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Does Anger Regulation Mediate the Discrimination-Mental Health Link among Mexican-Origin Adolescents? A Longitudinal Mediation Analysis Using Multilevel Modeling

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Abstract

Although prior research has consistently documented the association between racial/ethnic discrimination and poor mental health outcomes, the mechanisms that underlie this link are still unclear. The present three-wave longitudinal study tested the mediating role of anger regulation in the discrimination—mental health link among 269 Mexican-origin adolescents ($M_{age} = 14.1$ years, $SD = 1.6$; 57% girls), 12 – 17 years old. Three competing anger regulation variables were tested as potential mediators: outward anger expression, anger suppression, and anger control. Longitudinal mediation analyses were conducted using multilevel modeling that disaggregated within-person effects from between-person effects. Results indicated that outward anger expression was a significant mediator; anger suppression and anger control were not significant mediators. Within a given individual, greater racial/ethnic discrimination was associated with more frequent outward anger expression. In turn, more frequent outward anger expression was associated with higher levels of anxiety and depression at a given time point. Gender, age, and nativity status were not significant moderators of the hypothesized mediation models. By identifying outward anger expression as an explanatory mechanism in the discrimination-distress link among Latino youths, this study points to a malleable target for prevention and intervention efforts aimed at mitigating the detrimental impact of racism on Latino youths' mental health during the developmentally critical period of adolescence.

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Keywords

Racial/ethnic discrimination; anger regulation; Mexican-origin adolescents; depression; anxiety

Health disparities among racial/ethnic minority populations continue to pose a pressing public health challenge (Dominguez et al., May 8, 2015; Park, Schwartz, Lee, Kim, & Rodriguez, 2013; D. R. Williams, Mohammed, Leavell, & Collins, 2010). One contributing factor to such disparities is exposure to racism and racial/ethnic discrimination (Lewis, Cogburn, & Williams, 2015; Pascoe & Smart Richman, 2009; Schmitt, Branscombe, Postmes, & Garcia, 2014; D. R. Williams & Mohammed, 2009). Racism has been defined as “beliefs, attitudes, institutional arrangements, and acts that tend to denigrate individuals or groups because of phenotypic characteristics or ethnic group affiliation” (Clark, Anderson, Clark, & Williams, 1999). Racial/ethnic discrimination refers to unfair treatment due to an individual’s race or ethnicity (Contrada et al., 2000). As an acute or chronic stressor that can accumulate risk for mental and physical disorders over time, perceived racial/ethnic discrimination has been consistently associated with poor mental and physical health outcomes (Lewis et al., 2015; Pascoe & Smart Richman, 2009). For example, experiences of racial/ethnic discrimination among Latino youths have been prospectively associated with more depression and anxiety in longitudinal studies (e.g., Berkel et al., 2010; Sirin et al., 2015). However, what remains unclear are the specific underlying mechanisms and processes that explain the “how” and “why” behind this association between discrimination and mental health (Hatzenbuehler, Nolen-Hoeksema, & Dovidio, 2009; Pascoe & Smart Richman, 2009).

Developmentally, it is critical to examine these questions about underlying mechanisms in adolescence, given the importance of identity negotiation during this period (e.g., Phinney & Ong, 2007). Assaults on racial/ethnic identity formation through discrimination experiences in adolescence can be especially impactful given the coping resources associated with a strong ethnic identity. Moreover, the effects of discrimination at this developmental stage have implications for later health consequences in the life course as research on social determinants has established (Priest et al., 2013). Identifying mechanisms in adolescence can be helpful in prevention efforts geared towards promoting well-being in adulthood.

Much of the literature on the effects of discrimination on health has primarily focused on African American adults. Emerging research indicates the adverse impact of discrimination on the health of other minority populations, including Latinos (Berkel et al., 2010; Lee & Ahn, 2012; McClure et al., 2010). Latinos currently represent the largest ethnic minority group in the nation, with those identifying as Hispanic or Latino in origin at 55.4 million or 17.4% of the U.S. population (U.S. Census Bureau, 2015). This population is rapidly expanding and accounts for more than half of the total population growth in the U.S. since 2000 (Ennis, Ríos-Vargas, & Albert, 2011). In the Midwest, the Latino population grew significantly (by 49%) in the period between 2000 and 2010, accounting for more than 12 times the total population growth (4%) in the region (Ennis et al., 2011). Since 2000, the number of individuals of Mexican origin nationwide increased by 54% and makes up the largest group (63%) within the total Latino population (Ennis et al., 2011). Latinos are also

seen as frequent targets of racial/ethnic discrimination. A 2010 poll by the Pew Research Center (Pew Research Center, 2010) indicated that the greatest proportion of Americans (23%) view Hispanics as the racial/ethnic minority group most frequently encountering discrimination; similarly, the majority (61%) of Latinos cite discrimination against Hispanics as a “major problem” (Pew Hispanic Center, 2010).

Although the impact of racism on health has been studied in adults, relatively little research has focused on Latino children and adolescents (Pachter & García Coll, 2009), with a particular dearth of longitudinal studies of Latino youths from non-urban areas (Priest et al., 2013). One review found that out of 40 studies investigating the impact of racism on child health, only 3 focused on Latinos exclusively (Pachter & García Coll, 2009). Yet, Latino children (17.4 million under age 18) currently comprise the largest minority group of children in the U.S., and they experience serious health and mental health disparities. For example, Latino youth have higher rates of attempted suicide (Zayas, 2011), anxiety-related behaviors, and depression than their non-Hispanic peers (Center for Disease Control and Prevention, 2009). Furthermore, data from the National Latino and Asian American Study (NLAAS) reveal a distinct pattern showing that younger Latinos report higher rates of discrimination than their older counterparts, with a 50% prevalence rate in the youngest age group (18–24 year olds), compared to a 30% prevalence rate in the overall Latino population (Pérez, Fortuna, & Alegría, 2008). Yet, despite these sobering statistics regarding mental health disparities for Latino youths as well as their high levels of perceived discrimination, very little research attention has focused on examining how and why discrimination and disparities might be interrelated. The present study sought to fill these gaps in the disparities literature using an integrative theoretical approach.

