Psicothema

Psicothema 2022, Vol. 34, No. 1, 49-55
doi: 10.7334/psicothema2021.163

ISSN 0214 - 9915 CODEN PSOTEG

www.psicothema.com

Article

Brooding Rumination and Anxiety Sensitivity: Associations With Depressive and Anxiety Symptoms in Treatment-seeking Smokers

Carmela Martínez-Vispo, Ana López-Durán, Carmen Senra, and Elisardo Becoña
University of Santiago de Compostela

Abstract

Background: This study explores the shared and specific associations of brooding rumination and anxiety sensitivity to depression and anxiety symptomatology in a sample of treatment-seeking smokers. **Methods:** The sample was composed of 275 treatment-seeking adult smokers. Hierarchical linear regression analyses were conducted to examine the relations of both variables with depressive and anxiety symptoms. **Results:** Greater brooding rumination and anxiety sensitivity predicted higher levels of depression and anxiety symptoms. A specific relationship emerged after controlling for comorbid symptoms (depressive or anxiety symptoms) where brooding rumination was associated with depressive symptoms and anxiety sensitivity with anxiety symptoms. **Conclusions:** The findings showed that the variables examined are transdiagnostically related to emotional symptoms, but this relationship was symptomatology-specific when controlling for comorbid symptoms (depressive or anxiety symptoms). Due to the impact of affective symptoms on abstinence outcomes, these findings have relevant clinical implications. In the context of smoking cessation treatment, identifying shared and specific vulnerabilities might contribute to tailoring and designing more precise and effective interventions for quitting smoking.

Keywords: Smoking, brooding rumination, anxiety sensitivity, depressive symptoms, anxiety symptoms.

Resumen

Rumiación y Sensibilidad a la Ansiedad: Asociaciones con Síntomas Depresivos y de Ansiedad en Fumadores que Buscan Tratamiento Para Dejar de Fumar. **Antecedentes:** este estudio explora las asociaciones compartidas y específicas entre el factor reproches de la rumiación y la sensibilidad a la ansiedad con la sintomatología depresiva y ansiosa en una muestra de fumadores. **Método:** la muestra estaba formada por 275 fumadores adultos que demandaron tratamiento para dejar de fumar. Se realizó un análisis de regresión lineal jerárquica para examinar las relaciones de ambas variables con los síntomas depresivos y ansiosos. **Resultados:** mayores puntuaciones en rumiación-reproches y en sensibilidad a la ansiedad predijeron niveles más elevados de síntomas depresivos y ansiosos. Sin embargo, cuando se controlaron los síntomas comórbidos (depresivos o ansiosos), emergieron relaciones específicas entre la rumiación-reproches y los síntomas depresivos y entre la sensibilidad a la ansiedad y los síntomas ansiosos. **Conclusiones:** las variables examinadas se relacionan transdiagnósticamente con la sintomatología emocional, pero esta relación pasa a ser específica cuando se controlan los síntomas comórbidos (depresivos o ansiosos). Debido al impacto negativo que tienen los síntomas emocionales en la abstinencia, estos resultados pueden aportar implicaciones clínicas relevantes. La identificación de vulnerabilidades compartidas y específicas podría contribuir a adaptar y diseñar intervenciones más precisas y eficaces para dejar de fumar.

Palabras clave: fumar, rumiación-reproches, sensibilidad a la ansiedad, síntomas depresivos, síntomas de ansiedad.

Multiple cross-sectional and longitudinal studies have reported that smoking tobacco is associated with depressive and anxiety symptoms and syndromes (i.e., emotional psychopathology) (Goodwin et al., 2017; Prochaska et al., 2017). Research in this field has consistently found, for example, that depression and anxiety symptom severity is related to an increase in smoking rates, heavier smoking patterns, higher tobacco dependence, and greater difficulties in quitting smoking (Richardson et al., 2019; Weinberger et al., 2016). Conversely, smoking has also been associated with the course and severity of depressive and anxiety symptoms (Jamal et al., 2012).

The high co-occurrence of emotional symptoms in the general population (Belzer & Schneier, 2004; Cummings et al., 2014) is also common in smokers (Leventhal & Zvolensky, 2015). To explain the relationship between emotional psychopathology and tobacco use, it has been suggested that some cognitive vulnerability processes, such as brooding rumination and anxiety sensitivity, could be involved in the onset and maintenance of different forms of emotional psychopathology (Chasson et al., 2017; Mathews & MacLeod, 2005; Spinhoven et al., 2015). From this perspective, rumination and anxiety sensitivity could be acting as maladaptive emotion-regulation strategies that increase the risk of emotional disorders and symptoms (Aldao et al., 2010). Moreover, they may operate as underlying vulnerability processes that increase the propensity to relieve emotional distress with smoking behavior

Received: May 3, 2021 • Accepted: August 9, 2021
Corresponding author: Carmela Martínez-Vispo
Faculty of Psychology
University of Santiago de Compostela (Spain)
15782 Santiago de Compostela (Spain)
e-mail: carmela.martinez@usc.es

(Leventhal & Zvolensky, 2015), as they are associated with cognitive information-processing and attentional and interpretation biases (Gotlib & Joormann, 2010; Keogh et al., 2001). Concretely, rumination and, more specifically, the brooding rumination subtype, could be conceptualized as an individual's predisposition to focus perseveringly on negative thoughts, feelings, and problems, also showing a negative interpretation and attentional bias for negative events (Nolen-Hoeksema, 2008; Owens & Gibb, 2017). On another hand, anxiety sensitivity could be understood as a future-oriented attention bias, referring specifically to the fear of sensations/manifestations of anxiety, which influences processing because these sensations are interpreted as serious, harmful, and with catastrophic consequences (Bardeen & Daniel, 2018; Hunt et al., 2006; Reiss et al., 1986).

