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Experiences of Discrimination among Chinese American Adolescents and the Consequences for Socioemotional and Academic Development

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Abstract

This longitudinal study examined the influences of discrimination on socioemotional adjustment and academic performance for a sample of 444 Chinese American adolescents. Using autoregressive and cross-lagged techniques, results indicate that discrimination in early adolescence predicted depressive symptoms, alienation, school engagement, and grades in middle adolescence, but early socioemotional adjustment and academic performance did not predict later experiences of discrimination. Further, our investigation of whether earlier or contemporaneous experiences of discrimination influenced developmental outcomes in middle adolescence indicated differential effects, with contemporaneous experiences of discrimination affecting socioemotional adjustment, while earlier discrimination was more influential for academic performance. Finally, we found a persistent negative effect of acculturation on the link between discrimination and adolescents' developmental outcomes, such that those adolescents who were more acculturated (in this case, higher in American orientation) experienced more deleterious effects of discrimination on both socioemotional and academic outcomes.

Keywords

discrimination; Asian American; acculturation; socioemotional adjustment; academic performance

The Asian American population in the United States has been steadily increasing over the past few decades, with more than 10 million Asian Americans currently residing in the U.S. (Barnes & Bennett, 2002). Although commonly viewed as a “model minority” (Lee, 1996), Asian Americans are not immune to the discrimination faced by other minority groups (Young & Takeuchi, 1998). The deleterious effects of discrimination across developmental domains have been well-documented with adult samples, and more recent scholarship has focused on the effects of discrimination earlier in the life course. Much of this scholarship, however, has focused on African American youth. Asian American adolescents' experiences of discrimination remain understudied, perhaps disregarded, in part, due to researchers' difficulties reconciling the model minority stereotype with discriminatory treatment.

In the current investigation, we examine the consequences of discrimination on socioemotional adjustment and academic performance for a Chinese American sample. In particular, we use longitudinal data, with assessments in middle and high school, to examine how perceptions of discriminatory treatment in early and middle adolescence influence depressive symptoms, alienation, grades, and school engagement. Further, we examine how these relationships may vary as a function of adolescents' acculturation, enculturation, and nativity status.

Discrimination and the Model Minority Stereotype

When considering educational performance and outcomes, a myriad of studies document the achievement divide that separates European American and Asian American students from their African American, Latino, and Native American peers (See Farkas, 2003 for review). These between-group differences, although confounded by differences in socioeconomic disadvantage, are evident as early as preschool and escalate across elementary and secondary school. The divide observed in educational progress is mirrored across a number of developmental domains. That Asian students tend to not exhibit the educational disparities of other students of color has contributed to their label as the model minority (Lee, 1996). This label, however, ignores the great diversity in the Asian American population in terms of not only migration patterns, but also academic achievement, educational attainment, rates of risk behaviors, and occupational status (Leong et al., 2006). In addition to providing an incomplete picture of the Asian American population, the model minority label inaccurately implies that this population is not subject to adverse treatment experienced by those in other ethnic groups (Wong & Halgin, 2006; Young & Takeuchi, 1998) and that Asian Americans do not experience mental health difficulties or academic challenges (Chang & Sue, 2003; Qin, 2008).

Racial triangulation theory (Kim, 1999) serves as a useful framework for understanding the seeming contradiction between the model minority stereotype and discrimination. The theory suggests that racial positions in the U.S. should be defined not as a hierarchy but instead along two axes—inferior/superior and foreigner/insider. As the dominant and privileged racial group, European Americans occupy the highest racial position along both continuums and wield the power to racially categorize, with categorization of Asian Americans occurring in relation to European Americans and African Americans. Racial triangulation emerges in relation to categorization across the two axes; although the dominant (i.e., European American) culture may value Asian Americans more (“valorization” of the model minority), Asian Americans are also viewed as foreigners who cannot fully integrate into U.S. society (exclusion of the perpetual foreigner; see Tuan, 1999). This categorization ultimately results in ostracizing Asian Americans from the dominant group while also engendering tensions with minority groups occupying lower valorization positions (Kim, 1999).

Racial triangulation theory suggests that the experience of discrimination for Asian Americans may not mirror that of African Americans, and recent scholarship suggests that microaggressions, or “brief, everyday exchanges that send denigrating messages to people of color because they belong to a racial minority group,” experienced by Asian Americans are systematically different from those experienced by other marginalized ethnic groups (Sue, Bucceri, Lin, Nadal, & Torino, 2007, p. 72). As such, the extant literature documenting the processes and conditions of discrimination of African Americans youth may not apply to Asian Americans. Moreover, when studying the conditions and consequences of discriminatory experiences on Asian Americans, inclusion of the foreigner/insider status aspect of racial triangulations theory is critical. The present study operationalizes this aspect by examining the potential moderating effects of adolescents’ acculturation, enculturation, and nativity status.

Effects of Discrimination on Socioemotional Outcomes

Studies examining discrimination have observed that Asian American youth report experiences of discrimination and discrimination distress from both adults and peer sources (Greene, Way, & Pahl, 2006; Lee, 2003; Rosenbloom & Way, 2004). In examining the link between discriminatory experiences and socioemotional functioning, a large body of research has focused on depressive symptoms. The vast majority examining this association in Asian samples has focused on adults, identifying a consistent link between experiences of discrimination and depressive symptoms and distress among Asians in North America (Lam,

2007; Lee, 2003; Mossakowski, 2003; Noh, Kaspar, & Wickrama, 2007; Yip, Gee, & Takeuchi, 2008). Research with African American youth replicate the negative effects of discrimination on depressive symptoms both cross-sectionally (Sellers, Copeland-Linder, Martin, & Lewis, 2006; Simons et al., 2002; Wong, Eccles, & Sameroff, 2003) and longitudinally (Brody et al., 2006; Sellers & Shelton, 2003), and studies involving a more diverse representation of minority adolescents have observed similar associations (Greene et al., 2006; Romero, Carvajal, Volle, & Orduna, 2007).

To a lesser extent, the extant literature has documented the effects of discrimination on other socioemotional domains, identifying negative effects on adolescents' psychological distress (Sellers, Caldwell, Schmeelk-Cone, & Zimmerman, 2003), psychological resiliency (Wong et al., 2003), and self esteem (Fisher, Wallace, & Fenton, 2000; Greene et al., 2006; Wong et al., 2003). Surprisingly, the effects of discriminatory treatment on feelings of alienation are not well established. By their very nature, experiences of discrimination and alienation are closely tied, thus making it difficult to tease apart their relationship. Yet experiencing discriminatory treatment can make the target feel isolated both physically and emotionally (Crocker, Major, & Steele, 1998). Qualitative evidence of this isolation is found in a study of 32 Chinese immigrant adolescents; findings suggest that experiences of racist encounters alienated adolescents from both their peers and parents (Yeh, Kim, Pituc, & Atkins, 2008). Alienation and detachment from parents, in turn, has been linked to greater problem behaviors (Choi, He, & Harachi, 2008), more deviant beliefs (Deng & Roosa, 2007), and greater depressive symptoms (Ying, Lee, & Tsai, 2007) in both Asian American and Chinese adolescent samples. The influential nature of alienation from parents for Chinese samples in particular may stem from cultural values of filial piety and family obligation which are deeply rooted in Confucian values for Chinese families both in the U.S. and abroad (Chao & Tseng, 2002; Hsu, 1953; Qin, 2006). The current study, recognizing both the critical nature of family attachment for Asian American adolescents and the paucity of research examining the precursors of alienation, explores the effects of discrimination on feelings of alienation from family for a sample of Chinese American youth.