Conceptual and Methodological Moorings

Conceptually, the present study was informed by a theoretical model (Sanders-Phillips, Settles-Reaves, Walker, & Brownlow, 2009) which helps pinpoint underlying mechanisms that could explain the link between discrimination and mental health. The Sanders-Phillips et al. (2009) model is a broad ecological framework for understanding how exposure to racial discrimination at various levels (individual and structural) is linked to unfavorable child health outcomes and disparities through the mechanism of psychological and biological responses (e.g., anger). The present study builds upon this conceptual model focusing on deleterious effects of racism and discrimination on child health disparities. Specifically, the present study tests anger regulation as a potential intra-individual mechanism in the link between discrimination and mental health outcomes.

Methodologically, the present study aimed to disentangle within-person versus between-person effects within the context of discrimination experiences and their consequences for mental health. Currently, the discrimination and health disparities literature is dominated by between-person methods, which are insufficient to test theories that assume within-person effects (such as emotion regulation). Longitudinal designs, however, afford an excellent opportunity to disaggregate within-person versus between-person relations (Curran & Bauer, 2011). For example, consider the relation between perceived discrimination and outward anger expression. The between-person relation reflects the extent to which youths who

experience more perceived discrimination differ in outward anger expression from youths who experience less perceived discrimination. In contrast, the within-person relation reflects the extent to which a youth expresses more anger when he or she perceives more (or less) discrimination than when he or she does not. In the empirical research on discrimination and health disparities, there are very few studies that have capitalized on these new methods that allow for disaggregation of within-person versus between-person effects, as strongly advocated by Curran and Bauer (2011). Thus, in the present study, we apply a longitudinal, multilevel analysis which permits the disaggregation of within-person effects from between-person effects in the test of a mediation model linking racial/ethnic discrimination and mental health outcomes.

Mediating Mechanisms Underlying the Discrimination—Mental Health Link

One promising explanatory mechanism that can help explain the link between racial/ethnic discrimination and mental health problems is emotion regulation (Harrell et al., 2011). Emotion regulation refers to individuals' abilities to "influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998). Emotion regulation and dysregulation are central features of childhood and adolescent psychopathology (Keenan, 2000). For the purposes of this paper, anger regulation refers to youths' abilities to influence how and when they experience and express anger, with particular attention to three types of anger regulation—namely, outward anger expression, anger suppression, and anger control. Furthermore, anger regulation is viewed and operationalized neither as a state-level (subjective emotional experience) nor as a trait-level (proneness to anger as a personality trait) characteristic, but as a mechanistic *process* by which an individual expresses or controls his/her emotions as explained above. Given the acquisition of increasingly complex emotion regulation skills during the adolescent years, particularly with the onset of puberty and associated changes in the adolescent brain (Dahl & Spear, 2004; Ladouceur, Peper, Crone, & Dahl, 2012), anger regulation is very salient during this developmental stage.

Anger regulation has been empirically associated with the development and maintenance of internalizing problems among children and adolescents (Kerr & Schneider, 2008; Zeman, Cassano, Perry-Parrish, & Stegall, 2006). For example, outward anger expression (Kerr & Schneider, 2008) and anger suppression (Gross & John, 2003) have been associated with higher levels of psychopathology. In line with this research, we hypothesize that greater outward anger expression and anger suppression will be associated with *more* anxiety and depression, respectively. On the other hand, anger control has been associated with lower levels of internalizing problems (Eisenberg, Spinrad, & Eggum, 2010). Likewise, we hypothesize that anger control will be associated with *less* anxiety and depression, respectively, in the present study. Thus, the links between emotion regulation and psychopathology or well-being, respectively, have been well-established. Yet very little research has systematically examined the link between racial/ethnic discrimination and emotion regulation.

Emerging research is beginning to test emotion regulation (especially anger regulation) as a mediating mechanism of the discrimination—mental health link. Given the emotionally

York City. Finally, the conceptual model underpinning the present research involves novel ways of envisioning the impact of discrimination on health disparities among minority adolescents (Sanders-Phillips et al., 2009) and accounting for potential mediating mechanisms.

Study Hypotheses

In the present study, we operationalize anger regulation as: outward anger expression, anger suppression, and anger control. Given the theoretical and empirical work reviewed earlier, we hypothesize that perceived racial/ethnic discrimination will be positively associated with higher levels of all three types of anger regulation (outward anger expression, anger suppression, and anger control), intraindividually. In turn, outward anger expression and anger suppression are hypothesized to be associated with *more* anxiety and depression, respectively, whereas anger control is hypothesized to be associated with *less* anxiety and depression among Mexican-origin youths. Moreover, given that prior research has found age and gender differences in emotion regulation and anger regulation in particular (Eisenberg et al., 2010; Kerr & Schneider, 2008; Otterpohl & Wild, 2015) and age, gender and nativity status differences in perceived discrimination (Córdova & Cervantes, 2010; Finch, Kolody, & Vega, 2000; Pérez et al., 2008), we explored whether or not the hypothesized mediation effects of anger regulation in the association between discrimination and mental health outcomes would be moderated by age, gender, and nativity status. Because of the lack of previous findings in the relevant moderated mediation effects, we did not forward specific hypotheses for moderated mediation by age, gender or nativity status.

Method

Participants

The data for the current study originate from a 3-wave longitudinal study of discrimination and mental health in Latino adolescents and families. At Time 1, participants were 269 Mexican-origin adolescents, 12–17 years old ($M_{\text{age}} = 14.1$ years, $SD = 1.6$; see Table 1). The sample was 57% female ($n = 153$), and the majority of the sample was U.S.-born (71%; $n = 191$) with the remainder born in Mexico (29%; $n = 78$). The length of U.S. residency ranged from 2.4 months to 17 years ($M = 12.6$; $SD = 3.0$), with youth participants having spent, on average, 89.3% of their lives in the United States. Among those born in Mexico, the average length of U.S. residency was 10.3 years ($SD = 3.7$). In terms of family structure, 88.5% ($n = 238$) youths reported living in two-parent households. With respect to annual household income, mothers reported a median of \$20,000–\$29,999 for the father's income (33.1%; $n = 232$ valid responses across all income categories) and a median income below \$20,000 for themselves (38.7%; $n = 262$ valid responses across all income categories). This suggests a combined household income that approaches the national median income level of \$42,491 for Latino households (DeNavas-Walt & Proctor, 2015). Out of the participating parents ($n = 267$ mothers; $n = 236$ fathers) at T1, 85% of mothers reported a high school education or less, and 87.7% of fathers reported a high school education or less. See Table 1 for a summary of the youth sample characteristics at T1, T2, and T3.

