Prospective Associations Between Emotion Regulation and Depressive Symptoms Among Mexican-Origin Adolescents

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Reappraisal (reconstruing emotional experiences to alter their impact) and suppression (inhibiting emotionally expressive behavior) are emotion-regulation strategies with important implications for depression. While reappraisal generally predicts lower depressive symptoms, suppression generally predicts higher depressive symptoms. Because cultural factors can influence the processes involved in these links and because adolescence—especially for ethnic minority youth—brings particular emotional challenges, it's critical to investigate these links among Mexican-origin adolescents. However, research examining emotion regulation among Mexican-origin individuals is scarce and generally limited to cross-sectional designs. Thus, we examined prospective associations between reappraisal and suppression (assessed at age 17) and 2 facets of depressive symptoms (anhedonia and general distress) over 3 years (assessed at ages 16, 18, and 19) among 228 Mexican-origin adolescents. Latent growth curve models indicated that reappraisal was associated with lower anhedonia at baseline (age 16) and lower anhedonia over time, whereas suppression predicted greater anhedonia at baseline but not change over time. Consistent with the Mexican cultural value of *simpatía*, which emphasizes expressing positive emotions and inhibiting negative emotions, suppression of *positive* emotions was associated with *greater* anhedonia over time whereas suppression of *negative* emotions was associated with *lower* anhedonia over time. However, neither associated with anhedonia at baseline. Reappraisal and suppression were not associated with distress symptoms, and no effects were moderated by familism, household income, gender, or child nativity. The anhedonia results suggest that the benefits of reappraisal extend to Mexican-origin adolescents, but the effects of suppression may depend upon emotional valence in this group.

Keywords: Mexican-origin adolescents, reappraisal, suppression, depression, simpatía

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Emotions help us to achieve important sociocultural goals by providing meaning to situations and motivating adaptive behaviors (Keltner & Haidt, 1999; Mesquita et al., 2017). However, emotions can sometimes be unhelpful when their valence, intensity, or quality are inconsistent with the situation (e.g., experiencing amusement during a serious conversation). Emotion regulation—changing the emotions we have, when we have them, and how they are experienced and expressed (Gross, 1998b) – enables us to adjust our emotions in line with situational demands. Emotion regulation's central role in helping us adjust to these demands implicates it as a key driver of psychological health (Aldao et al., 2010; Cludius et al., 2020). Because cultural factors can influence the situational demands we encounter (Mesquita et al., 2017) and the normative ways of responding (e.g., Mehta et al., 2017), culture informs the meaning and nature of emotion regulation and therefore its relations with psychological health.

Despite the identification of cultural differences in the emotion-regulation strategies that promote psychological health (e.g., Hu et al., 2014; Soto et al., 2011), very few studies have examined Mexican-origin people (i.e., ancestors and/or they themselves were born in Mexico), and even fewer have examined Mexican-origin adolescents. Late adolescence in particular is a pivotal developmental period because many adolescents experience significant changes in mood and mood swings, heightened emotional reactivity, and the need to adapt to new and/or modified sociocultural contexts (e.g., work place stressors, increased responsibilities at home and school; Guyer et al., 2016). Without effective emotion regulation, these challenges can leave youth in late adolescence emotionally vulnerable to depression that can persist into adulthood (Schubert et al., 2017; Wolitzky-Taylor et al., 2014).

Investigating emotion regulation among Mexican-origin adolescents in the U.S. is particularly critical because they also (1) frequently face discrimination, racism, and/or economic hardships that may induce strong emotions (Behnke et al., 2011; Umaña-Taylor & Updegraff, 2007) and (b) have higher rates of mood disorders and greater depressive symptoms compared to European American and other ethnic-minority adolescents, particularly among girls (Merikangas et al., 2010), even when controlling for socioeconomic status (Anderson & Mayes, 2010). This means that Mexican-origin adolescents have additional challenges that can compound those already brought on by adolescence. Thus, we asked the following question: What are the bivariate and prospective associations between emotion regulation and depressive symptoms among Mexican-origin youth in late adolescence?

The current study focused on individual differences in two frequently studied emotion regulation strategies with strong implications for psychological health: cognitive reappraisal (reconstruing an emotional experience to alter its emotional impact) and expressive suppression (inhibiting emotionally expressive behavior). We examined how the habitual (i.e., regular) use of these strategies prospectively associated with depressive symptoms among Mexican-origin youth in late adolescence. We begin by reviewing past work examining the associations between reappraisal and suppression and depressive symptoms, followed by the limited work in this area examining Mexican-origin individuals. We then discuss the strengths of conceptualizing depressive symptoms as multidimensional within Mexican-origin youth followed by a focus on the aspects of Mexican culture suggesting that the association between suppression and depressive symptoms might differ for the suppression of positive versus negative emotions.

Emotion Regulation and Depressive Symptoms

Reappraisal and suppression have been extensively studied in relation to depressive symptoms, and etiological theories of depression indicate that emotion regulation is critically linked to the development of depression among adolescents (Hyde et al., 2008; Kovacs et al., 2008). Experimental and cross-sectional studies among college students and adults indicate that reappraisal is an effective down-regulator whereas suppression tends to be an ineffective down-regulator of negative emotional experiences (Gross, 1998a; Gross & John, 2003; Webb et al., 2012). In turn, across various ways of assessing depressive symptoms (e.g., self-reported symptoms, clinician-led diagnostic interviews), habitual reappraisal is generally negatively and habitual suppression is generally positively associated with depressive symptoms in college students and adults (Aldao et al., 2010; Cludius et al., 2020; Gross & John, 2003; Hu et al., 2014). A recent meta-analysis found similar associations during adolescence (Schäfer et al., 2017). However, some research suggests that depressive symptoms measured via both self-report and specific brain region activation might predict, rather than be a consequence of, suppression during mid and late adolescence (De France et al., 2019; Vilgis et al., 2018).

