Machimbarrena et al., 2018; Reid & Weigle, 2014). Because instances of exclusion via the internet can be discrete, persistent, and in some cases unnoticed by adults (Cassidy et al., 2013), it is of utmost importance to explore which factors are negatively associated with ostracism's adverse effects in adolescence. However, there is a lack of studies exploring this. We specifically focused on dispositional mindfulness (DM), a well-established factor for psychological health in youth (Brown et al., 2011; Pallozzi et al., 2017; Tomlinson et al., 2018). Our central research question was whether DM is associated with a threat to fundamental needs following computer-mediated ostracism and if this association depends on age or sex. Additionally, since previous

studies assessed ostracism distress by the need threat scale (NTS; Williams et al., 2000), no research was found that used NTS among Spanish adolescents; we first adapted the NTS and explored its psychometric properties in this sample.

Williams proposed the temporal need threat model of ostracism to describe how individuals respond to ostracism (for a review, see Williams, 2007). According to this model, during the initial reflexive stage, individuals experience social pain, negative mood, and a threat to four basic psychological needs: need to belong, self-esteem, control over the social environment, and meaningful existence. Research using Cyberball—a virtual ball-tossing game in which ostracism is manipulated (Williams & Jarvis, 2006)—has shown that these four needs are threatened in adults (Chen et al., 2020; Williams et al., 2000) and youth (Pharo et al., 2011; Ruggieri et al., 2013).

The most widely used tool for studying cyber ostracism is Cyberball (for a review, see Williams, 2007). During Cyberball, participants believe that they are playing online with two other players who are part of the computer program. The exclusion condition is programmed so that the participant only receives the ball two or three times at the beginning of the game. Typical Cyberball studies include 30 throws and last around 5 minutes. Evidence from a meta-analysis of 120 Cyberball studies found a large effect of ostracism (i.e., $d > |1.4|$), which supports its adequacy for psychology research (Hartgerink et al., 2015). Since most of the included studies in this meta-analysis focused on young adults, with few studies examining adolescent samples, the authors claimed that more research is needed to explore ostracism mechanisms across development. Studies comparing the consequences of ostracism following Cyberball among adults and youth reported differences, such as greater affective consequences and more substantial cognitive impairment, in adolescents compared with adults, and a differential impact on fundamental needs (Abrams et al., 2011; Sebastian et al., 2010; Tang et al., 2019).

Since ostracism situations occur frequently among youth, it is essential to prevent and reduce their negative impact and explore the negatively associated factors with ostracism distress once it has occurred. Timeo et al. (2019) proposed mindfulness as a coping strategy that may counteract the adverse effects of ostracism in youth. *Mindfulness* is the awareness that emerges through paying attention on purpose in the present moment and nonjudgmentally to the experience moment by moment (Kabat-Zinn, 2003, p. 145). DM is a trait that can be cultivated and developed through practice. Studies among adolescents associated DM with less internalizing and externalizing symptoms, an increase in wellbeing, and a reduction in cyberbullying victimization stability (Brown et al., 2011; Calvete et al., 2014; Pallozzi et al., 2017; Royuela-Colomer et al., 2018). However, to our knowledge, no study has directly examined ostracism and DM in adolescents.

There are several reasons to expect an association between DM and ostracism during adolescence. Studies among adults revealed an association between DM and the consequences of social exclusion. For example, one study showed that after receiving little attention on social media, individuals with high levels of DM reported less psychological distress than those with low DM levels (Poon & Jiang, 2020). Moreover, a neuroimaging study found that during Cyberball, DM predicted a reduction in activity and connectivity of brain regions associated with social distress and inhibition of negative affect, resulting in better emotion regulation and less distress following social exclusion (Martelli et al., 2018). These studies suggest that DM decreases emotional reactivity following ostracism and helps people cope with unpleasant emotional states by adopting more suitable emotion regulation strategies.

The evidence indicates that DM is related to emotion regulation. A recent review concluded that DM is associated with psychological health by improving emotional processing and regulation, being less reactive to stressful situations, and responding more appropriately (Tomlinson et al., 2018). Specifically, DM is related to rumination, a maladaptive emotion regulation strategy characterized by repetitively focusing on the symptoms, consequences, and causes of distress (Nolen-Hoeksema et al., 2008). Some authors have suggested that DM is associated with fewer psychological symptoms through reducing rumination (Jury & Jose, 2019). In the context of ostracism, Wesselmann et al. (2013) observed that rumination impeded recovery after ostracism by prolonging distress. Therefore, it could be that individuals with higher levels of DM ruminate less, thus reducing the impact of ostracism on their well-being. While these studies demonstrated the potential of DM in diminishing the effects of social exclusion, none of them focused on adolescents, who may be more vulnerable to ostracism experiences. Because DM is associated with better emotion regulation strategies in adolescents, including rumination (Pallozzi et al., 2017), one might expect to find an association between DM and need threat and extend previous knowledge among adults to this developmental period.

This study's main goal was to explore the association between DM and need threat during the Cyberball task and whether sex and age moderated the association. We hypothesized that DM would be negatively associated with need threat following ostracism. Furthermore, since previous studies reported higher levels of DM among adolescent males (Brown et al., 2011; Calvete et al., 2014), and in some cases, a different association with psychological symptoms in favor of males (Calvete et al., 2019), we hypothesized that DM would be more beneficial in males. Additionally, we included age as a moderator because developmental changes that occur through adolescence can influence our results. For example, the maturation of brain regions associated with cognitive processing is important for benefiting from mindfulness interventions (Zoogman et al., 2015), which are closely related to DM. Moreover, Pharo et al. (2011) found that ostracism increases throughout adolescence. Therefore, we hypothesized that the effect of DM on need threat would increase with age.