Recruitment and Procedures

Adolescents and their families were recruited from public schools, churches, and community-based organizations in a mid-sized Midwestern region using a purposive sampling strategy that focused on face-to-face interactions and referrals by trusted intermediaries as recommended for recruitment and retention of Latino immigrant families (C. R. Martinez, McClure, Eddy, Ruth, & Hyers, 2012). In keeping with recent recommendations for studies of cultural influence to use an ethnic-homogeneous design (Roosa et al., 2008), the present study focused on Mexican-origin families. Inclusion criteria were: 1) the family has an adolescent, age 12–17 years old, of Mexican descent; 2) residing with his/her biological mother, also of Mexican descent; 3) the adolescent's biological father was also of Mexican descent. Exclusion criteria were: 1) the adolescent has a severe learning or developmental disability which would prevent them from understanding or responding to survey questions; and, 2) the family participated in the pilot study (2011–2012) which assessed similar constructs.

Families recruited through public school systems were mailed bilingual (Spanish and English) letters and flyers describing the study. Interested recipients of these mailings were asked to call the bilingual, bicultural Latina project staff who then conducted follow-up screening interviews by phone to answer questions and determine study eligibility. Similarly, families recruited from churches and community-based organizations were given flyers or were asked to provide their names and contact information if they were interested in the study. Follow-up screening interviews were then conducted by project staff.

Data were collected from adolescents on three measurement occasions, spaced approximately 4 months apart (baseline, 4 months, and 8 months) from December 2013 through June 2015 over a period of 18 months. A similar time interval has been used successfully in prior research examining the mediating effect of emotion regulation in the link between a social stressor and internalizing symptoms in adolescents (McLaughlin, Hatzenbuehler, & Hilt, 2009). Youths were required to have parental permission and give informed assent. Written parental permission for their child's participation, parental consent for the parents' own participation, and youth assent (obtained after the parent gave permission) were obtained prior to survey completion at the Time 1 assessment point by trained bilingual, bicultural research staff. Information about the study and permission, consent, assent procedures were presented in the participant's preferred language; written materials were read aloud with opportunities for participants to ask questions prior to providing consent, permission, and assent. The target adolescent was then asked to independently complete a questionnaire in their preferred language (English or Spanish). At T1, 97.8% (263 out of 269 youths) completed the survey in English using an audio computer-assisted self-interview (ACASI) approach; 2.2% (6 youths) completed the survey in Spanish via face-to-face interview with a bilingual interviewer or Spanish language written questionnaire. The ACASI approach offers participants both auditory and visual presentation of survey questions; participants hear the question read aloud from the computer (e.g., over headphones) and also sees the question on the computer screen. The ACASI approach has been shown to provide better quality survey data among adolescents responding to socially sensitive questions, by increasing privacy, reducing cognitive burden,

and increasing the perceived scientific legitimacy of the study (Tourangeau & Smith, 1996). Questionnaires were administered to youths at one of four community-based sites across two counties.

At T1, $n = 269$ youths participated, whereas 98.9% of mothers ($n = 267$) and 87.7% of fathers ($n = 236$) responded to survey items; parents typically participated via face-to-face interviews with a bilingual, bicultural interviewer. At T2, 91.8% of youths ($n = 247$) were surveyed, and at T3, 91.8% of youths ($n = 247$) were surveyed again along with 91.4% of mothers ($n = 244$) who provided their reports about their child's mental health through a brief 15-minute interview. From T1 to T2, the corresponding attrition rate for youth participants was 8.2% ($n = 22$ youths were missing at T2), and from T2 to T3, the attrition rate was 0% (again, $n = 22$ youths missing at T3; this was due to 13 T1 participants who skipped T2 but returned at T3, and 13 other T2 participants who dropped out at T3). One-way ANOVA tests indicated that there were no significant differences on any of the study variables (i.e., discrimination, outward anger expression, anger suppression, anger control, anxiety, and depression) nor on demographic markers (i.e., age, gender, nativity status, years of U.S. residency) between the retained youth sample ($n = 233$ youths) vs. those who only participated in 1 ($n = 10$) or 2 ($n = 26$) timepoints.

For participants who scored in the clinically elevated range on measures of psychological distress, trained research staff debriefed the youth and parent(s) in their preferred language by providing information sheets (e.g., on depression or anxiety), referrals to local mental health agencies with bilingual services, and offering assistance in making an initial appointment with a service provider. Participating families received up to \$190 as compensation for their total time in the project (target adolescent received \$20 at T1, \$30 at T2, and \$40 at T3; each parent received \$40 at T1; mothers received \$20 at T3 for a brief interview). The present study was approved by the Human Subjects Institutional Review Board at the first author's institution.

Measures

All measures in the present study were available to youths in both English and in Spanish.

Demographic background—Age, gender, ethnicity, length of U.S. residency, birthplace, generation status, family annual household income, and parents' education levels were assessed.

Perceived racial/ethnic discrimination—The 10-item Perceptions of Racism in Children and Adolescents (PRaCY; short version) measure (Pachter, Szalacha, Bernstein, & García Coll, 2010) was used to assess adolescents' perceived racial/ethnic discrimination. The PRaCY measure assesses perceptions of both direct (targeting the adolescent respondent) and vicarious discrimination (targeting parents or other family members). This measure was originally developed using a sample that was predominantly Latino and African American (Pachter et al., 2010), and the authors developed a Spanish version as well (also used in the present study). There are two developmentally appropriate versions of the PRaCY—one for 8–13 year olds and another for 14–18 year olds; both versions contain 10 items, and the two versions differ on 2 items. The developers of the instrument have

demonstrated that the items are not biased by age (Pachter et al., 2010). In the present study, only the 8 items that were common across both age groups were used to reduce the possibility of problems of competing interpretations of the findings; this was deemed appropriate by the developer of the measure (L. M. Pachter, personal communication, February 04, 2016). Participants responded to each item using a dichotomous format (“Yes”; “No”). Sample items include: “Have you ever had someone make a bad or insulting remark about your race, ethnicity, or language?” and “Have you ever seen your parents or other family members treated unfairly or badly because of the color of their skin, language, accent, or because they came from a different country or culture?” In the present study, internal consistency was adequate, with Cronbach’s alphas of .70 (T1), .68 (T2), and .71 (T3).