Do these relations generalize across different cultural groups? Whereas mainstream U.S. culture is characterized as individualistic because of the emphasis on individual- (vs. group-level) goals, East Asian and Latinx cultures tend to be more collectivistic due to their greater emphasis on group-level goals (Hofstede, 2001;

Markus & Kitayama, 1991; Triandis et al., 1988). As a result, East Asians and Latinx individuals, compared to European Americans, have more rules regarding when and with whom it is appropriate to express emotions (i.e., greater emotion display rules; Matsumoto, Yoo, Nakagawa, et al., 2008; Senft et al., 2020). Thus, the consequences of suppression may be different for individuals who endorse more collectivistic cultural values (e.g., Wei et al., 2013). In line with this idea, a meta-analysis by Hu et al. (2014; see also Soto et al., 2011) found that the association between habitual suppression and depression was significantly weaker among samples with more Eastern (e.g., Chinese) versus Western (e.g., European American) cultural values. Of the few studies investigating Mexican-origin individuals, a measure of habitual suppression that omitted items concerning the suppression of positive emotions was associated with greater depressive symptoms among college students predominantly of Mexican-origin (Juang et al., 2016). Thus, these studies suggest culture is important to consider, yet it remains unclear whether these effects extend to or hold prospectively among Mexican-origin adolescents.

Although culture may shape the consequences of suppression, it might not influence reappraisal consequences (cf. Troy et al., 2017). Matsumoto, Yoo, Fontaine, et al. (2008) suggested that cultural effects on emotion regulation might primarily concern strategies involving observable behaviors (e.g., suppression) because these strategies are particularly influenced by cultural differences in emotion display rules. Since reappraisal targets emotional experience and not behavior (Gross, 1998b), its correlates might not be moderated by cultural values (Matsumoto, Yoo, Fontaine, et al., 2008). Indeed, the beneficial effects of habitual reappraisal on depressive symptoms extend to people of varying cultures and countries (Haga et al., 2009; Hu et al., 2014), including U.S. Latino and Mexican-origin individuals (Juang et al., 2016; Perez & Soto, 2011; Soto et al., 2012).

Together, these studies underscore the importance of investigating understudied groups such as Mexican-origin adolescents. Moreover, the dearth of longitudinal studies investigating Mexican-origin adolescents in this area highlights the need to test whether emotional regulation prospectively associates with developmental change in depressive symptoms.

Conceptualizing Depression as Multidimensional in Mexican-Origin Adolescents

Conceptualizing depression as multidimensional through its two core affective facets—anhedonia (the absence of positive affect that is relatively unique to depression) and general distress (nonspecific negative affect common to both anxiety and depression) (Watson et al., 1995) – among our sample of Mexican-origin late adolescents is critical for two reasons. First, anhedonia is more prevalent than distress symptoms during late adolescence, and changes in anhedonia and distress during late adolescence are not always associated (Conway et al., 2017). Second, anhedonia may be especially implicated among this population because Mexican culture highly values the experience and expression of positive emotions (Acevedo et al., 2020; Senft et al., 2020; Triandis et al., 1984). Thus, examining both anhedonia and distress may help to reveal important nuances with respect to depressive symptoms among Mexican-origin adolescents. While there may be other facets of depression (e.g., somatic symptoms), anhedonia and distress

are the most plausibly predicted by emotion regulation because they are affective dispositions (Watson et al., 1995).

The Suppression of Positive and Negative Emotions in Mexican Culture

The association between depressive symptoms and the suppression of positive emotions versus the suppression of negative emotions may differ because of Mexican cultural norms. In general, Mexican culture is oriented toward collectivism, interdependence, and relational harmony (Gabrielidis et al., 1997; Hofstede, 2001). Interdependence within Mexican culture differs from interdependence within other cultures (e.g., Asians; Campos & Kim, 2017) by its strong emphasis on expressing positive, but not negative, emotions (Acevedo et al., 2020; Senft et al., 2020; Triandis et al., 1984). This emphasis is represented by the Latino and Mexican cultural value of *simpatía*, in which one strives for expressive displays of positive emotions, warmth, politeness, and hospitality and avoidance of negative emotions and behaviors such as direct criticism and disagreement (Acevedo et al., 2020; Gabrielidis et al., 1997; Holloway et al., 2009; Rodríguez-Arauz et al., 2019; Sanchez-Burks et al., 2000; Triandis et al., 1984).

Simpatía suggests that the suppression of positive emotions in Mexican-origin individuals might undermine important interdependent social goals and thereby increase depressive symptoms. Indeed, Su et al. (2015) found that positive emotion suppression was associated with *worse* life satisfaction and eudaimonic well-being among Mexican Americans. In contrast, the cultural value of *simpatía* suggests that the suppression of negative emotions might facilitate warm and harmonious social interactions and thereby promote important interdependent social goals. This means that negative emotion suppression might be unassociated with depressive symptoms or even facilitate *lower* depressive symptoms among Mexican-origin individuals. Consistent with the former hypothesis, Su et al. (2015) found that negative emotion suppression was not associated with life satisfaction or eudaimonic well-being among Mexican Americans. However, since this was a single cross-sectional study and the effects of suppression on life satisfaction and eudaimonic well-being might differ from its effects on ill-being measures like depressive symptoms (e.g., Hu et al., 2014), it is important to extend this finding to our adolescent population. On the whole, the relation between negative emotion suppression and depressive symptoms might be neutral or even negative in Mexican-origin adolescents.

The Current Study

The current study aimed to make several contributions to our understanding of how emotion regulation relates to psychological health. First, we examined the associations between habitual reappraisal and suppression at age 17 and the two core affective facets of depression (anhedonia and general distress) across the crucial late adolescent years of 16 to 19 in an understudied population: Mexican-origin adolescents.[1] This enabled us to elucidate whether past work on emotion regulation generalizes to this adolescent population. Second, by examining the two core affective facets of depression (Watson et al., 1995), we provided a more nuanced understanding of how reappraisal and suppression relate to this particularly burdensome and pervasive psychological health

outcome. Third, our sample was recruited in a way that maximized variability in depressive symptoms (see Footnote 2), making it ideal to investigate research questions concerning depression. Fourth, our longitudinal design enabled us to separately examine whether reappraisal and suppression were associated with depressive symptoms at baseline (i.e., age 16) and change in symptoms from age 16 to 19, providing one of the first prospective investigations of these links among Mexican-origin individuals. Fifth, we examined whether habitual suppression of emotions overall, suppression of positive emotions, and suppression of negative emotions were associated with depressive symptoms. This allowed us to test whether emotional valence matters for suppression in line with the Latino and Mexican cultural value of *simpatía* (i.e., emphasis on expressing positive, but not negative emotions).

