CROSS-RACE FRIENDSHIPS AND ADJUSTMENT: LONGITUDINAL STUDIES OF
ASIAN AMERICAN ADOLESCENTS

By

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ABSTRACT

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Asian American adolescents' cross-race friendships are poorly understood. Using data from the National Longitudinal Study for Adolescent to Adult Health, two longitudinal studies (Ns = 915 and 1,154) investigated the associations between cross-race friendships and psychosocial and academic adjustment among Asian American adolescents. Study 1 examined the influence of cross-race friendships (derived from quantity and quality measures) on trajectories of perception of peer prejudice at school. Results showed that cross-race friendships were associated with weaker perception of peer prejudice. Cross-race friendships measured as quantity had an immediate but short effect, while cross-race friendships measured as quality exerted a delayed but long-term influence over how Asian American adolescents perceive peer prejudice at school. Similar findings were observed for friendships with other non-White groups (but not with the White group and not for cross-ethnic friendships). Study 2 explored the directionality in associations between cross-race best friendships (i.e., the proportion of cross-race friends in one's best female and male friend network) and psychological well-being and academic adjustment (school attachment and GPA). Results identified an overall linear decline in cross-race best friendships with age among Asian American adolescents. Cross-race best friendships positively influenced later self-esteem, but not the other way around. Higher levels of school attachment predicted greater decrease in cross-race best friendships, and declines in cross-race best friendships were accompanied by decreases in GPA for Asian American adolescents.

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CHAPTER 1. INTRODUCTION

Introduction to the Dissertation

With the growing proportion of racial/ethnic minority children among all children in the United States (Federal Interagency Forum on Child and Family Statistics, 2020), there is increasing scholarly interest in understanding children's cross-race friendships (Graham & Echols, 2018). For adolescents, friendships are characterized by similarity as a result of selection and influence and thus same-race friendships are more common than cross-race friendships (Brown and Larson, 2009; Hallinan & Teixeira, 1987). Nevertheless, cross-race friends can fulfill similar friendship functions such as emotional security (Aboud, Mendelson, & Purdy, 2003). In addition, cross-race friendships play different roles in adolescents' development from same-race friendships. While same-race friendships are associated with positive ethnic identity development, existing literature has confirmed the unique, beneficial effects of cross-race friendships on promoting positive intergroup attitudes, perceived school ethnic climate, psychological well-being, and academic achievement (Davies, Tropp, Aron, Pettigrew, & Wright, 2011; Graham, Munniksma, & Juvonen, 2014; Kawabata & Crick, 2015).

Despite the increasing attention to cross-race friendships, Asian Americans remain one of the most understudied groups in the cross-race friendship literature (Chen & Graham, 2017). Asian Americans have been characterized as ''the model minority'' because on the aggregate level they have achieved significant academic success despite their minority status (Kiang, Tseng, & Yip, 2016). However, Asian American adolescents tend to have greater peer challenges and poorer psychological well-being than Black and Latino youth (Niwa, Way, & Hughes, 2014; Qin, Way, & Mukherjee, 2008). The model minority stereotype contributes to peer discrimination and resentment targeting Asian American youth (Rosenbloom & Way, 2004).

Asian American adolescents tend to perceive more racial/ethnic discrimination perpetrated by peers than their White, Black, and Latino peers (Hughes, Del Toro, Harding, Way, & Rarick, 2016; Niwa et al., 2014). Understanding cross-race friendships of Asian American youth will give us more nuanced insights into their overall functioning in a racially/ethnically diverse society in the United States.

Grounded in intergroup contact theory (Allport, 1954; Pettigrew & Tropp, 2006) and the contact-in-context model (Yip, Cheon, and Wang, 2019), the purpose of these two longitudinal studies is to examine Asian American adolescents' cross-race friendships and how their cross-race friendships are associated with their psychosocial and academic adjustment. Intergroup contact theory (Allport, 1954; Pettigrew & Tropp, 2006) suggests that interactions, particularly friendships, with peers from out-groups can reduce intergroup prejudice and improve attitudes towards the out-groups. According to the contact-in-context model proposed by Yip et al. (2019), interpersonal diversity (e.g., cross-race friendships) changes over time as children develop and reciprocal associations may exist between interpersonal diversity and children's racial/ethnic development and outcomes.

Whereas the existing literature has primarily focused on the benefits of cross-race friendships on racial/ethnic attitudes or development and social adjustment, much less is known about how cross-race friendships are associated with psychological and academic adjustment. Longitudinal studies have already documented that intergroup contact and intergroup attitudes affect each other bidirectionally and that higher levels of positive intergroup attitudes also predict fewer declines in intergroup contact (Binder et al., 2009; Wölfer, Schmid, Hewstone, & van Zalk, 2016). However, much less is known about the longitudinal associations between cross-race friendships and psychological and academic well-being.

My dissertation consists of two studies. The two studies both used a longitudinal sample of Asian American adolescents in the National Longitudinal Study for Adolescent to Adult Health (Add Health). In study 1, latent growth curve models were used to examine: (1) the developmental trajectories of perception of peer prejudice at school among Asian Americans during adolescence; (2) the influence of cross-race friendships (measured as quantity and quality) on the perceived peer prejudice trajectories; and (3) the robustness of these associations for more nuanced forms of cross-race friendships (cross-ethnic friendships and cross-race friendships with the White vs. other non-White groups). In Study 2, autoregressive latent trajectory (ALT) models were applied to explore: (1) developmental trajectories of cross-race best friendships (measured as proportion of cross-race friends in one's best female and male friend network); (2) the associations between trajectories of cross-race friendships and psychological and academic well-beings; (3) and the directionality in these associations between cross-race friendships and well-being.

CHAPTER 2. STUDY ONE: QUANTITY AND QUALITY OF CROSS-RACE

FRIENDSHIPS AND TRAJECTORIES OF PERCEIVED PEER PREJUDICE AMONG

ASIAN AMERICAN ADOLESCENTS

Introduction

Existing research on adolescent perception of peer prejudice has rarely examined its

developmental trajectories (Benner & Graham, 2013; Respress, Small, Francis, & Cordova,

2013). The few longitudinal studies on perceived peer prejudice have not paid much attention to

Asian American group (Greene, Way, & Pahl, 2006; Hughes et al., 2016), or they only focus on

a portion of adolescence (either junior or senior high school; Bellmore, Nishina, You, & Ma,

2012; Niwa et al., 2014). For Asian American adolescents, few studies have examined how their

perception of peer prejudice change over time and how cross-race friendships in early

adolescence may affect the trajectory during adolescence.

For associations between cross-race friendships and perception of peer prejudice, most of

the existing studies rely on cross-sectional designs (Benner & Wang, 2017; Chen & Graham,

2017; Graham et al., 2014), whereas longitudinal studies draw mostly on data from two time

points (Munniksma & Juvonen, 2012; Tropp, Hawi, Van Laar, & Levin, 2012). Moreover, little

research has focused on the cross-race friendships derived from multiple measures (quantity and

quality) and in various operationalizations (cross-ethnic friendships and cross-race friendships

with the Whites vs. other non-Whites). To fill these gaps, the goals of the present study are to: 1)

examine developmental trajectories of perception of peer prejudice at school among Asian

American adolescents; 2) investigate the influence of cross-race friendships (measured as

quantity and quality) on the perceived peer prejudice trajectories; and 3) test whether the above

associations hold for more nuanced forms of cross-ethnic friendships (cross-ethnic friendships and cross-race friendships with the White vs. other non-White groups).

Changes in Perception of Peer Prejudice at School

Despite the absence of work examining the trajectories of perceived peer prejudice among Asian American adolescents, developmental change has been implied in adolescents' cognitive capability, racial/ethnic identity and relationships with peers. There has also been in empirical research on perceived peer prejudice of adolescents in general. The capacity for abstract thought enables adolescents to identify more nonliteral aspects of race/ethnicity, such as race-based discrimination and stereotypes (Brown & Bigler, 2005). Adolescents also begin to explore the shared experiences within their own racial/ethnic group and the differences based on racial/ethnic group memberships (Syed & Azmitia, 2008). As adolescents gain more independence and expend their social worlds, they are also more likely to be exposed to the mainstream culture and experience discrimination and stereotypes (Greene et al., 2006).

In addition, extensive cross-sectional research suggests that perceived peer prejudice increases with age (Coker et al. 2009; Fisher, Wallace, & Fenton, 2000). Yet, for the few longitudinal studies, there are mixed findings regarding trajectories of peer prejudice among adolescents in general. Specifically, some studies show no changes (during senior years in Greene et al., 2006), some research reveals linear declines (during junior years for Niwa et al., 2014; during senior years for Bellmore et al., 2012) or linear increases (during senior yeas for Benner & Graham, 2011), and other work identifies increases during junior years and decreases during senior years in perceived peer prejudice (Hughes et al., 2016). To address the mixed findings, the present study investigated the developmental changes of perceived peer prejudice among Asian American adolescents by fitting three potential shapes of trajectories (no-change,

linear, and nonlinear shape-factor). I hypothesized that the perception of peer prejudice had a linear increase over time during adolescence for Asian Americans.

Cross-Race Friendships and Perceived Peer Prejudice Trajectories

Intergroup contact theory (Allport, 1954) suggests that interactions with peers from out-groups can reduce intergroup anxiety and facilitate positive beliefs about the out-groups. The intergroup contact effect is particularly salient when contact involves friendships serving the context of close relationships (Pettigrew, 1997). There is also empirical evidence demonstrating that young people who have cross-race friends are less likely to perceive discrimination, feel stressed in intergroup encounters (Page-Gould, Mendoza-Denton, & Tropp, 2008), or report peer victimization (Graham et al., 2014). Cross-race friendships are also associated with better perception of school ethnic climate for Asian American adolescents (Chen & Graham, 2017).

However, the above literature seldom makes a distinction between existence and quality of cross-race friendships. Both intergroup contact theory and empirical studies highlight the importance of the quality of cross-race friendships. Intergroup contact theory (Allport, 1954) suggests that interactions with out-group members could reduce intergroup prejudice, under the optimal conditions of equal status within the situation, intergroup cooperation, common goals, and support of authorities. Cross-group friendships of high quality are more likely than friendships of low quality to satisfy the optimal conditions posited by intergroup contact theory through providing equality between friends, intimacy, and cooperation (Hunter & Elias, 2000). In line with this theory, empirical research shows that the quality of cross-race friendships has been found to have a positive or even greater influence on intergroup attitudes and social competence than the quantity (Chen & Graham, 2015; Hunter & Elias, 2000; Vervoort, Scholte, & Scheepers, 2010). During adolescence, the need for companionship remains important as in

childhood when children put emphasis on characteristics of their friendships such as sharing common activities or helping each other (Berndt, Hawkins, & Hoyle, 1986; McDougall & Hymel, 2007). The quality measure of cross-race friendships which captures behavioral engagement in the friendships, such as spending time together and self-disclosure, has the largest positive effect on positive intergroup attitudes among all measures of cross-race friendships (see the review in Davies et al., 2011). In the present study, I investigated the quality of cross-race friendships measured as the average number of shared activities together with nominated cross-race friends (Crosnoe & Elder 2004; Vaquera & Kao, 2008; Wong & Maffini, 2011).

Methodologically, it remains unclear how cross-race friendships are related to changes in perception of peer prejudice over time, given that the existing literature relies primarily on cross-sectional data (Benner & Wang, 2017; Chen & Graham, 2017; Graham et al., 2014) or longitudinal design with two time points (Munniksma & Juvonen, 2012; Tropp et al., 2012). The bioecological model (Bronfenbrenner & Morris, 2006) posits that how developmental processes (e.g., cross-race friendships) influence adjustment is affected by the child's evolving biopsychological characteristics over time. The associations between cross-race friendships (in quantity or quality) and perceived peer prejudice may change in magnitude over time, which is precluded from investigation using cross-sectional or two-wave longitudinal design. To address this gap, this study investigated how cross-race friendships in adolescence are associated with trajectories of perceived peer prejudice across adolescence. Building upon prior work, I hypothesized that Asian American adolescents with more cross-race friendships or cross-race friendships of higher quality would exhibit lower initial levels and fewer linear increases in perception of peer prejudice. Moreover, I expected that the quality of cross-race friendships may have a longer-lasting influence over time than the quantity of cross-race friendships. I also

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examined the interactions between the quantity and the quality of cross-race friendships. Due to the paucity of research, I did not pose hypotheses for how cross-race friendship quantity interacts with friendship quality to influence perceptions of peer prejudice.

Cross-Ethnic Friendships and Friendships with White versus Other Non-White Groups

The literature rarely makes distinctions between Asian American students from the same versus different ethnic groups or between friendships between Asian American students and those from White versus other non-White groups. Specifically, as compared with friendships with cross-ethnic but same-race peers, friendships with same-ethnic peers may have different implications on perception of peer prejudice for Asian American youth. The pan-ethnic label treats Asian Americans as a homogeneous group and ignores the diverse psychological and cultural processes underlying developmental trajectories within this group (Kiang et al., 2016). Using racial rather than ethnic labels may undermine the detection of cross-ethnic friendships as influence on the development of Asian Americans who are sensitive to heterogeneity within group. Empirical research shows that cross-ethnic friendships have more evident effects on changes in psychological well-being over time than cross-race friendships (Liu, Wang, & Nuttall, 2020). Research has also indicated that sub-ethnic Asian Americans groups differ in terms of intergroup attitudes and the odds of making cross-race friends, possibly due to different cultural distances from Western countries (Chen & Graham, 2015). As such, cross-ethnic friendships were hypothesized to be more salient in the influences on perception of peer prejudice than cross-race friendships for Asian American adolescents.

Cross-race friendships with those in the White group may exert a different influence on perception of peer prejudice as compared to cross-race friendships with those in other non-White groups. Research has shown that Asian American adolescents show a preference in friend choice

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for White group over Latino and Black groups (Chen & Graham, 2015). In addition, the source of peer prejudice perceived by Asian American youth might be attributed more to other non-White groups relative to the White group. Asian American students report harassment more perpetrated by their peers, while Black and Latino American students perceive discrimination more from their teachers and other adults at school (Benner & Graham, 2013; Niwa et al., 2014). The model minority stereotype depicting Asian American group as high achieving may win Asian students teachers' favoritism over other students and further fuel discriminatory treatment from peers, particularly from other non-White groups who are stereotyped as low performing (e.g., Black and Latino students; Huynh & Fuligni, 2010; Okeke, Howard, Kurtz-Costes, & Rowley, 2009). Therefore, I expected that cross-race friendships with other non-White groups may have more salient influence on perception of peer prejudice at school than those with the White group for Asian American adolescents.