Anger regulation—The 35-item State-Trait Anger Expression Inventory-2 Child/Adolescent version (Brunner & Spielberger, 2009) was used to assess adolescents’ anger regulation, operationalized as outward anger expression, anger suppression, and anger control. The *Anger Expression-Out* scale (5 items) assessed the frequency of outward anger expression towards others or objects in the environment. One sample item is, “I do things like slam doors” (PAR, Inc., 2009). The *Anger Expression-In* scale (5 items) assessed the frequency of anger suppression; that is, the frequency with which angry feelings are held in—that is, experienced but not expressed. Note: The term “anger suppression” will be used to refer to “anger expression-in.” One sample item is, “I get mad inside, but do not show it” (PAR, Inc., 2009). The *Anger Control* scale (5 items) assessed the frequency of controlling outward or inward anger expression through prevention of outward anger expression toward others and the environment or through the use of internal coping strategies such as cooling off or calming down. One sample item is, “I do something to relax and calm down” (PAR, Inc., 2009). Unlike anger suppression where angry feelings are still being experienced internally, anger control refers to attempts that result in the reduction of angry feelings. Each item was rated using a 3-point scale (1 = *Hardly ever*; 3 = *Often*). Scores for each subscale were calculated using the mean of the items. The STAXI-2 C/A is a well-validated instrument, and the internal consistency of these STAXI-2 C/A subscales has been reported to be adequate with reliability alphas ranging from .64 – .81 for male and female youths 12 – 18 years old (Brunner & Spielberger, 2009). In the present study, Cronbach’s alphas were as follows: Anger Suppression = .68 (T1), .67 (T2), .73 (T3); Anger Expression-Out = .76 (T1), .75 (T2), .71 (T3); Anger Control = .73 (T1), .76 (T2), .78 (T3).

Anxiety—The 10-item Multidimensional Anxiety Scale for Children (MASC-10; (March, Parker, Sullivan, & Stallings, 1997) is a widely used measure to assess youths’ anxiety symptoms across four basic dimensions (physical symptoms; harm avoidance; social anxiety; separation/panic). Participants were asked to rate the frequency with which a given statement described their thoughts, feelings, or behaviors recently. Each item was rated on a 3-point scale ranging from 0 (*Never true about me*) to 3 (*Often true about me*). Sample items include: “I feel restless and on edge” and “I feel shy.” The MASC has been successfully administered to Latino youth samples in prior research (e.g., W. Martinez, Polo, & Carter, 2012). Internal consistency was adequate in the present study with Cronbach’s alphas = .67 (T1), .70 (T2), and .72 (T3).

Depression—Youths’ depressive symptoms were assessed with the 12-item Children’s Depression Inventory-2 (CDI-2 Short form; (Kovacs, 2011). The CDI-2 measures cognitive, affective, somatic, and behavioral symptoms of depression during the previous two weeks. Participants were asked to endorse the sentence that best describes themselves (0 = *absence of symptoms*; 2 = *definite symptoms*). Sample items include: “I am sad once in a while; I am sad many times; I am sad all the time” and “I am tired once in a while; I am tired many days; I am tired all the time.” CDI scores were calculated using the sum of the items. The CDI has been successfully administered to children from various ethnic minority groups (Kovacs, 2011), including Latino adolescents (e.g., Kornienko & Santos, 2014). Internal consistency for the CDI-2 was adequate in the present study with Cronbach’s alphas of .81 (T1), .76 (T2), and .81 (T3).

Data Analytic Plan

To test the study hypotheses, we conducted longitudinal mediation analyses via multilevel modeling (Maxwell & Cole, 2007; Zhang, Zyphur, & Preacher, 2009) using SAS PROC MIXED (see Figure 1). We included perceived racial/ethnic discrimination (PRaCY) as the input variable, and the three mediators (i.e., outward anger expression, anger suppression, and anger control) were modeled as multiple mediators simultaneously.

In the current study, the input, mediator, and outcome variables are all time-varying (longitudinal). This design has multiple methodological strengths. Specifically, each individual acts as his or her control (Singer & Willett, 2003). Thus, the within-person findings are not confounded with between-person characteristics or relations. The use of time-varying variables permits the disaggregation of within-person from between-person effects. In the multilevel models, person-mean centering was applied to the input and mediator variables to disaggregate the between-person and within-person effects, given that the within-person effects were of primary research interest in the present study (Curran & Bauer, 2011; Singer & Willett, 2003; Wang & Maxwell, 2015). It is worth noting that such disaggregation is necessary and important because the composite effect without disaggregation is “generally an uninterpretable blend” (p. 138) of between- and within-person effects (Raudenbush & Bryk, 2002).

The level-1 multilevel mediation models, using anxiety as an example for the outcome variable, are as follows:

From the input variable to the mediators (the random-effects “a” path):

$$\begin{aligned} AO_{ij} &= IAO_i + \gamma_{AO_i} time_{ij} + a_{1i}(PRaCY_{ij} - PRaCY_i) + eAO_{ij} \\ AS_{ij} &= IAS_i + \gamma_{AS_i} time_{ij} + a_{2i}(PRaCY_{ij} - PRaCY_i) + eAS_{ij} \\ AC_{ij} &= IAC_i + \gamma_{AC_i} time_{ij} + a_{3i}(PRaCY_{ij} - PRaCY_i) + eAC_{ij} \end{aligned}$$

From the input variable and mediators to the outcome, Anxiety (the random-effects “b” path):

$$\begin{aligned}
 Anxiety_{ij} = & IY_i + \gamma_{Y_i} time_{ij} \\
 & + b_{1i}(AO_{ij} - AO_{i.}) + b_{2i}(AS_{ij} - AS_{i.}) + b_{3i}(AC_{ij} - AC_{i.}) \\
 & + c'_i(PRaCY_{ij} - PRaCY_{i.}) + eY_{ij}
 \end{aligned}$$

where $Anxiety_{ij}$, AO_{ij} , AS_{ij} , AC_{ij} , and $PRaCY_{ij}$ are the observed scores in the outcome variable *Anxiety*, mediator variables - *outward anger expression (AO)*, *anger suppression (AS)*, and *anger control (AC)*, and input variable *PRaCY* for individual i at time j , respectively. $Variable_{i.}$ is the individual i 's person mean of the variable, which is included for person-mean centering.