In addition to our main research question, we also used this opportunity to adapt and gather validity evidence for the need threat scale (NTS) in Spanish adolescents. Although NTS has been widely used in the ostracism literature, this scale's factor structure remains unclear. Following previous studies, we tested four models using confirmatory factor analysis (CFA): the original 4-factor structure (Williams et al., 2000), a unidimensional model (Gerber et al., 2017; Williams et al., 2000), a 2-factor structure—composed of the positively and negatively worded items—(Gerber et al., 2017), and a second unidimensional model controlling for the positively and negatively worded items.

Method

Participants

The sample consisted of 750 high school students from two schools in Vitoria-Gasteiz, Spain (52.40% female; age ranged

from 11 to 18, M_{age} = 14.51, SD_{age} = 1.43). Following the Spanish Society of Epidemiology and the Spanish Society of Family and Community Medicine (2000) guidelines, participants' socioeconomic status was 4.1% low, 11.8% low-medium, 26.9% medium, 47.6% medium-high, and 9.6% high.

Instruments

Mindfulness. The *Mindful Attention Awareness Scale-Adolescents* (MAAS-A; Brown et al., 2011; Calvete et al., 2014) is a 14-item self-report questionnaire that measures DM as paying attention to, and awareness of, what is occurring in the present. An example item is, "I find myself preoccupied doing things without paying attention." Students rated each statement using a 6-point scale ranging from 1 (*almost never*) to 6 (*almost always*). Items were recoded so that higher scores reflected higher DM levels, and we computed the mean score. The internal consistency in the present study (α = .78) was comparable to those reported in past studies (Calvete et al., 2014).

Cyberball. Using the typical cover story of Cyberball (Williams et al., 2000; Williams & Jarvis, 2006), participants were led to believe that they were engaging in a mental visualization exercise by playing an online ball-tossing game with two peers from another school taking part in the same study. Participants had to visualize the experience mentally (e.g., where they were or whom they were playing with; the instructions' full text is available in https://osf.io/6b42r/). In reality, the other players were computerized confederates and preprogrammed to exclude the participants from the online ball-tossing game. The game lasted three minutes and consisted of 20 ball tosses; the participants initially received three ball tosses and then no more.

Need Threat Scale. After Cyberball, participants completed a brief version of the need threat scale (NTS; Williams et al., 2000; Zadro et al., 2004). Because there is no Spanish version of the NTS, we translated the original version following the International Test Commission Guidelines for test translation and adaptation (Muñiz et al., 2013). Permission was requested from the original author to translate the scale. One researcher translated the scale, a second researcher edited the translation, and a third researcher approved the final version. All the researchers were fluent in both Spanish and English. The final version was sent to the original author (The translated scale is available in https://osf.io/6b42r/). The scale included 12 items with three items per need: belonging (e.g., "I felt poorly accepted by the other participants"), self-esteem (e.g., "During the Cyberball game, I felt good about myself"), control over the social environment (e.g., "I felt that I was able to throw the ball as often as I wanted during the game"), and meaningful existence (e.g., "I felt non-existent during the Cyberball game"). Previous studies reported adequate psychometric properties among adolescents (Pharo et al., 2011).

Procedure

This is a correlational study. The ethics committee of the University of Deusto approved the study in September 2019. We first contacted the principals of the schools. Once the schools agreed to participate in the study, we informed the families about the study. Finally, we presented the study in the classroom, and students who agreed to participate and had their parents' permission were included in the study.

Participants completed the study in class at their computers using Qualtrics®. First, they provided demographic information and completed the mindfulness questionnaire. Next, all participants played the Cyberball game in which they were excluded and reported their experience during the game with NTS. A psychologist delivered the instructions, including the cover story of the Cyberball. When all the school classes had completed the study, the participants were debriefed and provided with the research team's contact information. Finally, we raffled a 20-euro shopping voucher as compensation for their participation.

Data Analysis

We conducted data analysis using IBM SPSS (Version 26) and R (Version 1.3.1056). Missing values were handled through the SPSS Missing Values Analysis with the expectation-maximization algorithm. Items from the questionnaires had any or less than 0.90% of missing values, and were distributed completely at random, Little's MCAR test (1988): χ^2 (118) = 140.73, p = .075, for the MAAS-A; and χ^2 (68) = 59.23, p = .767 for the NTS, indicating that MCAR may be inferred (Tabachnick & Fidell, 2013). Therefore, the missing data were imputed at the item level for each subscale. CFA was computed using the R package Lavaan (Rosseel, 2012) and employed maximum likelihood (ML) estimation with robust standard errors and a Satorra-Bentler scaled test statistic (Satorra & Bentler, 2001). The model's goodness of fit was evaluated with the comparative fit index (CFI), the Tucker Lewis index (TLI), the Akaike information criterion (AIC), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMS). Generally, acceptable fit is indicated by CFI and TLI values of .90 or higher, RMSEA values lower than .08, SRMS values lower than .08, and the lowest values of AIC indicate the best model (Little, 2013).

Moderation analyses were computed in SPSS using hierarchical regression analysis. Continuous predictor variables were converted to z scores, and sex was coded as female = 0 and male = 1. In the first step, we entered sex and age as predictors. In the second step, we added DM as a third predictor. Finally, in the third step, the two-way interaction terms of DM with sex and DM with age were introduced. The Interactions package (Long, 2019) in R was used to explore and plot the interactions. We conducted a simple slope analysis, bootstrapped CI and applied the Jonshon-Neyman method. To correct for heteroscedasticity, the standard error estimates and significance tests were computed using the HC3 estimator (Hayes & Cai, 2007).