The Present Study

The present study used the Asian American subsample of the national Add Health study to investigate three research questions. First, how did perception of peer prejudice among Asian American youth change over time during adolescence? Perceived peer prejudice was expected to increase linearly with age during adolescence. Second, how were cross-race friendships (in quantity and quality) associated with trajectories of perceived peer prejudice across adolescence? I hypothesized that adolescents with more cross-race friendships or cross-race friendships of higher quality would exhibit lower levels and fewer increases in perceived peer prejudice. The quality was also compared with the quantity of cross-race friendships in terms of the magnitude of influence on perceived peer prejudice over time. I also tested the possible interactional effect of the friendship quantity and quality on perceived peer prejudice. Third, I explored whether the

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above associations were robust for cross-ethnic friendships and for cross-race friendships with the White versus other non-White groups. I hypothesized that that cross-ethnic friendships may be more salient than cross-race friendships, and friendships with other non-White groups may be more influential than those with the White group for Asian American adolescents' perception of peer prejudice.

Methods

Participants

Data for the present study was drawn from the National Longitudinal Study for Adolescent to Adult Health (Add Health), which is a nationally representative study of adolescents from Grades 7 to 12 used a multistage, stratified, and school-based cluster design (Harris, Halpern, & Whitsel, 2009). The final sample of 132 secondary schools were nationally representative of the U.S. secondary schools according to urbanicity, school type, school location and racial composition. To create a sampling structure for later data collections and oversampling, in-school wave was collected between September 1994 and April 1995 from almost all students in each school. In-home questionnaires were then administered to a nationally representative selection of students from the in-school wave. In the in-home sample, Chinese American adolescents were oversampled based on the in-school wave. The in-home sample included five waves of data. Specifically, Wave 1 (between April and December 1995) included students in Grades 7-12, and Wave 2 (in 1996) excluded participants who were Grade 12 at Wave 1. Wave 3 was conducted six years later (2001-02), Wave 4 was in 2008, and Wave 5 was in 2016-18.

The present study used the data from the in-school wave as the initial time assessment, Wave 1 as the second time assessment, and Wave 2 as the third time assessment. Only three

waves were used because participants graduated from school and perception of peer prejudice and peer nomination data were no longer collected in later waves. Cross-race friendships were constructed from data at the in-school wave, and perceived prejudice were assessed using data from the in-school wave, Wave 1, and Wave 2. Among the 15,355 participants who participated at both in-school wave and Wave 1, there were 1,154 Asian American participants. For the present sample, students with missing data for cross-race friendships were excluded ($N = 239$, 20.71%). The reasons for having missing data in cross-race friendships included no nomination of any friends ($N = 140$, 12.13%), missingness of IDs ($N = 88$, 7.63%), or missingness of racial/ethnic information ($N = 11$, .95%) for constructing cross-race friendships. Compared with the excluded participants, students in this sample were less likely to be male [$\chi^2 (1) = 6.18$, $p < .05$], first generational [$\chi^2 (1) = 4.36$, $p < .05$], and Vietnamese [$\chi^2 (1) = 4.23$, $p < .05$], and more likely to have parents with higher education [$\chi^2 (1) = 14.18$, $p < .01$]. I did not observe other demographic differences or differences by primary study variables between the sample and the excluded participants. Moreover, to examine attrition patterns, I also made comparison between students who had complete data across the three waves ($n = 528$, 58%) and those who had missing data ($n = 287$, 31.37% had missing for Wave 2). Compared with students who had missing data, those who had complete data from all three waves were more likely to be Chinese [$\chi^2 (1) = 9.55$, $p < .01$] and from the Midwest [$\chi^2 (1) = 8.05$, $p < .01$]; they were also less likely to be Korean [$\chi^2 (1) = 7.56$, $p < .01$] and Vietnamese [$\chi^2 (1) = 5.12$, $p < .05$]. No other differences in demographic variables or primary study variables were observed between the two groups. I therefore included gender, generational status, parental education, and Asian ethnicities as covariates to address the differential attrition issue.

In the final dataset, there were 915 self-identified Asian Americans (49% females) who

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were 11.5 to 19.5 years old at in-school wave (Mean age = 15.57, SD = 1.67), 12.5 to 21 years old at Wave 1 (Mean age = 16.24, SD = 1.69), and 13.5 to 22 years old at Wave 2 (Mean age = 17.18, SD = 1.70). The sample included adolescents from diverse ethnic backgrounds: 41% Filipino, 30% Chinese, 8% Japanese, 8% Korean, 5% Vietnamese, 2% Indian, and 15% other. The majority of the sample were 1st (N = 398, 44%; the participant was born outside the U.S.) and 2nd generations (N = 381, 42%; at least one parent was born outside the U.S.). In the sample, the participants had parents of varying educational levels, comprising 8% less than high school, 17% high school/GED, 15% some college, and 53% college or higher. For the current sample, school characteristics differed in terms of type (88.5% public and 11.5% private/religious), region (65% West, 13.4% Midwest, 11.9% Northeast, and 9.6% South), urbanicity (75.4% suburb, 22.1% urban, and 2.5% rural), size (25.7% less than 1000 students, 25.0% between 1000 and 2000, and 49.3% between 2000 and 3000), and racial representation of Asian American students (22.2% less than 15%, 25.5% between 15% and 30%, 40% between 30% and 45%, and 12.3% between 45% and 60%).

Measures

    Cross-race friendships. Cross-race friendships were constructed using social network data at the in-school wave. The maximum of friends that participants could nominate was five female best friends and five male best friends from a school roster. An objective measure of cross-race friendships was created by matching adolescents' nominated friends with each friend's self-reported race/ethnicity based on the complete network information. Adolescents' racial/ethnic backgrounds were based on two questions, "Are you of Hispanic or Spanish origin?" and "What is your race?" Adolescents' race/ethnicity was classified into five groups, including Hispanic, Non-Hispanic Black, Non-Hispanic Asian, Non-Hispanic White Americans

and other racial/ethnic groups. The friendships in which members of the pair were from different racial/ethnic backgrounds were identified as cross-race. The variable of cross-race friendships was computed by dividing the number of cross-race friends by the total number of friends in each participant's network. Unlike the number of cross-race friendships, the proportion of cross-race friendships used in this study takes into consideration the total number of friends nominated by each participant.

The more nuanced forms of cross-race friendships were then generated. *Cross-ethnic friendships* were created using the proportion of cross-ethnic friends in each participant's network. Ethnicity was constructed based on a follow-up question that asked adolescents who self-identified as Non-Hispanic Asian to report their ethnic background (Chinese, Filipino, Japanese, Asian Indian, Korean, Vietnamese, and other Asians). Friendships were then classified as cross-ethnic if members of the pair were from different ethnic backgrounds, including both cross-race and cross-ethnic but same-race friends (Kao & Joyner, 2006). *Cross-race friendships with the White versus other non-White groups* consisted of two variables. Friendships with the White group refer to the proportions of cross-race friends who were Non-Hispanic White Americans in each participant's network. Friendships with other non-White groups refer to the proportions of cross-race friends who were other non-White Americans (i.e., Hispanic, Non-Hispanic Black, other racial/ethnic groups) in each participant's network.

Quality of cross-race friendship. Cross-race friendship quality was calculated as the average number of activities shared together with all nominated cross-race friends at the in-school wave. After each friend nomination, adolescents were asked to report whether they engaged in the following activities with the listed friend over the past seven days: "going to the friend's house," "meeting the friend after school to hang out or going somewhere," "spending

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time with the friend last weekend," "talking with the friend about a problem," and "talking with the friend on the telephone." Items were rated on a 2-point scale ranging from 0 (*no*) to 1 (*yes*). Scores were summed across the items for each friend to generate a score ranging from 0 (no shared activities) to 5 (engagement in all five activities). The scores were then summed across all the listed cross-race friends, and the overall score was later divided by the number of reported cross-race friends. A friendship quality variable was created separately for cross-race friends, cross-ethnic friends, and friendships with the White versus with other non-White peers. Participants who reported no cross-race friends were scored "0" for friendship quality (Deutsch, Steinley, & Slutske, 2014). Prior work using Add Health data indicates that this measure is correlated with the rankings of friend nomination (i.e., first- through fifth-listed friend) and identifies this measure of contact intensity as a useful indicator of friendship intimacy (Kao & Joyner, 2004). A previous study using the Asian American sample of Add Health shows that this measure for best friends shows good reliability (α = .70; Wong & Maffini, 2011). Another study using Add Health data also indicates good reliability for the first three items of this measure (α = .83 and .88 for male friends and female friends respectively) and for the last two items of this measure (α = .70 and .82 for male and female friends respectively; Wainright & Patterson, 2008). In the current sample, the internal consistency for friendship quality was good (α = .77).

Perceived peer prejudice. Perceived peer prejudice variable assesses the adolescents' perceptions of peer prejudice at school at the in-school wave, Wave 1, and Wave 2. Adolescents reported their agreement with a single item asking about whether students at their school were prejudiced (Benner, Crosnoe, & Eccles, 2015). The response scale ranged from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores represented adolescents' greater perception of peer prejudice at school. In a previous study using Add Health data, this measure is found to be

negatively associated with school attachment (Benner et al., 2015).

Covariates. Adolescents self-reported their gender, parental education, immigrant status, and ethnicity, and I constructed racial representation of Asian American students at school based on participant reports. Gender was a dichotomous variable (1 = *female*; 0 = *male*). For parental education, students reported the highest education of both their mother and father on a 10-point scale. Parental education was then created based on the highest level of parental education with a 4-point scale from 1 (*less than high school*) to 4 (*college or higher*). Immigration status was generated based on questions including whether students themselves, their resident/non-resident biological mother, and their resident/non-resident biological father was born in the United States. Adolescents who were foreign born were identified as first generation, those who were native born with at least one foreign-born parent were classified as second generation, and those who were born to native-born parents were categorized as third generation. Asian ethnic background includes a group of dichotomous variables (i.e., Chinese, Filipino, Japanese, Asian Indian, Korean, Vietnamese, and others). For racial representation at school, I aggregated students by school ID at the in-school wave and created the proportion of each racial/ethnic group (White, Black, Hispanic, Asian American, and other) at each school based on self-reported racial/ethnic backgrounds. Racial representation of Asian American peers at school was created as a dichotomous variable with 15% as the criterion (1 = the percentage of Asian Americans was higher than 15%; 0 = the percentage was lower than 15%; Linn & Welner, 2007).

Data Analytic Strategy

Latent growth curve models were used to address questions about within-person changes and between-person differences in within-person changes (McArdle & Epstein, 1987). Data were modeled in M*plus* (M*plus* version 8.1; Muthen & Muthen, 1998-2017) using full information

maximum likelihood estimation (Enders, 2011; Enders & Bandalos, 2001). The dependency of students nested within schools was addressed using the clustering command in M*plus*. Unstandardized coefficients are reported.

To answer the first research question regarding developmental trajectories of perceived prejudice, unconditional no-growth, linear growth, and nonlinear shape-factor growth models (Sterba, 2014) were compared, and the best one of the three competing unconditional models was selected. For no-growth model, the model fit was assessed using χ^2 likelihood ratio test, root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI). CFI and TLI above .90 and .95 indicate acceptable and good model fit respectively, and RMSEA below .08 and .10 suggest acceptable and good model fit respectively (Bentler, 1990; Hu & Bentler, 1999). Given youth in the sample ranged in age from 11.5 to 20.5 at the in-school wave, I fit the linear and shape-factor growth models using the definition variable framework which scales the slope in age rather than wave of data collection (Grimm, Ram, & Estabrook, 2017; Sterba, 2014). Thus, while centered at age 11.5, the intercepts were interpreted as the predicted average score of perceived prejudice at age 11.5. For the model fit of the age-based model with the measurement occasions varying individually, only likelihood-based fit statistics were produced by the program, including -2 log likelihood (-2LL), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC; Grimm et al., 2017). To compare linear and shape-factor growth models, the Satorra-Bentler scaled χ^2 difference (S-B$\Delta\chi^2$) test was used, in which the normal-theory chi-square statistic is divided by a scaling correction to improve the chi-square approximation (Satorra & Bentler, 2010).

The second research question was then examined on how the quantity and quality of cross-race friendships influenced the trajectories of perceived prejudice across adolescence in

one model. The best-fit model of perceived prejudice trajectories was modeled conditional on both the quantity and quality of cross-race friendships. In the latent growth models, a significant effect of cross-race friendships on the latent slope was interpreted as the interaction between cross-race friendships and age, because age was included in the growth models as a predictor via the factor loading matrix (Preacher, Curran, & Bauer, 2004). Specifically, for probing this interaction, I first examined simple slopes of perceived prejudice trajectories conditional upon proportions or quality of cross-race friendships at low and high levels (one *SD* below and above each of the means). Then, I examined how the effect of cross-race friendship in quantity or quality on perceived prejudice varies with respect to age by calculating the alternative region of significance for the effect of cross-race friendships as a function of age (Curran, Bauer, & Willoughby, 2004). The confidence bands were plotted to reveal the exact age when the effect of cross-race friendships in quantity or quality changes from nonsignificant to significant.

To test the interaction between the quantity and quality of cross-race friendships, I added the interaction between cross-race friendship quantity and quality as one of the predictors. A significant effect of the interaction on the intercept was probed on levels of perceived prejudice at age 11.5. In the latent growth models, a significant effect of the two-way interaction on the latent slope was probed as a three-way interaction between cross-race friendship quantity, cross-race friendship quality, and age. Specifically, I first conducted simple slopes of three-way interaction to investigate how the association between the proportion of cross-race friendships and perceived prejudice trajectories varied by the quality of cross-race friendship (Curran et al., 2004). Then, I calculated the alternative region of significance related to the effect of cross-race friendship quantity as functions of age by cross-race friendship quality. The confidence bands were plotted to indicate the exact age when the effect of cross-race friendship quantity moderated

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by cross-race friendship quality becomes significant.

To answer the third research question, I explored the above associations for the quantity and quality of cross-ethnic friendships and those of cross-race friendships with the White versus other non-White groups. As conducted in the prior analyses, effects of friendship quantity and quality as well as the interaction between friendship quantity and quality were examined again respectively using the more nuanced forms, including cross-ethnic friendships, cross-race friendships with the White group, and cross-race friendships with other non-White groups.