At the second level, IY_i is predicted by $PRaCY_i$, AO_i , AS_i , and AC_i whereas IAO_i , IAS_i , and IAC_i are predicted by $PRaCY_i$. In this way, the within-person relations are disaggregated from the between-person relations (Curran & Bauer, 2011; Wang & Maxwell, 2015). The fixed effect of c'_i , c' , quantifies the average within-person direct effects of the input variable *PRaCY* on the outcome variable after controlling for the three mediators. The fixed effects of b_{1i} , b_{2i} , and b_{3i} (b_1 , b_2 , and b_3) quantify the average within-person relations between the mediator variables (outward anger expression, anger suppression, and anger control) and the outcome variable after controlling for the input variable *PRaCY* and other included mediators (e.g., for outward anger expression, the effects of anger suppression and anger control are controlled for), respectively. Furthermore, the fixed effect of a_{1i} , a_1 , quantifies the average within-person relation between the input variable *PRaCY* and the mediator variable *outward anger expression*. The fixed effect of a_{2i} , a_2 quantifies the average within-person relation between the input variable *PRaCY* and the mediator variable *anger suppression*. Finally, the fixed effect of a_{3i} , a_3 , quantifies the average within-person relation between the input variable *PRaCY* and the mediator variable *anger control* (see Figure 1).

We also fitted multilevel models without the mediators to the data to evaluate the total effects. The level-1 model, using anxiety as an example for the outcome variable, is as follows:

$$Anxiety_{ij} = IY_i + \gamma_{Y_i} time_{ij} + c_i (PRaCY_{ij} - PRaCY_{i.}) + eY_{ij}$$

where c_i is the within-person total effect of *PRaCY* on the outcome of individual i . The fixed-effects of c_i , c , measures the average within-person total effect of *PRaCY* on the outcome.

We used all available data in the data analyses. Full information maximum likelihood estimation was used to estimate the parameters in the multilevel mediation models, assuming that the missingness mechanism is missing at random (Zhang & Wang, 2013; Little & Rubin, 2014).

Results

Descriptive Statistics

Table 1 displays the participant characteristics across T1, T2, and T3. Table 2 displays the correlations, means, and standard deviations of the study variables at T1, T2, and T3, respectively. Testing (habituation) effects (e.g., decreasing means over time) due to repeated administration of the study measures were observed, as has been documented in prior longitudinal research (Twenge & Nolen-Hoeksema, 2002). Thus, in the following longitudinal mediation models, time is included as a level-1 covariate to linearly detrend the data (i.e., control for the linear effect of time) to study the net-time within-person effects, as suggested by Wang and Maxwell (2015).

Longitudinal mediation models

The results from the within-person mediation analyses are displayed by mental health outcome variable (i.e., anxiety and depression, respectively) in Table 3. With regard to the average within-person total effects of perceived discrimination (PRaCY) on mental health, both total effects were statistically significant ($\hat{c} = .362, p = .0013$ for anxiety, and $\hat{c} = .455, p = <.0001$ for depression); that is, perceived racial/ethnic discrimination was associated with more anxiety and depression, respectively, intra-individually over time.

Testing outward anger expression as the mediator—Results from the longitudinal mediation models showed that racial/ethnic discrimination was significantly associated with greater outward anger expression ($\hat{a}_1 = .237, p = .0001$), which in turn was significantly associated with higher levels of both anxiety ($\hat{b}_1 = .416, p < .0001$) and depression ($\hat{b}_1 = .429, p < .0001$). Further, the 95% confidence intervals of the average within-person mediation effects for outward anger expression as a mediator ($a_1 b_1$) did not include 0 after controlling for anger suppression and anger control as the other mediators ($\hat{a}_1 \hat{b}_1 = .099$ with the 95% confidence interval [.042, .169] for anxiety, and $\hat{a}_1 \hat{b}_1 = .102$ with the 95% confidence interval [.046, .169] for depression). Thus, outward anger expression significantly mediated the effect of perceived discrimination (PRaCY) on anxiety and depression, respectively. That is, greater perceived discrimination at a given time point for an individual was associated with significantly *more* outward anger expression for the individual, which in turn was linked to significantly *more* anxiety and depression, respectively, at that time point.

The average direct within-person effect of perceived discrimination on mental health (after controlling for the three mediators) remained significant ($\hat{c}' = .236, p = .038$ for anxiety and $\hat{c}' = .324, p < .0001$ for depression). Therefore, the significant mediation effects were *partial* mediation effects.

Testing anger suppression as the mediator—In contrast, anger suppression did not significantly mediate the links between perceived discrimination and both anxiety and depression, respectively. More specifically, the average within-person effect of PRaCY on anger suppression was not significantly different from 0 ($\hat{a}_2 = -.058, p = .413$). In addition, after statistically controlling for PRaCY, outward anger expression, and anger control, the

average within-person effect of anger suppression on anxiety or depression was not significantly different from 0 ($\hat{b}_2 = .049$ with $p = .496$ for anxiety and $\hat{b}_2 = .128$ with $p = .102$ for depression).

Testing anger control as the mediator—Anger control did not significantly mediate the links between perceived discrimination and anxiety or depression. More specifically, the average within-person effect of PRaCY on anger control was significantly different from 0 ($\hat{a}_3 = -.131$, $p = .040$). However, after statistically controlling for PRaCY, outward anger expression, and anger suppression, the average within-person effect of anger control on anxiety and depression, respectively, was nonsignificant ($\hat{b}_3 = -.133$ with $p = .100$ for anxiety and $\hat{b}_3 = -1.02$ with $p = .138$ for depression).

Finally, we conducted moderated mediation analyses to test whether or not the mediation effects were moderated by potential moderators including age (used as a continuous variable), gender (0/1), and nativity status (US-born or born in Mexico, 0/1) at Wave 1. Specifically, we included each potential moderator to predict the a_i paths (a_{1i} , a_{2i} , and a_{3i}), b_i paths (b_{1i} , b_{2i} , b_{3i}), and c' path in the level-2 models to test whether or not the mediation effects were moderated (e.g., Preacher, Rucker, & Hayes, 2007; Wang & Preacher, 2015). The moderators were included separately. Age, gender, and nativity status did not reach significance as moderators of any of the hypothesized mediation effects. In other words, age, gender, and nativity status did not significantly predict any of the a_i paths (a_{1i} , a_{2i} , and a_{3i}) and b_i paths (b_{1i} , b_{2i} , b_{3i}), p s > .05. Therefore, the mediation effects were not significantly moderated by age, gender, or nativity status.