Effects of Discrimination on Academic Outcomes

The influence of discrimination on adolescents' academic functioning has received less attention. Investigations with African American youth have found mixed results in relation to grades in school, with some studies identifying a negative link between discrimination and grades (Eccles, Wong, & Peck, 2006; Neblett Jr, Philip, Cogburn, & Sellers, 2006), while others find no differences (Wong et al., 2003). Results in other academic domains show more consistency, identifying a negative association between discrimination and adolescents' value of education, academic curiosity and persistence, and self concept of ability (Eccles et al., 2006; Neblett Jr et al., 2006; Smalls, White, Chavous, & Sellers, 2007; Wong et al., 2003). These studies, however, were conducted with African American samples, and given the expectations associated with the model minority stereotype, particularly those tied to academic performance, how discriminatory treatment might affect Asian American youth's academic outcomes is an area ripe for inquiry. Studies have suggested that Asian American students are resilient to academic disengagement (Chao, 1994; Kao, 2000). Whether this resiliency plays out with respect to discriminatory treatment is a focus of the current investigation. Racial triangulation theory suggests that the valorization of Asian Americans, essentially an endorsement of the model minority stereotype, should contribute to the success of Asian American adolescents in the academic domain; however, experiences of discrimination may make Asian American adolescents' status as perpetual foreigners more salient, thus disrupting academic performance.

Enculturation, Acculturation, and the Discrimination-Outcome Relationship

Although discrimination can have negative consequences across developmental domains, its effects are not uniform across individuals. Why some individuals experience the effects less than others has been a topic of recent scholarship. Some evidence with African American adolescents suggests that connection to and identification with one's ethnic group (i.e., ethnic identity) serves a protective factor, buffering the negative effects of discrimination on both mental health (Greene et al., 2006; Sellers et al., 2003) and academic functioning (Eccles et al., 2006; Smalls et al., 2007). Studies with Asian adult samples, however, have been more mixed. In three separate studies examining whether the relationship between discrimination and depression was moderated by ethnic identity, three different results emerged—no effects (Lee, 2003), ethnic identity as a protective factor (Mossakowski, 2003), and ethnic identity as a risk factor (Noh et al., 1999). Each study, however, employed a unique adult sample (Asian Indian college students, Filipino adults, and southeast Asian refugees in Canada for the three studies, respectively) and unique measures of ethnic identity, often including multiple aspects of ethnic identity (e.g., ethnic identity salience, language retention, affirmation and belonging) into a single construct.

How closely linked ethnic identity and acculturation are has been much debated in recent scholarship. Acculturation encompasses “the general processes and outcomes (both cultural and psychological) of intercultural contact” (p. 8) arising from “how individuals who have developed in one cultural context manage to adapt to new contexts that result from migration” (p. 6; Berry, 1997). Phinney (2003) asserts that acculturation and ethnic identity are confounded constructs because of the often overlapping items used to assess them. At the same time, other scholars conceptualize acculturation as a distinct construct from ethnic identity, arguing that “while ethnic identity requires conscious endorsement, acculturation does not” (Tsai, Chentsova-Dutton, & Wong, 2002, p. 42). For example, an individual may be aware of, and even embrace, American cultural values and customs (e.g., acculturation) without specifically identifying with that culture (e.g., ethnic identity) (Tsai, Chentsova-Dutton, & Wong, 2002, p. 42). As such, while previous research linking discrimination and ethnic identity may inform our understanding of the link between discrimination and acculturation, the discrimination-acculturation relationship may represent a unique process that is distinct and should be examined in its own right. Complicating matters further, scholars have argued for the need to distinguish acculturation from enculturation, both in terms of underlying conceptualization and implications for developmental outcomes (Kim, 2009). In the current study, we use orientation to Chinese culture as a measure of enculturation, or “the process of socialization to, and maintenance of, the norms of one's indigenous culture, including the salient values, ideas, and concepts” (Herskovitz, 1948).

Cuellar and colleagues (1997) found a strong positive relationship between measures of enculturation and ethnic identity for a Mexican-origin sample. To the extent that this enculturation-ethnic identity relationship also holds for Asian Americans, then researchers have, to a very limited extent, explored the relationship between discrimination and enculturation on outcomes for Asian samples. However, as previously emphasized, ethnic identity and enculturation are not interchangeable constructs, and as such, it is important to examine the link between discrimination and enculturation in its own right.

Currently, investigations of the relationships between acculturation and discrimination are scarcer, particularly with Asian American samples. In one exception, Goto and colleagues (2002) found that more acculturated Chinese American adults were more likely to report experiences of discrimination. In their qualitative study, Rosenbloom and Way (2004) found that Asian American adolescents distinguished between “mainstream” Chinese, those born in the U.S. or with long histories of U.S. residence, versus “FOBs,” those who recently emigrated

to the U.S. or were “fresh off the boat.” Mainstream Chinese adolescents expressed offense that non-Asian students confused them with the more recent Chinese immigrants, given differences in their ease with American culture. Whether acculturation moderates the relationship between discrimination and outcomes has not yet been examined with Asian samples, but in their study of Latino adolescents, Umana-Taylor and Updegraff (2007) found that strong orientation to mainstream American culture heightened the relationship between discrimination and depressive symptoms. The current study extends on findings on both enculturation and acculturation by examining how variations in each influence both mean-level differences in perceptions of discrimination and developmental outcomes as well as the relationship between the two. In addition, given the importance of nativity for processes of both acculturation and enculturation (see Kim, 2009 for discussion), we also explore the relationships between discrimination and developmental outcomes across native- and foreign-born Chinese Americans.

The Current Study

Garcia Coll and colleagues (1996) have argued that comprehensive models exploring the developmental competencies of all minority youth must recognize the core influence of experiences of discrimination and prejudice. The current study hearkens this call by examining how perceptions of discrimination during both early and middle adolescence influence Chinese American adolescents’ socioemotional adjustment and academic performance. Garcia Coll and colleagues argue for the recursive nature of development. Experiences of discrimination, and the inhibiting environment resulting from this discrimination, influence developmental competencies at a given point in time, yet how individuals cope with these inhibiting environments affects subsequent development. Early and middle adolescence, the developmental stages examined in the current study, are ideal times for examining the constructs we target, as developmental research suggests an increase in discrimination (Brody et al., 2006; Greene et al., 2006) and depressive symptoms (Ge, Lorenz, Conger, Elder & Simons, 1994) across adolescence and a decline in academic performance (Benner & Graham, 2009; Gutman, Sameroff, & Cole, 2003; Johnson, McGue, & Iacono, 2006). As seen in the conceptual model in Figure 1, our analyses enabled us to examine longitudinally whether the strength of relationships among study constructs changed across developmental stage and whether early or contemporaneous experiences of discrimination matter more for adolescents’ developmental outcomes. More specifically, using a sample of Chinese American adolescents, we addressed two primary research questions:

1. What is the relationship between discrimination and adolescents’ socioemotional functioning (i.e., depressive symptoms, alienation) and academic performance (i.e., grades in school, engagement) across early and middle adolescence?
2. Do adolescents’ enculturation, acculturation, or nativity influence mean-level differences in discrimination, socioemotional functioning, and academic outcomes or the strength of relationships between discrimination and adolescent adjustment?

While previous research has established the association between discrimination and developmental adjustment, the assumption is that discrimination is *predictive* of outcomes. It is important, however, to test alternate models to more fully explore this relationship. For example, research from the victimization literature finds some evidence that displays of emotional distress place youth at greater risk for victimization by peers (Egan & Perry, 1998). As such, it could be that adolescents exhibiting greater emotional distress may be easier targets for discriminatory treatment as well.