Although both brooding rumination and anxiety sensitivity are involved in the development of emotional symptoms, they are usually studied separately (Olatunji et al., 2013; Olthuis et al., 2014), so that the examination of their specific relations concurrently with depressive and anxiety symptomatology remains scarce. For instance, Epkins et al. (2013) examined the independent, combined, and specific relationships of rumination and anxiety sensitivity with depression and anxiety symptoms in a sample of preadolescent girls, finding that both factors were overlapping but were still independent vulnerabilities both for depression and anxiety. Besides, the authors pointed out that when controlling for covariance between depression and anxiety symptoms, rumination was uniquely associated with depression, and anxiety sensitivity with anxiety. In the same line, Brown et al. (2016), in a study examining the specific and shared associations between rumination and anxiety sensitivity dimensions with depressive and anxiety symptoms in unselected children, found that rumination was related to depressive symptoms whereas the Physical and Social Concern subscales of anxiety sensitivity were associated with anxiety. To our knowledge, there is a gap in the literature examining these relations because, to date, studies had only been conducted in children and adolescents, but not in adults.

As mentioned, available research supports the notion that both vulnerability processes could be implied in smoking behavior and tobacco dependence. In this vein, studies have shown that rumination is related to greater depressive symptoms in smokers compared with non-smokers (Richmond et al., 2001) and that brooding rumination is associated with greater tobacco dependence (Martínez-Vispo et al., 2020). Moreover, research has shown that depressive rumination was positively associated with number of quit attempt failures (Dvorak et al., 2011). Research has also found that anxiety sensitivity is related to greater tobacco dependence, a more severe withdrawal syndrome, greater perceived barriers to quit, and greater difficulties in quitting (Guillot et al., 2015, 2016; Zvolensky et al., 2019). However, to our knowledge, no studies have explored the relationship between both rumination and anxiety sensitivity and emotional symptomatology in treatment-seeking smokers. Given that the relationship between these vulnerability factors and emotional psychopathology could influence the severity of nicotine dependence (Martínez-Vispo et al., 2020; Zvolensky et al., 2020) and the risk of smoking cessation failure (Cooper et al., 2016; Leventhal & Zvolensky, 2015), it is relevant to study these associations in this population.

In light of the mentioned literature, we need to examine the specific relations of brooding rumination and anxiety sensitivity with depression and anxiety symptoms in treatment-seeking smokers because of the theoretical and clinical implications. Therefore, the main aim of this study was to examine the shared and specific relationships both of brooding rumination and anxiety sensitivity with depression and anxiety symptomatology. Concretely: (a) to analyze the relationships of brooding rumination and anxiety sensitivity with depressive symptomatology (before and after controlling for comorbid anxiety symptoms), and (b) to examine the association of brooding rumination and anxiety sensitivity with anxiety symptomatology (before and after controlling for comorbid depressive symptoms).

Method

Participants

The sample was composed of 275 Spanish treatment-seeking smokers enrolled in a randomized clinical trial for smoking cessation (NCT Identifier: 02844595). The present study is a secondary study of this trial, and the methodology and main results have been published previously (Martínez-Vispo et al., 2019).

The inclusion criteria were: (1) being current daily smokers, (2) aged 18 or older, (3) participating voluntarily in the study, and (4) providing written informed consent. The exclusion criteria were: (1) a diagnosis of severe mental disorder (i.e., bipolar or psychotic disorder); (2) a diagnosis of other substance use disorders different from tobacco (alcohol, cannabis, stimulants, hallucinogens, or opioids); (3) having received a smoking cessation treatment or pharmacological treatment to quit smoking over the previous year; (4) having a high life-risk disease (i.e., recent myocardial infarction); and (5) using tobacco products other than cigarettes.

Instruments

The following questionnaires were used to assess demographics and smoking-related variables:

- Smoking Habit Questionnaire (Becoña, 1994). This instrument consists of 56 items evaluating sociodemographics (sex, age, marital status, educational level) and smoking-related variables (i.e., years of smoking, number of previous quit attempts).
- Brooding subscale of the Ruminative Response Style (RRS; Nolen-Hoeksema, 1991; Spanish version by Hervás Torres, 2008). This self-report instrument assesses ruminative coping responses, which reflect a passive comparison of one's current situation with some unachieved standards (Treynor et al., 2003). In this sample, Cronbach's alpha scores for the Brooding subscale was .78.
- Anxiety Sensitivity Index 3 (ASI-3; Taylor et al., 2007; Spanish version by Sandín et al., 2007). This 18-item self-report questionnaire assesses fear of anxiety-related experiences/symptoms. This instrument comprises an ASI Total Scale and three subscales: AS-Physical Concerns, AS-Cognitive Concerns, and AS-Social Concerns. In the present sample, Cronbach's alpha was .91 for the ASI Total Scale.
- Fagerström Test of Cigarette Dependence (FTCD; Heatherton, Kozlowski, Frecker, & Fagerström, 1991; Spanish version by Becoña & Vázquez, 1998). This 6-item instrument assesses cigarette dependence, with higher scores

indicating greater cigarette dependence. Cronbach's alpha was .62 in the present sample.