Discussion

The present three-wave longitudinal study was designed to test the mediating role of anger regulation in the discrimination-mental health link in a sample of Mexican-origin adolescents residing in the Midwestern region of the U.S. Three competing anger regulation variables were tested as potential mediators: outward anger expression, anger suppression, and anger control. Results indicated that outward anger expression was the sole significant mediator among the three anger regulation variables that were tested in this study. Outward anger expression significantly mediated the association between perceived racial/ethnic discrimination and both anxiety and depression, respectively, for these Mexican-origin adolescents. Specifically, within a given adolescent, more perceived racial/ethnic discrimination at a given time point was associated with more frequent outward anger expression, which in turn was linked with higher levels of anxiety and depression for that adolescent. This finding illuminates one mechanistic pathway, addressing several calls in this literature to do so (e.g., Lewis et al., 2015; D. R. Williams & Mohammed, 2009), through which racial/ethnic discrimination influences mental health outcomes, in this case, for Latino adolescents. This finding provides direction on where and how to intervene to counteract the adverse effect of discrimination on mental health for Mexican-origin youths. The indirect effects of racial/ethnic discrimination on mental health problems through the mechanism of outward anger expression were not moderated by age, gender, or nativity status. This is the first longitudinal study to demonstrate the significant mediating role of anger expression as an underlying mechanism that can explain the link between perceived

racial/ethnic discrimination and mental health problems among Latino adolescents. It is also one of the first longitudinal studies in the literature on discrimination and mental health to disaggregate within-person effects from between-person effects (for another example, see also Zeiders, Umaña-Taylor, Updegraff, & Jahromi, 2015).

Of the three anger regulation variables, outward anger expression consistently mediated the link between perceived discrimination and depression and anxiety, respectively, whereas anger suppression and anger control did not. What distinguishes outward anger expression as the underlying mechanism in the discrimination-distress link? One possible explanation is that outward anger expression is associated with unique cognitive, behavioral, and physiological processes (differentiating outward anger expression from anger suppression or anger control) that play a role in mediating the association between discrimination and anxiety and depression, respectively. Another possible explanation is that unlike anger control and anger suppression, outward anger expression is a form of direct confrontation in the face (or wake) of a discrimination encounter. During adolescence, youths who perceive discrimination may not know how to best direct their outward anger expression in ways that will yield the desired outcome or change the discrimination experience for the better; thus, youths' outward anger expression was associated with poor mental health outcomes in this sample. Moreover, the results indicated *partial* mediation effects through outward anger expression for both anxiety and depression. Thus, for youths at risk for anxiety and depression, respectively, due to discrimination experiences, outward anger expression may be one intervening factor to consider among others.

Theoretically, the present study was anchored by a conceptual model (Sanders-Phillips et al., 2009) of how discrimination can be associated with poor health outcomes. The study findings are generally consistent with this model. Broadly, the Sanders-Phillips et al. (2009) model predicted that exposure to racial/ethnic discrimination leads to psychological responses such as anger, which in turn, leads to poor health outcomes (and health disparities) among youths. Similarly, the study findings also indicated that perceived racial/ethnic discrimination was associated with anger expression, which in turn, was associated with anxiety and depression in this sample of youths.

Past research on Latino adolescents' experiences of discrimination has examined other sources of risk and resilience, primarily as moderators of the discrimination-adjustment link (e.g., Delgado, Updegraff, Roosa, & Umaña-Taylor, 2011), but no other studies have addressed the role of anger regulation as a mediating mechanism. One prior study (Huynh, 2012), however, did examine state and trait anger (but not anger regulation per se) as a mediator in the link between ethnic microaggressions and depressive and somatic symptoms, respectively, among both Latino and Asian American high school students. Huynh (2012) found that state anger and trait anger partially mediated the effect of ethnic microaggressions (e.g., negative treatment frequency) on depressive and somatic symptoms, respectively. The present study found that outward anger expression partially mediated the effect of racial/ethnic discrimination on depression and anxiety, respectively among Mexican-origin adolescents. One major difference was that Huynh's (2012) study was cross-sectional, whereas the present study was longitudinal. The within-person approach, given the longitudinal data available in the present study, afforded the opportunity to assess within-

person fluctuations without the confound of between-person differences. The strengths of this approach have been extensively discussed elsewhere (e.g., Curran & Bauer, 2011; Singer & Willett, 2003). Other research has also examined anger as a mediating variable in the discrimination-adjustment link in other racial/ethnic minority groups (e.g., among African American adolescents; Gibbons et al., 2010). Despite the differences between prior research and the current study, one theme is common—namely that anger is a powerful emotion evoked in instances of perceived interpersonal racial/ethnic discrimination, and that the felt subjective experience of anger and associated anger regulation leads, in turn, to various forms of maladjustment among racial/ethnic minority adolescents. Although anger and concomitant anger regulation may be shared features associated with experiences of racial/ethnic discrimination across different racial/ethnic minority groups, cultural values and social norms surrounding the acceptability of volatile emotions such as anger (e.g., Zhou & Bishop, 2012) may influence or moderate the strength of this mediating mechanism; likewise, situational factors (e.g., power dynamics between the perpetrator vs. victim of discrimination) may affect how mediating mechanisms such as anger regulation operate.

With regard to the study design, the study sample, and most importantly, the mediating mechanisms in the discrimination—health link, the present study builds upon prior research and moves the evidence base forward. According to Williams and Mohammed's (2009) review of the discrimination and racial disparities in health literature, most studies were cross-sectional in design, and the few published studies with a longitudinal design indicated a positive association between racial discrimination and mental health symptoms. The present study contributes to the evidence base in this regard, adding positive findings for the prospective association between racial/ethnic discrimination and mental health problems among Latino adolescents specifically. The use of an ethnic homogeneous design and a Mexican-origin adolescent sample from the Midwest also contributes to the existing knowledge base where there are relatively few studies on racial/ethnic discrimination experiences and mental health consequences of youths within these demographic parameters. Most importantly, the study identifies a mechanistic pathway (i.e., via anger expression) through which we can better understand the critical process involved in *how* racial/ethnic discrimination experiences “get under the skin” to influence mental health outcomes. The present study findings open up this “black box” that scholars (Lewis et al., 2015; D. R. Williams & Mohammed, 2009) have urged the field to prioritize.

Moreover, our analytical methods allowed us to disaggregate within-person effects from between-person effects. This longitudinal multilevel approach permitted us to pinpoint that when a specific individual perceives that he/she is the target of racial/ethnic discrimination at a given point in time, then, these anger regulation processes are triggered, which in turn, lead to anxiety and depression, respectively, for that particular individual. The statistical methods which allowed us to target the within-person, intrapsychic processes are also a contribution to the discrimination and health disparities literature.