We adopted a transactional model framework (Sameroff & MacKenzie, 2003) for exploring the relationship between discrimination and outcomes, hypothesizing a mutual influence over

time, such that earlier discrimination would influence, for example, later socioemotional functioning, but so too would earlier socioemotional functioning influence later discrimination. The longitudinal nature of our data enabled us to test the transactional model in a single analytic framework using cross-lagged and autoregressive techniques within a structural equation modeling framework. Cross-lagged models allow for inferences about the temporal relationships between constructs to be made (Mayer & Carroll, 1988; Singer & Willett, 2003). We specifically adopted a continuous-time cross-lagged design (see Gershoff, Aber, & Clements, 2008, for review), which allowed us to not only examine how earlier assessments of discrimination and socioemotional/academic functioning (during early adolescence) predicted later assessments of these constructs (during idle adolescence), but also how discrimination and outcomes simultaneously influenced each other (reciprocal effects during middle adolescence).

In addition to the comprehensive examination of the relationship between discrimination and outcomes, we also sought to examine the possible influence of adolescents' enculturation, acculturation, and nativity status, potential sources of individual variability in reactions to discrimination. Adolescents' orientation to both American and Chinese culture may be critical mechanisms for understanding why some adolescents are more affected by discrimination than others. While previous research has highlighted the protective nature of ethnic identity for African Americans, due to the lack of studies specifically linking enculturation to discrimination, we offered no hypotheses regarding the influence of enculturation (i.e., Chinese orientation in the current study) on modeled relationships. In contrast, the limited evidence examining acculturation (i.e., American orientation in the current study) suggests that acculturation may actually exacerbate the effects of discrimination for immigrant youth, a finding we expected to replicate in the current study. The deleterious effects of acculturation may reflect the dissonant environmental influences described by Garcia Coll and colleagues (1996). More specifically, an environment characterized by discrimination may be particularly inhibiting for highly acculturated adolescents because of the disconnect between identifying with American culture yet still experiencing discrimination. As such, the environment of discrimination would be more dissonant for youth who are more highly acculturated as compared to those who are less acculturated, resulting in greater developmental challenges for more acculturated youth.

Method

Participants

Participants were 444 Chinese American families participating in a longitudinal study. Adolescents were initially recruited from seven middle schools in two regions in Northern California. Slightly more than half of the sample (54%) was female (M age = 13.0 years, SD = 0.73 at wave 1; 17.1 years, SD = 0.80 at wave 2). Adolescents were in 7th or 8th grade at wave 1 and, four years later, were in 11th or 12th grade at wave 2. Most adolescent participants were born in the U.S. (75%), while the vast majority of their parents were foreign born, primarily from Hong Kong and the Guangdong province of Southern China. Most adolescents resided in two-parent homes (86%). Detailed demographic data on the participants is presented in Table 1.

Procedure

After gaining consent from school districts, middle schools with a substantive population of Asian American students (at least 20% of student body) were selected, resulting in seven eligible schools. Chinese American families were then identified by school administrators. In total, 47% of those families identified by school administrators consented to participate in the study. A packet of questionnaires for adolescents and their parents were distributed at school

or mailed to the families' homes, and research staff collected questionnaires at students' schools two to three weeks after distribution. Of the families who received questionnaire packets at wave 1, 76% completed the surveys, with response rates differing across the two regions where data were collected (82% vs. 59%). Four years later families were approached to participate in the second data collection wave. In total, 79% of wave 1 participating families completed wave 2 questionnaires. During both waves of data collection, families received nominal compensation for their participation.

Attrition analyses examining families who participated in both data collection waves and those who attrited at w2 revealed no significant differences between groups on key demographic variables (i.e., parental education, family income, parent and child immigration status, parent marital status, parental age) with one exception—boys were more likely to have attrited than girls ($\chi^2(1) = 16.1, p < .001$). In response to this difference, adolescent gender is included as a covariate for all analyses.

Measures

All measures were assessed at two time points, once in early adolescence (middle school, termed w1) and once in middle adolescence (high school, termed w2). Table 1 displays descriptive statistics for each measure by wave. Cronbach alpha levels are reported below for w1 and w2 separately.

Discrimination—We measured adolescents' perceptions of discrimination using Kessler, Mickelson, and Williams' (1999) measure of chronic daily discrimination, which has been validated with Asian American samples (Gee, Spencer, Chen, & Takeuchi, 2007). Adolescents were asked how often on a day-to-day basis 10 different discriminatory experiences occurred (e.g., "I am treated with less respect than other people"). Our measure included one additional item not included in the original measure ("People assumed my English is poor") in order to make the scale more relevant to Asian Americans. Ratings ranged from 1 (*never*) to 4 (*often*), with higher scores indicating greater experiences of daily discrimination (Cronbach's $\alpha = 0.85$ and 0.86 at w1 and w2, respectively). Reliabilities for the measure were practically identical for the scale with and without the new item.

Socioemotional outcomes—Adolescents completed the 20-item Center for Epidemiological Studies Depression (CES-D) Scale (Radloff, 1977), which has been validated with Asian American adolescents (Greenberger & Chen, 1996). A sample item is "I was bothered by things that don't usually bother me." Adolescents reported whether they experienced each symptom during the past week using a 4-point scale ranging from 0 (*rarely or none of the time (less than 1 day)*) to 3 (*most or all of the time (5–7 days)*). Higher mean scores reflected greater depressive symptoms (Cronbach's $\alpha = 0.87$ and 0.90 at w1 and w2, respectively). Adolescents' feelings of alienation and isolation within the family were assessed using a subscale from the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987), which has been validated with an Asian American college sample (Ying, Lee, & Tsai, 2007). Adolescents responded to eight items, including "I get upset a lot more than my parents know about." Responses ranged from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating more alienation (Cronbach's $\alpha = 0.85$ and 0.87 at w1 and w2, respectively). Correlations between depressive symptoms and alienation were generally moderate in size ($r = .58$ and $.51$ in w1 and w2, respectively).

Academic outcomes—We relied on two measures of adolescents' academic outcomes—grades and school engagement—both drawn from adolescent self-reports. One item asked adolescents "which of the following is closest to your average grade in school?" Adolescents identified their grades on a 13-point scale ranging from 1 (*F*) to 13 (*A+*). School engagement

was based on five items adapted from the Iowa Youth and Families Project (Conger & Elder Jr, 1994); similar items have been shown to be valid for Asian American adolescent samples (Chao, 2001; Glanville & Wildhagen, 2007). A sample item is “I usually finish my homework.” Ratings ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher mean ratings reflected greater school engagement (Cronbach’s $\alpha = 0.79$ and 0.85 at w1 and w2, respectively). Correlations between grades and school engagement were generally moderate in size ($r = .57$ and $.54$ in w1 and w2, respectively). In contrast, the correlations between socioemotional and academic outcomes were significant but generally small in size (r range: $-.12$ to $-.28$ in w1; $-.21$ to $-.26$ in w2).

Cultural orientation—Adolescents’ orientation toward American and Chinese cultures was assessed by the 20-item Vancouver Index of Acculturation (VIA, Ryder, Alden, & Paulhus, 2000), which has been validated with Asian American adolescents (Weaver & Kim, 2008). The VIA comprises two scales, American and Chinese cultural orientation, each covering 10 identical domains, such as tradition (e.g., I often follow Chinese cultural traditions) and values (e.g., I believe in mainstream American values). The response scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*), with higher scores indicating greater American/Chinese orientation. To facilitate multiple group analyses of high and low orientation groups, we created two dichotomous variables (one American orientation and one Chinese orientation variable). Each was based on the median split of an aggregated orientation score across waves 1 and 2 (average Cronbach’s $\alpha = 0.80$ and 0.85 for American and Chinese orientation, respectively). We aggregated orientation across waves because our discrimination and outcome measures included both w1 and w2 scores, and we wanted to capture the variation in orientation scores across waves. The use of a median split of an aggregated variable is consistent with other discrimination studies’ multiple group analyses (see Brody et al., 2006).