- The Beck Depression Inventory (BDI-II, Beck et al., 1996, Spanish version by Sanz & Vázquez, 2011). This is a 21-item self-report instrument measuring current depressive symptoms, with higher scores indicating higher depressive symptoms (score ranges from 0 to 63). Cronbach alpha was .91 in the present sample.
- Beck Anxiety Inventory (BAI; Beck & Steer, 1993, Spanish version by Sanz & Navarro, 2003). This instrument is composed of 21 items assessing anxiety symptomatology severity. Higher BAI scores are indicative of more anxiety (score ranges from 0 to 63). Cronbach alpha was .90 in the present sample.

Procedure

Participant recruitment was conducted through the media, posters in healthcare centers, word of mouth, primary care physicians, and other specialized services of the public healthcare system reference. Those who agreed to participate in the study provided written informed consent. Participants meeting the inclusion criteria were assessed through a face-to-face interview and completed the questionnaires described previously.

The study was approved by the Bioethics Committee of the University of Santiago de Compostela.

Data analysis

Descriptive and correlation analyses were conducted for the overall demographic and study variables (sex, age, education, cigarette dependence, depressive symptoms, anxiety symptoms, brooding rumination, and anxiety sensitivity).

Assumptions for multivariable regression analysis were tested. Specifically, multicollinearity was tested by examining correlations (all correlations were less than .90). Variance Inflation Factors (all below 10), linearity, and homoscedasticity were examined with plots of the regression-standardized residuals compared with the predicted regression-standardized values, and the independence of errors was checked with Durbin-Watson tests. Mahalanobis' test was performed to detect multivariate outliers, identifying five cases, which were removed from the analysis.

Two separate hierarchical linear regression models were conducted to examine the relationship between cognitive vulnerabilities and depression (Model 1) and anxiety (Model 2) symptoms. These models were conducted including in the first step sociodemographics (sex, age, education) and tobacco dependence; in the second step, both cognitive vulnerabilities simultaneously (brooding rumination and anxiety sensitivity) and in the third step, comorbid symptomatology (depressive or anxiety symptoms). Squared semi-partial correlations (sr^2) were employed for effect size estimates with small, medium, and large effects represented by sr^2 values of 0.01, 0.09, and 0.25, respectively (Cohen et al., 2003).

Analyses were conducted using the SPSS software version 24. A p-value of $< .05$ was used as a test of statistical significance.

Results

Frequencies, means, and standard deviations, and correlations among the measures are shown in Table 1.

Depressive symptoms

Regarding depressive symptomatology, covariates entered at the first step of the model accounted for a significant amount of variance, adjusted $R^2 = 0.10$, $F(4, 265) = 8.458$, $p < .001$, with education and tobacco dependence being significant predictors. After entering brooding rumination and anxiety sensitivity at Step two, the model accounted for a significant amount of variance, adjusted $R^2 = 0.36, F(6, 263) = 26.172, p < .001$, with both variables being significant predictors. When adding anxiety symptoms in the third step, the model continued to account for a significant amount of variance ($R^2 = 0.448$, $F(7, 262) = 32.126$, $p < .001$), with anxiety symptoms being a significant predictor. In this third model, rumination continued to be a significant predictor, whereas anxiety sensitivity did not (Table 2).

Anxiety symptoms

Concerning anxiety symptomatology, covariates entered at the first step of the model accounted for a significant amount of variance, adjusted $R^2 = 0.098, F(4, 265) = 9.03, p < .001$, with age, sex, and tobacco dependence being significant predictors. After entering brooding rumination and anxiety sensitivity at Step two, the model accounted for a significant amount of variance, adjusted $R^2 = 0.247, F(6, 263) = 16.032, p < .001$, with both variables being significant predictors. When adding depressive symptoms in the third step, the model continued to account for a significant amount of variance, adjusted $R^2 = 0.350$, $F(7, 262) = 22.001$, $p < 0.001$, and depressive symptoms were a significant predictor. In this third model, anxiety sensitivity continued to be a significant predictor, whereas rumination did not (Table 3).

Discussion

The main aim of the present study was to examine the shared and specific relationships of two cognitive vulnerability processes, brooding rumination and anxiety sensitivity, with depression and anxiety symptomatology in treatment-seeking smokers. Our data showed positive and significant correlations between depression, anxiety, brooding rumination, anxiety sensitivity, and tobacco dependence. These findings align with previous literature showing the co-occurrence of affective symptoms in smokers

Table 1
Descriptive data and correlations of study variables ($N = 270$)

	M (SD) % (n)	1	2	3	4	5	6	7
1. Age	45.40 (11.01)	–						
2. Sex[1]	61.9 (167)	.005	–					
3. Education[1]	40.4 (109)	-.092	.025	–				
4. FTCD	4.78 (2.10)	.078	-.090	-.117	–			
5. BAI	9.69 (8.81)	-.105	.149*	-.098	.259**	–		
6. BDI-II	10.70 (8.99)	-.051	.036	-.227**	.254**	.548**	–	
7. RRS-B	4.61 (3.11)	-.025	.248**	-.166**	.201**	.435**	.553**	–
8. ASI	19.86 (13.57)	-.043	.142*	-.078	.218**	.400**	.429**	.523**