Further, when gender, age, and nativity status were tested as potential moderators in the mediation model, none were found to reach significance. That is, gender, age, and nativity status (being born in Mexico vs. the U.S.) were not found to be significant moderators of the significant indirect effects through outward anger expression or the other non-significant

indirect effects of anger suppression and anger control. The lack of moderating effects may be due to several factors, but we speculate that perhaps because the provocative nature of racial or ethnic discrimination is so emotion-laden, the response of outward anger expression may transcend differences in gender, age, and nativity status for this sample of adolescents.

Study Limitations

Though the present study findings are novel in identifying outward anger expression as a mediating mechanism in the prospective association between perceived racial/ethnic discrimination and Latino adolescents' mental health outcomes, the results must be interpreted in light of some important limitations. First, the study's convenience sample may not necessarily be representative of Mexican-origin families in this Midwestern region; the purposive sampling method restricts the generalizability of these findings, but these data will nonetheless add to the limited knowledge base on Latino youths residing in the Midwest. Second, there appeared to be a testing effect across time given the repeated administration of the study measures; this testing effect has been consistently found in prior longitudinal studies as a result of habituation to survey items (see meta-analysis by Twenge & Nolen-Hoeksema, 2002). However, the statistical methods used in the present study's analyses accounted for this by including time as a covariate to detrend the data (Wang & Maxwell, 2015). Third, both the time interval and the number of time points may have also played a role in the present study's findings. Having data from only three time points, the current study is limited in studying lagged effects and the issue of reciprocal causation: that is, does discrimination cause anger regulation or does anger regulation increase perceived discrimination? If data from additional time points with shorter intervals were available, the results could be more precise (e.g., narrower confidence intervals) and more importantly, more models could be fitted to the data (e.g., lagged-effects mediation models, Cole & Maxwell, 2003; latent difference score models, McArdle, 2009) to evaluate the issues of reciprocal causation and lagged effects. Future studies using intensive longitudinal designs such as daily diary or experience sampling designs would be helpful for studying such issues (Bolger & Laurenceau, 2013). Fourth, some of the study's measures had relatively low reliabilities at certain timepoints (specifically, Cronbach's alphas = .68 at T2 for PRaCY; .68, and .67 at T1 and T2, respectively, for anger suppression; .62 at T1 for the anxiety measure). Statistically, low reliabilities attenuate the observed correlation between two variables (e.g., McDonald, 1999). For the significant mediation effects, this is a lesser concern. However, the low reliability issue may have an influence on the interpretation of the nonsignificant results. Specifically, some nonsignificant results could be significant if more reliable measures were used. Thus we need to interpret the nonsignificant results cautiously. Finally, the present study's inclusion criteria inherently required that the adolescent and both the mother and father be available to participate. These criteria most likely resulted in a generally more resilient or well-adjusted sample than the average Mexican-origin family in this region or at least, compared to those youths from one-parent households. At the same time, due to the strict inclusion criteria for the current study sample, these results reflect a conservative test of the study hypotheses.

Implications for Future Research, Intervention, and Conclusions

The current study's novel results have important implications for future theory, research, and interventions. Specifically, by identifying emotion regulation as one potential mediating mechanism that can explain the association between discrimination experiences and poor mental health outcomes, the study points to and expands new horizons for future theory and research that can begin to unpack the black box of the "how" and "why" discrimination experiences are so toxic for individuals' mental and physical health. Future research can investigate many fruitful avenues related to the specific conditions under which anger expression or other forms of anger regulation, as well as emotion regulation more broadly, may impact mental and physical health outcomes. Moreover, other specific emotions may also play a mediating role in the link between discrimination and mental health outcomes; for example, experienced humiliation (e.g., Fernández, Saguy, & Halperin, 2015) may be one promising path of inquiry. Finally, future studies should examine whether or not the current mediation model involving anger regulation can be applied to discrimination experiences among other racial/ethnic minority groups. It remains an open empirical question as to whether or not anger regulation as a mediation mechanism in the link between discrimination and mental health outcomes can be replicated cross-culturally with other populations.

For the Mexican-origin adolescents in the present sample, it appears that perceptions of racial/ethnic discrimination trigger outward anger expression, which in turn leads to higher levels of depression and anxiety, respectively. Regardless of the mental health outcome, however, the results clearly indicate that targeting adolescents' outward anger expression is one fruitful avenue for practitioners hoping to intervene and impact the causal link between discrimination and distress. In conclusion, by identifying outward anger expression as an explanatory mechanism in the discrimination-distress link among Latino youths, this study aids the development of targeted interventions that can mitigate the detrimental impact of racism on Latino youths' mental health and thus, reduce mental health disparities.

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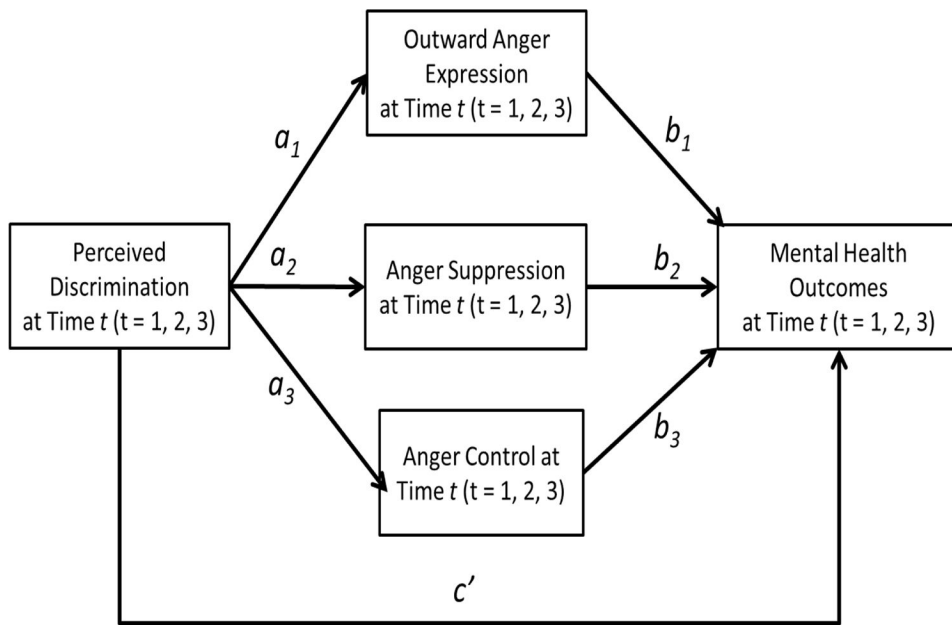


Figure 1. Conceptual representation of hypothesized longitudinal mediation model depicting the total and specific indirect effects of racial/ethnic discrimination on youths' mental health problems through anger regulation variables.