Covariates—All analyses included adolescent gender (1 = female, 0 = male) and nativity status (1 = born in U.S., 0 = born abroad) as covariates. We also controlled for region of data collection due to differential response rates and some differences in student outcomes (w1 discrimination: $t(441) = -2.84, p < .01$; w1 engagement: $t(437) = 3.14, p < .01$; w2 grades: $t(342) = 2.25, p < .05$). In addition, because the study included two cohorts (7th and 8th grade in wave 1) who differed in some wave 1, but not wave 2, measures (w1 discrimination: $t(433) = -1.97, p < .05$; w1 depression: $t(434) = -2.33, p < .05$; w1 alienation: $t(431) = -3.00$), we included grade level in wave 1 as a covariate. We also included parent-reported income at wave 1 as a proxy for family socioeconomic status. Mothers and fathers self-reported their income using an equal interval 12-point scale, ranging from 1 (*\$15,000 or under*) to 12 (*more than \$165,000*), based on recommendations by Barrera and colleagues (2001) for use with ethnic minority and urban samples. Because mother and father reports of family income were highly correlated ($r = .91$), they were subsequently averaged into a single mean score.

Results

Data Analysis Strategy

We employed path analysis within a structural equation modeling (SEM) framework to test relations within the model. Through path analysis, we simultaneously tested for direct and indirect effects of model constructs. Analyses were conducted using *Mplus* 4.2 (Muthen & Muthen, 2006). The *Mplus* estimation procedure handles missing data through the full-information maximum likelihood (FIML) method, enabling us to include all available data in the path analyses. All inferences for the indirect effects were based on the *Mplus* estimation of indirect effects, which estimates indirect effects with delta method standard errors (Muthen & Muthen, 2003). We report bootstrapped effects to correct for the positive skew typical of indirect effects, resulting in more power to detect significance (Shrout & Bolger, 2002).

The conceptual model for our analyses is displayed in Figure 1. To answer our first research question (i.e., the relationship between discrimination and adolescents' socioemotional functioning and academic outcomes across early and middle adolescence), we first explored descriptively developmental changes in our constructs of interest across time. We then conducted a series of analyses to essentially build up our model. In the first stage of the analyses, we tested an autoregressive model that included direct effects of w1 discrimination on w2 discrimination (Path A1 in Figure 1) and w1 developmental outcomes (e.g., depression, grades) on w2 outcomes (Path A2). This initial model also assessed the direct effect of w1 discrimination on w2 outcomes (Path B1). We conducted these initial analyses to establish the developmental link between discrimination during early adolescence and developmental outcomes in middle adolescence, after accounting for change in the constructs across time. Further, these analyses represent the only analyses in which the models were not fully saturated, enabling us to establish the quality of model fit. In the second stage of the analyses, we tested a fully discrete-time cross-lagged autoregressive model, adding a direct effect of w1 developmental outcomes on w2 perceptions of discrimination (Path B2). These analyses, which resulted in a fully saturated model, enabled us to verify the direction of influence for the cross-lagged effects (i.e., does earlier discrimination predict later developmental outcomes, vice versa, or both?). Our final model integrated transactional relationships (Gershoff, Aber, & Clements, 2008) with the established autoregressive and cross-lagged relationships by adding a direct effect of discrimination in middle adolescence (w2) on outcomes at the same developmental period (Path C1) and w2 outcomes on discrimination at the same developmental period (Path C2). Due to issues with limited degrees of freedom, paths C1 and C2 were tested in separate models. With the transactional model, we establish whether contemporaneous or prior experiences of discrimination matter more for developmental outcomes during middle adolescence. Further, we also examined the degree to which contemporaneous experiences of discrimination mediated the relationship between earlier discrimination and adolescents' adjustment.

Our second set of analyses—multiple group analyses—were used to answer our second research question, whether the strength of relationships within our model were robust for immigrants and native born and those high and low in American and Chinese orientations (acculturation and enculturation, respectively). Using methods recommended by Bollen (1989) and Kenny (2005), we used a stepwise process for multi-group comparisons. In each step, we included additional constraints on model parameters and observed whether doing so led to a significant decrease in overall model fit, using chi-square difference tests. This process allowed us to test where precisely in our model group-related differences existed. In addition to the multiple group analyses, we conducted independent samples t-tests to examine mean-level differences in adolescents' perceived discrimination, socioemotional outcomes, and academic outcomes across nativity status and high/low enculturation and acculturation groups.

Exploring Developmental Change and Relationships Between Discrimination and Socioemotional and Academic Outcomes

We first examined whether adolescents' perceptions of discrimination or developmental outcomes changed across time. Results from paired-samples t-tests highlight the developmental challenges that adolescents in our sample experienced as they moved from early to middle adolescence. Specifically, adolescents' perceptions of discrimination increased ($t(348) = -2.42, p < .05$) across time. At the same time, feelings of depression and alienation increased ($t(347) = -3.28, p < .001$ and $t(347) = -3.19, p < .01$ for depressive symptoms and alienation, respectively), while school engagement and grades declined ($t(341) = 8.86, p < .001$ and $t(339) = 10.12, p < .001$ for engagement and grades, respectively).

We next began exploring the relationships between discrimination and developmental outcomes across time. Model fit statistics for the autoregressive models with the w1 discrimination-w2 outcome link are presented in Table 3. For all models, w1 discrimination predicted w2 discrimination (Path A1: average $\beta = .32, p < .001$; β range: .31 to .33). Similarly, w2 developmental outcomes were predicted by outcomes at w1 (Path A2: $\beta = .27$ for alienation; $\beta = .24$ for depressive symptoms; $\beta = .36$ for engagement; $\beta = .40$ for grades, $p < .001$).

An exploration of cross-lagged relationships between discrimination and outcomes across early and middle adolescence indicate a clear and expected pattern. Discrimination at w1 predicted all w2 developmental outcomes (Path B1: $\beta = .15, p < .05$ for alienation; $\beta = .16, p < .05$ for depressive symptoms; $\beta = -.15, p < .01$ for engagement; $\beta = -.14, p < .05$ for grades). In contrast, neither socioemotional nor academic outcomes in early adolescence predicted later discrimination (Path B2: $\beta = .06, .08, -.10$, and $-.10$ for alienation, depressive symptoms, engagement, and grades, respectively).

In the final addition to our model, we tested two separate transactional effects: transactional model 1 included the effects of w2 discrimination on w2 outcomes (Path C1 in the conceptual model in Figure 1), and transactional model 2 included effects of w2 outcomes on w2 discrimination (Path C2 in the conceptual model). In addition, we examined whether w2 discrimination mediated the relationship between w1 discrimination and w2 (Paths A1 and C1) as well as whether w2 developmental outcomes mediated the relationship between w1 outcomes and w2 discrimination (Paths A2 and C2). Results for both transactional models indicated differential effects for socioemotional adjustment and academic performance.

For socioemotional adjustment in transactional model 1, w2 discrimination (a potential mediator) was associated with both of the w2 socioemotional outcomes (Path C1: $\beta = .18, p < .01$ for alienation; $\beta = .35, p < .001$ for depressive symptoms), and w2 discrimination indeed mediated the relationship between w1 discrimination and both w2 alienation ($\beta_{\text{ind}} = .06, p < .01$) and w2 depressive symptoms ($\beta_{\text{ind}} = .11, p < .001$). That is, once the relationship between w2 discrimination and w2 outcomes (Path C1) was included in the model, the relationships between w1 discrimination and the w2 socioemotional outcomes became nonsignificant (Path A1: $\beta = .09$ and $.05$ for alienation and depressive symptoms, respectively).