Results

Need Threat Scale: Psychometric Properties

To examine the NTS structure, we conducted four CFA models. The 4-factor correlated model (Model 1)—corresponding to the four needs—with three items loading onto each factor had a poor fit. The covariance matrix was non-positive definite, indicating high collinearity of the items and factors. Indeed, the correlation between the factors was high (-.96 to .98), which indicates that this model was not adequate. The 2-factor model (Model 2), with two factors corresponding to the ones obtained in the exploratory factor analysis by Gerber et al. (2017), fit the data well. The unidimensional model, representing a general need threat (Model

3), yielded an acceptable fit index, but factor loadings for items 5 and 10 were non-significant. Because the 2-factor model corresponds to positively and negatively worded items and suspecting of measurement artifact associated with the wording of the items, following Brown's (2015) recommendations, we tested a unidimensional model with correlated errors for negatively worded items (Model 4). This model yielded better fit indices. However, items 5 and 10 factor loadings were non-significant and had an R^2 of .001 and .003, respectively. Moreover, the item-total correlation of these two items was low (.12 and .05 for items 5 and 10), and they correlated negatively with some other items. Table 1 presents the correlation matrix. Considering all the above, we decided to test a fifth model: a unidimensional model removing items 5 and 10 (Model 5). The fit indices from this model were similar to those obtained for the 12-item model with correlated errors. All factor loadings were significant, and the lower AIC (compared to the 12-item model) suggested that the 10-item model was more parsimonious. Moreover, internal consistency increased from .80 to .83 after removing items 5 and 10. Table 2 shows a summary of

the tested models. Figure 1 displays the factor loadings for the 10-item unidimensional model.

Mindfulness and Need Threat

The results were calculated using the 10-item version of the NTS. Table 3 shows descriptive statistics, zero-order associations, and sex differences. There was a small but significant negative correlation between DM and NTS, and between DM and age. Age correlated positively with NTS. T-tests releveled sex differences in both DM and need threat: girls, compared with boys, scored significantly higher on NTS and lower on DM.

The hierarchical regression analyses are displayed in Table 4. The analyses revealed that, while controlling for sex and age, DM scores did not significantly predict need threat. However, the interaction between DM and age was significant. To unpack this interaction effect, we conducted simple slope analyses with robust SE and bootstrapped CI ($N = 1,000$). The results revealed that DM was associated with NTS in older adolescents (one *SD* above the

Table 1
Inter-Item and Item-Total Correlation Matrix for the 12-item Need Threat Scale (NTS; Williams et al., 2000; Zadro et al., 2004)

	1	2	3	4	5	6	7	8	9	10	11	12	Item-Total
1	–												.36
2	.15**	–											.53
3	.22**	.39**	–										.41
4	.18**	.53**	.37**	–									.56
5	.11**	.00	-.05	-.03	–								.12
6	.31**	.55**	.38**	.62**	.05	–							.73
7	.29**	.08*	.02	.11**	.28**	.21**	–						.32
8	.24**	.43**	.42**	.50**	-.04	.55**	.09*	–					.58
9	.21**	.10**	.00	.09*	.27**	.19**	.45**	.11**	–				.29
10	.11**	-.09*	-.09*	-.07*	.23**	-.04	.24**	-.03	.23**	–			.05
11	.26**	.48**	.38**	.48**	.06	.69**	.20**	.56**	.18**	.01	–		.70
12	.17**	.42**	.32**	.44**	.05	.59**	.16**	.45**	.14**	-.02	.66**	–	.59

Note: * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed)

Table 2
Model Fit Indices for the Alternative Models Tested in the Confirmatory Factor Analysis of the Need Threat Scale

	Models tested	X² S-B	df	CFI	TLI	AIC	RMSEA [CI]	SRMR
1	**4-Factor model**	381.948**	48	0.843	0.784	28901.988	0.110** [0.100; 0.120]	0.093
2	**2-Factor model**	225.962**	53	0.925	0.906	28666.569	0.072** [0.063; 0.082]	0.070
3	**Unidimensional model A**	434.308**	54	0.820	0.780	28961.175	0.111** [0.101; 0.121]	0.094
4	**Unidimensional model B**	162.885**	44	0.948	0.921	28611.686	0.066* [0.056; 0.077]	0.038
5	**Unidimensional model C**	147.515**	32	0.945	0.922	23756.191	0.078** [0.065; 0.091]	0.040

