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# **Expressive suppression a mediating variable between stress and procrastination in eating behavior disorder**

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**Abstract**---Eating disorders (EDs) are psychiatric illnesses in which emotions play an important role in their development and maintenance. These disorders are associated with expressive suppression, stress, and procrastination. The purpose of this work was to explain eating disorders from stress and procrastination, with expressive suppression as a mediating variable. It was attended by 918 students from three universities in Ecuador. The information was collected through four instruments: inventory of eating disorders, perceived stress scale, Tuckman procrastination scale and emotional regulation questionnaire. The data was analyzed through a mediational analysis in the Jasp program, version 15. The independent variables were: procrastination and stress, the dependent variable was risk of experiencing bulimia (REB) and the mediating variable was expressive suppression. Procrastination and stress, mediated by expressive suppression, were found to have no statistically significant effect on EBR. Procrastination has a direct effect on REB, although stress does not, and the model between expressive suppression and REB explains a good percentage of the variance.

**Keywords**---eating behavior disorders, stress, expressive suppression, procrastination.

## Introduction

Eating disorders (EDs) are psychiatric illnesses that occur in various populations and are characterized by abnormal eating, maladaptive behaviors, disturbed attitudes in relation to weight and body shape (American Psychiatric Association, 2013). The diagnostic and statistical manual of mental disorders (DSM-5) describes the classification of eating disorders, as well as the international classification of diseases (ICD-11; World Health Organization, 2019) and they are: Pica, rumination disorder, disorder avoidance/restrictive food intake, anorexia nervosa, bulimia nervosa, and binge eating disorder. The Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013) provides subtype qualifiers, severity indicators, and remission definitions for each disorder. In addition, it is important to point out that obesity is not included in the eating disorders, because it is considered as the excess of energy consumption in relation to the energy expended and there are multiple biological, genetic, behavioral and social factors that explain its development.

TCAs have increased over the last 50 years and this is due in part to routine change in eating habits (Fitzsimmons-Craft et al., 2019). A meta-analysis of epidemiological studies on eating disorders in Latin America found a prevalence of 1% for anorexia nervosa, 1.16% for bulimia nervosa, and 3.53% for binge eating disorder in a population older than 10 years (Kolar et al., 2016). Although eating disorders present various investigations, there is great uncertainty regarding their pathophysiology and treatment (Treasure, 2021). Eating disorders are disabling and even fatal, considerably harming physical and mental health, as well as social functioning, since they change the way people perceive their environment (Zitron-Emanuel & Ganel, 2018). They may also present comorbidity with other mental disorders such as depression, anxiety, suicidal ideation, substance addiction, among others (Bannatyne et al., 2018; Bodell et al., 2018; Chesney et al., 2014; Davis et al., 2017; Fitzsimmons-Craft et al., 2019; Marcus & Wildes, 2009; Murray et al., 2019; Prefit et al., 2019; Smith et al., 2018; Treasure, 2020; Wade et al., 2015; Yao et al., 2016).

There is an approach that emotions influence the acquisition or maintenance of eating disorders, several studies indicate that difficulties in differentiating, describing and regulating emotions play an important role (Aldao et al., 2010; Cardi et al., 2019; Danner et al., 2014; Kobylńska & Kusev, 2019; Leehr et al., 2015; Mallorqui-Bagué et al., 2018; Naumann et al., 2016; Naumann & Svaldi, 2021; Oldershaw et al., 2015; Prefit et al., 2019; Svaldi et al., 2012; Westwood et al., 2017). From this perspective, it is evident that emotions directly influence psychological conditions such as expressive suppression (Naumann & Svaldi, 2021; Ortiz et al., 2019; Prefit et al., 2019), stress (Tsakona et al., 2021; Vaz-Leal et al., 2020) and procrastination (Skinner et al., 2016; Yan et al., 2018).