In contrast, for the academic outcomes in transactional model 1, w2 discrimination was not predictive of either academic outcome at w2—school engagement ($\beta = -.04$) or grades ($\beta = -.07$)—and thus possible mediation effects could not be explored for the academic outcomes. However, the relationship between w1 discrimination and w2 academic outcomes remained significant (Path A1: school engagement ($\beta = -.13, p < .05$); grades ($\beta = -.12, p < .05$)), even after accounting for the concurrent w2 relationships (Path C1).

When next we examined whether including the alternate transactional effect (w2 outcomes on w2 discrimination) influenced the cross-lagged relationships, we observed similar results. Both w2 socioemotional outcomes (potential mediators) were associated with w2 discrimination (Path C2: $\beta = .19, p < .01$ for alienation; $\beta = .36, p < .001$ for depressive symptoms). Mediation analyses indicated that the w2 socioemotional outcomes mediated the relationship between w1 socioemotional outcomes and w2 discrimination ($\beta_{\text{ind}} = .05, p < .05$ for alienation; $\beta_{\text{ind}} = .10, p < .001$ for depressive symptoms).

For the academic outcomes, neither of the potential mediators (w2 school engagement or w2 grades) predicted w2 discrimination (Path C2) ($\beta = -.05$ and $-.07$ for w2 engagement and grades, respectively), consistent with our earlier findings that w1 academic outcomes also were not predictive of w2 discrimination.

Effects of Enculturation, Acculturation, and Nativity Status

To answer our second research question, we examined whether adolescents' enculturation, acculturation, or nativity influence mean-level differences in discrimination, socioemotional functioning, and academic outcomes or the strength of relationships between discrimination and outcomes.

Analyses of mean level differences—We conducted independent samples *t*-tests to examine possible mean-level differences in discrimination and developmental outcomes in early and middle adolescence by enculturation, acculturation, and nativity status. No differences in study constructs emerged by adolescents' nativity status. We did, however, observe mean-level differences for both enculturation (operationalized as orientation toward Chinese culture) and acculturation (operationalized as orientation toward American culture). Adolescents low in Chinese orientation fared worse in the academic domain compared to their more enculturated peers (academic engagement w1: $t(436) = -2.48, p < .05$; w2: $t(342) = -3.09, p < .001$). Adolescents low in American orientation fared worse across developmental domains. In particular, adolescents low in American orientation were more likely to report experiences of discrimination at w1 ($t(440) = 2.39, p < .05$) and were also more likely to report experiencing depressive symptoms (w1: $t(441) = 3.27, p < .001$; w2: $t(346) = 2.20, p < .05$) and feelings of alienation (w1: $t(438) = 3.22, p < .001$) than their more acculturated peers. Adolescents low in American orientation were also less likely to report being engaged in school (w1: $t(436) = -3.19, p < .01$; w2: $t(342) = -2.77, p < .01$).

Multiple group analyses—We conducted multiple group analyses to explore whether differences in the strength of association of modeled relationships differed by adolescents' nativity status and cultural orientation. Results revealed no differences across native and foreign born youth. We also observed no difference for adolescents high and low in Chinese orientation. As hypothesized, differences did emerge between those adolescents who were high and low in American orientation for three of the four developmental outcomes under study. As shown in Table 3, these group differences were generally specific to the relationship between w2 discrimination and w2 outcomes, including alienation from family, school engagement, and grades. In all cases (and as depicted in Figure 2), the relationship between w2 discrimination and w2 outcomes was significant for adolescents high in American orientation ($\beta = .36, p < .001$ for alienation, $\beta = -.14, p < .05$ for school engagement, and $\beta = -.18, p < .05$ for grades) but not for those low in American orientation ($\beta = .03, -.01, \text{ and } .03$ for alienation, engagement, and grades, respectively). A similar pattern of associations across American orientation groups was observed for the relationship between w1 discrimination and w2 school engagement ($\beta = -.26, p < .001$ for high American orientation, $\beta = -.02, ns$ for low American orientation).

Discussion

This longitudinal study examined the relationship between experiences of discrimination and adolescents' socioemotional and academic outcomes. Our study targets an ethnic group much overlooked in existing discrimination scholarship—Chinese American youth. In drawing attention to the detrimental effects of discrimination on Chinese American adolescents' developmental competencies, the current study challenges assumptions of the model minority stereotype and addresses limitations in the current discrimination research, which often overlooks the experiences of Asian American youth. Additionally, while previous research in other domains has emphasized the resiliency of Asian American adolescents to developmental disparities, our study challenges the generalizability of this assumption. Indeed, previous studies (Chao, 1994; Kao, 2000) focusing on constructs such as socioeconomic disadvantage and parenting styles, constructs with high predictive validity in predicting European American

children's school performance, have found that these constructs are not particularly salient predictors of Asian American children's academic performance. Of particular significance in the current study is the determination that early experiences of discrimination can have lasting effects, particularly in relation to academic performance. This provides evidence that when an exploration of Chinese American's developmental competencies seriously considers students' minority experiences, one is likely to uncover more comprehensive models which illuminate how academic performance may be undermined in a group depicted as invulnerable to negative academic outcomes.

Longitudinally Linking Discrimination to Developmental Outcomes

While previous research has generally posited directionality in the relationships among discriminatory treatment and developmental outcomes (i.e., discrimination predicts outcomes), the validity of this assumption has rarely been tested (see Sellers & Shelton, 2003 for an exception). Part of our study's contribution lies in our attention to the alternate relationship. Namely, we specifically examined not only whether earlier discrimination (in middle school) influenced later adolescent outcomes (in high school) but also whether earlier outcomes influenced later experiences of discrimination. Using autoregressive and cross-lagged techniques, we found ample evidence for discrimination in middle school predicting later socioemotional and academic functioning, even after controlling for the influence of the outcomes in middle school, findings consistent with a number of studies of African American adolescents' experiences of discrimination (Brody et al., 2006; Sellers et al., 2006; Simons et al., 2002). The opposite relationship, in which earlier socioemotional adjustment or academic performance predicted later discrimination, was not supported by our findings. Given that previous research examining these possible bi-directional relationships longitudinally has focused on African American samples, this study replicated the processes by which discrimination influences developmental outcomes with an Asian American sample. Moreover, given that neither earlier psychological adjustment nor academic performance predicted later experiences of discrimination, future research should explore other processes, such as parents' racial socialization strategies, that may help further illuminate the experiences of discrimination for Asian American youth.

In addition to testing cross-lagged effects, we used a transactional model framework to explore whether earlier or contemporaneous experiences of discrimination influenced high school outcomes. We observed differential effects, with contemporaneous experiences of discrimination mattering more for socioemotional outcomes but earlier discrimination mattering more for academics. Our findings related to socioemotional outcomes are consistent with those of Sellers and Shelton (2003), who found that, when examining experiences of discrimination at the beginning and end of freshmen year for a sample of African American college students, only later discrimination predicted psychological distress at the end of students' freshman year. Why later, rather than earlier, experiences of discrimination influence socioemotional outcomes may be explained by the cumulative nature of experiences of discrimination. As Solorzano and colleagues (2000) note, experiences of racial microaggressions are additive, and only over time do they begin to take their toll on the targets of the discrimination. As the Chinese American adolescents in our sample continued to experience discriminatory treatment, and significant increases in discriminatory treatment from early to middle adolescence, they may have experienced increasing difficulty coping with the microaggressions, thus contributing to the delayed influence of discrimination on socioemotional outcomes.