In all the conditional models, covariates controlled for included gender, immigrant status, and racial representation as binary variables as well as parental education as a continuous variable. Previous studies show that male adolescents are more likely to have cross-race friendships than their female counterparts (Graham, Cohen, Zbikowski, & Secrist, 1998; Way & Chen, 2000; Way & Greene, 2006). However, males tend to report lower quality friendships and have fewer demands for closeness or intimacy with age relative to females (Graham et al., 1998; Plummer, Stone, Powell, & Allison, 2016). Adolescents with parents from higher educational backgrounds are more likely to make cross-race friends (Kao & Joyner, 2006). Generational status has also been found to have a positive association with the likelihood of making cross-race friends for Asian American youth, possibly due to increasing proficiency in English language and enhanced cross-cultural knowledge over generations (Hamm, Bradford, & Heck, 2005; Kao & Joyner, 2006; Ying, Lee, Tsai, Lee, & Tsang, 2001). Among sub-ethnic groups within Asian Americans, the odds of making cross-race friends differ. For example, South Asian youth tends to report more cross-race friends than other Asian groups, possibly due to smaller cultural and linguistic distance from Western countries (Chen & Graham, 2015). The racial composition at school may affect students' ability to recognize race-based discrimination (Walsemanne, Bell, &

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Maitra, 2011). Low racial representation of same-race peers at school has also been linked to poorer school attachment and greater depressive symptoms (Benner & Wang, 2014, 2015).

Results

Sample Description

Descriptive statistics and bivariate correlations among study variables over time are presented in Table 2.1. The proportion of cross-race friendships, cross-ethnic friendships, and cross-race friendships with the White group as well as the quality of cross-ethnic friendships and cross-race friendships with the White group were positively correlated with perceived peer prejudice at the in-school wave. The quality of cross-race friendships with the White group was positively correlated with perceived peer prejudice at Wave 1.

Unconditional Models of Perceived Prejudice

Perceived prejudice was modeled first with a no-growth model, second with a linear age-based growth model, and third with a shape-factor age-based growth model. For no-growth model, model fit was acceptable: χ^2 (df) = 13.14 (6); RMSEA = .04; CFI = .94; TLI = .97. The levels of perceived prejudice averaged across time for the average student was estimated to be 3.01 (SE = .04, $p < .001$) with a variance estimate of .41 (SE = .05, $p < .001$). The linear age-based growth model fitted the data significantly better than the no-growth data with S-B$\Delta\chi^2$ (df) = 45.33 (3). The levels of perceived prejudice at age 11.5 for the average student was estimated to be 2.78 (SE = .09, $p < .001$) with a variance estimate of .73 (SE = .15, $p < .001$). The estimated average linear rate of change in perceived prejudice was .05 (SE = .01, $p < .01$) with a variance estimate of .01 (SE = .01, $p < .05$). However, the shape-factor age-based growth model did not appear to fit the data significantly better than the linear growth model based on S-B$\Delta\chi^2$ (df) = 2.95 (1). The occasion-specific departure (set at T2) from linearity was not significantly different

from 0 (b = -6.58, SE = 5.94, p = .27). Therefore, the linear growth model was selected because it fits the data better than no-growth model and is more parsimonious than the shape-factor growth model.

Models of Perceived Prejudice Conditional on Cross-Race Friendships

All parameter estimates for the effects of cross-race friendships quantity and quality on the linear age-based growth model of perceived prejudice (from age 11.5 to 22) are shown in Table 2.2 (first column). Since no interaction emerged between friendship quantity and quality, the results were reported from the model without the interaction. Having higher proportion of cross-race friendships was associated with lower levels of perceived prejudice at age 11.5 and greater increases in perceived prejudice during adolescence. By comparison, having higher quality of cross-race friendships was not associated with levels of perceived prejudice at age 11.5 but was associated with fewer increases in perceived prejudice.

Given the significant effects of friendships quantity and quality on latent slopes of perceived prejudice, I examined the simple slopes and regions of significance of the two-way interaction between cross-race friendships (respectively for quantity and quality) and age on perceived prejudice. More specifically for friendship quantity, as shown in Figure 2.1a, the simple slopes of perceived prejudice were not significantly different from 0 for both adolescents with a low proportion (one SD below the mean) of cross-race friendships (b = -.10, SE = .10, p = .31) and those with a high proportion (one SD above the mean) of cross-race friendships (b = .01, SE = .08, p = .87). The confidence bands for the region of significance as a function of age (as seen in Figure 2.1b) indicated that the effect of friendship quantity on perceived prejudice was only significant below age 13 and approximately above age 16. That is, cross-race friendships in quantity were negatively associated with perceived prejudice only up to age 13.

The magnitude of this effect weakened with age before age 13, which is revealed by the convergence over time of the two trajectories of perceived prejudice for adolescents with low and high proportions of cross-race friendships. In contrast, starting from age 16, cross-race friendships in quantity were positively associated with perceived prejudice. The magnitude of this effect after age 16 strengthened with age, as indicated by the divergence of the two trajectories of perceived prejudice for adolescents with low and high friendship quantities.

For cross-race friendship quality, as shown in Figure 2.1c, the simple slopes of perceived prejudice were not significantly different from 0 for both adolescents with low quality (set at minimum) of cross-race friendships ($b = -.02$, $SE = .08$, $p = .84$) and those with high quality (one SD above the mean) of cross-race friendships ($b = -.08$, $SE = .09$, $p = .40$). The confidence bands for the region of significance as a function of age (as seen in Figure 2.1d) indicated that the effect of friendship quality on perceived prejudice was significant above approximately the age 19.5. That is, cross-race friendship quality was not associated with perceived prejudice until age 19.5. From age 19.5, cross-race friendship quality was negatively associated with perceived prejudice and this effect increased in magnitude as age increased, which is reflected by the divergence of the two trajectories of perceived prejudice for adolescents with low and high friendship quality.

Models of Perceived Prejudice Conditional on Cross-Ethnic Friendships

All parameter estimates for the effects of cross-ethnic friendships quantity and quality on the linear age-based growth model of perceived prejudice (from age 11.5 to 22) are shown in Table 2.2 (second column). Because no interaction was observed between friendship quantity and quality, the results were reported from the model without including the interaction. Having more cross-ethnic friendships was not associated with levels of perceived prejudice at age 11.5

but was associated with greater increases in perceived prejudice during adolescence. For cross-ethnic friendship quality, it was not associated with either levels of perceived prejudice at age 11.5 or changes over time in perceived prejudice.

Given the significant effects of cross-ethnic friendship quantity on latent slopes of perceived prejudice, I examined the simple slopes and regions of significance of the two-way interaction between cross-ethnic friendship quantity and age on perceived prejudice. As shown in Figure 2.2a, the simple slopes of perceived prejudice were not significantly different from 0 for both adolescents with a low proportion (one SD below the mean) of cross-ethnic friendships ($b = -.05$, $SE = .10$, $p = .57$) and those with a high proportion (one SD above the mean) of cross-ethnic friendships ($b = .03$, $SE = .08$, $p = .69$). As evident in the confidence bands for the region of significance as a function of age (Figure 2.2b), the effect of friendship quantity on perceived prejudice was significant above the age 16.5. That is, cross-ethnic friendship quantity was not associated with perceived prejudice until age 16.5. From age 16.5, cross-ethnic friendships in quantity were positively associated with perceived prejudice. The magnitude of this effect after age 16.5 strengthened with age, as revealed by the divergence the two trajectories of perceived prejudice for adolescents with low and high quantities of cross-ethnic friendships.

Models of Perceived Prejudice Conditional on Cross-Race Friendships with Whites

All parameter estimates for the effects of cross-race friendships with the White peers in quantity and quality on the linear age-based growth model of perceived prejudice (from age 11.5 to 22) are shown in Table 2.2 (third column). Since no interaction emerged between friendship quantity and quality, the results were reported from the model without the interaction. No significant effect of cross-race friendships with the White peers, either in quantity or in quality, was observed for both levels at age 11.5 and changes over time of perceived prejudice during

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adolescence.

Models of Perceived Prejudice Conditional on Cross-Race Friendships with Non-Whites

All parameter estimates for the effects of cross-race friendships with non-White peers in quantity and quality on the linear age-based growth model of perceived prejudice (from age 11.5 to 22) are shown in Table 2.2 (fourth column). Since no interaction was observed between friendship quantity and quality, the results were reported from the model without including the interaction. Having more cross-race friendships with non-White peers was associated with lower levels of perceived prejudice at age 11.5 and more increases in perceived prejudice during adolescence. In contrast, having higher quality of cross-race friendships with other non-White peers was associated with higher levels of perceived prejudice at age 11.5 and fewer increases in perceived prejudice.

Given the significant effects of friendships quantity and quality on latent slopes of perceived prejudice, I examined the simple slopes and regions of significance of the two-way interaction between cross-race friendships with non-White peers (respectively for quantity and quality) and age on perceived prejudice. More specifically for friendship quantity, as shown in Figure 2.3a, the simple slopes of perceived prejudice were not significantly different from 0 for both adolescents with a low proportion (set at the minimum) of friendships with other non-White peers ($b = -.03$, $SE = .08$, $p = .70$) and those with a high proportion (one SD above the mean) of friendships with other non-White peers ($b = .04$, $SE = .07$, $p = .56$). The confidence bands for the region of significance as a function of age (as evident in Figure 2.3b) showed that the effect of friendship quantity on perceived prejudice was significant only below the age 13.5 and above approximately the age 18. That is, the proportions of cross-race friendships with non-White peers were negatively associated with perceived prejudice only up to age 13.5. The magnitude of this

effect weakened with age before age 13.5, which was revealed by the convergence of the two trajectories of perceived prejudice for adolescents with low and high proportions of friendships with other non-White peers. In contrast, starting from age 18, the proportions of cross-race friendships with non-White peers were positively associated with perceived prejudice. The magnitude of this effect strengthened with age after age 18, which was revealed by the divergence of the two trajectories of perceived prejudice for adolescents with low and high proportions of cross-race friendships with non-White peers.

For the quality of cross-race friendships with non-White peers, as shown in Figure 2.3c, the simple slopes of perceived prejudice were not significantly different from 0 for both adolescents with low quality (set at minimum) of friendships with other non-White peers (b = .03, SE = .07, p = .68) and those with high quality (one SD above the mean) of friendships with other non-White peers (b = -.05, SE = .09, p = .55). The confidence bands for the region of significance as a function of age (as seen in Figure 2.3d) indicated that the effect of friendship quality on perceived prejudice was significant below approximately the age 13 and above the age 17.5. That is, the quality of cross-race friendships with non-White peers were positively associated with perceived prejudice only up to age 13. The magnitude of this effect weakened with age before age 13, which was revealed by the convergence over time of the two trajectories of perceived prejudice for adolescents with low and high quality of cross-race friendships with non-White peers. In contrast, starting from age 17.5, the quality of cross-race friendships with non-White peers was negatively associated with perceived prejudice. The magnitude of this effect strengthened with age after age 17.5, which was revealed by the divergence over time of the trajectories of perceived prejudice for adolescents with low and high quality of cross-race friendships with non-White peers.

Discussion

Limited existing research has examined the trajectories of perception of peer prejudice and how cross-race friendships affect the trajectories during adolescence, particularly among Asian American adolescents. Guided by intergroup contact theory (Allport, 1954; Pettigrew and Tropp, 2006), the present study used latent growth curve model to examine how Asian American adolescents' perception of peer prejudice change over time during adolescence and how cross-race friendships in early adolescence affect trajectories of perception of peer prejudice during adolescence. An overall increase was identified for Asian American students' perception of peer prejudice at school during adolescence. Cross-race friendships measured as quality had a more delayed but longitudinal influence on the perception of peer prejudice than friendships measured as quantity. In addition, cross-ethnic friendships had less evident effects on perception of peer prejudice, but cross-race friendships with other non-White groups (vs. with the White group) had influences on changes in perception of peer prejudice similar to those observed for cross-race friendships.

Changes in Perception of Peer Prejudice at School

The present study investigated Asian American adolescents' trajectories of perceived peer prejudice by fitting three potential shapes of age-based changes (no-change, linear, and nonlinear shape-factor) to three waves of data. As hypothesized, Asian American youth's perception of peer prejudice at school followed an overall linear increasing trajectory over time during adolescence. This finding was consistent with previous studies (among Latino adolescents in Benner & Graham, 2011; among Black adolescents in Martin et al., 2011). Due to the cognitive development of abstract thought, adolescents are able to conceptualize race/ethnicity at more complex and non-literal levels and recognize and interpret race-based discrimination and

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stereotypes (Brown & Bigler, 2005). Moreover, adolescents also begin to understand the shared experiences of their own racial/ethnic group and become increasingly sensitive to how their group are treated by other groups (Syed & Azmitia, 2008; Umaña-Taylor et al., 2014). Adolescents' increasing independence and expended social worlds may also increase their likelihood of encountering discrimination and stereotypes (Benner & Graham, 2011; Greene et al., 2006).

Cross-Race Friendships and Perceived Peer Prejudice Trajectories

The present study contributes to our understanding of cross-race friendships in the forms of quantity and quality and perception of peer prejudice at school among Asian American adolescents. Consistent with my hypotheses, higher proportions of cross-race friendships were associated with lower levels of perceived peer prejudice at school at age 11.5, and the strength of association between cross-race friendship quantity and perceived peer prejudice decreased during early adolescence. However, unexpectedly, in middle adolescence, higher proportions of cross-race friendships in early adolescence were associated with higher levels of perceived peer prejudice at school, and the magnitude of the association increased later on. The unexpected finding may illuminate the potential negative influences of cross-race friendships in quantity on perceived peer prejudice in the long run. Cross-race friendships of high quantity may not guarantee the friendship quality and may involve some level of misunderstanding and negative interactions possibly related to racial/ethnic and cultural differences (Chang & Samson, 2018). Moreover, these patterns revealed that early adolescence is a critical period for the beneficial effect of cross-race friendships in quantity. In contrast, although cross-race friendship quality was not associated with levels of perceived peer prejudice at age 11.5, it began to exert influence on youth's perception of peer prejudice at school in late adolescence. Specifically, cross-race

friendships of higher quality in early adolescence were associated with weaker perception of peer prejudice at school in late adolescence, and the strength of the association increased over time. This finding suggests that cross-race friendships in quality are more influential during late adolescence than early on.