Expressive suppression is understood as the attempt to hide, inhibit or reduce the emotional response (Gross, 2002, 2014). It is considered an intentional coping

strategy (Watson & Greer, 1983) and is associated with various negative consequences such as increased physiological arousal, decreased memory, lower social functioning, impaired self-esteem, lower satisfaction with life and well-being (Butler et al., 2003; Brewer et al., 2016; Brummer et al., 2014; Dryman et al., 2018; Hu et al., 2014; Richards and Gross, 2000; Wang et al., 2017).

The relationship between expressive suppression and eating disorders is unknown, some research indicates that this is correlational in nature and does not allow causal attribution (Aldao et al., 2010; Prefit et al., 2019), while others indicate that suppression expressiva acts as a maintainer of the eating disorders (Naumann & Svaldi, 2021; Ortiz et al., 2019). In studies carried out by Svaldi et al. (2010, 2014) point out that binge eating and food intake is significantly higher when patients use expressive suppression compared to cognitive reappraisal when watching negative videos. Also, there is evidence of a significant relationship between expressive suppression and rumination (Liverant et al., 2011; Wenzlaff & Luxton, 2003). On the other hand, there are systematic reviews and meta-analyses that indicate that inadequate emotional controls contribute to the development and maintenance of anorexia nervosa, bulimia nervosa and binge eating disorder (Danner et al., 2014; Dingemans et al., 2017; Lavander et al. al., 2015; Leehr et al., 2015; Oldershaw et al., 2015; Svaldi, 2012; Westwood et al., 2017).

Stress is an emotional imbalance that appears during a threatening situation, whose magnitude exceeds one's own coping resources and well-being is compromised (Folkman et al., 1986). Stressors are those that pose a serious threat to the well-being of an organism (Kagan, 2016). There is evidence that stressors cause disorders in the system that regulates stress and food responses (Mocanu et al., 2016), be it mild-acute or chronic-prolonged (Sominisky & Spencer, 2014). Various studies mention the relationship between stress and eating disorders (Keski-Rahkonen & Mustelin, 2016; Oka et al., 2014; Papargyri et al., 2018; Rodgers et al., 2018; Tsakona et al., 2021; Vaz-Leal et al., 2020). Similar studies with the variables of perceived stress, expressive suppression and autonomic symptoms have been carried out in Ecuador (Viñanzaca-López & Reivan-Ortiz, 2021).

Procrastination is the generalized or selective practice of deliberately and intentionally postponing something (Moreta-Herrera et al., 2018; Zentall et al., 2018) and emotions have a certain relationship with its development (Pietrzak & Tokarz, 2016). It is said that all people tend to procrastinate at different times in their lives (Zacks & Hen, 2018). Procrastination can be situational or chronic (Argumedo et al., 2005; Ferrari et al., 1995; Moreta-Herrera et al., 2018), although it can also be seen as a personality trait (Malobabić et al., 2019). Several studies point to the relationship between procrastination and eating disorders, either in a general way (Levallius et al., 2015; Skinner et al., 2016) or specifically, such as binge eating disorder (Yan et al., 2018). Therefore, the question arises: Does expressive suppression constitute a modulating variable between stress and procrastination in the acquisition of eating disorders? That is why the purpose of this work is to explain eating disorders from stress and procrastination, with expressive suppression as a modulating variable.

## Methodology

### Participants

There was the participation of 918 university students from Ecuador from the three cities: Cuenca, Quito and Guayaquil, who were contacted by institutional mail and notified of their voluntary participation in the research. The sample was divided into three groups: the Catholic University of Cuenca ( $n = 302$ ), the Pontifical Catholic University of Ecuador in Quito ( $n = 306$ ), and the University of Guayaquil ( $n = 310$ ). The mean age of the participants was 21.34 years ( $SD = 2.74$ ). The inclusion criteria were: (1) being of legal age and (2) being legally enrolled and studying at one of the three universities mentioned. The exclusion criteria were: (1) that the students did not give their consent to participate in the study (2) students that consume psychotropic substances and (3) that they present psychological alterations or cognitive dysfunctions.