As exploratory analyses, we also tested whether the effects of emotion regulation on depressive symptoms were moderated by familism values, household income, gender, and child nativity. Familism is a cultural value involving strong identification and feelings of attachment with one's nuclear and extended family in addition to strong feelings of loyalty, reciprocity, and solidarity with one's family (Sabogal et al., 1987). Since familism is negatively associated with depressive symptoms among Mexican-origin youth (Stein et al., 2015), it might moderate the effects of emotion regulation on depressive symptoms. Household income was examined because it can influence the relation between reappraisal and depressive symptoms (Troy et al., 2017). Gender was examined because of heightened rates of depression among female versus male Mexican-origin adolescents (Merikangas et al., 2010) and child nativity was examined because rates of depression can differ between U.S. versus foreign-born minorities (Budhwani et al., 2015).

Guided by past research on the link between emotion regulation and depressive symptoms, and the scant literature on these links in Mexican-origin individuals, we tested the following hypotheses for both facets of depression (anhedonia, general distress): (a) Reappraisal will be associated with fewer depressive symptoms at baseline (i.e., at age 16) and a decrease in depressive symptoms over time (i.e., change in depressive symptoms across ages 16 to 19); (2) suppression (which included items for both positive and negative emotion suppression and two neutrally valenced items) will not be associated with depressive symptoms due to differential effects of positive and negative emotion suppression; (c) positive emotion suppression will be associated with *greater* depressive symptoms at baseline and an *increase* in depressive symptoms over time; (d) negative emotion suppression will either not be associated with depressive symptoms or will be associated with *fewer* depressive symptoms at baseline and a *decrease* in depressive symptoms over time. We did not make predictions for the exploratory analyses.

Method

Participants

Participants were 229 youth enrolled in a neurobiology substudy of the California Families Project (CFP). The CFP is an ongoing

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[1] Habitual reappraisal and suppression are relatively stable over 4 years ($r = .37$ for reappraisal, .45 for suppression; Gutentag et al., 2020), including across ages 15 to 17 among Australian adolescents (Gullone et al., 2010).

prospective longitudinal study that examines developmental risk and resilience factors among this population. The main CFP study included 674 Mexican-origin families living in Northern California with a fifth-grade child who was randomly drawn from school rosters during the 2006–2007 and 2007–2008 school years (50% female; M_{age} = 10.7 years, SD_{age} = .5 at initial study recruitment). The substudy examined neurobiological mechanisms in the etiology of depression and therefore sought to recruit a sample with variability in depressive symptoms.[2] The sample size was based on a power analysis for detecting small-to-medium sized associations between the neurobiological measures and depressive symptoms as denoted in the NIMH grant proposal that funded the study. Youth enrolled in the substudy were 17.2 years old (SD = .4) at the time of data collection (49.3% female based on self-reported biological sex), 73.8% born in the U.S (the remainder were born in Mexico), predominantly living in low SES households (median total household income = $25,750 at age 16; median education level of parents = 9th grade), and 71.6% had parents who were born in Mexico (15.7% were born in the United States and the remainder were unavailable). One participant did not complete the emotion regulation measure which left a final sample of 228.

Procedure

The current study examined depressive symptoms that were self-reported by adolescents at the age 16, 18, and 19 CFP assessments. Habitual reappraisal and suppression were self-reported during the substudy that took place approximately 6 months (M = 6.2 months, SD = 3.6 months) after the age 16 CFP assessment. Since the time between these assessments varied across participants, we also controlled for the lag in our analyses. All participants' parents provided informed consent and participants provided assent. This study was approved by the University of California, Davis Institutional Review Board and all participants were financially compensated.

Measures

Emotion Regulation: Reappraisal and Suppression

Habitual reappraisal and suppression were measured at age 17 with the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). Participants reported the extent to which they generally agreed (1 = *strongly disagree*, 7 = *strongly agree*) with six items measuring reappraisal (e.g., "I control my emotions by changing the way I think about the situation I'm in") and four items measuring suppression (e.g., "I control my emotions by not expressing them"). Reappraisal and suppression scores in the current study reflected the mean of the reappraisal and suppression items, respectively (reappraisal α = .80; suppression α = .69).

Of the four items measuring suppression, two items do not reference emotional valence (e.g., "I keep my emotions to myself"), one item concerns positive emotion suppression ("When I am feeling positive emotions, I am careful not to express them") and one item concerns negative emotion suppression ("When I am feeling negative emotions, I make sure not to express them"). The latter two items were our measures of habitual positive and negative emotion suppression, respectively (r = .15). To remain consistent with the suppression analyses, we also ran separate models for reappraisal aiming

to increase positive emotions and reappraisal aiming to decrease negative emotions. The ERQ has two items for each and the different valenced reappraisals were strongly correlated (r = .65, $p <$ .001).

Depressive Symptoms: Anhedonia and Distress Symptoms

The Mini-Mood and Anxiety Symptoms Questionnaire (Mini-MASQ; Casillas & Clark, 2000; Watson et al., 1995) was used to measure the two affective facets of depressive symptoms (anhedonia and general distress) at ages 16, 18, and 19. The anhedonia subscale assesses the absence of positive affect that is relatively unique to depression and includes 2 negatively keyed items (e.g., "How much have you felt withdrawn from other people?") and 6 positively keyed items (e.g., "How much have you felt really happy?", "How much have you felt like you had a lot of energy?"). The distress subscale includes 8 negatively keyed items measuring nonspecific negative affect common to both anxiety and depression (e.g., "How much have you felt hopeless?", "How much have you felt uneasy?"). Participants indicated the extent to which they felt or experienced each item during the past week (1 = *not at all*, 4 = *very much [a lot]*). Positively keyed items were reversed scored and the items for each subscale were averaged to reflect higher symptoms. Internal consistency was good across all ages (distress α = .81 to .86, anhedonia α = .81 to .87).

Cultural Values: Familism

Sixteen items from the Mexican American Cultural Values Scale (MACVS; Knight et al., 2010), included at the age 16 assessment, were used to measure familism cultural values. The MACVS measures three aspects of familism: obligations (5 items; e.g., "Children should be taught that it is their duty to care for their parents when their parents get old"), support (6 items; e.g., "Family provides a sense of security because they will always be there for you"), and family as referent (5 items; e.g., "A person should always think about his or her family when making important decisions"). Endorsement of values was rated on a 4-point scale (1 = *not at all*, 4 = *very much*) and the items were averaged to derive a mean familism score at age 16 (α = .88).