Note: * $p < .05$. ** $p < .01$ level
X² S-B = Satorra-Bentler scaled chi-square test, CFI = Comparative Fit Index, TLI = Tucker Lewis Index, AIC = Akaike's Information Criterion, RMSEA = Root Mean Square Error of Approximation, SRMR = Standardized Root Mean Square Residual.
4-Factor model: 4 correlated factors: Belonging, Meaningful existence, Self-esteem and Sense of control, 2-Factor model: 2 correlated factors: negative and positive worded items, Unidimensional model A: one general need threat factor, Unidimensional model B: one general need threat factor with Correlated Errors for inverse items, Unidimensional model C: one general need threat factor without items 5 and 10 and with Correlated Errors for inverse items
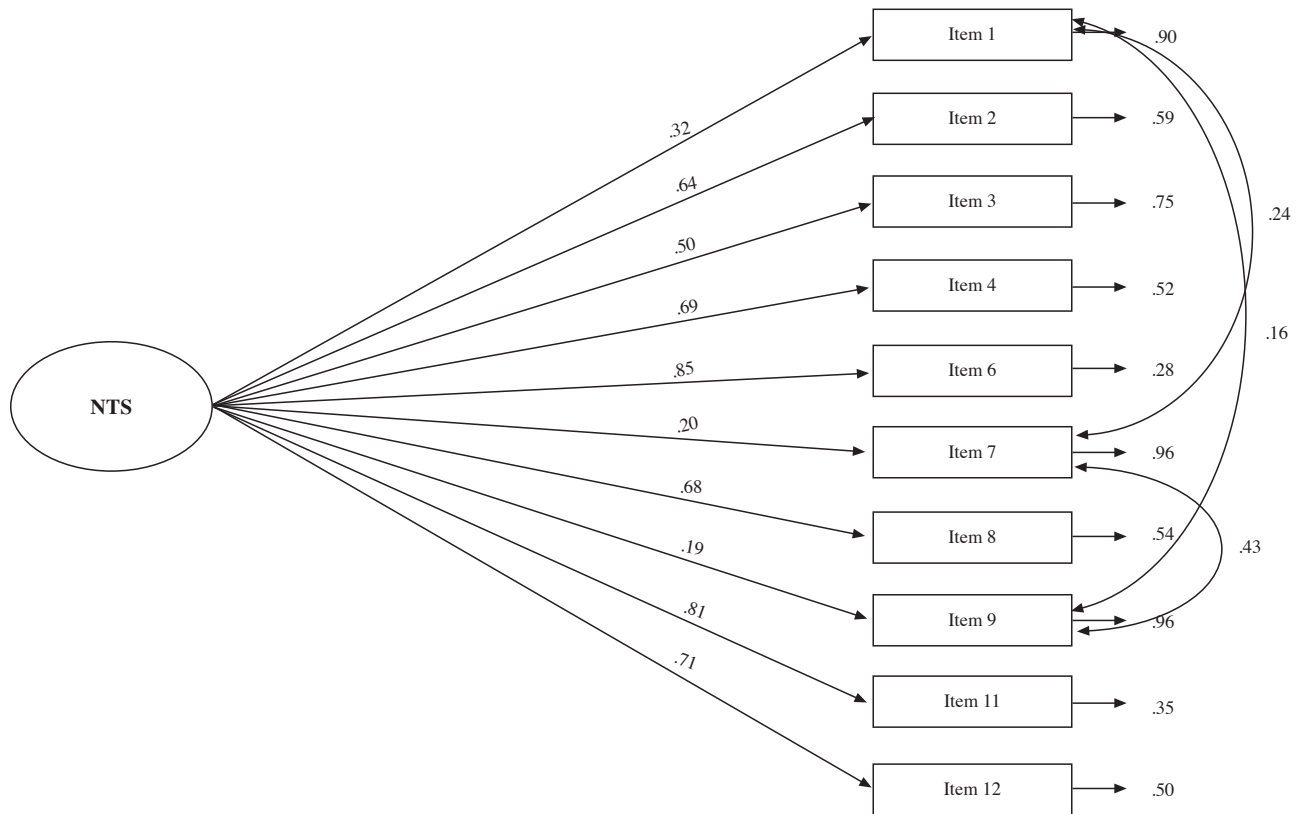
Figure 1. Need Threat Scale Factor Loadings for the 10-item Unidimensional Model with Correlated Errors for Inverse Items

Table 3
Dispositional Mindfulness and 10-item Need Threat Scale Total Scores; Sex Differences; and Pearson Correlations

	Total Sample (N = 750)		Female (n = 393)		Male (n = 357)		t	p	d	Zero-order correlations		
	M	*SD*	*M*	*SD*	*M*	*SD*					NTS	Age
MAAS-A	4.3	0.74	4.24	0.75	4.38	0.72	2.61	.009	0.19	MAAS-A	-.08*	-.19**
NTS	3.68	0.89	3.86	0.82	3.49	0.92	5.89	< .001	0.43	NTS		.10**

Note: *P < 0.05 **P < 0.01
Total scores are computed as the mean of items.
MAAS-A = Mindfulness Attention Awareness Scale Adolescents; NTS = Need Threat Scale

Table 4
Hierarchical Regression for 10- item Version of the Need Threat Scale with Mindfulness as a Predictor, and Age and Sex Interaction Effects

Variable	B	SE B	ß	t	p	95% CI for B	R²	Δ R²
Step 1							.05	.05***
Sex[a]	-0.35	0.06	-0.20	-5.39	<.001	[-0.47, -0.22]		
Age	0.08	0.03	-0.10	2.59	.010	[0.02, 0.15]		
Step 2							.06	.01
Mindfulness	-0.02	0.04	-0.02	-0.44	.660	[-0.11, 0.07]		
Step 3							.06	.01
Mindfulness*Age	-0.07	0.03	-0.08	-2.06	.040	[-0.13, -0.01]		
Mindfulness* Sex[a]	-0.06	0.07	-0.05	-0.95	.341	[-0.19, 0.07]		

Note: CI = Confidence interval: lower, upper limit. Predictors (age and mindfulness) are standardized
[a] Female = 0; Male = 1

average age: B = -0.12, SE = 0.05, t = -2.38, p = .02, 95% CI [.02, .22]), whereas it was non-significant in younger adolescents (one *SD* below the average age: B = 0.02, SE = 0.05, t = 0.39, p = .69, 95% CI [-.05, .08]), or in adolescents of average age (B = -0.05; SE = 0.03; t = -1.45; p = .15, 95% CI [-.11, .02]). Figure 2 represents this moderation. The Johnson-Neyman interval indicated that the slope of DM is p < .05 when age is inside the interval [0.31, 86.62] and the range of observed values of age is [-1.90, 2.83]. A z value of 0.31 corresponds to a raw value of 14.96.