The theoretical underpinnings of continuous-time cross-lag designs provide further insights to this pattern of relationships. As Gershoff and colleagues (2008) explain, a comprehensive understanding of how constructs influence each other over time must take into account not

only relationships across longer time intervals but also simultaneous influences at a given point in time. These point-in-time influences represent a process of interactions that account for the influences across longer time spans. In the case of our study, students who reported more discrimination in early adolescence were more likely to feel depressed and alienated in high school. Yet once we accounted for discrimination at both time points, the simultaneous (within time) influences served as the critical predictor of emotional distress, with earlier discrimination exerting its influence only indirectly.

The fact that earlier but not contemporaneous experiences of discrimination matter more for academic performance is a novel finding in the discrimination literature. Possible elucidation of these findings may be found in the work of Garcia Coll and colleagues (1996). They conceptualize development as recursive, with individuals' reactions to their environments influencing subsequent development. Using their theoretical framework, experiences of discrimination would create (or at minimum contribute to) an inhibiting environment in the context in which it occurred. Schools are a particularly salient context for adolescents, as they spend a large proportion of their time in that context (Steinberg, 2002), and Chinese American families place particular emphasis on the importance of school and academic achievement (Chao, 1994). While the measure of discrimination used in the current study was general and not specific to schools, research indicates that Asian American youth report more experiences of discrimination by peers and exhibit higher distress due to peer discrimination than students from other ethnic minority groups (Fisher et al., 2000; Rosenbloom & Way, 2004). According to Garcia Coll and colleagues' model, experiences of discrimination at school could lead to perceptions of schools as an inhibiting context. Poor perceptions of school climate have been found to contribute to adolescents disconnecting from their school environments, as evidenced by less school engagement and poorer academic performance (Barber & Olsen, 2004; Benner, Graham, & Mistry, 2008), and this disconnect only hinders future academic development. Whether this proposed mechanism explains the relationships between early discrimination and later academic performance is a topic for future study. If validated, however, it would suggest the critical role that schools must play early in children's lives to both ensure schools are promoting (rather than inhibiting) environments that foster positive development and to combat the effects of discrimination, providing adolescents with skills needed to cope with discriminatory treatment.

Influences of Cultural Orientation

Understanding how and why discrimination matters specifically for Asian American youth requires acknowledgement of their unique cultural experiences, experiences that differ substantially from African American adolescents, the focus of most existing research on discrimination. This research highlighted the protective nature of ethnic identity for African American students (Eccles et al., 2006; Greene et al., 2006), yet for our sample, orientation toward Chinese culture (a measure of enculturation, a similar but not identical proxy for ethnic identity) did not influence the effects of discriminatory treatment for the outcomes of our Chinese American adolescents. Instead, the current study found acculturation, or orientation toward U.S. culture, to be a meaningful, albeit negative, influence on outcomes. More specifically, we observed a persistent negative effect of orientation to American culture, such that Chinese American adolescents who were more oriented to American culture experienced more deleterious effects of discrimination on their developmental outcomes. These findings offer support for the theorists calling for a distinction between ethnic identity (and enculturation) and acculturation (see Tsai, Chentsova-Dutton, & Wong, 2002). It also suggests that identifying with a culture (ethnic identity) and engaging in the behaviors of a culture (enculturation) may produce differential relationships with discrimination. While ethnic identity may be protective against discrimination, simply engaging in the traditional and practices of a culture does not provide the same buffer against discrimination for adolescents.

Previous research has found that those Chinese American adolescents higher in ethnic identity (as measured by an adapted version of the adapted from the Multidimensional Inventory of Black Identity or MIBI) expressed more positive academic attitudes (Fuligni, Witkow, & Garcia, 2005) and better psychological well-being (Kiang, Yip, Gonzales-Backen, Witkow, & Fuligni, 2006). It is possible that the Chinese American students in the current study who expressed high Chinese orientation would not exhibit high levels of ethnic identity as assessed through instruments such as those adapted from the MIBI and thus would not experience the buffering effect of strong ethnic identity found in other studies. Future studies should explore how measures of enculturation, as measured in the current study, interplay with more traditional measures of ethnic identity to influence adolescent outcomes.

The tenets of racial triangulation theory (Kim, 1999) provide an another useful lens for interpreting these results, particularly in combination with cognitive dissonance theory (Festinger, 1957). According to Festinger, cognitive dissonance arises from simultaneously holding two competing cognitions. If not alleviated in some way, cognitive dissonance can exacerbate negative functioning. For example, Prinstein and Aikins (2004) found that when adolescents placed particular importance on status within their peer groups but experienced peer rejection, they experienced more pervasive depressive symptoms. In the current study and in the context of racial triangulation theory, we surmise that adolescents high in American orientation would place themselves more as “insiders” than “foreigners” on the insider-foreigner continuum, yet experiences of discrimination would contradict this self-view. As such, the cognitive dissonance between those of the self (e.g., I’m American) and what others perceive (e.g., he/she is a foreigner) may contribute to the exacerbated effects of discrimination for highly acculturated adolescents. Future studies should explore the accuracy of this hypothesis; if proven accurate, addressing adolescents’ cognitive dissonance may be one method to improve Chinese American adolescents’ strategies for coping with experiences of discrimination.

Caveats and Limitations

While the research reported here contributes to our understanding of discrimination’s influence on Chinese American adolescents’ socioemotional and academic outcomes, some limitations and caveats should be noted. First, we employed a global measure of discrimination that was not context specific. Given that some research suggests that Asian American youth face differential experiences of discrimination across ecological contexts (Fisher et al., 2000; Rosenbloom & Way, 2004), whether discrimination from peers would exert similar effects to discrimination by school personnel or discrimination in the community cannot be determined. However, the fact that we observed effects of both earlier and later discrimination on two distinct developmental domains supports the validity of this more global discrimination measure with our sample. Second, it must be acknowledged that all measures in the current sample are based on adolescent-report and thus subject to respondent bias. Data for the current sample are drawn from a larger study of family relations and include not only adolescent reports but also reports from mothers and fathers. While parents provide assessments of three of our four outcome variables (all but grades in school), we deliberately chose to rely on adolescent self-reports. In the current dataset, compared with adolescent reports, parents tended to underestimate their children’s experiences of depressive symptoms, alienation, and engagement in school, and there was less variability in parent responses for two of the three outcomes (results available from first author upon request). A final caveat to bear in mind is that our sample consists solely of Chinese American adolescents residing in metropolitan areas of northern California; thus, generalizations of our findings to Asian Americans at large are unwarranted. Asian ethnic groups in the U.S. have unique historical and immigrant experience and socioeconomic standing in the U.S. (Leong et al., 2007), which may influence both parents’ awareness of discrimination and the racial socialization practices they utilize (Kim, Gonzales,

Stroh, & Wang, 2006; Phinney & Chavira, 1995). For example, many of our study participants migrated from southern China to northern California, a migration history reflective of the broader Chinese immigrant history of the U.S. that traces its roots to the California gold rush (Chan & Hsu, 2008; Hsu, 2000). The homogeneity of our sample allows us to avoid possible conflation of experiences and does not make undue generalizations across Asian American subpopulations (e.g., Chinese, Korean, Filipino).

Despite these limitations, our findings extend existing scholarship on adolescents' experiences of discrimination, illustrating the persistent negative influence of discrimination from middle to high school on two distinct domains of development socioemotional functioning and academic performance. Through highlighting the pervasive negative influences of discrimination on Chinese American adolescents' developmental competencies, we hope to combat the inaccurate assumptions that model minorities do not experience discrimination and are invulnerable to negative developmental (particularly academic) outcomes. Through illuminating these challenges, we seek to promote more developmentally-appropriate models for ethnic minorities generally and encourage the expansion of available support services for an often overlooked portion of the adolescent minority population.