These contrasting results between friendship quantity and quality partially confirm my hypotheses on the longer-lasting influence of cross-race friendship quality than that of cross-race friendship quantity. These findings also expanded the intergroup contact theory (Allport, 1954; Pettigrew & Tropp, 2006) by highlighting the critical timing when cross-race friendships in various forms (quantity and quality) are particularly influential over perceived peer prejudice. Cross-race friendship quantity had an instant but short effect, and cross-race friendship quality exerted a delayed but long-term influence over the extent to which adolescents perceive peer prejudice at school. The development and maintenance of a friendship is more determined by the friendship quality than the friendship quantity. For example, shared activities with cross-race friends (e.g., going to a friend's home or talking over the phone) provide opportunities for support-seeking and self-disclosing, which offer a sense of companionship and closeness and further contribute to the stability and longevity of the friendship (Abeele, Schouten, & Antheunis, 2017; Lessard, Kogachi, & Juvonen, 2019). In addition, spending time together with cross-race friends can lead to reduced behavioral avoidance of the out-group possibly by providing opportunities for repeated contact and introduction of new cross-race peers (Chen & Graham, 2015; Davies et al., 2011). Therefore, higher-quality cross-race friendships in which peers share more activities and perspectives may become increasingly influential over time on how the adolescents experience peer prejudice and navigate future cross-race interactions. In addition, although no interactive influence between cross-race friendship quantity and quality

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emerged for perceived peer prejudice, future work could explore whether cross-race friendship

quantity interacts with quality to affect other developmental processes and outcomes.

Cross-Ethnic Friendships and Friendships with White versus Non-White Groups

The present study also contributes to the literature by disentangling influences of cross-

race friendships in more nuanced operationalizations (cross-ethnic friendships, friendships with

the White vs. non-White groups). Inconsistent with my hypothesis, cross-ethnic friendships in

quantity were not associated with levels of perceived peer prejudice at school at age 11.5 and

were positively associated with perceived peer prejudice across middle and late adolescence. No

effect of cross-ethnic friendship in quality emerged for the developmental trajectories of

perceived peer prejudice. It is possible that individuals who have more same-race but cross-

ethnic friends are more likely to witness prejudicial treatment towards their racial group and

share the feelings of helplessness with the victims who have themselves experienced the overt

discrimination (Tynes, Giang, Williams, & Thompson, 2008). As such, the influence of cross-

ethnic friendships on perception of peer prejudice was not as salient as that of cross-race

friendships. Further research will provide more insights if examining how perception of peer

prejudice of cross-race friends and cross-ethnic friends may influence the individual's own

perception of peer prejudice trajectories.

Cross-race friendships were influential on perception of peer prejudice at school when

friends were from other non-White groups but not when they were White Americans. Cross-race

friendships with non-White groups had effects on trajectories of perceived peer prejudice similar

to those observed for general cross-race friendships. This finding is aligned with my hypothesis

and previous research on Asian Americans' perception of peer prejudice (Hughes et al., 2016;

Niwa et al., 2014). The model minority stereotype may fuel prejudice and harassment more from

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other non-White groups with the burden of stereotypes related to poor performance. Thus, Asian students who have cross-race friendships with other non-White peers are less likely to perceive prejudice from peers at school. In addition, this finding was in contrast with previous research showing that the influence of cross-race friendships on psychological well-being is only observed for friendships with the White group but not for friendships with other non-White groups (Liu et al., 2020). It may highlight that cross-race friendships with the White versus non-White groups are beneficial for different developmental domains for Asian American adolescents.

Study Limitations and Implications

Although the present study has important strengths, it is not without limitations. First, perceived peer prejudice was explored using only a single item, which may mask multiple dimensions within their perception of peer prejudice in terms of race/ethnic, gender, immigration status, and socioeconomic status. Moreover, in Add Health, the measure regarding perceived peer prejudice at school was not phrased specifically to address racially/ethnically based prejudice perpetrated by peers. The likelihood of attributing experience of prejudice specifically to race has also been found to be associated with the number of cross-race friendships (Kawabata & Crick, 2011; Killen, 2007). Second, only cross-race friendships in early adolescence were examined in the present study, because Add Health collected only one wave of social network data for the full sample. This precludes the understanding of parallel processes over time between cross-race friendships and perceived peer prejudice. Given previous research has documented a decline in cross-race friendships over the course of childhood (Gaias, Gal, Abry, Taylor, Granger, 2018; Kawabata & Crick, 2011), the increases in perception of peer prejudice may be accompanied by more declines in cross-race friendships over time. This may suggest a

third factor which accounts for the changes in these two constructs (Wang & Yip, 2020). In addition, the association between cross-race friendships and perceived peer prejudice may be attributed to the influence from perception of peer prejudice to cross-race friendships or the reciprocal relationship between these two constructs (Graham & Echols, 2018). Concerns about being target by prejudice may contribute to the hesitation to engage in interactions with out-group members, thereby curbing the development of cross-group friendships (Davis et al., 2011).

Despite the limitations, the present study identified overall increases over time of perception of peer prejudice across adolescence for Asian American youth. Moreover, the findings also suggest that quantity of cross-race friendships had an immediate but short effect, and quality of cross-race friendships exerted a delayed but long-term influence over how Asian American adolescents perceive peer prejudice at school. Thus, the study underscores that interventions on improving adolescents' perception of peer context at school might be more successful if targeting the quality of cross-race friendships. The findings may be informative for schools to create programs that fosters meaningful interactions among peers from different racial/ethnic backgrounds, such as designing friendship-building activities that nurture empathy and intimacy. Finally, the present study also highlights the importance of promoting cross-race friendships with other non-White groups for Asian American adolescents. Given that prior research has found the influence of cross-race friendships on psychological well-being is only observed for friendships with the White group (Liu et al., 2020), intervention efforts on encouraging cross-race friendships with the White and non-White peers may be useful in promoting psychological and social adjustment respectively for Asian American adolescents.

CHAPTER 3. STUDY TWO: LONGITUDINAL EXAMINATION OF ASSOCIATIONS BETWEEN CROSS-RACE FRIENDSHIPS AND PSYCHOLOGICAL AND ACADEMIC ADJUSTMENT AMONG ASIAN AMERICAN ADOLESCENTS

Introduction

Little existing research on cross-race friendships and psychological and academic outcomes has focused on the developmental trajectories over time and directions in associations between cross-race friendships and adjustment. Most of the existing studies about cross-race friendships rely on cross-sectional design, whereas longitudinal studies typically examine relationships between friendships at an earlier time and well-being at a later time (Kawabata & Crick, 2015; Munniksma & Juvonen, 2012). These methodological designs are limited in uncovering changes over time in cross-race friendships and associations between these changes with adjustment. According to the contact-in-context model proposed by Yip et al. (2019) regarding the benefits and challenges of diversity, interpersonal diversity (e.g., cross-race friendships) changes over time as children develop.

In addition, although the positive associations between cross-race friendships and adjustment have been well established, the methodological constrains in previous work also limits research efforts to fully address the directionality of these associations, i.e., if the directions are from cross-race friendships to adjustment, the other way around, or bidirectional (McGill, Way, & Hughes, 2012). The contact-in-context model suggests reciprocal associations between youth's interpersonal diversity experiences and their racial/ethnic developmental processes and outcomes (Yip et al., 2019). It is possible that well-adjusted adolescents choose to form friendships with cross-race members, so adjustment may affect cross-race friendships (Hollander, 1958). It would be informative to examine the individual conditions or predictors

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that lead to cross-race friendships (Cameron & Turner, 2017). In the current study, developmental trajectories of cross-race best friendships (measured as proportion of cross-race friends in one's best female and male friend network) were studied in particular due to the unavailability of general friendship nomination across all three waves in Add Health. The associations between trajectories of cross-race best friendships and psychological and academic adjustment were then explored, and the directionality in associations between cross-race friendships and adjustment were disentangled.

Longitudinal Patterns of Adolescents' Cross-Race Friendships

While prior studies have primarily focused on the patterns of cross-race friendships during childhood (Aboud et al., 2003; Gaias et al., 2018; Kawabata & Crick, 2011), much less is known about the developmental changes of adolescents' cross-race friendships. Friendships are especially salient during adolescence, as children gradually shift their attention outside the home and peers gain more importance in their social world (Brown & Larson, 2009). Based on life course theory, children's friendships are dynamic, interactive relationships which can interlock social pathways and developmental trajectories (Crosnoe, 2000). As youth age, their friendships evolve as they perform more complicated roles and navigate more complex environments. Race/ethnicity is an important factor that youth pay attention to in making friends (Graham & Echols, 2018). Compared to childhood, adolescents begin to be aware of more nonliteral aspects of race/ethnicity, such as racial/ethnic differences in friendships or racial/ethnic discrimination (Quintana, 1998), and actively search for the meaning of race/ethnicity in constructing their identities (Umaña-Taylor et al., 2014). As such, adolescence is a critical developmental period for understanding the development of cross-race friendships.

Methodological designs used in prior research are also limited in uncovering changes

over time in cross-race friendships. Specifically, most existing studies on developmental changes of cross-race friendships have used cross-sectional designs with participants of various ages or grades (Graham & Cohen, 1997; Hallinan & Teixeira, 1987; Singleton & Asher, 1979). As documented in previous research, children of older age or from higher grade levels tend to have a smaller number of cross-race friendships (Graham & Cohen, 1997; Hallinan & Teixeira, 1987). In addition, existing longitudinal studies (Aboud et al., 2003; Cappella, Hughes, & McCormick, 2017; Kawabata & Crick, 2011; McGill et al., 2012) have primarily drawn on data from two time points only which provide some information about the amount of change, however, without considering trajectories over time. To fully understand developmental trajectories of adolescents' cross-race friendships, a longitudinal perspective is needed to capture changes that occur over time. In the present study, I utilized a longitudinal sample of Asian American adolescents that includes three measurement waves to investigate developmental trajectories of cross-race friendships during adolescence.

Instead of adolescents' one-time racial/ethnic preferences, it is necessary to examine the constancy and longitudinal patterns of their cross-race friendships during adolescence. Adolescents change their friends often (Bowker, 2004; Chan & Poulin, 2007), possibly because of the way the schools are organized which requires students to switch classes and classmates often (Poulin & Chan, 2010). With the consciousness and understanding of differences on the racial/ethnic basis during adolescence (Syed & Azmitia, 2008), youth may be more likely to disproportionately favor same-race friends over cross-race friends based on the homophily (similarity) principle (Aboud & Mendelson, 1996). Moreover, due to the increased autonomy, older adolescents are less likely to rely on peers to form their racial/ethnic identities than younger adolescents (Umaña-Taylor et al., 2014). As such, I hypothesized that cross-race

friendships may decline with age during adolescence.

Cross-Race Friendships and Psychological Well-Being

Cross-race friendships are beneficial for Asian American's psychological well-being, specifically in terms of enhancing students' self-esteem. The self-expansion theory asserts that the involved other in the close relationship could be cognitively included into the self (Aron & Aron, 1986; Aron et al., 2004). Cross-race friendships can therefore provide opportunities for the individual to incorporate the distinct resources and perspectives of the outgroup member into the concept of self. Further, the inclusion of the outgroup's perspectives and resources as a result of cross-race friendships can predict feelings of self-confidence in completing a variety of goals (Dys-Steenbergen, Wright, & Aron, 2016). Aligned with the self-expansion theory, studies on cross-race friendships and social competence have shown that children who have cross-race friends are perceived as having higher levels of self-confidence, relational inclusion, and leadership skills by peers and teachers than those who do not have cross-race friends (Kawabata & Crick, 2008; Lease & Blake, 2005).

There are two gaps in existing literature examining the association between cross-race friendships and psychological well-being. First, little is known regarding how changes in cross-race friendships and psychological well-being are associated with each other over time, which could provide important implications for practices. Asian American adolescents with more cross-race friends exhibit better psychological well-being, such as higher level of self-esteem (Liu et al., 2020). Yet, without examining the trajectories of cross-race friendships, it remains unclear how declines over time in cross-race friendships may be associated with self-esteem during adolescence. Given an overall linear increase in self-esteem during adolescence identified in prior studies using Add Health (Kort-Butler & Hagewen, 2011; Oshri, Carlson, Kwon, Zeichner,

& Wickrama, 2017), I expected that more declines in cross-race friendships were associated with fewer increases in self-esteem over time. Second, another limitation is the unknown direction of the association between cross-race friendships and psychological well-being. The association may be attributed to the influence from psychological adjustment to cross-race friendships or the reciprocal relationship between psychological well-being and cross-race friendships. Youth who are better adapted with fewer emotional difficulties or better emotion regulation skills may be better able at forming and maintaining friendships across groups (social-cognitive theory; Aboud & Levy, 2013). More psychologically adjusted youth may be better equipped to navigate potential stressors from having less typical friendships such as cross-race friendships. Although not studied specifically, existing research implies an association between racial/ethnic identity and friendship diversity. Adolescent boys' secure sense about their racial/ethnic identity motivates them to establish racially/ethnically diverse friendships because they feel self-confident in their social identity and less anxious when interacting with other groups (Rivas-Drake, Umaña-Taylor, Schaefer, & Medina, 2017). The current study explored how trajectories of cross-race friendships influence psychological well-being as well as the potential reciprocal relationship between cross-race friendships and psychological well-being.

Cross-Race Friendships and Academic Adjustment

With much scholarly attention has been paid to the association between cross-race friendships and intergroup attitudes, much less is known about its interrelationship with academic adjustment (Kawabata & Crick, 2008; Lease & Blake, 2005). According to social capital theory (Almedom, 2005), the bridging social capital (e.g., cross-race friendships) can be educational resources which add new ways of thinking and perspectives to the cultural resources within the group and stimulate the learning of different ways to approach a problem. There is

empirical evidence demonstrating that interactions, particularly friendships, with peers from different racial/ethnic groups are associated with cognitive growth (Antonio, Chang, Hakuta, Kenny, Levin, & Milem, 2004). In addition, cross-race friendships may provide a socializing environment where students feel comfortable in learning and school activities with peers from various backgrounds (Kawabata & Crick, 2015). In empirical research, cross-race friendships have been linked to better academic attitudes and stronger sense of school belonging and safety (Cardinali, Migliorini, Andrighetto, Rania, & Visintin, 2016; Kawabata & Crick, 2015; Munniksma & Juvonen, 2012; Newgent, Lee, & Daniel, 2007).