Discussion

This study examined the association between DM and need threat following ostracism after the Cyberball among Spanish adolescents, and whether sex and age moderated the association. Additionally, we translated and explored the structure of the NTS. Regarding DM, the results partially support our hypothesis. As predicted, there was a small negative correlation between DM and need threat, but this association was not significant over and above sex and age. While age moderated the association between DM and need threat, sex did not. The findings suggested that in our sample, NTS was best conceptualized as a 10-item unidimensional measure of need threat.

As hypothesized, the results indicated that DM was more beneficial to older adolescents. Zoogman et al. (2015), who found a positive association between age and mindfulness interventions' effects in adolescence, suggested that adolescents need higher cognitive development to benefit from mindfulness. A recent study including young and older adults found that mindfulness becomes especially important for wellbeing with advancing age (Mahlo & Windsor, 2021). Another possible reason is that our results were affected by the difficulty in responding to the items from the mindfulness questionnaire, which are negatively worded and

might have influenced younger adolescents' responses. As a recent study suggested, younger adolescents' cognitive development level might diminish adequate understanding of mindfulness items (Cortazar et al., 2020).

In this study, DM's effect was small. These results seem to be consistent with Williams's need threat model (2009) and other studies that consistently demonstrated that ostracism is universal and its initial impact does not vary according to personality characteristics (McDonald & Brent Donnellan, 2012). Similarly, a study among adults found that brief mindfulness practice was not beneficial immediately after the ostracism episode but only after a delay (Molet et al., 2013). A possible explanation that Molet et al. (2013) presented is that an individual with low levels of DM will ruminate more after the ostracism episode, which might increase distress. However, this does not happen immediately but after a while, when the person has been ruminating for some time. For that reason, DM might be beneficial in the long term following ostracism.

Because there was no Spanish adaptation for adolescents of the NTS, we translated and explored its structure in our sample. As Williams et al. (2000) proposed in the original version, some authors used the NTS as a measure of four distinct needs (Chen et al., 2020; Ruggieri et al., 2013; Zadro et al., 2004), while others employed it as a composite score of need threat (Tang et al., 2019; van Beest & Williams, 2006). However, Williams et al. (2000) did not explore the scale's internal structure, and the four-factor structure has never been empirically demonstrated. In line with previous studies (Gerber et al., 2017), the current study does not support a 4-factor structure of the NTS among Spanish adolescents but a unidimensional measure of need threat. Moreover, in our sample, two items did not load significantly into the common factor (item 5: "I felt as though I had made a 'connection' or bonded with one or more of the participants during the Cyberball
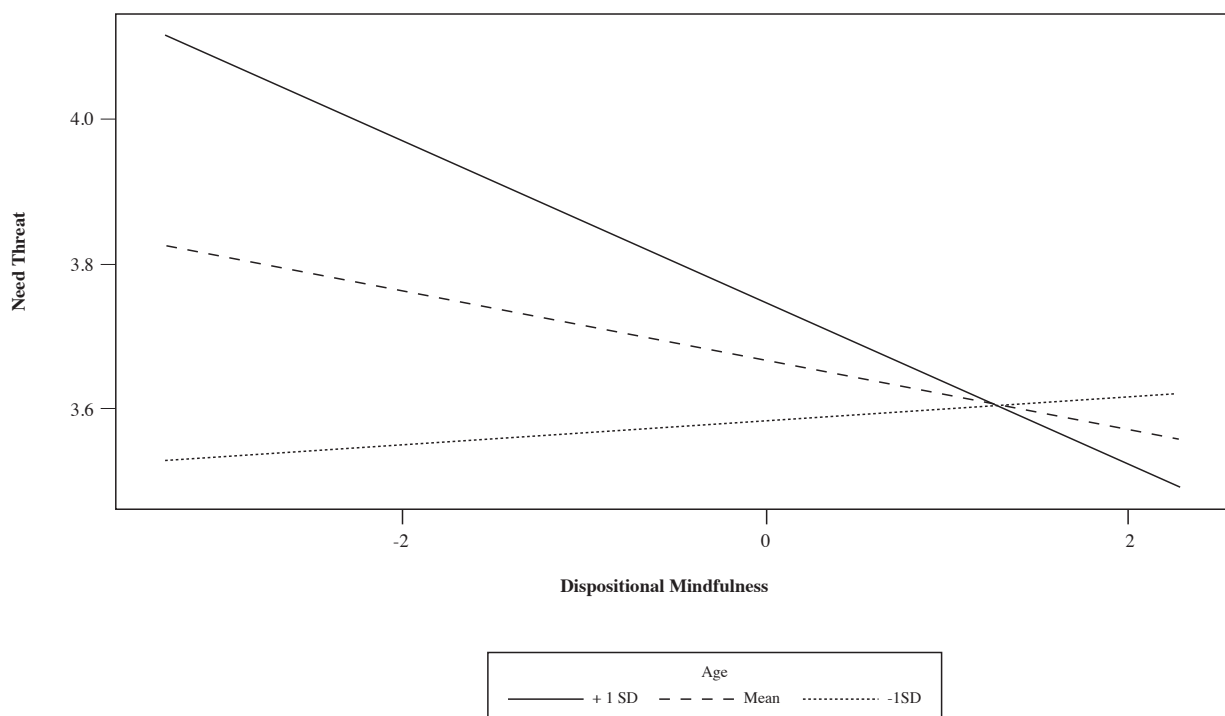
Figure 2. The Association between Need Threat and Mindfulness Moderated by Age

game" and item 10: "I felt that my performance [e.g. catching the ball, deciding whom to throw the ball to] had some effect on the direction of the game"). Thus, we removed these items because they might have been challenging for adolescents to understand. Indeed, both items contain more words than the rest of the items, which might have increased its reading difficulty, compromising its understanding. This study's findings support the idea that NTS is a general measure of need threat, which was assumed in previous studies among adolescents (Bolling et al., 2011).