### Instruments

- Eating Disorder Inventory-3 (EDI-3; Garner, 2010)  
It consists of 91 items that are distributed in 12 primary scales that are: drive for thinness, bulimia, body dissatisfaction, low self-esteem, personal alienation, interpersonal insecurity, interoceptive deficit, emotional dysregulation, perfectionism, asceticism and fears of maturity. It has a scoring system from zero to four points. For its qualification, scales are used according to T-scores and percentiles. For this study, we worked with the Spanish adaptation of Elosua et al. (2010) mainly with the bulimia scale as the TCA of interest.
- Perceived Stress Scale (PSS; Cohen et al., 1983)  
This instrument is designed to measure the perception of psychological stress to the extent that everyday life situations are perceived as stressful. The Spanish version (Remor, 2006) was used, which is composed of 10 items with a five-point Likert-type response scale ranging from never=0 to always=4. For the rating, the items are added and the higher the score, the higher the perceived stress. This version has a reliability of 0.82.
- Tuckman Procrastination Scale (Tuckman, 1990)  
It is a self-report tool on the tendency to waste time, procrastinate or stop doing things that should already be done. The questionnaire consists of 72 items that include the following topics: (1) general self-description of the tendency to postpone tasks (procrastination proper), (2) difficulty in doing things that are unpleasant and avoiding them, (3) tendency to blame others other misfortune itself. The Argentine Adaptation of the Tuckman Scale (ATPS) (Furlan et al., 2012) was used in its 15-item version. The CFA shows a one-dimensional factorial structure with high internal consistency of 0.87.
- Cuestionario de Regulación Emocional (ERQ-P; Gross & John, 2003)  
El cuestionario fue creado por Gross y John (2003) adaptado al castellano por Cabello et al. (2006). Esta escala permite evaluar las diferencias que se producen entre las estrategias de reevaluación cognitiva y la estrategia de supresión, consta de 10 ítems (con una escala de Likert entre 1= En desacuerdo total y 7 = En total acuerdo).

## **Procedure**

The study was approved by the Ethics Committee for Research on Human Beings of the Equinocial Technical University (UTE) with code IMP-SIC-LLA CUIO 1408 20 and was developed according to the guiding statements of the Declaration of Helsinki for medical research health in humans. All participants gave their signed consent and were informed about the objectives of the research. The confidentiality of all data was guaranteed in accordance with the Ethical Principles of Psychologists and the APA Code of Conduct (APA, 2002, 2008). The participants did not receive monetary compensation for their collaboration. In the first instance, contact was maintained with the main authorities of the universities and later it was applied in a group manner (within class time). Participants answered the scales by hand in the following order: (1) Eating Disorder Inventory-3, (2) Perceived Stress Scale, (3) Tuckman Procrastination Scale, and (4) Emotional Regulation Questionnaire.

## **Statistic analysis**

An analysis was carried out in the first instance based on descriptive statistics of gender, city and marital status; Tests were also run to examine data distribution. Subsequently, T-student tests were applied for independent samples to analyze differences between gender and eating disorders. Consecutively, the one-way ANOVA test was applied with its respective post hoc tests to identify differences between groups. Finally, a mediation analysis was developed whose independent variables were stress and procrastination, the dependent variable was the risk of experiencing one of the types of eating disorders, bulimia, and the mediating variable was expressive suppression. Data analysis was performed with the open source statistics program JASP, version 15.

## **Results**

This work fulfills the purpose of analyzing whether expressive suppression constitutes a modulating variable between perceived stress and procrastination in the acquisition of eating disorders (EDs). For this, in the first instance, the descriptions of the study population are exposed, being in terms of gender, 59.4% of women and 40.6% of men are obtained. Regarding the city of residence, 32.9% are from Cuenca, 33.3% from Quito and 33.8% from Guayaquil. 92% are single and the rest between married, common-law, widowed and divorced.