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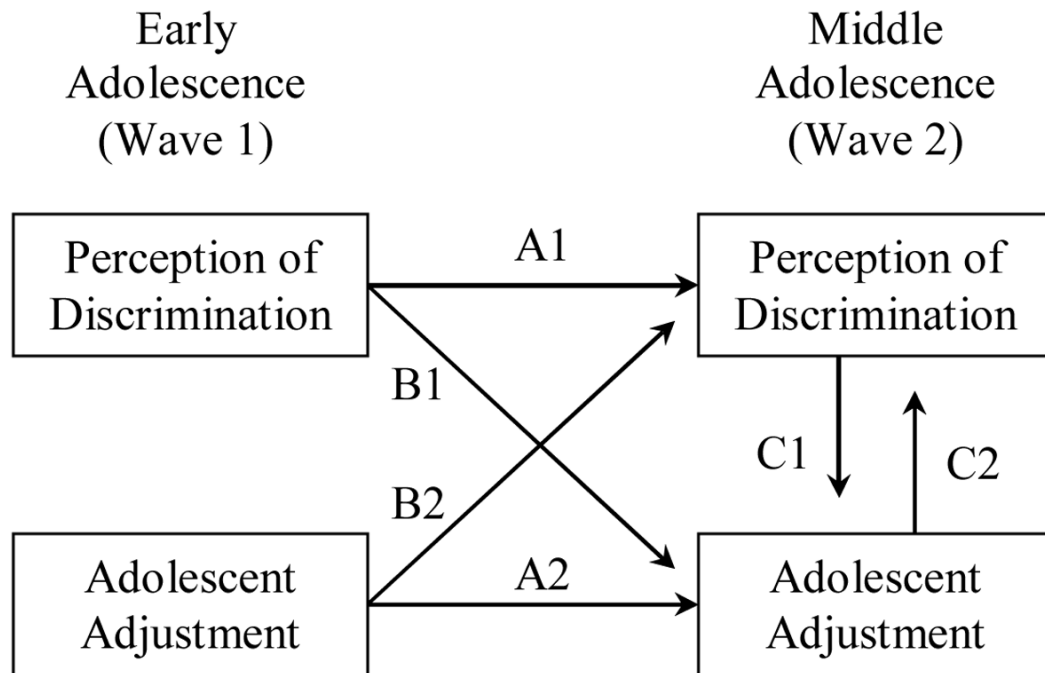
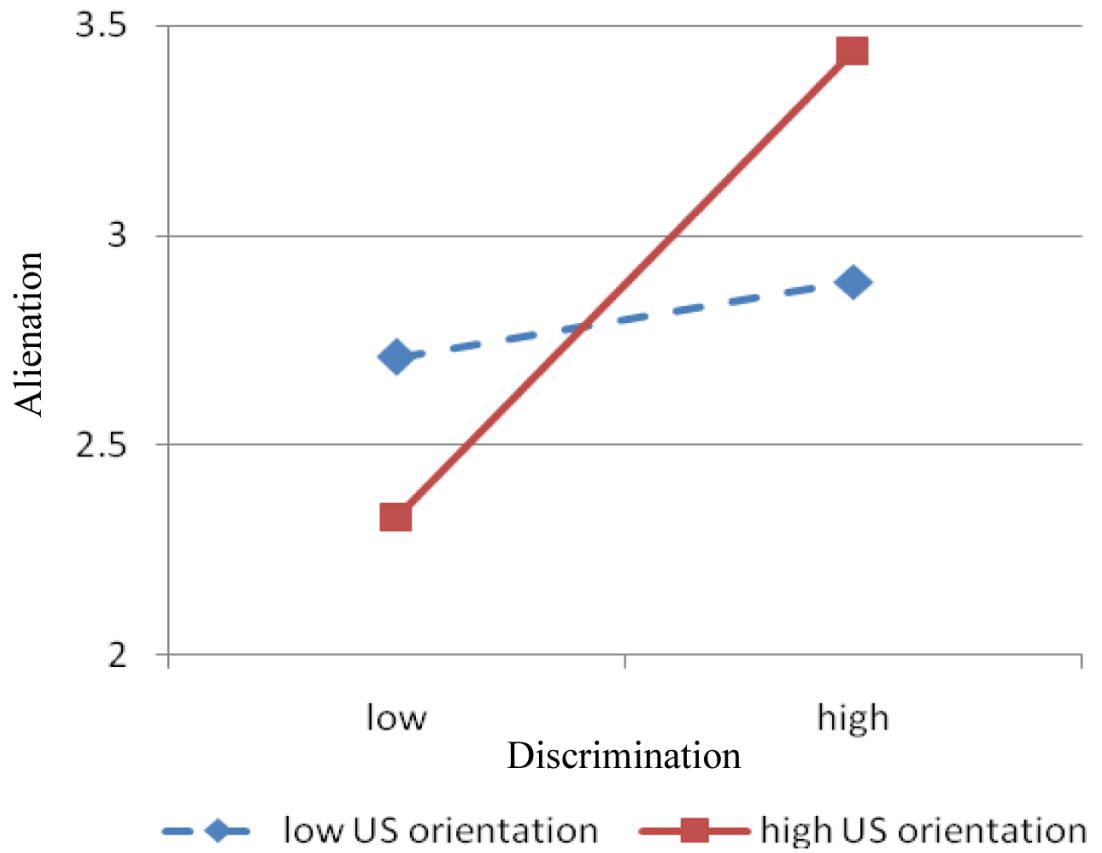
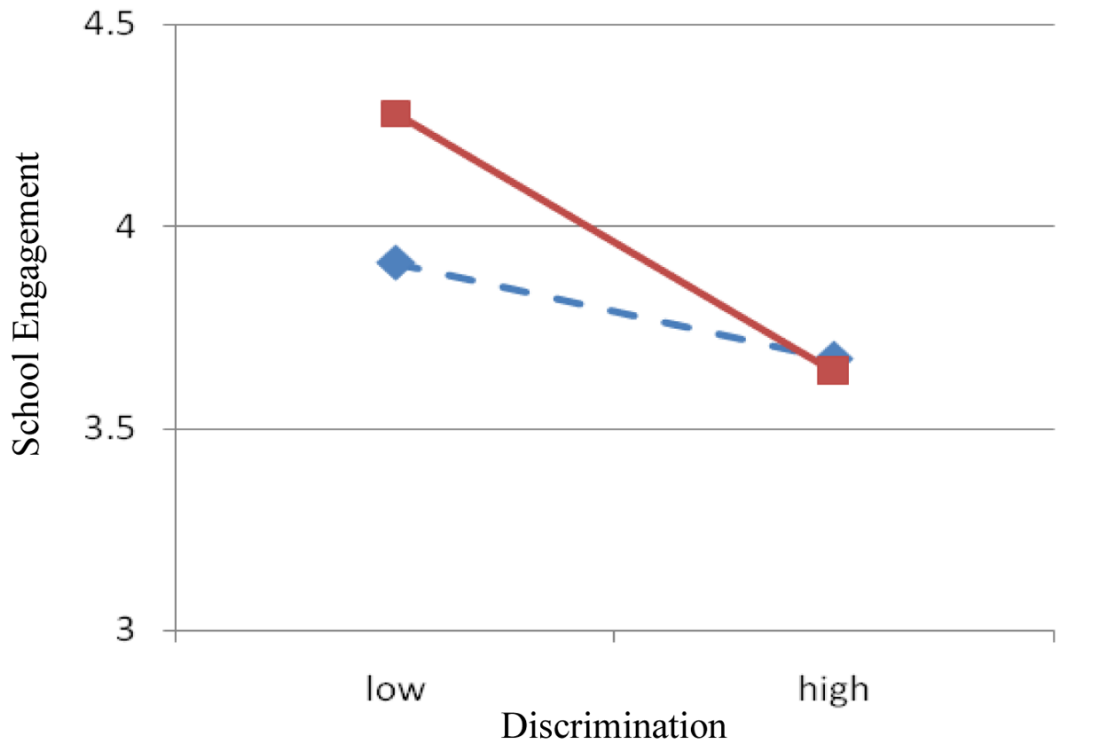


Figure 1.