In line with previous studies, we found that age affects the impact of ostracism (Bolling et al., 2011; Pharo et al., 2011; Sebastian et al., 2010; Tang et al., 2019). The fact that older adolescents showed higher levels of need threat might indicate an increase in interpersonal stress sensitivity during adolescence (Abrams et al., 2011; Crone & Konijn, 2018). Previous literature suggests that ostracism's consequences are less severe in adults than in youth (Pharo et al., 2011; Sebastian et al., 2010), suggesting a nonlinear relationship, which was recently prosed (Tang et al., 2019). Indeed, it seems that there is a curvilinear relationship across the lifespan with an increase of need threat from childhood and early adolescence to older adolescence and a decrease through adulthood.

Finally, regarding sex, the results revealed that the girls, compared with the boys, seemed to be more vulnerable to need threat after the Cyberball. This result contradicts the meta-analysis of Hartgerink et al. (2015), which did not find sex differences in need threat. The lack of sex differences in Hartgerink et al. (2015) might be explained by the overrepresentation of studies containing adult samples, and ostracism might work differently across development. The idea of a developmental influence in sex differences in ostracism is supported by a study that found an impairment in cognitive performance following ostracism only in young adolescent girls but not in boys (Hawes et al., 2012). These authors suggested that female adolescents ruminating more in the presence of interpersonal stress than males explains sex differences. The response styles theory (Nolen-Hoeksema et al., 2008) postulates that the dramatic increase in rumination suffered by girls (but not boys) during middle adolescence might explain why adolescent girls tend to have more internalizing symptoms compared with boys. Therefore, the fact that rumination prolongs distress following ostracism (Wesselmann et al., 2013) could explain differences in need threat.

These findings have significant implications for the understanding of ostracism during adolescence. Regarding the association between DM and need threat following ostracism, teachers and other professionals who might want to foster DM in adolescents to reduce social exclusion impact should be aware that the beneficial role might be present in older adolescents, but more research is needed on younger adolescents. This study provides evidence on the association between DM and ostracism by suggesting a negative association between DM and adverse

consequences of ostracism, expanding previous studies which suggested an association between DM and being less likely to ostracize (Jones et al., 2019).

Regarding need threat, this study's findings suggest that among Spanish adolescents, the NTS represents general need threat instead of individual needs. Interestingly, ostracism's effects might be more severe among older adolescents and girls; therefore, prevention and intervention programs should focus mainly on these two groups.

This study is limited in several ways. First, the unidimensional structure of the NTS is limited to our sample of Spanish adolescents and Zadro's (2004) version of NTS. This structure might differ in versions of the NTS that include more items or with other samples. Thus, future studies should examine whether using other samples or different NTS versions yields a 4-factor structure. Second, part of the sample included early adolescents, who might have had difficulties responding to some complicated items. However, our sample covers all stages of adolescence, providing a broad developmental perspective. Third, we assessed DM as a unidimensional construct of acting with awareness; some authors argue that mindfulness is a multifaceted construct (Baer et al., 2008); thus, future studies should address whether need threat is related to other facets of mindfulness. Finally, our results are limited to the design's cross-sectional nature, making it impossible to determine the association's direction. Indeed, some authors have suggested that long-term victimization diminishes DM in adolescents (Riggs & Brown, 2017). Therefore, future studies should examine the association between need threat and DM longitudinally. A key strength of the present study was the sample size, which is larger than previous studies using adolescent samples (Pharo et al., 2011; Ruggieri et al., 2013).

In an era where social media seems to play a big part in adolescents' social life and they are vulnerable and subject to social exclusion and rejection, it is essential to understand ostracism's consequences and protective mechanisms. This study extends previous knowledge in three ways: first, we adapted and translated the NTS for its use in Spanish adolescents; second, we found that girls and older adolescents suffer more distress following ostracism; and third, we found that DM is negatively associated with need threat in older, but not in younger adolescents.

<div align="center">Acknowledgements</div>

<div align="center">References</div>

Abrams, D., Weick, M., Thomas, D., Colbe, H., & Franklin, K. M. (2011). On-line ostracism affects children differently from adolescents and adults. *British Journal of Developmental Psychology*, *29*(1), 110-123. https://doi.org/10.1348/026151010X494089

Baer, R. A., Smith, G. T., Lykins, E., Button, D., Krietemeyer, J., Sauer, S., Walsh, E., Duggan, D., & Williams, J. M. G. (2008). Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. *Assessment*, *15*(3), 329-342. https://doi.org/10.1177/1073191107313003

Bolling, D. Z., Pitskel, N. B., Deen, B., Crowley, M. J., Mayes, L. C., & Pelphrey, K. A. (2011). Development of neural systems for processing social exclusion from childhood to adolescence. *Developmental Science*, *14*(6), 1431-1444. https://doi.org/10.1111/j.1467-7687.2011.01087.x

Brown, K. W., West, A. M., Loverich, T. M., & Biegel, G. M. (2011). Assessing adolescent mindfulness: Validation of an adapted Mindful Attention Awareness Scale in adolescent normative and psychiatric populations. *Psychological Assessment*, 23(4), 1023-1033. https://doi.org/10.1037/a0021338

Brown, T. A. (2015). *Methodology in the social sciences. Confirmatory factor analysis for applied research* (2nd ed.). The Guilford Press.