[1]Sex categorized as 1 = Female; 0 = Male; Education categorized as 1 = University; 0 = lower than University. FTCD = Fagerström Test of Cigarette Dependence; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory; RRE-B = Ruminative Response Style Brooding; ASI-T= Anxiety Sensitivity Index. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$

Table 2
Hierarchical regression with depression as the outcome variable

Predictor	R^2	Adjusted R^2	R^2 Change	B	SE B	β	95% Confidence Interval LL	UL
Step 1	.113	.100						
Age				-.073	.048	-.089	-.167	.021
Sex[1]				1.098	1.072	.059	-1.013	3.209
Education[1]				-3.877	1.068	-.212***	-5.980	-1.774
FTCD				.982	.243	.236***	.504	1.461
Step 2	.374	.360	.261***					
Age				-.043	.040	-.052	-.122	.036
Sex[1]				-1.587	.941	-.086	-3.440	.266
Education[1]				-2.410	.913	-.132**	-4.209	-.612
FTCD				.451	.212	.108*	.034	.868
ASI				.117	.038	.176**	.041	.192
RRS-B				1.263	.172	.438***	.924	1.602
Step 3	.462	.448	.088***					
Age				-.013	.038	-.016	-.087	.061
Sex[1]				-2.003	.876	-.108*	-3.729	-.278
Education[1]				-2.216	.849	-.121**	-3.887	-.544
FTCD				.225	.200	.054	-.168	.618
ASI				.069	.036	.104	-.003	.141
RRS-B				.992	.165	.344***	.667	1.317
BAI				.353	.054	.346***	.247	.459

[1] Sex categorized as 1 = Female; 0 = Male; Studies categorized as 1 = University; 0 = less than University
ASI = Anxiety Sensitivity Index; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory; FTCD = Fagerström Test of Cigarette Dependence; RRS-B = Ruminative Response Style Brooding; LL = lower limit; UL = upper limit.
* $p < .05$; ** $p < .01$; *** $p < .001$

Table 3
Hierarchical regression with anxiety as the outcome variable

Predictor	R^2	Adjusted R^2	R^2 Change	B	SE B	β	95% Confidence Interval LL	UL
Step 1	.111	.098						
Age				-.107	.047	-.134*	-.199	-.015
Sex[1]				3.102	1.052	.171**	1.032	5.173
Education[1]				-1.559	1.048	-.087	-3.622	.503
FTCD				1.053	.238	.259***	.584	1.522
Step 2	.264	.247	.153***					
Age				-.084	.043	-.104	-.168	.001
Sex[1]				1.180	1.000	.065	-.788	3.149
Education[1]				-.551	.970	-.031	-2.462	1.359
FTCD				.639	.225	.157**	.196	1.082
RRS-B				.768	.183	.272***	.408	1.129
ASI				.135	.041	.209***	.055	.216
Step 3	.367	.350	.104***					
Age				-.067	.040	-.083	-.145	.012
Sex[1]				1.813	.934	.100	-.026	3.651
Education[1]				.409	.913	.023	-1.389	2.207
FTCD				.459	.211	.113*	.045	.874
RRS-B				.265	.187	.094	-.102	.632
ASI				.089	.039	.137*	.013	.165
BDI-II				.398	.061	.407***	.279	.518

[1] Sex categorized as 1 = Female; 0 = Male; Studies categorized as 1 = University; 0 = less than University
ASI = Anxiety Sensitivity Index; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory; FTCD = Fagerström Test of Cigarette Dependence; RRS-B = Ruminative Response Style Brooding; LL = lower limit; UL = upper limit.
* $p < .05$; ** $p < .01$; *** $p < .001$

and the association between emotional symptoms. Furthermore, our data showed that both cognitive vulnerability variables were significantly related to depression and anxiety symptoms (Kircanski et al., 2017; Poh et al., 2020), which extends previous literature by revealing such associations in treatment-seeking smokers. Besides, our results are also consistent with studies reporting an association of these affect-related variables with greater tobacco dependence (Jamal et al., 2018; Martínez-Vispo et al., 2020; Svicher et al., 2018).

By examining the relationships of both cognitive vulnerabilities with specific affective symptoms, regression analyses revealed that both brooding rumination and anxiety sensitivity were associated, interchangeably and concurrently, with depressive and anxiety symptoms. These findings are consistent with previous data showing that rumination is not only related to depressive symptoms, but that is associated with anxiety symptoms as well (Aldao et al., 2010; Olatunji et al., 2013), and that anxiety sensitivity is not uniquely related to anxiety but to depression also (Zvolensky et al., 2015).

Interestingly, when comorbid symptoms were controlled in the regression analysis, brooding rumination was specifically related to depression, whereas anxiety sensitivity was specifically associated with anxiety symptoms. These results support the idea that brooding rumination and anxiety sensitivity are vulnerabilities related to emotional symptoms, both specifically (Allan et al., 2014; Garnefski & Kraaij, 2018; Olatunji et al., 2013) and transdiagnostically (Kim et al., 2012; Watkins, 2009). Therefore, the present findings suggest that, while both brooding rumination and anxiety sensitivity could be considered transdiagnostic vulnerabilities, a specific level of action should be considered. What is more, since previous research has pointed out that the three anxiety sensitivity factors (physical, cognitive, and social concerns) have a different relationship with smoking behavior and tobacco dependence (Guillot et al., 2016), it is necessary to explore in future studies whether some of these subscales also have a shared and specific relationship with emotional symptomatology in treatment-seeking smokers.