Household Income

Total annual household income was reported by the mothers at the age 16 assessment using a 20-point ordinal response scale, with response options increasing in $5,000 increments (1 = "Less than $5,000", 2 = "$5,000-$10,000, …, up to 20 = "95,000 or more"). We recoded this response scale into dollar values by taking the midpoint

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[2] Self-reported depressive symptoms on the Diagnostic Interview Schedule for Children-IV (DISC-IV; Shaffer et al., 2000) and the anhedonia and distress subscales of the Mini-Mood and Anxiety Symptoms Questionnaire (Casillas & Clark, 2000) at age 14 were used as a basis for inclusion in the sub-study. Adolescents were recruited based upon whether they scored above the median on at least one of these measures (n = 175) or reported symptoms below the median on each measure (n = 54). This ensured variability in depressive symptoms generally, but not necessarily on any one measure. Twenty-two participants met criteria for clinical depression based on our diagnostic assessment using the DISC-IV. We did not control for this because 1) the number of participants was small and 2) we would be controlling for something we are predicting (depressive symptoms). We did not ask participants if they were in treatment for depression. While two participants reported SSRI use, their reasons for using SSRIs were not reported.

of the dollar range for each response option (1 = "$2,500", 2 = "$7,500", ..., up to 20 = "$100,000") (Median at age 16 = $25,750).

Latent Growth Curve Modeling, Model Fit, Outliers, and Missing Data

Latent growth curve modeling (LGM) is ideal for our research questions because it affords the modeling of a latent intercept factor (i.e., baseline or age 16 depressive symptoms) and a latent slope factor (i.e., rate of change in depressive symptoms per unit of time) for our measures of depressive symptoms. Years since age 16 was our unit of time. LGM also estimates means and variances pertaining to individual differences in the intercept and slope of depressive symptoms as random effects. The "lavaan" package in R was used for all LGM models.

We used second-order LGM models because of their enhanced reliability and statistical power compared to observed variables (Newson, 2015), and item parcels were used as indicators of the latent variables because of their enhanced reliability compared to individual items (Little et al., 2002). Three parcels were created for anhedonia: the two negatively keyed items were placed on separate parcels and the remaining six items were randomly distributed. Three parcels were also created for distress symptoms. Since there were five depression- and three anxiety-oriented items (although they are all nonspecific symptoms), each parcel included one anxiety-oriented item. The five depression-oriented items were randomly distributed among the parcels. Parceling items in this way leads to roughly equal common factor variance among parcels (Little et al., 2002). We included lag-1 autocorrelations among the parceled indicators.

Model Fit Indices and Cutoff Criteria

Model fit was assessed via the model chi-square (χ^2), the comparative fit index (CFI), and the standardized root-mean-square residual (SRMR). CFI values at or above .95 indicated good fit and SRMR values at or below .08 indicated good fit (Hu & Bentler, 1999).

Inspection of Multivariate Outliers

We used Mahalanobis distance, a measure of the distance between each multivariate data point and the centroid of the overall data while controlling for the shape of the overall data (Cabana et al., 2019), to detect the presence of multivariate outliers on our measures of depressive symptoms (Leys et al., 2018). Two multivariate outliers were detected and removed for anhedonia and five were detected and removed for distress symptoms. Except for one instance involving anhedonia (see Footnote 4), the results were unaffected by these removals.

Missing Data

As a result of longitudinal attrition, the response rates varied slightly across our relevant scales. The largest percent of missing data occurred at the age 19 assessment, when 7% of the data were missing for distress symptoms and 8% of the data were missing for anhedonia. Full information maximum-likelihood estimation was used for missing data and the results were not affected by this decision (compared to models based on complete data [$N = 202$]).

Data Analytic Plan

Longitudinal Measurement Invariance: Anhedonia and Distress Symptoms

Establishing longitudinal measurement invariance for our measures of depressive symptoms ensures that any observed changes are not an artifact of differences in the measurement properties of the variables across assessments (Newson, 2015). Using confirmatory factor analysis, nested model comparisons were used to investigate different levels of measurement invariance in which each level was established by obtaining good fit on the above mentioned fit indices and observing a less than .01 decrease in the CFI (Cheung & Rensvold, 2002; Hirschfeld & von Brachel, 2014).

We began by testing for configural measurement invariance to determine whether the same factor structure existed across the three assessments (i.e., model fits well at each time point). Next, we tested for metric invariance via constraining the factor loadings to be equal across assessments to determine whether the indicators were equivalently contributing to the latent factors at each assessment. We subsequently tested for scalar (i.e., strong) invariance by constraining the indicator intercepts to be equal across assessments to evaluate whether mean differences across assessments reflected true changes in the construct.

Primary Analyses: Emotion Regulation and Depressive Symptoms

We first examined fit of a model in which the depressive symptoms latent intercept and slope factors (for both anhedonia and general distress) were modeled without the emotion regulation variables (i.e., unconditional latent growth curves). Upon observing sufficient model fit for these models, reappraisal and suppression were included as time-invariant covariates (see Figure 1 for our LGM models). Specifically, using separate models for anhedonia and distress symptoms, the depressive symptoms latent intercept and slope factors were regressed on the reappraisal fixed effect (model 1). Next, the depressive symptoms latent intercept and slope factors were regressed on the suppression fixed effect (model 2). Finally, the depressive symptoms latent intercept and slope factors were regressed on the positive emotion suppression and negative emotion suppression fixed effects simultaneously (which were allowed to covary; model 3). The results were consistent when they were examined in separate models.

Since reappraisal and suppression were measured after the time point the depressive symptoms latent intercept represents (age 17 and age 16, respectively), this path should not be interpreted as a directional path from emotional regulation to depressive symptoms, but rather as an association. However, modeling the path as a correlation severely reduces model fit because LGM requires modeling regression paths between latent variables and time-invariant covariates (Newson, 2015; Preacher et al., 2008). We therefore retain the LGM approach but interpret associations between emotion regulation and the depressive symptoms intercept as bidirectional associations, rather than as directional effects.[3]

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[3] Our decision to interpret these associations as bidirectional is supported by the similar magnitude of the associations obtained in our models and the bivariate correlations between reappraisal and suppression at age 17 and depression at age 16 reported in Table 1.