Next, the T student statistical test is applied to independent samples in order to analyze the possibility of gender differences in terms of the variables of anorexia, bulimia, procrastination, expressive suppression and stress. The Levene test shows homogeneous variances ( $p > .05$ ) for all the variables. It starts from a significance level of .05% where differences are observed in the anorexia variable ( $t = 2.832$ ;  $p = .005$ ), procrastination ( $t = 5.143$ ;  $p = .000$ ). For the rest of the variables, the null hypothesis is accepted, as shown in Table 1.

Table 1  
Gender differences in the study variables

	Male <i>n</i> =373		Female <i>n</i> =545		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Anorexia	11.24	4.860	12.21	5.226	2.832	.005
Bulimia	15.70	6.583	14.92	6.743	-1.727	.085
Procrastination	4.70	2.497	5.54	2.369	5.143	.000
Expressive suppression	90.22	22.286	92.29	23.138	1.347	.178
Stress	82.45	16.328	81.41	18.831	-.866	.387

Note. *M*: medium; *SD*: standard deviation

Subsequently, the unifactorial ANOVA statistical test is applied between the study variables and the groups of cities in order to observe the relationship between them. The degree of significance of the *p* value is analyzed, where less than 5% is evidenced for all the variables, for which the alternative hypothesis of a relationship between the variables is accepted. Therefore, the Tukey HSD post hoc contrast test is applied, with a significance value of .05, where lower values (different averages) are observed in the following pairs of cities with the study variables: for anorexia Cuenca- Quito (*p*= .042; IC 95%  $\varphi$ : .03 a 1.95) and Quito-Guayaquil (*p*= .000; IC 95%  $\varphi$ : -2.69 a -.77); for bulimia Cuenca- Quito (*p*= .041; IC 95%  $\varphi$ : .04 a 2,53), Cuenca-Guayaquil (*p*=.000; IC 95%  $\varphi$ : -3,41 a -.93) and Quito-Guayaquil (*p*= ,000; IC 95%  $\varphi$ : -4,69 a -2,22); for procrastination Cuenca- Quito (*p*= ,019; IC 95%  $\varphi$ : 07 a 1,00 ); for expressive suppression Cuenca-Guayaquil (*p*= ,016 ; IC 95%  $\varphi$ : ,77 a 9,40) and for perceived stress Cuenca-Guayaquil (*p*= ,000 ; IC 95%  $\varphi$ : -17,79 a -11,65 ) and Quito-Guayaquil (*p*= ,000 ; IC 95%  $\varphi$ : -20,20 a -14,08 ) as can be seen in table 2. For the rest of the couples, no different average results were found.

Table 2  
Mean differences between groups of cities and eating behavior disorders

	ANOVA			Tukey HSD		
	<i>F</i>	<i>df</i>	<i>p</i>	IC 95%		<i>p</i>
				li	ls	
Anorexia	9.078	2	.000			
Cuenca-Quito				.03	1.95	.042
Cuenca-Guayaquil				-1.70	.22	.168
Quito-Guayaquil				-2.69	-.77	.000
Bulimia	21.959	2	.000			
Cuenca-Quito				.04	2.53	.041
Cuenca-Guayaquil				-3.41	-.93	.000
Quito-Guayaquil				-4.69	-2.22	.000
Procrastination	3.955	2	.019			
Cuenca-Quito				.07	1.00	.019
Cuenca-Guayaquil				-.32	.61	.749
Quito-Guayaquil				-.86	.07	.112
Expressive suppression	4.353	2	.013			
Cuenca-Quito				-3.37	5.28	.863

Cuenca-Guayaquil				.77	9.40	.016
Quito-Guayaquil				-.17	8.43	.063
Stress	101.430	2	.000			
Cuenca-Quito				-.66	5.50	.155
Cuenca-Guayaquil				-17.79	-11.65	.000
Quito-Guayaquil				-20.20	-14.08	.000

Note. Test HSD: Honestly-significant-difference, df: degrees of freedom, li-ls: class limits.