The findings of this study have some clinical implications for smoking cessation interventions due to the fact that these vulnerability processes are related, in a specific and shared way, to both depressive and anxiety symptoms which are associated with greater difficulties to quit, stronger withdrawal symptoms, and a greater risk for smoking relapse (Cooper et al., 2016; Garey et al., 2020; Hitsman et al., 2013; Piper et al., 2011). Consequently, future studies need to explore whether tailoring smoking cessation interventions, including specific therapeutic strategies targeting both vulnerability factors, could improve smoking cessation outcomes. For instance, including strategies addressing rumination explicitly, such as rumination-focused

functional analysis to identify its antecedents and consequences, and training participants to promote more concrete and specific thoughts, could reduce rumination and negative mood (Watkins & Moberly, 2009; Watkings & Roberts, 2020) and, consequently, increase the likelihood of quitting. Regarding anxiety sensitivity, the inclusion of therapeutic strategies such as psychoeducation and interoceptive exposure could also be useful to improve cessation success rates (Naragon-Gainey, 2010). In this vein, it would also be necessary to study whether a transdiagnostic treatment protocol including convergent cognitions and themes related to depressive and anxiety symptomatology could be effective in achieving and maintain tobacco abstinence. Additionally, it would be necessary to examine jointly the role of brooding rumination, anxiety sensitivity, and affective symptoms in predicting smoking cessation treatment barriers (i.e., withdrawal and craving intensity, treatment drop out). Finally, future studies are needed to explore whether these results are maintained at the end of treatment and how smoking abstinence may impact on them.

The present study has several limitations that should be considered in the interpretation of the results. Firstly, this study was conducted with individuals seeking treatment to quit smoking, which implies that these findings might not necessarily generalize to smokers from the general population. Secondly, this study was conducted with non-clinically diagnosed participants, and the level of emotional symptoms was mild. Therefore, it would be necessary to replicate this study with clinically depressed and anxious treatment-seeking smokers. Thirdly, this study used cross-sectional data collected at baseline. Therefore, it is not possible to state the causality in the relations between brooding rumination and anxiety sensitivity, and affective symptoms. Finally, the study variables were assessed by self-report questionnaires. This implies some possible biases such as social desirability. Future studies should examine the relationships between brooding rumination, anxiety sensitivity, and affect-related symptoms using multi-trait and multi-method approaches.

Despite these limitations, the present study has several strengths. First, examining affective-related symptomatology in treatment-seeking smokers is warranted due to their impact on smoking-cessation treatment outcomes. Secondly, a wide range of possible confounders were controlled in the analysis, including sociodemographics and nicotine dependence. Finally, this study has an adequate sample size and used well-validated questionnaires of affective symptomatology.

Overall, the results of the present study support and extend previous research examining the specificity of the associations between transdiagnostic vulnerability factors and depression and anxiety in treatment-seeking smokers. In particular, our findings showed that, although both variables were concurrently related to both depression and anxiety symptoms, the relationship was symptomatology-specific when comorbid symptoms were controlled. This suggests that depressive and anxiety symptoms share vulnerability factors, but also that such vulnerabilities are specific when considering the co-occurrence of other affective symptomatology. Hence, the results of the current study coincide with the conceptualization of depression and anxiety as two different yet highly related constructs. In the context of smoking cessation treatment, the identification of these specific and shared vulnerabilities associated with depression and anxiety symptoms might contribute to tailoring and designing more precise and effective interventions to quit smoking.

Acknowledgements

This research was supported by the Spanish Ministry of Economy and Competiveness (Project reference: PSI2015-66755-R) and co-financed by FEDER (European Regional Development Fund; pluri-annual plan 2014-2020).

References

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217-237. https://doi.org/10.1016/J.CPR.2009.11.004

Allan, N. P., Capron, D. W., Raines, A. M., & Schmidt, N. B. (2014). Unique relations among anxiety sensitivity factors and anxiety, depression, and suicidal ideation. *Journal of Anxiety Disorders*, *28*(2), 266-275. https://doi.org/10.1016/j.janxdis.2013.12.004

Bardeen, J. R., & Daniel, T. A. (2018). Anxiety sensitivity and attentional bias to threat interact to prospectively predict anxiety. *Cognitive Behaviour Therapy*, *47*(6), 482-494. https://doi.org/10.1080/16506073.2018.1466911

Beck, A., Steer, R., & Brown, G. (1996). *Beck Depression Inventory-second edition. Manual*. The Psychological Corporation.

Beck, A. T., & Steer, R. (1993). *Beck Anxiety Inventory manual*. Psychological Corporation.

Becoña, E. (1994). Evaluación de la conducta de fumar [Assessment of smoking behavior]. In J. L. Graña (Ed.), *Conductas Adictivas: Teoría, evaluación y tratamiento* [Addictive Behaviors: Theory, assessment and treatment] (pp. 403-454). Debate.