Table 1

Demographic Characteristics of the Study Sample

Characteristic	Adolescents (T1) (<i>n</i> = 269)	Adolescents (T2) (<i>n</i> = 246)	Adolescents (T3) (<i>n</i> = 246)
Age	14.1 (<i>SD</i> = 1.58)	14.5 (<i>SD</i> = 1.61)	14.9 (<i>SD</i> = 1.61)
Gender			
Male	116 (43.1%)	101 (41.1%)	101 (41.1%)
Female	153 (56.9%)	145 (58.9%)	145 (58.9%)
Birthplace			
U.S.	191 (71.0%)	178 (72.4%)	176 (71.5%)
Mexico	78 (29.0%)	68 (27.6%)	70 (28.5%)
Years lived in U.S.	12.57 (<i>SD</i> = 2.97)	13.00 (<i>SD</i> = 3.02)	13.24 (<i>SD</i> = 3.26)
Generational status			
1 st generation	82 (30.5%)	74 (30.1%)	71 (28.9%)
2 nd generation/more	187 (69.5%)	172 (69.9%)	175 (71.1%)
Family Structure ^{<i>l</i>}			
Two-parent family	238 (88.5%)	217 (88.2%)	210 (85.4%)
Single-mother/other	30 (11.2%)	29 (11.8%)	36 (14.6%)
Parent work status ^{<i>l</i>}			
Mother works (yes)	157 (58.4%)	143 (58.1%)	144 (58.5%)
Father works (yes)	247 (91.8%)	222 (90.2%)	223 (90.7%)

Note. All numbers outside parentheses are *N* values, except for age, which is the mean value.

^{*l*}Missing data (*n* = 1 missing at T1).

Table 2

Correlations between All Study Variables across Three Timepoints

	1	2	3	4	5	6	M	SD
<i>Time 1 (N = 269)</i>								
1. PRaCY	--						2.95	2.15
2. Anger-Out	.39***	--					8.18	2.39
3. Anger Suppression	-.09	-.34***	--				9.74	2.26
4. Anger Control	-.16**	-.38***	.36***	--			12.55	2.08
5. Anxiety	.20**	.24***	.20**	-.03	--		12.43	4.45
6. Depression	.33***	.50***	.05	-.24***	.45***	--	4.00	3.61
<i>Time 2 (N = 246)</i>								
1. PRaCY	--						2.47	2.02
2. Anger-Out	.30***	--					7.48	2.13
3. Anger Suppression	.00	-.25***	--				9.78	2.24
4. Anger Control	-.09	-.26***	.34***	--			12.91	2.16
5. Anxiety	.14*	.21**	.25***	.07	--		11.31	4.52
6. Depression	.39***	.48***	.11	-.16*	.39***	--	3.61	3.19
<i>Time 3 (N = 246)</i>								
1. PRaCY	--						2.13	2.02
2. Anger-Out	.39***	--					7.46	2.03
3. Anger Suppression	-.05	-.29***	--				9.95	2.40
4. Anger Control	-.08	-.32***	.37***	--			12.98	2.03
5. Anxiety	.23***	.32***	.19***	0.01	--		10.89	4.67
6. Depression	.39***	.47***	0.08	-0.10	.51***	--	3.57	3.48

Note. PRaCY = Perceived Discrimination; Anger-Out = Outward Anger Expression.

* $p < .05$;

** $p < .01$;

*** $p < .001$.

Results from Multilevel Longitudinal Mediation Analyses by Mental Health Outcome

Table 3

Mediator	<i>a</i>	<i>b</i>	<i>c'</i>	<i>a*b</i>	<i>c</i>
<i>Outcome: Anxiety</i>					
Anger-Out	$\hat{a}_1 = .237 (.0001)$	$\hat{b}_1 = .416 (<.0001)$	$\hat{c}' = .236 (.038)$	$\hat{a}_1\hat{b}_1 = .099 [.042, .169]$	$\hat{c} = .362 (.0013)$
Anger Suppression	$\hat{a}_2 = -.058 (.413)$	$\hat{b}_2 = .049 (.496)$		$\hat{a}_2\hat{b}_2 = -.003 [-.022, .010]$	
Anger Control	$\hat{a}_3 = -.131 (.040)$	$\hat{b}_3 = -.133 (.100)$		$\hat{a}_3\hat{b}_3 = .017 [-.004, .051]$	
<i>Outcome: Depression</i>					
Anger-Out	$\hat{a}_1 = .237 (.0001)$	$\hat{b}_1 = .429 (<.0001)$	$\hat{c}' = .324 (<.0001)$	$\hat{a}_1\hat{b}_1 = .102 [.046, .169]$	$\hat{c} = .455 (<.0001)$
Anger Suppression	$\hat{a}_2 = -.058 (.413)$	$\hat{b}_2 = .128 (.102)$		$\hat{a}_2\hat{b}_2 = -.007 [-.031, .011]$	
Anger Control	$\hat{a}_3 = -.131 (.040)$	$\hat{b}_3 = -.102 (.138)$		$\hat{a}_3\hat{b}_3 = .013 [-.003, .039]$	

Note: The **bolded** typeface represents significant direct or indirect effects. *a* represents the fixed-effects coefficient of the input variable PRaCY on a mediator (outward anger expression, anger suppression, or anger control); *b* represents the fixed-effects coefficient of a mediator (outward anger expression, anger suppression, or anger control) on the outcome variable after controlling for PRaCY and the other mediators; *c'* represents the fixed-effects coefficient of the input variable PRaCY on the outcome variable after controlling for the mediators, the direct effect; *c* represents the fixed-effects coefficient of the total effect of PRaCY on the outcome variable. For the *a*, *b*, *c'*, and *c* columns, the values outside the parentheses are the fixed-effects within-person effect estimates, and the values inside the parentheses are the corresponding *p* values. For the *a*b* column, the values outside the brackets are the indirect effect estimates, and the values inside the brackets are the 95% confidence intervals. If the 95% confidence interval of *a*b* does not include 0, the mediation effect is significant at the 0.05 significance level. The missing data handling method was full information likelihood estimation.