Figure 1
Latent Growth Curve Models Tested in the Current Study
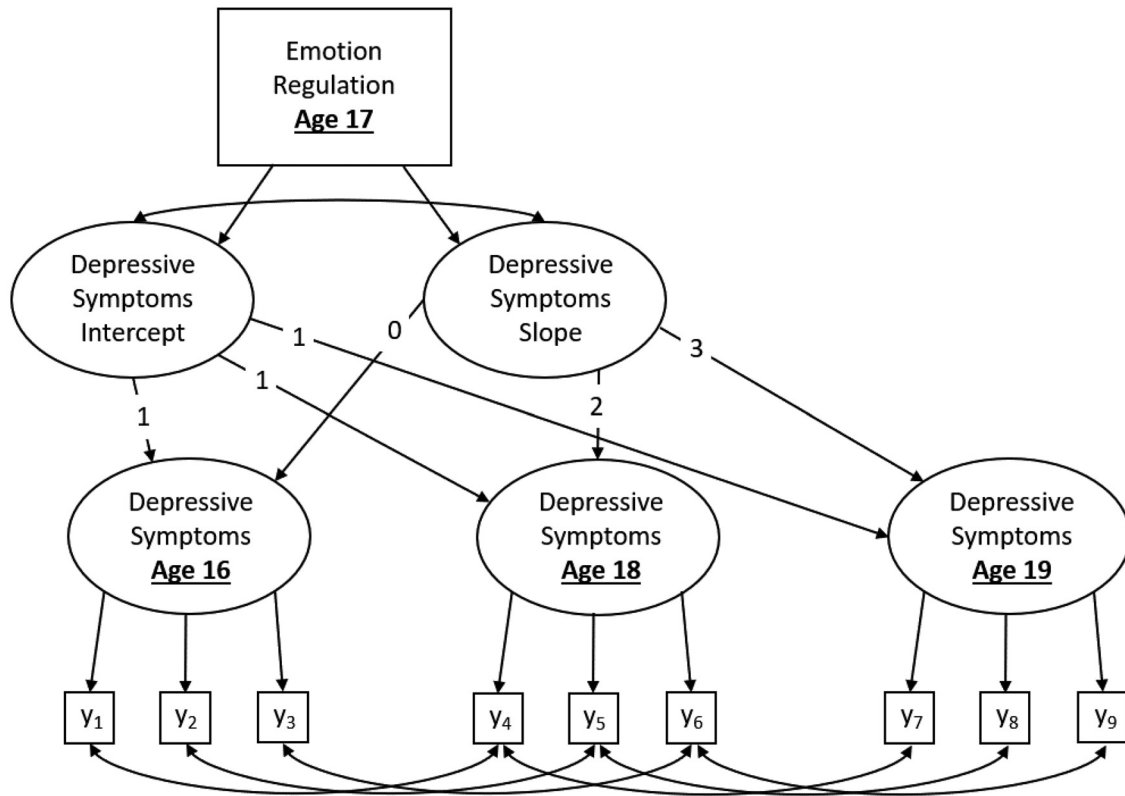
Note. Each facet of depressive symptoms (anhedonia, general distress) was examined separately and used 3 parcels as indicators of the latent variables. Squares represent observed emotion regulation variables. Reappraisal and overall suppression were examined in separate models. Positive emotion suppression and negative emotion suppression were included in the same model and allowed to covary.

We used the Benjamini-Hochberg correction (Benjamini & Hochberg, 1995) to control for the false discovery rate within each family of tests. We considered anhedonia and distress separate families of tests because changes in these variables during late adolescence are not always associated (Conway et al., 2017) and they were only modestly correlated in the present sample (see Table 1). We therefore ran a total of 8 tests within each family (reappraisal, overall suppression, positive emotion suppression, and negative emotion suppression for both the latent intercept and slope). Each significant effect we observed held after applying the correction.

Control Variables

Familism values, household income, gender, child nativity, parent nativity, and the lag between the assessment of emotion regulation at age 17 and the age 16 CFP assessment were included as covariates for the primary analyses.

Exploratory Analyses: Moderation by Familism, Household Income, Gender, and Nativity

To test whether familism values and household income moderated the associations between emotion regulation and depressive symptoms, we regressed the depressive symptoms latent intercept and slope factors on mean centered fixed effects for familism

values (or income), one form of emotion regulation, and their interaction in a series of separate models. Anhedonia and distress symptoms were also examined in separate models. We then inspected the direction and significance of the association between the interaction fixed effect and the depressive symptoms latent factors. The exploratory analyses examined positive and negative emotion suppression separately to reduce model complexity and ease interpretation. We ran separate multigroup LGM models with gender and child nativity as 0/1 grouping variables to examine whether the primary analyses varied based upon gender and nativity. We used nested model comparisons to compare an unconstrained model to a model with all fixed effects constrained to be equal across groups; a nonsignificant change in the χ^2 indicated consistency across groups.

We also used the Benjamini-Hochberg correction for our exploratory analyses since 32 tests were conducted for both anhedonia and distress symptoms (i.e., the interaction term between each of the four moderators and each of the four emotion regulation strategies for the depressive symptoms latent intercept and latent slope).

Power Analyses

The Shiny web app "pwrSEM" (Wang & Rhemtulla, 2020), which estimates power for target effects in SEM based on a user

Table 1
Descriptive Statistics Among the Primary Study Variables

Scale (age administered)	*N*	*M*	*SD*	α
Emotion regulation				
Reappraisal (17)	228	4.87	1.09	.80
Suppression (17)	228	3.88	1.19	.69
Positive emotion suppression (17)	228	2.68	1.52	—
Negative emotion suppression (17)	228	4.29	1.68	—
Depressive symptoms				
Anhedonia (16)	224	1.86	.51	.81
Anhedonia (18)	218	1.81	.56	.84
Anhedonia (19)	207	1.88	.58	.87
Distress symptoms (16)	221	1.50	.46	.83
Distress symptoms (18)	213	1.39	.43	.81
Distress symptoms (19)	207	1.42	.48	.86
Cultural values				
Familism (16)	228	3.45	.38	.88

Note. Numbers in parentheses following the scale names refer to the age at which the scale was administered. α is not provided for positive and negative emotion suppression because these were single-item measures.

specified model, was used to estimate power based on our already collected sample size. According to past effect sizes for reappraisal and suppression on depression, we estimated power based on β = .25 which indicated that we had over 92% power.