Although the associations between cross-race friendships and academic adjustment have been established, previous studies on mean-level associations are limited in drawing any conclusions regarding the association between changes in cross-race friendships and academic adjustment as well as the directionality of their interrelationship. Investigating associations using longitudinal data may provide additional information to help our understanding. Considering previous research on the general population identifying no change or a linear decline for school attachment and a linear decrease in GPA during adolescence (Neel & Fuligni, 2013; Wang & Eccles, 2011), I expected that sharper declines in cross-race friendships were associated with lower levels or/and sharper declines of school attachment and greater decreases in GPA over time. In addition, the association may be alternatively interpreted as the influence of academic adjustment on cross-race friendships or there may exist a reciprocal interrelationship between the two. African and European American youth with more externalizing behaviors tend to have greater decreases in cross-race friendships over time (Cappella et al., 2017). For Asian American youth specifically, they tend to nominate friends with relatively high level of similarity on academic orientations, and youth with higher achievement levels tend to have lower likelihood of

having cross-race friendships (Hamm, Bradford, & Heck., 2005). Therefore, this study investigated the association between changes in cross-race friendships and academic adjustment as well as the direction of the association between cross-race friendships and academic adjustment among Asian American adolescents.

The Present Study

The current study utilized the Asian American subsample of the national Add Health study to address three research questions. The first research question concerned how cross-race friendships change over time during adolescence for Asian American youth. I put forth the hypothesis that cross-race friendships declined with age during adolescence. The second research question explored how changes in cross-race friendships are associated with psychological well-being (i.e. self-esteem) and academic adjustment (i.e., school attachment, GPA). I expected that sharper declines in cross-race friendships were associated with slower increases in self-esteem, lower levels and/or sharper declines of school attachment, and greater decreases in GPA over time for Asian American adolescents. The third research question aimed to disentangle directionality in the association between cross-race friendships and psychological well-being (i.e. self-esteem) and academic adjustment (i.e., school attachment, GPA). It is possible that there is an influence of adjustment on cross-race friendships or a reciprocal relationship between them.

Methods

Participants

The current sample was drawn from the National Longitudinal Study for Adolescent to Adult Health (Add Health). Add Health used a multistage, stratified, cluster design to gather a sample of secondary schools ($N = 132$) that were nationally representative of institutions in the United States based on urbanicity, school type, school location, and racial/ethnic composition

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(Harris et al., 2009). Between September 1994 and April 1995 at in-school wave, almost all students in the selected schools participated in the study, which provides a sampling structure for later data collections. Based on the initial in-school wave, a nationally representative sample of students was selected into the core in-home sample. In the in-home sample, Chinese American students were oversampled according to the in-school wave data. The core in-home sample included five waves of data collection. Specifically, Wave 1 (between April and December 1995) enrolled adolescents ranging from grades 7 to 12. Wave 2 was conducted one year later (1996) with participants who were in Grade 12 at Wave 1 excluded. Wave 3 was conducted six years later (2001-02), Wave 4 was in 2008, and Wave 5 was in 2016-18.

The present study focuses on data collected at the in-school wave as the initial time measurement, Wave 1 as the second time measurement, and Wave 2 as the third time measurement. This study only used three waves of data because participants graduated from high school and peer nomination and academic adjustment data were no longer available in later waves. Among the 20,745 participants at Wave 1 in the core in-home sample, there were 1,467 Asian American participants. The present study selected 1,154 Asian American adolescents who participated both at the in-school wave and Wave 1 to ensure that every student had the initial time measurement. Compared with excluded participants ($N = 313$, 21.34%), students in the current sample were less likely to be Filipino [χ^2 (1) = 15.31, $p < .001$] and other Asians [χ^2 (1) = 4.41, $p < .05$]. They were also more likely to be from private/religious schools [χ^2 (1) = 10.97, $p < .01$] or schools in the Midwestern United States [χ^2 (1) = 5.70, $p < .05$] or Northeastern United States [χ^2 (1) = 24.79, $p < .001$]. For the analytic sample, I also compared adolescents who had complete data from all the three waves ($N = 777$, 67.33%) with those who had missing data at Wave 2 ($N = 377$, 32.67%). Compared with students who had missing data at Wave 2,

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those who had complete data were more likely to be Chinese [χ^2 (1) = 10.59, $p < .01$] and from

schools in the Midwestern United States [χ^2 (1) = 9.10, $p < .01$]. I observed no differences by

other demographic variables or the study variables from these analyses. The differential attrition

was addressed by including Asian ethnicity as a covariate in the models.

The final dataset included 1,154 Asian American adolescents (47% females) with age

ranging from 11.5 to 20.5 (Mean age = 15.61, SD = 1.65) at the in-school wave. The present

sample was ethnically diverse (41% Filipino, 29% Chinese, 8% Korean, 7% Japanese, 6%

Vietnamese, 2% Asian Indian, and 16% other Asians) and diverse in terms of generational status

(45% first generation, 40% second generation and 14% third generation). Participants reported

parental education (9% less than high school, 20% high school/GED, 15% some college, and

56% college or higher). The current sample came from schools with diverse characteristics in

terms of type (89% public and 11% private/religious), urbanicity (75% urban, 23% suburb, and

2% rural), region (66% West, 13% Midwest, 12% Northeast, and 9% South), size (24% below

1000 students, 27% between 1000 and 2000, 47% between 2000 and 3000, and 2% above 3000),

and racial representation of Asian American students at school (23% below 15%, 25% between

15% and 30%, 39% between 30% and 45%, and 14% above 45%).

Measures

Cross-race friendships. I used the social network data at the in-school wave, Wave 1,

and Wave 2 to create the cross-race friendship variable. At the in-school wave, respondents were

asked to nominate up to five female friends and five male friends, starting with their best friends,

whereas respondents at Wave 1 and Wave 2 were asked to name only two best friends (one

female and one male). To keep the creation of friendship variable consistent across waves, I only

examined the first best female and the first best male friend in each participant's network. I used

one-way nomination which excludes fewer subjects from analyses rather than reciprocated nomination considering both received and sent nominations (Henry, Schoeny, Deptula, & Slavick, 2007). In addition, the one-way nomination may provide more accurate information about the influence of friendships because it measures both the subjectively perceived friendships and actually existing friendships (Kiesner, Poulin, & Nicotra, 2003).

An objective measure of cross-race friendships was conducted by matching adolescents' nominated friends and friends' self-reported race/ethnicity based on the complete nomination information. A single race/ethnicity variable was constructed based on adolescents' self-reported racial/ethnic background on two questions, "Are you of Hispanic or Latino origin?" and "What is your race?" Each participant was classified into one of the following groups: Hispanic, Non-Hispanic Black, Non-Hispanic Asian, Non-Hispanic White Americans and other racial/ethnic groups. If both members of the pair were from different racial/ethnic backgrounds, I categorized their friendship as cross-race. The variable of cross-race friendships was created by calculating the proportion of cross-race friends in each participant's network of best friendships (one best female friend and one best male friend). The proportion of cross-race friendships was used because it takes into account the total number of nominated friends for each participant. Using the Add Health data, Kao and Joyner (2004) finds that the likelihood for a best friend to be cross-race is lower than that for a lower-ranked friend and the likelihood for the individual to shares activities with a best friend is higher than with a lower-ranked friend.

Self-esteem. At the in-school wave, Wave 1, and Wave 2, self-esteem was constructed as a composite variable, i.e., the mean of four items adapted from the Rosenberg's (1965) measure of general self-esteem, including "You have a lot of good qualities," "You have a lot to be proud of," "You like yourself just the way you are," and "You feel like you are doing everything just

about right." Responses were rated on a 5-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. In a previous study on all racial/ethnic groups of Add Health, the measure is reported as having good reliability (α = .85), negative association with depressive symptoms and positive association with academic adjustment (Bankston & Zhou, 2002). In the current sample, the internal consistency for self-esteem was good across waves (α = .80 at In-school Wave, α = .81 at Wave 1, and α = .81 at Wave 2).

School attachment. At in-school wave, Wave 1, and Wave 2, school attachment was measured based on the extent to which participants agreed on the following three items, i.e., "I feel like I am part of this school," "I feel close to people at my school," and "I am happy to be at this school" (Johnson, Crosnoe, & Elder, 2001; Moody & White, 2003). The response scale ranged from 0 = *strongly agree* to 4 = *strongly disagree*. These items were reverse coded such that higher values indicated higher levels of school attachment. Scores across the three items were averaged to get the variable of school attachment. This measure has demonstrated good reliability (α = .78 - .79) in previous studies using Add Health (e.g., Benner Crosnoe, & Eccles, 2014; Ueno, 2009). Previous research using Add Health data also shows that this measure is positively associated with GPA, self-esteem and negatively associated with depressive symptoms (Johnson et al., 2001; Joyce & Early, 2014; Markowitz, 2017). In the current sample, the internal consistency for school attachment was good (α = .75 - .78 across the three waves).

GPA. At in-school wave, Wave 1, and Wave 2, participants were asked to report their grades from the most recent grading period in English/Language Arts, Mathematics, History/Social Studies, and Science. Responses to each item were coded as 1 = *D or lower*, 2 = *C*, 3 = *B*, and 4 = *A*. These four items were averaged to create a grade point average (i.e., GPA) measure. Higher scores indicate greater academic achievement. Due to self-report, the measure is

inevitably subject to reporting bias, which results in inflated grade information than actual grades, especially for students with lower actual grades (Schwartz & Beaver, 2015). However, the relative ranking of racial/ethnic groups on self-reported GPA from Add Health is similar to the relative ranking of these groups on other educational measures such as national reading tests, the Scholastic Assessment Test (SAT), and the American College Test (ACT; Bankston & Zhou, 2002). In addition, several prior studies have indicated significant positive strong correlations between self-reported grades and school-reported grades (Bogenschneider, 1997; Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). This measure has been used in prior studies using either the Asian American sample or the general sample from Add Health (Benner et al., 2014; Choi, 2007; Ryabov, 2013). Higher scores in GPA predict more problem behaviors (e.g., sexual, smoking and drinking behaviors) among adolescents (Choi, 2007). The probability of having same-race peers based on school racial/ethnic composition is positively associated with the measure of GPA for Asian American sample in Add Health (Ryabov, 2013).

Covariates. Adolescents' gender, parental education, immigrant status and sub-Asian ethnicity were created based on student reports. Adolescents reported highest level of education of their parents on a 10-point scale. The variable of parental education was then created to represent the highest level of parental education on a 4-point scale from 1 (*less than high school*) to 4 (*college or higher*). For immigration status, student reported whether students themselves, their resident/non-resident biological mother, and their resident/non-resident biological father were born in the United States. Three binary immigration status variables were constructed, including first generation if students were born outside the United States, second generation if students were born in the United States but had at least one foreign-born parent, and third generation if both students and parents were born in the United States. For ethnicity, Asian

American adolescents self-identified their ethnic background (i.e., Chinese, Filipino, Japanese, Asian Indian, Korean, Vietnamese, and other).

Data Analytic Strategy

Structural equation modeling (SEM) was built in M*plus* 8.1 (Muthen & Muthen, 1998-2017) with full information maximum likelihood estimation to handle missing data using all available information (Enders, 2011; Enders & Bandalos, 2001). The latent growth curve models (LCMs) allow for testing intra-individual trajectories over time for repeated measures (McArdle & Epstein, 1987), while autoregressive models use regressions of the construct on its prior wave to account for time-specific variations (Little & Card, 2013). This study used autoregressive latent trajectory (ALT) models, a hybrid of LCMs and autoregressive models, to specify the developmental processes by taking into account both individual-specific random components and time-specific lagged effects (Bollen & Curran, 2004). As seen in Figure 3.1, ALT models include an across-time component that estimates rates of change in cross-race friendships and adjustment over time and the correlation between trajectories of cross-race friendships and adjustment. In addition, ALT models also have a wave-specific component that assesses the possible direction of the correlation between cross-race friendships and adjustment in specific waves, while controlling for individual trajectories and prior levels of development. Thus, ALT models allow for the investigation of the interrelations between cross-race friendship and adjustment at both the latent trajectory and time-specific levels. The clustering command in M*plus* was used to account for the dependency of students nested within schools. Unstandardized coefficients are reported.

Due to the age range from 11.5 to 20.5 for participants enrolled at in-school wave, I used the definition variable approach to scale the slope in age rather than wave of measurement

(Grimm, Ram, & Estabrook, 2017; Sterba, 2014). Thus, I fit age-based linear trajectory models with the intercepts centered such that the intercept reflects the predicted average score of cross-race friendships and adjustment at age 11.5. Since the measurement occasions vary individually when the definition variable approach is used, the program only produces likelihood-based fit statistics, including -2 log likelihood (-2LL), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC; Grimm et al., 2017). Lower AIC and BIC values indicate a better model. To compare two nested models using maximum likelihood estimation with robust standard errors to account for the non-normal distribution of the data, I conducted the Satorra-Bentler scaled χ^2 difference (S-B$\Delta\chi^2$) test in which the normal-theory chi-square statistic is divided by a scaling correction to improve the chi-square approximation (Satorra & Bentler, 2010). The S-B$\Delta\chi^2$ test sometimes may fail to produce a positive scaling correction value, which further results in an uninterpretable negative chi-square difference test. Under this situation, an alternative approach provided by Bryant and Satorra (2012) was taken to calculate an improved scaling correction value, which can assure a positive chi-square value for model comparison test.

I first examined how the trajectories of cross-race friendships and psychological and academic adjustment changed over time during adolescence. Univariate unconditional LCMs, autoregressive models, and ALT models were estimated separately for each growth process (cross-race friendships, self-esteem, school attachment, and GPA). I followed the suggestion of Bollen and Curran (2004, 2006) and the report by Morin, Maïano, Marsh, Janosz, and Nagengast (2011) and tested if the ALT models were the best-fitting model. To compare the LCMs and ALT models, I specified LCMs to be nested within ALT models by fixing autoregressive and cross-lagged parameters to zero. For autoregressive models, a nested likelihood ratio test cannot be performed to compare it with other models, so its model fit was evaluated individually using

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χ^2 likelihood ratio test, root mean square error of approximation (RMSEA), comparative fit index (CFI), and Tucker-Lewis index (TLI). CFI and TLI > .90 and RMSEA < .08 separately indicate acceptable model fit (Bentler, 1990; Hu & Bentler, 1999). Because these univariate unconditional models revealed similar results to the multivariate unconditional models, the results are presented in the table section but not interpreted in the result section.