Becoña, E., & Vázquez, F. L. (1998). The Fagerström Test for Nicotine Dependence in a Spanish sample. *Psychological Reports*, *83*, 1455-1458. https://doi.org/10.2466/pr0.1998.83.3f.1455

Belzer, K., & Schneier, F. R. (2004). Comorbidity of anxiety and depressive disorders: Issues in conceptualization, assessment, and treatment. *Journal of Psychiatric Practice*, *10*, 296-306. https://doi.org/10.1097/00131746-200409000-00003

Brown, H. M., Meiser-Stedman, R., Woods, H., & Lester, K. J. (2016). Cognitive Vulnerabilities for Depression and Anxiety in Childhood: Specificity of Anxiety Sensitivity and Rumination. *Behavioural and Cognitive Psychotherapy*, *44*(1), 30-42. https://doi.org/10.1017/S1352465814000472

Chasson, G. S., Bello, M. S., Luxon, A. M., Graham, T. A. A., & Leventhal, A. M. (2017). Transdiagnostic emotional vulnerabilities linking obsessive-compulsive and depressive symptoms in a community-based sample of adolescents. *Depression and Anxiety*, *34*(8), 761-769. https://doi.org/10.1002/da.22669

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Lawrence Erlbaum Associates Publishers.

Cooper, J., Borland, R., McKee, S. A., Yong, H.-H., & Dugué, P.-A. (2016). Depression motivates quit attempts but predicts relapse: Differential findings for gender from the International Tobacco Control Study. *Addiction*, *111*(8), 1438-1447. https://doi.org/10.1111/add.13290

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin*, *140*(3), 816-845. https://doi.org/10.1037/a0034733

Dvorak, R., Simons, J., & Wray, T. (2011). Impulsivity moderates the association between depressive rumination and number of quit attempt

failures by smokers. *Addiction Research & Theory*, *19*(3), 283-288. https://doi.org/10.3109/16066359.2010.512110

Epkins, C. C., Gardner, C., & Scanlon, N. (2013). Rumination and anxiety sensitivity in preadolescent girls: Independent, combined, and specific associations with depressive and anxiety symptoms. *Journal of Psychopathology and Behavioral Assessment*, *35*(4), 540-551. https://doi.org/10.1007/s10862-013-9360-7

Garey, L., Olofsson, H., Garza, T., Shepherd, J. M., Smit, T., & Zvolensky, M. J. (2020). The Role of Anxiety in Smoking Onset, Severity, and Cessation-Related Outcomes: A Review of Recent Literature. *Current Psychiatry Reports*, *22*(8), 38. https://doi.org/10.1007/s11920-020-01160-5

Garnefski, N., & Kraaij, V. (2018). Specificity of relations between adolescents' cognitive emotion regulation strategies and symptoms of depression and anxiety. *Cognition and Emotion*, *32*(7), 1401-1408. https://doi.org/10.1080/02699931.2016.1232698

Goodwin, R. D., Wall, M. M., Garey, L., Zvolensky, M. J., Dierker, L., Galea, S., Gbedemah, M., Weinberger, A. H., Williams, J. M., Hu, M.-C., & Hasin, D. S. (2017). Depression among current, former, and never smokers from 2005 to 2013: The hidden role of disparities in depression in the ongoing tobacco epidemic. *Drug and Alcohol Dependence*, *173*, 191-199. https://doi.org/10.1016/j.drugalcdep.2016.11.038

Gotlib, I. H., & Joormann, J. (2010). Cognition and Depression: Current Status and Future Directions. *Annual Review of Clinical Psychology*, *6*(1), 285-312. https://doi.org/10.1146/annurev.clinpsy.121208.131305

Guillot, C. R., Leventhal, A. M., Raines, A. M., Zvolensky, M. J., & Schmidt, N. B. (2016). Anxiety sensitivity facets in relation to tobacco use, abstinence-related problems, and cognitions in treatment-seeking smokers. *Addictive Behaviors*, *56*, 30-35. https://doi.org/10.1016/j.addbeh.2016.01.005

Guillot, C. R., Zvolensky, M. J., & Leventhal, A. M. (2015). Differential associations between components of anxiety sensitivity and smoking-related characteristics. *Addictive Behaviors*, *40*, 39-44. https://doi.org/10.1016/j.addbeh.2014.08.004

Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction*, *86*(9), 1119-1127.

Hervás Torres, G. (2008). Adaptación al castellano de un instrumento para evaluar el estilo rumiativo [Spanish adaptation of an instrument to assess ruminative style: Ruminative responses scale]. *Revista de Psicopatología y Psicología Clínica*, *13*(2), 111-121. https://doi.org/10.5944/rppc.vol.13.num.2.2008.4054

Hitsman, B., Papandonatos, G. D., McChargue, D. E., DeMott, A., Herrera, M. J., Spring, B., Borrelli, B., & Niaura, R. (2013). Past major depression and smoking cessation outcome: A systematic review and meta-analysis update. *Addiction*, *108*(2), 294-306. https://doi.org/10.1111/add.12009

Hunt, C., Keogh, E., & French, C. C. (2006). Anxiety sensitivity: The role of conscious awareness and selective attentional bias to physical threat. *Emotion*, *6*(3), 418-428. https://doi.org/10.1037/1528-3542.6.3.418

Jamal, A., Phillips, E., Gentzke, A. S., Homa, D. M., Babb, S. D., King, B. A., & Neff, L. J. (2018). Current Cigarette Smoking Among Adults - United States, 2016. *MMWR. Morbidity and Mortality Weekly Report*, *67*(2), 53-59. https://doi.org/10.15585/mmwr.mm6702a1