Results

Descriptive Statistics and Preliminary Analyses

Descriptive statistics for all scales are displayed in Table 1 and their intercorrelations are displayed in Table 2. Anhedonia and distress symptoms were stable across the three assessments (i.e., no significant changes). However, consistent with past research investigating youth in late adolescence (Conway et al., 2017), anhedonia was significantly higher than distress symptoms at each assessment (all *p*s < .001). The variances for anhedonia were significantly larger than the variances for distress at ages 18 and 19 (both *p*s < .011), but not age 16. Anhedonia and distress symptoms were positively associated at each assessment (*r*s = .41 to .57, *p*s < .001) and familism was positively associated with reappraisal (*r* = .24, *p* < .001) but not suppression. Familism was also negatively associated with anhedonia at each assessment (*r*s = −.16 to -.32, *p*s < .03), but not distress symptoms.

Primary Analyses: Emotion Regulation and Depressive Symptoms

Depressive Symptoms Longitudinal Measurement Invariance

Scalar (i.e., strong) measurement invariance was established for both anhedonia and distress symptoms. These results are displayed in Table S1 of the online supplemental materials.

Model Fit

Model fit for the anhedonia unconditional latent growth curve model was below our set cut offs for both the CFI (.94) and SRMR (.13). However, various researchers have emphasized the need to use cut offs as aids rather than absolute thresholds (McNeish et al., 2018; Perry et al., 2015). Thus, we considered the fit of our

anhedonia model acceptable. Model fit for the distress unconditional latent growth curve model was good in terms of the CFI (.97) and SRMR (.06). We next examined model fit for our models in which the emotion regulation variables were included as time-invariant covariates and found that model fit was comparable to the unconditional latent growth curve models (reported in Table S2 of the online supplemental materials).

Intercepts and Residual Variances of Depressive Symptoms Latent Factors

In terms of the anhedonia and distress unconditional latent growth curve models, there were significant individual differences in both intercepts (*p*s < .01) but not in either slope (*p*s > .242). Since our hypotheses were specific to the associations between the reappraisal and suppression fixed effects and the anhedonia and distress symptoms intercept and slope factors, we only report these results below.

Table S3 of the online supplementary materials shows (a) the intercepts for the anhedonia and distress symptoms intercept and slope factors across our primary models and whether the intercepts were significantly different from zero, and (b) the residual variances for the anhedonia and distress symptoms intercept and slope factors and whether their variations were significant

Hypothesis Testing

Reappraisal. The results for anhedonia were consistent with our predictions (see Table 3). Specifically, reappraisal was negatively associated with both the intercept (β = −.24, *p* = .002) and slope (β = −.26, *p* = .026) of anhedonia. In contrast to predictions, reappraisal was not significantly associated with either the intercept (β = −.14, *p* = .116) or slope (β = .00, *p* = .976) of distress symptoms. Thus, reappraisal was associated with lower anhedonia at age 16 and a decrease in anhedonia from age 16 to 19, but it was not associated with distress symptoms.[4]

Suppression. Consistent with predictions, suppression was not associated with the slope of anhedonia (β = −.11, *p* = .356) nor the intercept (β = .12, *p* = .162) or slope (β = .05, *p* = .711) of distress symptoms. However, in contrast to predictions, suppression was associated with greater anhedonia at baseline (β = .24, *p* = .002), (see Table 3). These results indicated that while suppression was not associated with change in anhedonia or distress symptoms from age 16 to 19, suppression was associated with greater anhedonia at age 16.

Positive emotion suppression was not associated with the intercept of anhedonia (β = .14, *p* = .085) but it was positively associated with the slope of anhedonia (β = .27, *p* = .027). However, positive emotion suppression was not associated with either the intercept (β = .08, *p* = .380) or slope of distress symptoms (β = .01, *p* = .915). Thus, positive emotion suppression was associated with an increase in anhedonia from age 16 to 19, but it was not associated with anhedonia at age 16 or distress symptoms.

The association between negative emotion suppression and the intercept of anhedonia was not statistically significant (β = .11, *p* = .158). However, negative emotion suppression was negatively

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[4] The results for the association between reappraisal and the slope of anhedonia differed when the two multivariate outliers were *not* removed. Although the association was negative in both cases, it was *not* significant when the outliers were not removed (β = −.15, *p* = .178) whereas it was significant (β = −.26, *p* = .026) when the outliers were removed (as reported in the results).

Table 2

Intercorrelations Among the Primary Study Variables

Scale (age administered)	1	2	3	4	5	6	7	8	9	10	11
Emotion regulation											
1. Reappraisal (17)	—										
2. Suppression (17)	.11	—									
3. Positive suppression (17)	−.14*	.57*	—								
4. Negative suppression (17)	.26*	.74*	.15*	—							
Depressive symptoms											
5. Anhedonia (16)	−.21*	.21*	.13*	.11	—						
6. Anhedonia (18)	−.23*	.09	.14*	.01	.54*	—					
7. Anhedonia (19)	−.36*	.13	.23*	−.05	.41*	.47*	—				
8. Distress symptoms (16)	−.11	.11	.08	.08	.43*	.14*	.21*	—			
9. Distress symptoms (18)	−.07	.10	.06	.06	.30*	.41*	.28*	.42*	—		
10. Distress symptoms (19)	−.12	.16*	.10	.05	.21*	.27*	.57*	.25*	.36*	—	
Cultural values											
11. Familism (16)	.24*	−.07	.01	.01	−.31*	−.32*	−.16*	−.04	.01	−.08	—

Note. Numbers in parentheses denote the age at which the scale was administered. Positive suppression refers to the suppression of positive emotions and negative suppression refers to the suppression of negative emotions.
* $p < .05$.

associated with the slope of anhedonia ($\beta = −.30$, $p = .014$). In contrast to anhedonia, negative emotion suppression was not associated with either the intercept ($\beta = .08$, $p = .368$) or slope ($\beta = −.05$, $p = .701$) of distress symptoms. Thus, negative emotion suppression was associated with a *decrease* in anhedonia across ages 16 to 19, but it was not associated with anhedonia at age 16 or distress symptoms.