I then tested how cross-race friendships were associated with psychological and academic adjustment in separate models. Multivariate unconditional LCMs, autoregressive models, and ALT models were estimated separately for cross-race friendships with each adjustment. To test the second research question on how changes in cross-race friendships and adjustment were associated, the multivariate LCMs included correlations between the intercept and slope factors of both constructs. To test the third research question on the direction of the associations between cross-race friendships and adjustment, in the multivariate ALT models, cross-lagged regression parameters were added going from one construct to the other. The three multivariate models were compared to determine which one provided the most complete and parsimonious representation of the data. Furthermore, additional constraints were added in a stepwise fashion to the ALT models to ensure that the final model was the most parsimonious: a) Fixing the slope variance to zero, b) excluding the slope factor, c) excluding the time-specific uniquenesses' correlations, d) constraining the time-specific uniquenesses' correlations to equality, e) constraining the autoregressive parameters to equality across time, and f) constraining the cross-lagged paths within the same direction to be equal across time (Bollen & Curran, 2004, 2006). The steps a), b), and e) were added on one construct (cross-race friendships or adjustment) at a time. More specifically, for the step f) to determine the direction of effect, I first constrained cross-lagged paths from T1 friendships to T2 adjustment and from T2 friendships to T3

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adjustment to be equal, and then I fixed cross-lagged paths from T1 adjustment to T2 friendships and from T2 adjustment to T3 friendships to be the same.

Finally, the covariates were added to the final selected model by regressing on the intercept and slope factors of both constructs (cross-race friendships and adjustment). I controlled for gender, immigrant status, and Asian ethnicity as binary time-invariant variables and parental education as a continuous variable that was grand-mean-centered. Previous studies indicate the importance of these covariates for cross-race friendships. Male adolescents are more likely to make friends with cross-race peers than their female counterparts (Graham, Cohen, Zbikowski, & Secrist, 1998; Way & Chen, 2000; Way & Greene, 2006). Adolescents with parents of higher educational levels are more likely to have cross-race friendships (Kao & Joyner, 2006). Prior work also observes a positive association between generational status and the likelihood of making cross-race friends for Asian American youth (Hamm et al., 2005; Kao & Joyner, 2006; Ying et al., 2001). The odds of making cross-race friends differ by ethnicities within the Asian pan-ethnic group, possibly due to various cultural distances from Western countries (Chen & Graham, 2015). In the next section, results are presented in the order of self-esteem followed by school attachment and then GPA.

Results

Sample Description

Descriptive statistics, sample size, and bivariate correlations between primary study variables over time are reported in Table 3.1. Repeated measures of each construct (i.e., cross-race friendships, self-esteem, school attachment, and GPA) were correlated over time. Means of each construct were relatively stable over time. Repeated measures of cross-race friendships and

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self-esteem and school attachment were not correlated across waves. In addition, T1 cross-race friendships had a weak and negative association with T1 GPA.

Cross-Race Friendships and Self-Esteem

Unconditional univariate model. Model fits and model comparisons from the three sets of unconditional univariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 6) for cross-race friendships and self-esteem are shown in Table 3.2 (respectively in cross-race friendships rows and self-esteem rows). With the exemption of fixed regressions (Models 6 both for self-esteem and cross-race friendships), similar results were observed for unconditional univariate and multivariate models separately for self-esteem and cross-race friendships, so the univariate models are not presented in detail. In univariate models, autoregressions cannot be fixed to equality for self-esteem and cross-race friendships. Specifically, for self-esteem, the autoregressions between adjacent time points were observed to increase over time ($b = .04$, $SE = .004$, $p < .001$ for T1 predicting T2; $b = .06$, $SE = .01$, $p < .001$ for T2 predicting T3). For cross-race friendships, the autoregressions between adjacent time points were also observed to increase over time ($b = .07$, $SE = .02$, $p < .01$ for T1 predicting T2; $b = .14$, $SE = .05$, $p < .01$ for T2 predicting T3).

Unconditional multivariate model. Model fits and model comparisons from the three sets of unconditional multivariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 12) for cross-race friendships and self-esteem are shown in Table 3.3. The results revealed that the autoregressive model (Model 1) did not provide a satisfactory fit to the data and the ALT model (Model 2) was superior to the autoregressive model according to AICs and BICs. Additionally, the ALT model

provided a significant improvement in model fit over the nested ALT-LCM (Model 3) based on the S-B$\Delta\chi^2$ statistics.

Models 4, 5 and Models 6, 7 represent the ALT models with modifications on slope variances and slopes respectively for self-esteem and cross-race friendships. Specifically, the results showed that it was necessary to exclude the slope factor for self-esteem because including it resulted in linear dependency for the latent factors (Model 5). The estimated parameters revealed that the average levels of self-esteem for Asian American adolescents had an initial mean value of 3.75 at age 11.5 ($SE = .02$, $p < .001$), and there was significant inter-individual variability in the levels of self-esteem ($b = .24$, $SE = .01$, $p < .001$). Concerning cross-race friendships, the slope factor for cross-race friendships should not be removed because it significantly changed the overall fit of the model (Model 7), which suggests that cross-race friendships of Asian American adolescents changed over time. The estimated parameters showed that the average levels of cross-race friendships for Asian American adolescents were .60 at age 11.5 ($SE = .07$, $p < .001$), and there was significant inter-individual variability in the levels of cross-race friendships ($b = .19$, $SE = .06$, $p < .01$). Cross-race friendships declined slightly with age ($b = -.05$, $SE = .02$, $p < .01$), but the rate of intra-individual decrease was common to all Asian American adolescents (i.e., the slope variance is $b = .002$, $SE = .002$, $p = .23$). The association between the intercept factor and slope factor for cross-race friendships was not significant ($b = -.01$, $SE = .01$, $p = .23$).

Models 8 to 12 respectively test time-specific uniqueness correlations between cross-race friendships and self-esteem, fixed autoregressions separately for self-esteem and cross-race friendships, and fixed cross-lagged regressions. More specifically, the time-specific covariances between the uniquenesses of cross-race friendships and self-esteem can be removed without

significantly changing the overall fit of the model (Model 8). The equality constraints can be imposed on the autoregressive parameters for self-esteem (Model 9) and cross-race friendships (Model 10), which indicates that the ability of self-esteem and cross-race friendships predicting later levels of their own remained stable during adolescence ($b = .04$, $SE = .01$, $p < .001$ for self-esteem; $b = .08$, $SE = .03$, $p < .05$ for cross-race friendships). The cross-lagged regressions of self-esteem on cross-race friendships cannot be constrained to equality over time (Model 11), but the cross-lagged regressions of cross-race friendships on self-esteem were necessary to be constrained to equality over time (Model 12).

Conditional multivariate model. The parameter estimates from the final ALT model (Model 12) for the association between cross-race friendships and self-esteem conditional on covariates are presented in Table 3.6 (first column). Specifically, no significant correlations were observed between intercept factors of self-esteem and cross-race friendships ($b = .01$, $SE = .02$, $p = .68$) and between intercept factor of self-esteem and slope factor of cross-race friendships ($b = -.004$, $SE = .01$, $p = .42$). For cross-lagged associations, T2 cross-race friendships predicted T3 self-esteem ($b = .15$, $SE = .06$, $p < .01$), but T1 cross-race friendships did not predict T2 self-esteem ($b = .05$, $SE = .05$, $p = .37$). Self-esteem did not significantly predict later cross-race friendships at any waves ($b = -.002$, $SE = .003$, $p = .50$). The findings provided some support for more cross-race friendships predicting later higher self-esteem but not vice versa.

Cross-Race Friendships and School Attachment

Unconditional univariate model. Model fits and model comparisons from the three sets of unconditional univariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 6) for school attachment are shown in Table 3.2 (see school attachment rows). Similar results were observed for

unconditional univariate and multivariate models separately for school attachment, so the univariate model is not presented in detail.

     Unconditional multivariate model. Model fits and model comparisons from the three sets of unconditional multivariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 12) for cross-race friendships and school attachment are shown in Table 3.4. The results demonstrated that the autoregressive model (Model 1) did not provide a satisfactory fit to the data, and the ALT model (Model 2) provided a better fit to the data over the autoregressive model according to AICs and BICs. In addition, the model fit of ALT model was improved over that of the nested ALT-LCM (Model 3) based on the S-B$\Delta\chi^2$ statistics.

     Models 4, 5 as well as Models 6, 7 represent the ALT models with modifications on slope variances and slopes respectively for school attachment and cross-race friendships. Specifically, the results showed that the slope factor of self-esteem can be removed without significantly changing the overall fit of the model (Model 5), which suggests that school attachment was intra-individually stable during adolescence. The estimated parameters revealed that the average levels of school attachment for Asian American adolescents had a mean value of 3.61 at age 11.5 (*SE* = .03, $p < .001$), and there was significant inter-individual variability in the levels of school attachment ($b = .25$, *SE* = .02, $p < .001$). Concerning cross-race friendships, parameter estimates were similar to those in models for cross-race friendships and self-esteem.

     Models 8 to 12 respectively test time-specific uniqueness correlations between cross-race friendships and school attachment, fixed autoregressions for school attachment and cross-race friendships, as well as fixed cross-lagged regressions. More specifically, the time-specific covariances between the uniquenesses of cross-race friendships and school attachment were not

necessary to include because the inclusion did not significantly change the overall fit of the model (Model 8). The equality constraints can be imposed on the autoregressive parameters for school attachment (Model 9) and cross-race friendships (Model 10), which indicates that the ability of school attachment and cross-race friendships predicting later levels of their own remained stable during adolescence ($b = .05$, $SE = .01$, $p < .001$ for school attachment; $b = .08$, $SE = .03$, $p < .05$ for cross-race friendships). Both the cross-lagged regressions of school attachment on cross-race friendships (Model 11) and the cross-lagged regressions of cross-race friendships on school attachment (Model 12) can be constrained to equality over time.

       Conditional multivariate model. The parameter estimates from the final ALT model (Model 12) for the association between cross-race friendships and school attachment conditional on covariates are presented in Table 3.6 (second column). Specifically, no significant correlation was observed between intercept factors of school attachment and cross-race friendships ($b = .04$, $SE = .02$, $p = .11$). However, the intercept factor of school attachment was negatively associated with the slope factor of cross-race friendships ($b = -.01$, $SE = .004$, $p < .05$). For cross-lagged correlations, no significant associations emerged for both paths from cross-race friendships to later school attachment ($b = -.01$, $SE = .07$, $p = .88$) and from school attachment to later cross-race friendships ($b = -.002$, $SE = .003$, $p = .65$).

Cross-Race Friendships and GPA

       Unconditional univariate model. Model fits and model comparisons from the three sets of unconditional univariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 6) for GPA are shown in Table 3.2 (see GPA rows). Similar results were observed for unconditional univariate and multivariate models separately for GPA, so the univariate model is not presented in detail.

Unconditional multivariate model. Model fits and model comparisons from the three sets of unconditional multivariate models (i.e., LCMs, an autoregressive model, and ALT models) and ALT models with modifications in stepwise fashion (Models 4 to 12) for cross-race friendships and GPA are shown in Table 3.5. The results showed that the autoregressive model (Model 1) did not provide an adequate fit to the data based on fit indices, and the ALT model (Model 2) was superior to the autoregressive model according to AICs and BICs. In addition, the ALT model fit the data better than the nested ALT-LCM (Model 3) based on the S-B$\Delta\chi^2$ statistics.

Models 4, 5 as well as Models 6, 7 represent the ALT models with modifications on slope variances and slopes respectively for GPA and cross-race friendships. Specifically, the results revealed that the slope factor of GPA was necessary to model because it significantly improved the overall mode fit (Model 5). Based on the estimated parameters for the mean and variances of the intercept factor, the average Asian American adolescent had a score of 3.32 at age 11.5 (*SE* = .10, *p* < .001), and there was significant inter-individual variation in the levels of GPA (*b* = .71, *SE* = .15, *p* < .001). The estimated parameters for the slope factor indicated that the GPA for the average Asian American adolescent decreased .06 per year (*SE* = .02, *p* < .01), and there was significant inter-individual variability in the slopes of GPA (*b* = .01, *SE* = .01, *p* < .05), which indicates that Asian American adolescents differed in the annual change of GPA. In addition, the intercept and slope of GPA were significantly correlated (*b* = -.07, *SE* = .03, *p* < .05), suggesting that higher GPA at age 11.5 was associated with more annual declines in GPA for Asian American adolescents. In terms of cross-race friendships, similar parameter estimates were observed with those in models for cross-race friendships and self-esteem.

Models 8 to 12 respectively test time-specific uniqueness correlations between cross-race friendships and GPA, fixed autoregressions for GPA and cross-race friendships, and fixed cross-lagged regressions. More specifically, the time-specific covariances between the uniquenesses of cross-race friendships and school attachment can be removed without significantly changing the model fit (Model 8). The equality constraints cannot be imposed on the autoregressive parameters of GPA (Model 9; $b = -.01$, $SE = .01$, $p = .69$ for T1 predicting T2; $b = .02$, $SE = .01$, $p = .22$ for T2 predicting T3). However, the autoregressive parameters of cross-race friendships can be constrained equal (Model 10; $b = .08$, $SE = .03$, $p < .01$). Both the cross-lagged regressions of GPA on cross-race friendships (Model 11) and the cross-lagged regressions of cross-race friendships on GPA (Model 12) can be constrained to equality over time.

Conditional multivariate model. The parameter estimates from the final ALT model (Model 12) for the association between cross-race friendships and GPA conditional on covariates are presented in Table 3.6 (third column). Specifically, no significant correlations were observed between intercept factors of GPA and cross-race friendships ($b = -.01$, $SE = .03$, $p = .82$), between the intercept factor of GPA and the slope factor of cross-race friendships ($b = -.01$, $SE = .01$, $p = .15$), as well as between the slope factor of GPA and the intercept factor of cross-race friendships ($b = -.01$, $SE = .01$, $p = .28$). However, the slope factor of GPA was positively associated with the slope factor of cross-race friendships ($b = .003$, $SE = .001$, $p < .05$). For cross-lagged paths, I observed no significant predictions from cross-race friendships to later GPA ($b = -.03$, $SE = .04$, $p = .48$) and from GPA to later cross-race friendships ($b = .00$, $SE = .004$, $p = .99$).

Discussion

Previous studies have primarily focused on the patterns of cross-race friendships during childhood and the benefits of cross-race friendships on racial/ethnic attitudes or development and social adjustment. However, much less is known about how cross-race friendships change over time during adolescence. In addition, less attention has been paid to how changes in cross-race friendships are associated with psychological well-being and academic adjustment as well as how cross-race friendships affect well-being and adjustment bidirectionally. Guided by the contact-in-context model (Yip et al., 2019), the present study using a longitudinal sample identified an overall linear decline in cross-race friendships with age among Asian American adolescents. Cross-race friendships positively influenced later self-esteem, but not the other way around. Higher levels of school attachment at age 11.5 predicted greater decrease in cross-race friendships, and declines in cross-race friendships were accompanied by decreases in GPA during adolescence.