Table 3 shows that the indirect effect was not statistically significant ( $p = 0.452$ ). Therefore, the effect of procrastination and stress on the bulimia risk (BR), mediated by expressive suppression, was not significant, that is, there is no mediation in this model. Although regarding the direct effects, procrastination did have a direct effect on BR (estimator=.007;  $p < .001$ ), while stress and BR did not ( $p = .565$ ). Something similar happened with the total effects, where statistical significance was found only between procrastination and BR. In addition, the coefficient of determination increased from .020 to .098 by adding expressive suppression. Therefore, the model between BR and suppression explains 98% of the variance.

Table 3  
Mediational analysis of expressive suppression for Bulimia Risk

Measures	Estimator	SE	z-value	p	IC95%	
					li	ls
Direct						
Procrastination →BR	.007	.002	4.085	< .001	.004	.011
Stress →BR	.008	.014	.575	.565	-.020	.036
Indirect						
Procrastination →SE→BR	-6.459e - 5	8.594e - 5	-.752	.452	- 2.330e - 4	1.038e -4
Stress →SE→BR	-.005	.004	- 1.089	.276	-.013	.004
Totals						
Procrastination →BR	.007	.002	4.048	< .001	.004	-.023
Stress →BR	.004	.014	.270	.787	.011	.031

Note. BR: bulimia risk, ES: expressive suppression, SE: standard error, li-ls: class limits.

## Discussion

The first objective of this study was to establish gender differences in the study variables (anorexia, bulimia, perceived stress, expressive suppression and procrastination), showing differences for anorexia and procrastination. Similar results in terms of gender differences are found in other studies such as those by Bothe et al. (2022) Murr and Neumann (in press) Noebel et al. (in press) who shows a higher prevalence in women as well as significant differences with the male gender. In relation to procrastination, various studies (Balkis & Duru, 2017; Maftei et al., 2021; Magdová et al., 2021) support differences by gender, attributing high levels of procrastination in the male gender.

Finally, taking into account the purpose of explaining eating disorders from stress and procrastination, with expressive suppression as a modulating variable, it was found that procrastination and stress on BR mediated by expressive suppression was not significant, these results contradict other results. research that suggests that expressive suppression acts as a maintainer of eating disorders (Liverant et al., 2011; Naumann & Svaldi, 2021; Ortiz et al., 2019; Wenzlaff & Luxton, 2003) or, in turn, contributes to the development and maintenance in disorders such as anorexia nervosa, bulimia nervosa, and binge eating disorder (Danner et al., 2014; Dingemans et al., 2017; Lavander et al., 2015; Leehr et al., 2015; Oldershaw et al., 2015; Svaldi, 2012; Westwood et al., 2017).

On the other hand, this research indicates that procrastination did have a direct effect on eating disorders, this is associated with several studies that demonstrate the relationship between procrastination and eating disorders (Levallius, et al., 2015; Skinner et al., 2016; Yan et al., 2018). The limitation of the study was that for the ED dependent variable, only one of its types, BR, was measured. In future research, it is suggested to consider the other subtypes such as: anorexia nervosa, binge eating disorder, pica, rumination disorder, and avoidance/restrictive food intake disorder. Finally, it is highlighted that expressive suppression is an important variable in BR. Therefore, interventions focused on the adequate control of emotions are necessary in the treatment and prevention of eating disorders. Although the literature shows that there is a relationship between eating disorders and stress, procrastination and expressive suppression, in this study procrastination and stress, mediated by expressive suppression, do not have a statistically significant effect on BR. Procrastination has a direct effect on BR, although stress does not. The model between expressive suppression and BR explains a good percentage of the variance.

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### **Conflict of interests**

The authors declare not to have any interest conflicts.

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