Control Variables and Different Valenced Reappraisals

The results were the same across all models when controlling for familism values, household income, gender, child and parent nativity, and the time lag between the assessment of reappraisal and suppression and the age 16 depression assessment. Further, emotion valence did not play a role for reappraisal, such that reappraisal aimed at increasing positive emotions and reappraisal aimed at decreasing negative emotions mirrored the overall results.

Exploratory Analyses: Moderation by Familism, Household Income, Gender, and Nativity

As reported in the online supplemental materials, familism values and household income did not moderate the effects of

reappraisal and suppression on depressive symptoms after the Benjamini-Hochberg correction. Imposing equality constraints across gender or across nativity did not lead to a significant reduction in fit for any of our models, suggesting that the findings did not differ significantly for males versus females or for youth born in the U.S. versus Mexico.

Discussion

Many psychological health problems are characterized by emotion regulation difficulties. Yet, limited research has investigated whether emotion regulation is associated with psychological health among Mexican-origin adolescents, a population particularly vulnerable to mood disorders (Anderson & Mayes, 2010; Merikangas et al., 2010). To better understand this vulnerability and elucidate whether past results generalize to this population, the current study examined whether habitual reappraisal and suppression at age 17 were associated with the two affective facets of depressive symptoms (anhedonia and general distress) at age 16 and the change in depressive symptoms from ages 16 to 19 among Mexican-origin late adolescents. Although mean

Table 3

Results of the Primary Analyses: Associations Between Emotion Regulation and Depressive Symptoms at Baseline (Age 16) and the Change in Depressive Symptoms Over Yime (Age 16 to 19)

Model (M): fixed effects	Baseline depressive symptoms			Change in depressive symptoms		
	B	95% CI	β	*B*	95% CI	β
Anhedonia						
M1: Reappraisal	−.30**	[−.50, −.11]	−.24**	−.08*	[−.15, −.01]	−.26*
M2: Suppression	.28**	[.10, .45]	.24**	−.03	[−.10, .03]	−.11
M3: Positive suppression	.12	[−.02, .26]	.14	.06*	[.01, .11]	.27*
Negative suppression	.09	[−.04, 22]	.11	−.06*	[−.10, −.01]	−.30*
Distress symptoms						
M1: Reappraisal	−.13	[−.30, .03]	−.14	.00	[−.07, .07]	.00
M2: Suppression	.11	[−.04, .26]	.12	.01	[−.05, .08]	.05
M3: Positive suppression	.05	[−.07, .18]	.08	.00	[−.05, .05]	.01
Negative suppression	.05	[−.06, .16]	.08	−.01	[−.05, .04]	−.05

Note. Positive suppression refers to the suppression of positive emotions and negative suppression refers to the suppression of negative emotions.
* $p < .05$.   ** $p < .01$.

levels of depressive symptoms were stable across all three assessments, habitual reappraisal and suppression had important associations with the development of anhedonia over time.

Emotion Regulation and Anhedonia

Reappraisal

The results concerning anhedonia (the absence of positive affect that is relatively unique to depression) were generally in line with predictions. Specifically, habitual reappraisal was associated with lower symptoms at age 16 and a decrease in symptoms across ages 16 to 19. These results are consistent with cross-sectional studies examining U.S. Latino and Mexican-origin college samples using unidimensional measures of self-reported depressive symptoms (Juang et al., 2016; Perez & Soto, 2011; Soto et al., 2012). However, our results expand on these prior findings by showing that reappraisal is *prospectively* associated with lower *anhedonia* among adolescents.

Suppression

Habitual suppression was associated greater anhedonia at age 16, but it was not associated with the change in anhedonia. The former is consistent with results from a study examining predominantly Mexican-origin college students (Juang et al., 2016) and the latter is consistent with results from a study examining adolescents (De France et al., 2019) using unidimensional self-reports of depressive symptoms. Posthoc analyses revealed that the association between suppression and age 16 anhedonia was driven by the two neutrally valenced items because the association including only these items was significant and positive ($\beta = .24$, $p = .002$) whereas it was not significant (but in the same direction) for each of the emotion specific items (see Table 3). As denoted below, the lack of association between change in anhedonia and suppression is due to contrasting effects for positive and negative emotion suppression.

The cultural value of *simpatía* emphasizes expressive displays of positive emotions (Holloway et al., 2009; Rodríguez-Arauz et al., 2019; Sanchez-Burks et al., 2000). Since the suppression of positive emotions might undermine these goals, we predicted that it might lead to increased depressive symptoms. Although habitual positive emotion suppression was negatively associated with life satisfaction and well-being among Mexican Americans in Su et al. (2015), the bivariate association between positive emotion suppression and anhedonia at age 16 was not significant in our sample of Mexican-origin adolescents. However, our results denoted that positive emotion suppression was associated with increases in anhedonia across ages 16 to 19.

In contrast to positive emotions, *simpatía* deemphasizes negative emotion expression (Acevedo et al., 2020; Gabrielidis et al., 1997; Triandis et al., 1984), suggesting that suppressing negative emotions might not be associated with depressive symptoms or might even associate with *lower* depressive symptoms among Mexican-origin youth. Our results denoted that while habitual negative emotion suppression was not associated with anhedonia at age 16, it was associated with a *decrease* in anhedonia across ages 16 to 19. The lack of bivariate association at age 16 is consistent with Su et al. (2015) who found that negative emotion suppression

was not concurrently associated with life satisfaction or well-being among Mexican Americans.

Why might positive and negative emotion suppression have a greater impact on experiences of anhedonia over time rather than bivariate/concurrent associations? Suppression does not affect momentary subjective emotion experience (Gross, 1998a). However, the cultural value of *simpatía* suggests that there are beneficial social outcomes associated with expressing positive emotions and suppressing negative emotions. These effects might accumulate over adolescence, a key developmental phase for both emotion regulation and cultural identification, and only reveal themselves when prospective associations with anhedonia are examined. In other words, time may be a key factor with respect to the effects of these strategies on anhedonia.