Longitudinal Patterns of Adolescents' Cross-Race Friendships

The present study used three waves of data on adolescents' cross-race best friendships and examined the developmental trajectories of cross-race friendships during adolescence. A slope factor was identified to describe Asian American adolescents' trajectories of cross-race friendships over time. As hypothesized, cross-race friendships declined with age from early to late adolescence. This finding confirmed prior cross-sectional studies, indicating that children of younger ages or from lower grade levels have fewer cross-race friendships than those of older ages or from higher grade levels (Graham & Cohen, 1997; Hallinan & Teixeira, 1987). The decrease in cross-race friendships may suggest that racial/ethnic homophily in friendships increases over adolescence, as adolescents begin to understand the shared experiences of their

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own racial/ethnic group and the differences by racial/ethnic group memberships (Syed & Azmitia, 2008). The finding may also suggest that adolescents become less dependent on peers in developing their racial/ethnic identities (Umaña-Taylor et al., 2014). In addition, the present study also revealed that the time-specific deviations in cross-race friendships were also predictive of subsequent deviations in cross-race friendships during adolescence (e.g., declines in T1 cross-race friendships predicted declines in T2 cross-race friendships) and the predictive ability increased over time. This finding was aligned with McGill et al. (2012) indicating that adolescent cross-race best friendships are stable over time. It is noteworthy that the present study observed no variability in the changes of cross-race friendships for Asian American adolescents. The changes of cross-race friendships may be constraint by its measure which used only two best friends (one female friend and one male best friend) in one's peer network. Future work with three-wave data of cross-race general friendships could explore the changes in cross-race general friendships over time and group differences in the changes of cross-race general friendships.

Cross-Race Friendships and Psychological Well-Being

The present study also contributes to our understanding of the directionality in interrelations between cross-race friendship and psychological well-being at the time-specific level. Although the underlying trajectory processes of cross-race friendships and self-esteem were not related, the time-specific variations in cross-race friendships positively predicted later time-specific variations in self-esteem, which is consistent with previous studies (Lease & Blake, 2005; Liu et al., 2020). The findings also highlighted that the temporal directionality of the effects went only from cross-race friendships to self-esteem rather than the other way around. These findings confirm the hypothesis on friendships affecting psychological well-being and contradicts the hypothesis on psychological well-being affecting friendships as well as the

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reciprocal hypothesis. Given global self-esteem which was used in the present study represents the way individuals think about themselves as a whole (Brown, Dutton, & Cook, 2001), it could be informative for future research to study self-confidence specifically in the social domain as a potential psychological predictor for cross-race friendships. It is worth noting that the effect was not stable across time, only significant for T2 predicting T3, which provided partial support for my hypothesis. The inconsistent cross-lag effects may be due to the longer time interval between T2 and T3 than the interval between T1 and T2.

Moreover, given that a slope factor cannot be included in the model of self-esteem, the present study found that self-esteem was stable during adolescence, which is aligned with some previous studies suggesting the developmental stability of self-esteem (Young & Mroczeck, 2003). However, the autoregressions between adjacent time points for self-esteem were significant and increasing over time, which indicated the impact of time-specific deviations from the overall trajectories on the model. The neglect of autoregressive influences may account for the discrepant results regarding self-esteem trajectories in prior research (e.g., increasing self-esteem identified in Greene & Way, 2005).

Cross-Race Friendships and Academic Adjustment

The present study also contributes to the clarification of directionality in association between cross-race friendships and school attachment through their latent trajectories. School attachment at age 11.5 was negatively related to rate of declines in cross-race friendships. The present study observed that school attachment was more likely to be a conditioner predicting cross-race friendships rather than an outcome predicted by cross-race friendships. It is worth mentioning that the effect of school attachment was fairly weak. Adolescents who felt more attached to the school at age 11.5 tended to have slightly higher rates of decline in cross-race

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friendships (i.e., slightly higher rates of increase in same-race friendships) during adolescence. This finding is aligned with a prior study using Asian American subsample of Add Health which suggests that friendship preference for same-race peers is positively linked to academic achievement of Asian American adolescents, after controlling for school racial/ethnic composition (Ryabov, 2013). One possible explanation for this finding is that given strong sense of belonging at school (i.e., youth's perceived fit between them and school context), youth may not have to build out-group friendships which involve more efforts to embrace cultural differences in order to address the dissonance between them and school context. Future work is needed to replicate the current finding for cross-race friendships in general, not just for cross-race best friendships as in the present study.

In terms of GPA, the present study extended prior studies on mean-level associations to the observation of parallel processes over time between cross-race friendships and GPA for Asian American adolescents. Although fewer cross-race friendships at age 11.5 were not associated with decreases over time in GPA, more decreases in cross-race friendships were accompanied by more declines in GPA over time. In addition, given the non-significant cross-lag effects, it would be legitimate to say that the association between cross-race friendships and GPA was primarily due to covariations rather than to the influence of one variable over the other. These findings were inconsistent with all of my hypotheses with respect to directionality. The simultaneous changes over time in GPA and cross-race friendships may indicate another developmental factor that influences changes in the two constructs. For example, friendship instability (i.e., the number of friendship losses and gains) may be a third factor which affects both cross-race best friendships and academic achievement for adolescents (Lessard & Juvonen,

2018). Future research can continue exploring the third variable(s) that contribute(s) to the covariations of GPA and cross-race friendships.

Study Limitations and Implications

There are limitations of the present study that warrant noting. First, because Add Health collected only one wave (i.e., in-school wave) of social network data with 10-friend nomination for the full sample, I was only able to examine the cross-race best friendships (i.e., one female best friend and one male best friend) across three waves. The cross-race friendships from general network may display more decreases over time than cross-race best friendships, because more time is committed to best friendships than other general friendships. In addition, cross-race best friendships are limited in the range of changes (i.e., 0 to 2) relative to cross-race friendships from general network, it may explain the lack of inter-individual variability in the changes of these best friendships, which further resulted in the weak associations between the slopes of cross-race best friendships and the intercepts and slopes of adjustment. Future studies with multiple assessments of cross-race friendships from general network will be informative in investigating group differences in the trajectories of cross-race friendships and understanding parallel processes over time or reciprocal associations between cross-race friendships in general network and adjustment.

Moreover, the present study only used one construct (i.e., self-esteem) to represent psychological well-being, since other psychological measures (e.g., depressive symptoms) in Add Health have inconsistent assessment items and responses across the three waves. Adolescents with more cross-race friendships tend to have less perceived vulnerability and fewer depressive symptoms (Graham et al., 2014; Liu et al., 2020). Better-adapted youth who have fewer emotional difficulties or better emotion regulation skills may do better in forming and

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maintaining friendships across groups (Aboud & Levy, 2013). Future research is needed to understand the associations between other constructs in psychological domain and cross-race friendships and disentangle the directionality in these associations.

In conclusion, the current study identified an overall decline of cross-race friendships over adolescence among Asian American youth. The finding provides insights into Asian American youth's social adjustment over time by focusing on adolescence when peer relationships become salient and influential and by utilizing longitudinal methodology which enables discovery of individual growth curve. Moreover, the current study is informative in disentangling directionality in associations between cross-race friendships and adjustment of Asian American youth. Cross-race friendships were associated with psychological well-being at the time-specific level, whereas associating with academic adjustment at the latent trajectory level. Specifically, more cross-race friendships predicted later higher levels of self-esteem, not vice versa. For academic adjustment, the present study underscores school attachment as a predictor for increases in same-race friendships as well as parallel declines over time in cross-race friendships and GPA. This finding confirms the importance of cross-race friendships as a malleable mechanism for interventions intended to facilitate psychological adaptation of Asian American adolescents. Future research should continue to explore the associations between adolescents' cross-race friendships and academic adjustment.

CHAPTER 4. CONCLUSION

Conclusion to the Dissertation

The present studies found that cross-race friendships declined with age and perception of peer prejudice at school increased with age during adolescence for Asian American youth. These findings add to the literature on Asian Americans' developmental trajectories by focusing on adolescence when peer relationships become salient and influential as well as by utilizing longitudinal methodology which enables discovery of Asian American youth's growth curve. In addition, the present studies contribute to our understanding of the longitudinal associations between cross-race friendships and social well-being (Study 1) as well as psychological and academic adjustment (Study 2) among Asian American adolescents. Findings indicated that cross-race friendships were associated with weaker perception of peer prejudice and higher levels of self-esteem. In particular, Study 1 showed that quantity of cross-race friendships had an instant but short effect, and quality of cross-race friendships exerted a delayed but long-term influence over how Asian Americans adolescents perceive peer prejudice at school. Similar findings were observed for friendships with other non-White peers (but not for friendships with the White peers or cross-ethnic friendships). The importance of promoting cross-race friendships with non-White groups was highlighted as promoting social adjustment for Asian American adolescents. Finally, Study 2 is informative in disentangling directionality in associations between cross-race friendships and psychological and academic adjustment for Asian American youth. Cross-race friendships were associated with psychological well-being at the time-specific level, whereas the association with academic adjustment was at the latent trajectory level. Specifically, higher proportion of cross-race friendships in one's network predicted later higher levels of self-esteem, not vice versa. For academic adjustment, higher levels of school

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attachment at age 11.5 were related to greater decreases in cross-race friendships, and declines in cross-race friendships were accompanied by decreases in GPA during adolescence.

APPENDICES

APPENDIX A: Chapter 2 Tables

Table 2.1. Study 1 Correlations, Means, and Standard Deviations for Primary Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Cross-Race Friendships	-										
2. Quality of Cross-Race Friendships	.49***	-									
3. Cross-Ethnic Friendships	.78***	.41***	-								
4. Quality of Cross-Ethnic Friendships	.32***	.81***	.41***	-							
5. Friendships with Whites	.71***	.30***	.55***	.20***	-						
6. Quality of Friendships with Whites	.51***	.57***	.42***	.48***	.65***	-					
7. Friendships with Non-Whites	.59***	.35***	.46***	.21***	-.15***	-.02	-				
8. Quality of Friendships with Non-Whites	.32***	.78***	.26***	.62***	-.04	.14***	.49***	-			
9. T1 perceived prejudice	.10**	.07	.09**	.08*	.14***	.09**	-.02	.04	-		
10. T2 perceived prejudice	.05	.06	.04	.06	.06	.08*	.004	.01	.42***	-	
11. T3 perceived prejudice	-.01	.01	-.05	.01	.02	.02	-.03	-.01	.29***	.42***	-
Valid N	915	915	857	857	915	915	915	915	833	900	597
Mean	0.39	0.99	0.56	1.21	0.19	0.50	0.20	0.76	3.03	2.96	3.09
SD	0.39	1.26	0.42	1.27	0.32	1.02	0.28	1.24	1.01	1.08	1.00
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
Maximum	1.00	5.00	1.00	5.00	1.00	5.00	1.00	5.00	5.00	5.00	5.00

Note. T1 = in-school wave; T2 = Wave 1; T3 = Wave 2. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2.2. Unstandardized Estimates for Associations among Cross-Race Friendships and Trajectories of Perceived Prejudice.

Parameters	Cross-Race Friendships			Cross-Ethnic Friendships			Cross-Race Friendships with Whites			Cross-Race Friendships with Non-Whites		
	b	(SE)	p	b	(SE)	p	b	(SE)	p	b	(SE)	p
Level factor mean	3.18	(.35)	<.001	2.98	(.35)	<.001	3.07	(.34)	<.001	3.03	(.32)	<.001
Slope factor mean	-.04	(.08)	.61	-.01	(.09)	.90	-.02	(.08)	.84	-.001	(.08)	.99
Level factor residual variance	.69	(.12)	<.001	.59	(.15)	<.001	.71	(.14)	<.001	.64	(.11)	<.001
Slope factor residual variance	.01	(.01)	<.05	.01	(.01)	.17	.01	(.01)	<.05	.01	(.01)	.07
Level, slope covariance	-.07	(.03)	<.05	-.05	(.03)	.13	-.07	(.03)	<.05	-.06	(.03)	<.05
CRF quant → level factor	**-.48**	**(.20)**	**<.05**	**-.37**	**(.23)**	**.11**	**-.03**	**(.30)**	**.90**	**-.64**	**(.26)**	**<.05**
CRF quant → slope factor	**.14**	**(.05)**	**<.01**	**.10**	**(.05)**	**<.05**	**.04**	**(.07)**	**.53**	**.15**	**(.05)**	**<.01**
CRF qual → level factor	**.13**	**(.07)**	**.05**	**.13**	**(.08)**	**.12**	**-.03**	**(.10)**	**.77**	**.19**	**(.09)**	**<.05**
CRF qual → slope factor	**-.03**	**(.01)**	**<.05**	**-.02**	**(.02)**	**.15**	**.02**	**(.02)**	**.47**	**-.04**	**(.02)**	**<.05**
Female → level factor	.31	(.17)	.07	.35	(.18)	<.05	.31	(.17)	.06	.28	(.17)	.10
Female → slope factor	-.06	(.03)	.06	-.07	(.03)	<.05	-.06	(.03)	<.05	-.06	(.03)	.09
Parental education → level factor	-.01	(.07)	.87	-.03	(.06)	.68	-.01	(.07)	.89	-.03	(.07)	.69
Parental education → slope factor	.002	(.01)	.87	.01	(.01)	.71	-.001	(.01)	.94	.01	(.01)	.59
1st generation → level factor	-.58	(.25)	<.05	-.56	(.27)	<.05	-.61	(.25)	<.05	-.49	(.25)	<.05
1st generation → slope factor	.16	(.06)	<.01	.17	(.07)	<.01	.16	(.06)	<.01	.14	(.05)	<.05
2nd generation → level factor	-.19	(.20)	.36	-.18	(.22)	.43	-.21	(.20)	.29	-.17	(.19)	.37
2nd generation → slope factor	.08	(.05)	.11	.09	(.06)	.12	.09	(.05)	.10	.08	(.05)	.11
Racial representation → slope factor	-.39	(.21)	.06	-.28	(.19)	.14	-.24	(.23)	.29	-.24	(.18)	.18
Racial representation → slope factor	.05	(.05)	.33	.02	(.05)	.71	.02	(.05)	.72	-.003	(.04)	.94

Note. Bolded coefficient estimates were the primary interests of the present study. Coefficient estimates for each ethnic group (Chinese, Japanese, Indian, Korean, Vietnamese, and Other Asians; Filipino Asians as the reference group) were not reported here to save space. b = Unstandardized Estimates. CRF = cross-race friendship.