Jamal, M., Willem Van der Does, A. J., Cuijpers, P., & Penninx, B. W. J. H. (2012). Association of smoking and nicotine dependence with severity and course of symptoms in patients with depressive or anxiety disorder. *Drug and Alcohol Dependence*, *126*(1-2), 138-146. https://doi.org/10.1016/j.drugalcdep.2012.05.001

Keogh, E., Dillon, C., Georgiou, G., & Hunt, C. (2001). Selective attentional biases for physical threat in physical anxiety sensitivity. *Journal of Anxiety Disorders*, *15*(4), 299-315. https://doi.org/10.1016/S0887-6185(01)00065-2

Kim, S., Yu, B. H., Lee, D. S., & Kim, J. H. (2012). Ruminative response in clinical patients with major depressive disorder, bipolar disorder, and anxiety disorders. *Journal of Affective Disorders*, *136*(1-2), e77-e81. https://doi.org/10.1016/j.jad.2011.06.034

Kircanski, K., LeMoult, J., Ordaz, S., & Gotlib, I. H. (2017). Investigating the nature of co-occurring depression and anxiety: Comparing diagnostic and dimensional research approaches. *Journal of Affective Disorders*, *216*, 123-135. https://doi.org/10.1016/j.jad.2016.08.006

Leventhal, A. M., & Zvolensky, M. J. (2015). Anxiety, depression, and cigarette smoking: A transdiagnostic vulnerability framework to understanding emotion-smoking comorbidity. *Psychological Bulletin*, *141*(1), 176-212. https://doi.org/10.1037/bul0000003

Martínez-Vispo, C., Rodríguez-Cano, R., López-Durán, A., Senra, C., Fernández del Río, E., & Becoña, E. (2019). Cognitive-behavioral treatment with behavioral activation for smoking cessation: Randomized controlled trial. *PLOS ONE*, *14*(4), e0214252. https://doi.org/10.1371/journal.pone.0214252

Martínez-Vispo, C., Senra, C., López-Durán, A., Fernández del Río, E., & Becoña, E. (2020). Does Rumination Mediate the Effect of Depressive Symptoms on Cigarette Dependence and Craving in Seeking Treatment Smokers? *Journal of Psychopathology and Behavioral Assessment, 42*, 765-773. https://doi.org/10.1007/s10862-020-09812-9

Mathews, A., & MacLeod, C. (2005). Cognitive Vulnerability to Emotional Disorders. *Annual Review of Clinical Psychology*, *1*(1), 167-195. https://doi.org/10.1146/annurev.clinpsy.1.102803.143916

McKenzie, M., Olsson, C. A., Jorm, A. F., Romaniuk, H., & Patton, G. C. (2010). Association of adolescent symptoms of depression and anxiety with daily smoking and nicotine dependence in young adulthood: Findings from a 10-year longitudinal study. *Addiction*, *105*(9), 1652-1659. https://doi.org/10.1111/j.1360-0443.2010.03002.x

Naragon-Gainey, K. (2010). Meta-analysis of the relations of anxiety sensitivity to the depressive and anxiety disorders. *Psychological Bulletin*, *136*(1), 128-150. https://doi.org/10.1037/a0018055

Nolen-Hoeksema, S. (2008). The Response Styles Theory. In C. Papageorgiou & A. Wells, *Depressive Rumination: Nature, Theory and Treatment* (pp. 105-123). John Wiley & Sons Ltd. https://doi.org/10.1002/9780470713853.ch6

Olatunji, B. O., Naragon-Gainey, K., & Wolitzky-Taylor, K. B. (2013). Specificity of rumination in anxiety and depression: A multimodal meta-analysis. *Clinical Psychology: Science and Practice*, *20*(3), 225-257. https://doi.org/10.1111/cpsp.12037

Olthuis, J. V., Watt, M. C., & Stewart, S. H. (2014). Anxiety Sensitivity Index (ASI-3) subscales predict unique variance in anxiety and depressive symptoms. *Journal of Anxiety Disorders*, *28*(2), 115-124. https://doi.org/10.1016/j.janxdis.2013.04.009

Owens, M., & Gibb, B. E. (2017). Brooding rumination and attentional biases in currently non-depressed individuals: An eye-tracking study. *Cognition and Emotion*, *31*(5), 1062-1069. https://doi.org/10.1080/02699931.2016.1187116

Piper, M. E., Cook, J. W., Schlam, T. R., Jorenby, D. E., & Baker, T. B. (2011). Anxiety diagnoses in smokers seeking cessation treatment: Relations with tobacco dependence, withdrawal, outcome and response to treatment. *Addiction*, *106*(2), 418-427. https://doi.org/10.1111/j.1360-0443.2010.03173.x

Poh, R. Y. N., Zhuang, S., Ong, X. L., & Hong, R. Y. (2020). Evaluating Structural Models of Cognitive Vulnerabilities: Transdiagnostic and Specific Pathways to Internalizing Symptoms. *Assessment*, 107319112091528. https://doi.org/10.1177/1073191120915287

Prochaska, J. J., Das, S., & Young-Wolff, K. C. (2017). Smoking, mental illness, and public health. *Annual Review of Public Health*, *38*(1), 165-185. https://doi.org/10.1146/annurev-publhealth-031816-044618