Calvete, E., Morea, A., & Orue, I. (2019). The role of dispositional mindfulness in the longitudinal associations between stressors, maladaptive schemas, and depressive symptoms in adolescents. *Mindfulness*, 10(3), 547-558. https://doi.org/10.1007/s12671-018-1000-6

Calvete, E., Sampedro, A., & Orue, I. (2014). Adaptation of the Mindful Attention Awareness Scale-Adolescents (MAAS-A) to assess the mindfulness trait in Spanish adolescents. *Psicología Conductual Behavioral Psychology*, 22(2), 277-291.

Cassidy, W., Faucher, C., & Jackson, M. (2013). Cyberbullying among youth: A comprehensive review of current international research and its implications and application to policy and practice. *School Psychology International*, 34(6), 575-612. https://doi.org/10.1177/0143034313479697

Chen, Z., Poon, K.-T., DeWall, C. N., & Jiang, T. (2020). Life lacks meaning without acceptance: Ostracism triggers suicidal thoughts. *Journal of Personality and Social Psychology*, 119(6), 1423-1443. https://doi.org/10.1037/pspi0000238

Cortazar, N., Calvete, E., Fernández-González, L., & Orue, I. (2020). Development of a short form of the Five Facet Mindfulness Questionnaire-Adolescents for children and adolescents. *Journal of Personality Assessment*, 102(5), 641-652. https://doi.org/10.1080/00223891.2019.1616206

Crone, E. A., & Konijn, E. A. (2018). Media use and brain development during adolescence. *Nature Communications*, 9(1), 1-10. https://doi.org/10.1038/s41467-018-03126-x

Gerber, J. P., Chang, S.-H., & Reimel, H. (2017). Construct validity of Williams' ostracism needs threat scale. *Personality and Individual Differences*, 115, 50-53. https://doi.org/10.1016/j.paid.2016.07.008

Hartgerink, C. H. J., van Beest, I., Wicherts, J. M., & Williams, K. D. (2015). The ordinal effects of ostracism: A meta-analysis of 120 Cyberball studies. *PLOS ONE*, 10(5), e0127002. https://doi.org/10.1371/journal.pone.0127002

Hawes, D. J., Zadro, L., Fink, E., Richardson, R., O'Moore, K., Griffiths, B., Dadds, M. R., & Williams, K. D. (2012). The effects of peer ostracism on children's cognitive processes. *European Journal of Developmental Psychology*, 9(5), 599-613. https://doi.org/10.1080/17405629.2011.638815

Hayes, A. F., & Cai, L. (2007). Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation. *Behavior Research Methods*, 39(4), 709-722. https://link.springer.com/content/pdf/10.3758/BF03192961.pdf

Jones, E. E., Wirth, J. H., Ramsey, A. T., & Wynsma, R. L. (2019). Who is less likely to ostracize? Higher trait mindfulness predicts more inclusionary behavior. *Personality and Social Psychology Bulletin*, 45(1), 105-119. https://doi.org/10.1177/0146167218780698

Jury, T. K., & Jose, P. E. (2019). Does rumination function as a longitudinal mediator between mindfulness and depression? *Mindfulness*, 10(6), 1091-1104. https://doi.org/10.1007/s12671-018-1031-z

Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144-156. https://doi.org/10.1093/clipsy/bpg016

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *Journal of the American Statistical Association*, 83(404), 1198-1202. https://doi.org/10.1080/01621459.1988.10478722

Little, T. D. (2013). *Longitudinal structural equation modeling*. The Guilford Press.

Long, J. A. (2019). *Interactions: Comprehensive, User-Friendly Toolkit for Probing Interactions*. https://cran.r-project.org/package=interactions.

Machimbarrena, J. M., Calvete, E., Fernández-González, L., Álvarez-Bardón, A., Álvarez-Fernández, L., & González-Cabrera, J. (2018). Internet Risks: An Overview of Victimization in Cyberbullying, Cyber Dating Abuse, Sexting, Online Grooming and Problematic Internet Use. *International Journal of Environmental Research and Public Health*, 15(11), 2471. https://doi.org/10.3390/ijerph15112471

Mahlo, L., & Windsor, T. D. (2021). Older and more mindful? Age differences in mindfulness components and well-being. *Aging & Mental Health*, 25(7), 1320-1331. https://doi.org/10.1080/13607863.2020.1734915

Martelli, A. M., Chester, D. S., Warren Brown, K., Eisenberger, N. I., & DeWall, C. N. (2018). When less is more: Mindfulness predicts adaptive affective responding to rejection via reduced prefrontal recruitment. *Social Cognitive and Affective Neuroscience*, 13(6), 648-655. https://doi.org/10.1093/scan/nsy037

McDonald, M. M., & Brent Donnellan, M. (2012). Is ostracism a strong situation? The influence of personality in reactions to rejection. *Journal of Research in Personality*, 46(5), 614-618. https://doi.org/10.1016/j.jrp.2012.05.008