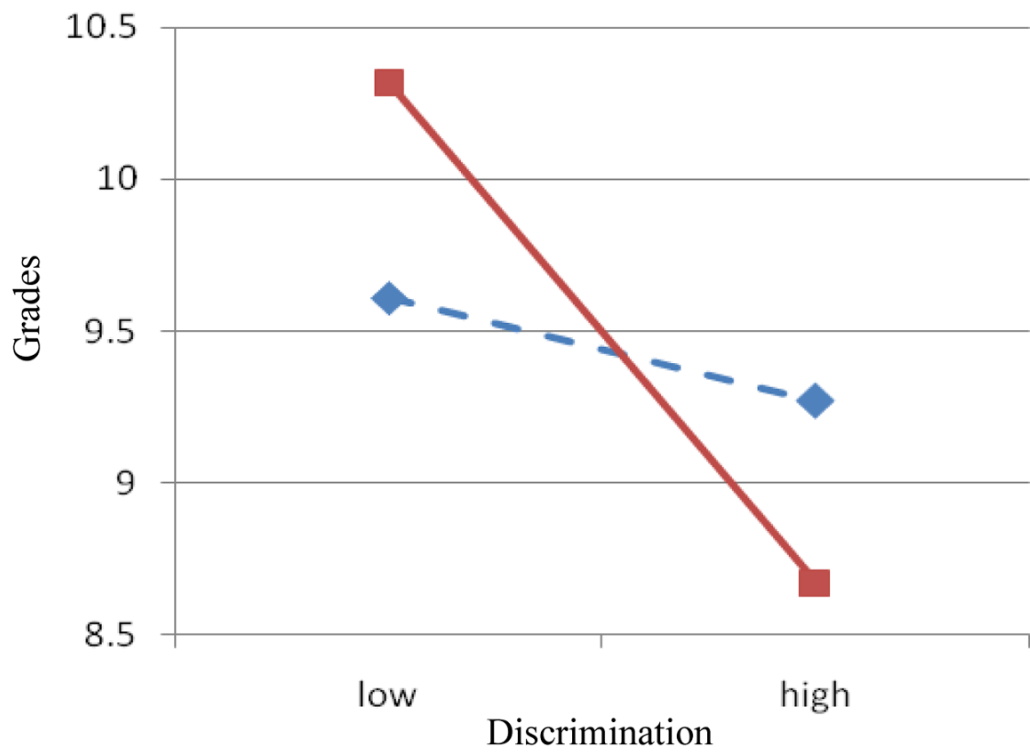
Conceptual model of the relationship between discrimination and outcomes across time.

Note: Outcomes are alienation, depression, engagement, and grades. Three sets of analyses were conducted in a stepwise manner, first testing paths a, then adding path b, and finally path c.





—◆— low US orientation —■— high US orientation



—◆— low US orientation —■— high US orientation

Figure 2.

Figure 2a. Relationship between w2 discrimination and w2 alienation by US orientation.

Figure 2b. Relationship between w2 discrimination and w2 school engagement by US orientation.

Figure 2c. Relationship between w2 discrimination and w2 grades by US orientation.

Table 1

Demographics of Study Participants at Wave 1

	Adolescent <i>M (SD)</i>	Mother <i>M (SD)</i>	Father <i>M (SD)</i>
Gender (% female)	54.0	--	--
Nativity (% immigrant)	24.8	89.7	87.1
Family structure (% 2-biological parents)	86.0	--	--
Grade in school (% 8 th grade)	52.1	--	--
Age	13.0 (0.73)	44.1 (4.52)	47.9 (6.15)
Highest level of education	--	5.9 (1.72)	5.9 (1.82)
Income	--	3.8 (2.49)	4.0 (2.54)

Note. For parent education, 5 = some high school and 6 = finish high school. For income, 3 = \$30,001 to 45,000 and 4 = \$45,001 to 60,000.

Table 2

Descriptive Statistics for Model Constructs

	Wave 1			Wave 2		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Perceived discrimination	1.72	0.50	444	1.77	0.49	349
Alienation in family	2.66	0.74	441	2.80	0.73	340
Depressive symptoms	1.64	0.42	444	1.71	0.46	348
School engagement	4.16	0.63	439	3.90	0.73	344
Grades	10.50	1.75	436	9.60	2.02	344
Acculturation (U.S. orientation)	3.73	0.49	442	3.80	0.44	349
Enculturation (Chinese orientation)	3.80	0.56	442	3.79	0.56	349

Note. Total possible *N* is 444 at wave 1 and 350 at wave 2.

Table 3

Model Fit Statistics

Outcome	χ^2 (df)	p-value	CFI	RMSEA	SRMR	W2 R ²
Alienation	1.30 (1)	0.25	0.999	0.026	0.007	0.20
Depressive symptoms	1.62 (1)	0.20	0.998	0.037	0.009	0.18
Engagement	3.14 (1)	0.08	0.991	0.069	0.013	0.28
Grades	2.80 (1)	0.09	0.990	0.064	0.012	0.25

Note. W2 = wave 2. Because the final models were fully saturated, fit statistics presented above are for a model that includes both autoregressive paths (Paths A1, A2 in the conceptual model) and the direct relationship between W1 discrimination and W2 outcome (Path B1).

Table 4

Multiple Group Analyses—Effects of American Orientation on Model Relationships

Constrained Path	χ^2 (df)	χ^2 Difference Test <i>p</i> -value
Alienation		
1. None	0 (0)	--
2. w1 discrimination → w2 discrimination w1 alienation → w2 alienation	4.04 (2)	<i>n.s.</i>
3. w1 discrimination → w2 alienation w1 alienation → w2 discrimination	4.53 (4)	<i>n.s.</i>
4. w2 discrimination → w2 alienation	17.89 (5)	.000
Depressive Symptoms		
1. None	0 (0)	--
2. w1 discrimination → w2 discrimination w1 depression → w2 depression	0.18 (2)	<i>n.s.</i>
3. w1 discrimination → w2 depression w1 depression → w2 discrimination	4.08 (4)	<i>n.s.</i>
4. w2 discrimination → w2 depression	5.46 (5)	<i>n.s.</i>
School Engagement		
1. None	0 (0)	--
2. w1 discrimination → w2 discrimination w1 engagement → w2 engagement	1.06 (2)	<i>n.s.</i>
3. w1 engagement → w2 discrimination	1.73 (3)	<i>n.s.</i>
4. w1 discrimination → w2 engagement	8.17 (4)	.01
4. w2 discrimination → w2 engagement	13.57 (5)	.02
Grades in School		
1. None	0 (0)	--
2. w1 discrimination → w2 discrimination w1 grades → w2 grades	4.14 (2)	<i>n.s.</i>
3. w1 discrimination → w2 grades w1 grades → w2 discrimination	4.14 (4)	<i>n.s.</i>
4. w2 discrimination → w2 grades	8.45 (5)	.04

Note. Models are nested step-wise such that a given step includes current constraints as well as constraints imposed in previous steps. *n.s.* denotes nonsignificant difference.