Reiss, S., Peterson, R. A., Gursky, D. M., & McNally, R. J. (1986). Anxiety sensitivity, anxiety frequency and the prediction of fearfulness. *Behaviour Research and Therapy, 24*, 1-8. doi: 10.1016/0005-7967(86)90143-9

Richardson, S., McNeill, A., & Brose, L. S. (2019). Smoking and quitting behaviours by mental health conditions in Great Britain (1993-2014). *Addictive Behaviors*, *90*, 14-19. https://doi.org/10.1016/j.addbeh.2018.10.011

Richmond, M., Spring, B., Sommerfeld, B. K., & McChargue, D. (2001). Rumination and cigarette smoking: A bad combination for depressive outcomes? *Journal of Consulting and Clinical Psychology*, *69*(5), 836-840. https://doi.org/10.1037/0022-006X.69.5.836

Sandín, B., Valiente, R. M., Chorot, P., & Santed Germán, M. A. (2007). ASI-3: A new scale for the assessment of anxiety sensitivity. *Revista de Psicopatología y Psicología Clínica*, *12*(2). https://doi.org/10.5944/rppc.vol.12.num.2.2007.4036

Sanz, J., & Navarro, M. E. (2003). Propiedades psicométricas de una versión española del Inventario de Ansiedad de Beck (BAI) en estudiantes universitarios [The psychometric properties of a spanish version of the Beck Anxiety Inventory (BAI) in a university students sample]. *Ansiedad y Estrés*, *9*, 59-84.

Sanz, J., & Vázquez, C. (2011). *Adaptación española del Inventario para Depresión de Beck-II (BDI-II) Manual* [Spanish adaptation of the Beck Depression Inventory-II (BDI-II). Manual]. Pearson.

Spinhoven, P., Drost, J., van Hemert, B., & Penninx, B. W. (2015). Common rather than unique aspects of repetitive negative thinking are related to depressive and anxiety disorders and symptoms. *Journal of Anxiety Disorders*, *33*, 45-52. https://doi.org/10.1016/j.janxdis.2015.05.001

Svicher, A., Zvolensky, M. J., & Cosci, F. (2018). Study of the relationship between anxiety sensitivity, smoking abstinence expectancies, nicotine withdrawal, and cigarette dependence among daily smokers. *Journal of Addictive Diseases*, *37*(1-2), 55-63. https://doi.org/10.1080/10550887.2018.1542239

Taylor, S., Zvolensky, M. J., Cox, B. J., Deacon, B., Heimberg, R. G., Ledley, D. R., Abramowitz, J. S., Holaway, R. M., Sandin, B., Stewart, S. H., Coles, M., Eng, W., Daly, E. S., Arrindell, W. A., Bouvard, M., & Cardenas, S. J. (2007). Robust dimensions of anxiety sensitivity: Development and initial validation of the Anxiety Sensitivity Index-3. *Psychological Assessment*, *19*(2), 176-188. https://doi.org/10.1037/1040-3590.19.2.176

Treynor, W., González, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, *27*(3), 247-259. https://doi.org/10.1023/A:1023910315561

Watkins, E. R. (2009). Depressive rumination and co-morbidity: Evidence for brooding as a transdiagnostic process. *Journal of Rational - Emotive and Cognitive - Behavior Therapy*, *27*(3), 160-175. https://doi.org/10.1007/s10942-009-0098-9

Watkins, E. R., & Moberly, N. J. (2009). Concreteness training reduces dysphoria: A pilot proof-of-principle study. *Behaviour Research and Therapy*, *47*(1), 48-53. https://doi.org/10.1016/j.brat.2008.10.014

Watkins, E. R., & Roberts, H. (2020). Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. *Behaviour Research and Therapy*, *127*, 103573. https://doi.org/10.1016/j.brat.2020.103573

Weinberger, A. H., Kashan, R. S., Shpigel, D. M., Esan, H., Taha, F., Lee, C. J., Funk, A. P., & Goodwin, R. D. (2016). Depression and cigarette smoking behavior: A critical review of population-based studies. *The American Journal of Drug and Alcohol Abuse*, *43*(4), 416-431. https://doi.org/10.3109/00952990.2016.1171327

Zvolensky, M. J., Bakhshaie, J., Garza, M., Valdivieso, J., Ortiz, M., Bogiaizian, D., Robles, Z., & Vujanovic, A. (2015). Anxiety sensitivity and subjective social status in relation to anxiety and depressive symptoms and disorders among Latinos in primary care. *Journal of Anxiety Disorders*, *32*, 38-45. https://doi.org/10.1016/j.janxdis.2015.03.006

Zvolensky, M. J., Bakhshaie, J., Shepherd, J. M., Garey, L., Viana, A. G., & Peraza, N. (2020). Anxiety symptoms and smoking among Latinx adult smokers: The importance of sensitivity to internal cues in terms of dependence, barriers for quitting, and quit problems. *Journal of Behavioral Medicine*, *43*(1), 88-98. https://doi.org/10.1007/s10865-019-00059-8

Zvolensky, M. J., Bakhshaie, J., Shepherd, J. M., Peraza, N., Garey, L., Viana, A. G., Glover, N., Brown, J. T., & Brown, R. A. (2019). Anxiety sensitivity and smoking among Spanish-speaking Latinx smokers. *Addictive Behaviors*, *90*, 55-61. https://doi.org/10.1016/j.addbeh.2018.10.022