Molet, M., Macquet, B., Lefebvre, O., & Williams, K. D. (2013). A focused attention intervention for coping with ostracism. *Consciousness and Cognition*, 22(4), 1262-1270. https://doi.org/10.1016/j.concog.2013.08.010

Muñiz, J., Elosua, P., Hambleton, R. K., & International Test Commission (2013). Directrices para la traducción y adaptación de los tests: segunda edición [International Test Commission Guidelines for test translation and adaptation: Second edition]. *Psicothema*, 25(2), 151-157. https://doi.org/10.7334/psicothema2013.24

Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3(5), 400-424. https://doi.org/10.1111/j.1745-6924.2008.00088.x

Pallozzi, R., Wertheim, E., Paxton, S., & Ong, B. (2017). Trait mindfulness measures for use with adolescents: A systematic review. *Mindfulness*, 8(1), 110-125. https://doi.org/10.1007/s12671-016-0567-z

Pharo, H., Gross, J., Richardson, R., & Hayne, H. (2011). Age-related changes in the effect of ostracism. *Social Influence*, 6(1), 22-38. https://doi.org/10.1080/15534510.2010.525852

Poon, K.-T., & Jiang, Y. (2020). Getting less likes on social media: Mindfulness ameliorates the detrimental effects of feeling left out online. *Mindfulness*, 11(4), 1038-1048. https://doi.org/10.1007/s12671-020-01313-w

Reid, D., & Weigle, P. (2014). Social Media Use among Adolescents: Benefits and Risks. *Adolescent Psychiatry*, 4(2), 73-80. https://doi.org/10.2174/221067660402140709115810

Riggs, N. R., & Brown, S. M. (2017). Prospective associations between peer victimization and dispositional mindfulness in early adolescence. *Prevention Science*, 18(4), 481-489. https://doi.org/10.1007/s11121-017-0750-z

Rosseel, Y. (2012). Lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2), 1-36. http://www.jstatsoft.org/v48/i02/

Royuela-Colomer, E., Calvete, E., Gámez-Guadix, M., & Orue, I. (2018). The protective role of dispositional mindfulness against the perpetuation of cyberbullying victimization and perpetrationamong adolescents. *Cyberpsychology, Behavior, and Social Networking*, 21(11), 703-710. https://doi.org/10.1089/cyber.2017.0685

Ruggieri, S., Bendixen, M., Gabriel, U., & Alsaker, F. (2013). Cyberball: The impact of ostracism on the well-being of early adolescents. *Swiss Journal of Psychology*, 72(2), 103-109. https://doi.org/10.1024/1421-0185/a000103

Satorra, A., & Bentler, P. M. (2001). A scaled difference chi-square test statistic for moment structure analysis. *Psychometrika*, 66(4), 507-514. https://doi.org/10.1007/BF02296192

Sebastian, C., Viding, E., Williams, K. D., & Blakemore, S.-J. (2010). Social brain development and the affective consequences of ostracism in adolescence. *Brain and Cognition*, 72(1), 134-145. https://doi.org/10.1016/j.bandc.2009.06.008

Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2009). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. Guilford Press.

Tabachnick, B., & Fidell, L. (2013). *Using multivariate statistics* (6th ed.). Pearson.

Tang, A., Lahat, A., Crowley, M. J., Wu, J., & Schmidt, L. A. (2019). Neurodevelopmental differences to social exclusion: An event-related neural oscillation study of children, adolescents, and adults. *Emotion*, 19(3), 520-532. https://doi.org/10.1037/emo0000456

Timeo, S., Riva, P., & Paladino, M. P. (2019). Learning to cope with everyday instances of social exclusion: A review of emotional and cognitive strategies for children and adolescents. *Journal of Applied*

Biobehavioral Research, *24*(4), 1-17. https://doi.org/10.1111/jabr.12173

Tomlinson, E. R., Yousaf, O., Vittersø, A. D., & Jones, L. (2018). Dispositional mindfulness and psychological health: A systematic review. *Mindfulness*, *9*(1), 23-43. https://doi.org/10.1007/s12671-017-0762-6

van Beest, I., & Williams, K. D. (2006). When inclusion costs and ostracism pays, ostracism still hurts. *Journal of Personality and Social Psychology*, *91*(5), 918-928. https://doi.org/10.1037/0022-3514.91.5.918

Wesselmann, E. D., Ren, D., Swim, E., & Williams, K. D. (2013). Rumination hinders recovery from ostracism. *International Journal of Developmental Science*, *7*(1), 33-39. https://doi.org/10.3233/DEV-1312115

Williams, K. D. (2007). Ostracism. *Annual Review of Psychology*, *58*(1), 425-452. https://doi.org/10.1146/annurev.psych.58.110405.085641

Williams, K. D., Cheung, C. K. T., & Choi, W. (2000). Cyberostracism: Effects of being ignored over the Internet. *Journal of Personality and Social Psychology*, *79*(5), 748-762. https://doi.org/10.1037/0022-3514.79.5.748

Williams, K. D., & Jarvis, B. (2006). Cyberball: A program for use in research on interpersonal ostracism and acceptance. *Behavior Research Methods*, *38*(1), 174-180. https://doi.org/10.3758/BF03192765

Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology*, *40*(4), 560-567. https://doi.org/10.1016/j.jesp.2003.11.006

Zoogman, S., Goldberg, S. B., Hoyt, W. T., & Miller, L. (2015). Mindfulness interventions with youth: A meta-analysis. *Mindfulness*, *6*(2), 290-302. https://doi.org/10.1007/s12671-013-0260-4