Culture and Intrapersonal (Reappraisal) Versus Observable (Suppression) Emotion Regulation

Our anhedonia results support Matsumoto, Yoo, Fontaine, et al.'s (2008) suggestion that cultural influences on emotion regulation may be specific to strategies involving observable behaviors (i.e., suppression but not reappraisal) because of cultural differences in emotion display rules. Specifically, our reappraisal results for anhedonia are consistent with the broader literature linking reappraisal with better psychological health regardless of cultural or national background (Haga et al., 2009; Hu et al., 2014). In terms of positive and negative emotion suppression, our results suggest that cultural processes might influence how these strategies associate with anhedonia because their observable behaviors are key targets of cultural socialization processes.

Emotion Regulation and Generalized Distress Symptoms

Unlike anhedonia, reappraisal and suppression were not associated with general distress symptoms (nonspecific negative affect common to both anxiety and depression). This suggests that while reappraisal and suppression may have important implications for symptoms unique to depression (anhedonia) among Mexican-origin adolescents, they might have fewer implications for symptoms of depression shared with anxiety (distress). However, low base rates (i.e., right skew) and variability in distress symptoms at each assessment might also explain why we did not observe any significant effects and near zero effects for the change in distress symptoms.

One way to account for skew and low variance in structural equation modeling is to use robust standard errors (West et al., 1995). Because this requires complete data, we reran all distress models using robust standard errors on our complete data ($N = 202$). However, even with robust standard errors, no significant associations between reappraisal and suppression and distress symptoms were observed. The results were also the same when we only examined the depression-oriented items of the subscale (5 items, although they are nonspecific symptoms).

The means and variances for distress symptoms in our sample of Mexican-origin youth were noticeably lower than distress symptoms reported by adults using the Mini-MASQ (Casillas & Clark, 2000). This might suggest that the distress items may be

harder to understand or are simply endorsed less frequently among Mexican-origin youth. Fewer positively keyed items on the distress versus anhedonia subscales (0 vs. 6) might also account for the skew and low variability.

Exploratory Analyses

Our exploratory analyses indicated that our results were not moderated by familism values, household income, gender, or child nativity. This suggests that the effects of reappraisal and suppression on depressive symptoms among Mexican-origin youth generalize across these cultural and demographic differences. However, low power may have contributed to our moderation results. Thus, it is critical to examine these potential moderators in larger samples.

Limitations and Future Directions

Although the current study provided important insights into how reappraisal and suppression are associated with symptoms of two core affective facets of depression among Mexican-origin in late adolescence, several limitations need to be considered. First, our focus on self-reported habitual reappraisal and suppression may not fully reflect the potential utility of these strategies in particular contexts and variability in whether these strategies are successfully implemented (Ford & Troy, 2019; Girme et al., 2020). Since contexts can influence the difficulty of using emotion regulation strategies (Suri et al., 2018; Young & Suri, 2020), they can moderate the relation between emotion regulation and psychological health (Troy et al., 2017). For example, the psychological-health benefits of reappraisal among U.S. Latinos is moderated by personal perceptions of discrimination and whether one lives in a county with a large proportion of other U.S. Latinos (Perez & Soto, 2011; Soto et al., 2012). Future research should investigate other contexts (e.g., with ingroups vs. out-groups) that might moderate the effects of reappraisal and suppression on psychological health among Mexican-origin individuals, as well as how successfully they implement these strategies.

Second, since our sample consisted exclusively of Mexican-origin adolescents, our findings should not be generalized to other communities within the broad and heterogenous Latino demographic (e.g., Puerto Rican, Cuban). Relatedly, future studies should directly compare Mexican-origin adolescents to another cultural group (e.g., European Americans) to determine whether our effects for positive and negative emotion suppression generalize or are unique to this population. The results of Su et al. (2015) suggest that the harmful effects of positive emotion suppression among Mexican Americans might not generalize to Chinese Americans. Third, some caution is warranted in interpreting our results concerning positive and negative emotion suppression because they were measured with single items. The general suppression items from the ERQ can be used as a template for creating additional items to use in future studies (e.g., adjusting the item "I keep my emotions to myself" to "I keep my positive emotions to myself"). Fourth, we asked about positive and negative emotions generally rather than specific emotions. There may be cultural specificity depending on the specific emotions being suppressed and the context in which

they are suppressed. For example, the suppression of pride was associated with greater depressive symptoms among European Americans but not Chinese Singaporeans (Su et al., 2013) and the suppression of anger was significantly less associated with depressive symptoms among Asian Americans versus European Americans (Cheung & Park, 2010). It will be important for future research to replicate our findings within other Latino groups and to compare across different cultural groups, replicate our results concerning positive and negative suppression using measures with more than one item, and identify the specific emotions for and contexts in which suppression affects depressive symptoms.

Fifth, we were not able to test whether depressive symptoms predicted changes in reappraisal and suppression consistent with research showing that depressive symptoms predicts suppression during mid and late adolescence (De France et al., 2019; Vilgis et al., 2018). Further, reappraisal and suppression were measured *after* our initial measurement of depressive symptoms. Consequently, we cannot make any directionality claims despite our prospective design. Future studies should test these bidirectional relations and measure reappraisal and suppression *prior* to or concurrently with the initial measure of depressive symptoms. Finally, although our positive and negative emotion suppression results for anhedonia were largely consistent with the Latino and Mexican cultural value of *simpatía*, we did not specifically measure individual differences in the endorsement of *simpatía* values (e.g., Acevedo et al., 2020). It will be important for future studies to specifically link our results with *simpatía* values.[5]

Concluding Comment

Research investigating whether emotion regulation predicts psychological health among diverse populations is limited in both amount and scope. Our investigation of Mexican-origin adolescents, emotion regulation, and symptoms pertaining to the two core affective facets of depression revealed important nuances with respect to whether emotion regulation predicted depressive symptoms in this population. Specifically, whereas habitual reappraisal and suppression predicted anhedonia (e.g., low positive affect), their effects on distress symptoms (i.e., high negative affect) were limited in our sample. Further, the effects of positive and negative emotion suppression had contrasting effects on anhedonia over time. Our results point to one's cultural background as an important factor with respect to whether particular emotion regulation strategies benefit or worsen psychological health. Cultural nuances such as these underscore the importance of continuing to investigate the links between emotion regulation and psychological health in diverse samples to develop and advance culturally informed models of these links.

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[5] The cultural value of *simpatía* among Latino and Mexican individuals may contribute to a cultural context in which the observed associations between positive and negative emotion suppression and anhedonia are particularly likely, but individual differences in *simpatía* might not explain within-group variability in the association between positive and negative suppression and anhedonia.

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