APPENDIX B: Chapter 3 Tables

Table 3.1. Study 2 Correlations, Means, and Standard Deviations for Primary Study Variables.

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. T1 Cross-Race Friendships	-											
2. T2 Cross-Race Friendships	.69***	-										
3. T3 Cross-Race Friendships	.60***	.75***	-									
4. T1 Self-Esteem	.03	.01	-.05	-								
5. T2 Self-Esteem	.06	.02	-.03	.54***	-							
6. T3 Self-Esteem	.04	.07	-.03	.47**	.59***	-						
7. T1 School Attachment	.00	-.03	-.01	.47***	.26***	.23***	-					
8. T2 School Attachment	-.05	-.07	-.06	.23***	.27***	.17***	.49***	-				
9. T3 School Attachment	-.02	-.04	-.04	.22***	.22***	.32***	.39***	.45***	-			
10. T1 GPA	-.09*	-.04	-.06	.08*	.09**	.10**	.08**	.04	.11***	-		
11. T2 GPA	-.04	.01	.01	.05	.12***	.13***	.05	.08**	.08*	.66***	-	
12. T3 GPA	-.05	.00	.02	.05	.13**	.17***	.04	.08*	.16***	.58***	.69***	-
Valid N	654	699	504	1053	1151	776	1054	1137	734	1055	1129	729
Mean	.39	.38	.37	3.75	3.91	4.00	3.60	3.83	3.79	3.12	3.03	3.10
SD	.47	.46	.46	.76	.67	.64	.86	.75	.75	.73	.76	.71
Minimum	.00	.00	.00	1.00	1.50	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	1.00	1.00	1.00	5.00	5.00	5.00	5.00	5.00	5.00	4.00	4.00	4.00

Note. T1 = in-school wave; T2 = Wave 1; T3 = Wave 2. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3.2. Model Fits and Model Comparisons for Unconditional Univariate Autoregressive

Models, ALT Full Models, LCMs, and ALT Models with Modifications.

Models	Log-Lik	SC Factor	Difference Test SC	CM	S-B$\Delta\chi^2$ (df)	AIC	BIC
Cross-race friendships							
1. Autoregressive, full model	-212.89	3.31				437.78	463.37
2. ALT, full model	-870.84	6.76				1757.67	1798.08
3. ALT, nested LCM	-878.97	9.09	2.70	2	6.03 (2)[*a]	1769.94	1800.25
4. ALT, no slope variance	-871.69	7.42	2.14	2	.80 (1)[b]	1757.38	1792.74
5. ALT, no slope	-902.03	10.12	1.16	2	53.83 (3)[***]	1814.05	1838.38
6. ALT-2, fixed regressions	-873.22	7.65	.51	2	9.31 (1)[**]	1760.88	1795.80
For autoregressive, full model (M1), χ^2(df) = 10.36 (1)[**], RMSEA = .13, CFI = .98, TLI = .95.							
Self-esteem							
1. Autoregressive, full model	-1430.81	.88				2873.61	2903.37
2. ALT, full model	-2797.22	1.06				5610.44	5650.85
3. ALT, nested LCM	-2861.58	1.06	1.04	2	123.77 (2)[***]	5735.16	5765.47
4. ALT, no slope variance	-2797.22	1.15	.38	2	.02 (1)	5608.44	5643.80
5. ALT, no slope	-2811.42	.97	1.60	4	17.78 (2)[***c]	5632.83	5658.08
6. ALT-5, fixed regressions	-2816.52	.90	1.27	5	8.03 (1)[**]	5641.03	5661.23
For autoregressive, full model (M1), χ^2(df) = 47.12 (1)[***], RMSEA = .21, CFI = .94, TLI = .83.							
School attachment							
1. Autoregressive, full model	-1721.04	2.22				3454.09	3483.81
2. ALT, full model	-3220.1	1.31				6456.21	6496.62
3. ALT, nested LCM	-3263.99	1.21	1.59	2	55.34 (2)[***]	6539.98	6570.29
4. ALT, no slope variance	-3220.22	1.38	.76	2	.30 (1)	6454.44	6489.79
5. ALT, no slope	-3224.19	1.51	1.06	4	7.51 (2)[*c]	6458.39	6483.64
6. Alt-5, fixed regressions	-3225.58	1.53	1.44	5	1.92 (1)	6459.15	6479.36
For autoregressive, full model (M1), χ^2(df) = 36.18 (1)[***], RMSEA = .18, CFI = .80, TLI = .41.							
GPA							
1. Autoregressive, full model	-1356.13	4.21				2724.26	2753.95
2. ALT, full model	-2677.30	3.74				5370.60	5411.01
3. ALT, nested LCM	-2680.97	4.67	.95	2	7.70 (2)[*]	5373.94	5404.25
4. ALT, no slope variance	-2681.47	3.97	2.10	2	3.97 (1)[*]	5376.94	5412.30
5. ALT, no slope	-2692.59	5.30	1.14	2	26.87 (3)[***]	5395.18	5420.43
6. Alt-2, fixed regressions	-2680.70	4.26	.07	2	99.53 (1)[***]	5375.41	5410.77
For autoregressive, full model (M1), χ^2(df) = 46.07 (1)[***], RMSEA = .21, CFI = .96, TLI = .87.							

Note. Bolded models were the final model. Log-lik = loglikelihood; SC = scaling correction; CM = comparison model for S-B$\Delta\chi^2$. [a] Alternative approach for S-B$\Delta\chi^2$ test was used to ensure positive scaling correction value. [b] With warning message (linear dependency), so comparison model was retained. [c] Model was retained due to warning message for the comparison model. [*]p < .05. [**]p < .01. [***]p < .001.

Table 3.3. Model Fits and Model Comparisons for Unconditional Multivariate Autoregressive Models, ALT Full Models, LCMs, and

ALT Models with Modifications for Cross-Race Friendships and Self-Esteem.

Models	Log-Lik	SC Factor	Difference Test SC	CM	S-B$\Delta\chi^2$ (df)	AIC	BIC
1. Autoregressive, full model	-3685.54	2.97				7417.08	7533.25
2. ALT, full model	-3664.45	2.72				7382.90	7519.28
3. ALT, nested LCM	-3738.70	4.13	.66	2	224.71 (11)***	7509.39	7590.21
4. ALT, no slope variance on SE	-3664.47	2.80	.40	2	.12 (1)	7380.95	7512.27
5. ALT, no slope on SE	-3676.31	3.02	1.62	4	14.58 (4)**c	7396.62	7507.75
6. ALT-5, no slope variance on CRFs	-3677.12	3.07	1.95	5	.83 (1)b	7396.24	7502.31
7. ALT-5, no slope on CRFs	-3707.60	3.47	.98	5	63.72 (4)***	7451.20	7542.12
8. ALT-5, no time-specific uniqueness correlations	-3678.25	3.35	.93	5	4.16 (3)	7394.50	7490.46
9. ALT-8, fixed autoregressions for SE	-3680.40	3.45	1.54	8	2.81 (1)	7396.81	7487.73
10. ALT-9, fixed autoregressions for CRFs	-3681.22	3.60	.88	9	1.84 (1)	7396.44	7482.30
11. ALT-10, fixed CRFs -> SE regressions	-3684.56	3.78	.82	10	8.14 (1)**	7401.12	7481.93
12. ALT-10, fixed CRFs -> SE regressions	-3683.01	3.84	2.13	10	1.68 (1)a	7398.01	7478.83
For autoregressive, full model (M1), χ^2 (df) = 58.51 (4)***, RMSEA = .11, CFI = .96, TLI = .86.							

Note. Bolded models were the final model. CRFs = cross-race friendships; SE = self-esteem; Log-lik = loglikelihood; SC = scaling correction; CM = comparison model for S-B$\Delta\chi^2$. [a] Alternative approach for S-B$\Delta\chi^2$ test was used to ensure positive scaling correction value. [b] With warning message (linear dependency), so comparison model was retained. [c] Model was retained due to warning message for the comparison model. *p < .05. **p < .01. ***p < .001.

Table 3.4. Model Fits and Model Comparisons for Unconditional Multivariate Autoregressive Models, ALT Full Models, LCMs, and ALT Models with Modifications for Cross-Race Friendships and School Attachment.

Models	Log-Lik	SC Factor	Difference Test SC	CM	S-B$\Delta\chi^2$ (*df*)	AIC	BIC
1. Autoregressive, full model	-4112.17	3.41				8270.34	8386.51
2. ALT, full model	-4084.24	2.84				8222.47	8358.85
3. ALT, nested LCM	-4136.94	4.31	.71	2	149.02 (11)***	8305.88	8386.70
4. ALT, no slope variance on SA	-4084.37	2.92	.86	2	.30 (1)[b]	8220.73	8352.06
5. ALT, no slope on SA	-4089.26	3.28	.93	2	10.75 (5)	8222.51	8333.63
6. ALT-5, no slope variance on CRFs	-4090.31	3.32	2.42	5	.87 (1)[b]	8222.62	8328.69
7. ALT-5, no slope on CRFs	-4122.05	3.75	1.16	5	56.46 (4)***	8280.10	8371.02
8. ALT-5, no time-specific uniqueness correlations	-4090.17	3.63	1.03	5	1.78 (3)	8218.34	8314.31
9. ALT-8, fixed autoregressions for SA	-4090.87	3.68	2.76	8	.51 (1)	8217.74	8308.66
10. ALT-9, fixed autoregressions for CRFs	-4091.69	3.85	.83	9	1.99 (1)	8217.38	8303.25
11. ALT-10, fixed CRFs -> SA regressions	-4092.42	4.06	.59	10	2.47 (1)	8216.83	8297.65
12. ALT-11, fixed CRFs -> SA regressions	-4094.41	4.34	-.16	11	1.68 (1)[a]	8218.82	8294.58

For autoregressive, full model (M1), χ^2 (*df*) = 83.97 (4)***, RMSEA = .13, CFI = .93, TLI = .75.

Note. Bolded models were the final model. CRFs = cross-race friendships; SA = school attachment; Log-lik = loglikelihood; SC = scaling correction; CM = comparison model for S-B$\Delta\chi^2$. [a] Alternative approach for S-B$\Delta\chi^2$ test was used to ensure positive scaling correction value. [b] With warning message (linear dependency), so comparison model was retained. *p < .05. **p < .01. ***p < .001.

Table 3.5. Model Fits and Model Comparisons for Unconditional Multivariate Autoregressive Models, ALT Full Models, LCMs, and ALT Models with Modifications for Cross-Race Friendships and GPA.

Models	Log-Lik	SC Factor	Difference Test SC	CM	S-BΔχ² (df)	AIC	BIC
1. Autoregressive, full model	-3588.82	4.08				7223.65	7339.82
2. ALT, full model	-3538.70	3.53				7131.41	7267.78
3. ALT, nested LCM	-3555.45	5.51	.65	2	51.69 (11)***	7142.89	7223.71
4. ALT, no slope variance on GPA	-3542.93	3.59	1.91	2	4.42 (1)*	7137.85	7269.18
5. ALT, no slope on GPA	-3556.32	4.13	.90	2	38.95 (5)***	7156.64	7267.76
6. ALT-2, no slope variance on CRFs	-3539.47	3.60	1.67	2	.92 (1)[b]	7130.94	7262.27
7. ALT-2, no slope on CRFs	-3571.56	4.18	.67	2	98.42 (5)***	7187.12	7298.24
8. ALT-2, no time-specific uniqueness correlations	-3542.09	3.81	1.30	2	5.20 (3)	7132.19	7253.41
9. ALT-8, fixed autoregressions for GPA	-3543.71	3.96	.33	8	9.72 (1)	7133.42	7249.60
10. ALT-8, fixed autoregressions for CRFs	-3542.94	3.93	1.08	8	1.56 (1)	7131.87	7248.04
11. ALT-10, fixed CRFs -> GPA regressions	-3542.97	4.08	.56	10	.12 (1)**	7129.94	7241.06
12. ALT-11, fixed CRFs -> GPA regressions	-3545.18	4.30	2.16	11	2.04 (1)[a]	7132.35	7238.42

For autoregressive, full model (M1), χ² (df) = 98.55 (4)***, RMSEA = .14, CFI = .97, TLI = .81.

Note. Bolded models were the final model. CRFs = cross-race friendships; Log-lik = loglikelihood; SC = scaling correction; CM = comparison model for S-BΔχ². [a] Alternative approach for S-BΔχ² test was used to ensure positive scaling correction value. [b] With warning message (linear dependency), so comparison model was retained. *p < .05. **p < .01. ***p < .001.

Table 3.6. Unstandardized Estimates for Final ALT Model of Associations Between Cross-Race Friendships and Adjustment Conditional on Covariates.

	Self-Esteem			School Attachment			GPA		
	b	(SE)	p	b	(SE)	p	b	(SE)	p
Latent Factors									
CRFs level mean	.34	.17	.05	.33	.18	.07	.33	.18	.06
CRFs slope mean	-.05	.03	.13	-.05	.03	.16	-.04	.03	.18
WB level mean	3.9	.1	<.001	3.58	.12	<.001	2.61	.46	<.001
WB slope mean							-.04	.08	.56
Residual Variance and Covariances Of Latent Factors									
Residual variance									
CRFs level residual variance	.2	.07	<.01	.21	.07	<.01	.21	.07	<.01
CRFs slope residual variance	.003	.002	.15	.003	.002	.13	.003	.002	.17
WB level residual variance	.22	.01	<.001	.25	.02	<.001	.62	.1	<.001
WB slope residual variance							.01	.01	<.05
Covariances									
CRFs level, slope	-.02	.01	.19	-.02	.01	.18	-.02	.01	.20
CRFs level, WB level	.01	.02	.68	.04	.02	.11	-.01	.03	.82
CRFs slope, WB level	-.004	.01	.42	**-.01**	**.004**	**<.05**	-.01	.01	.15
WB level, slope							-.06	.02	<.01
WB slope, CRFs level							-.01	.01	.28
WB slope, CRFs slope							**.003**	**.001**	**<.05**
Cross-Lagged Associations									
T1 CRFs → T2 WB	.05	.05	.37	-.01	.07	.88	-.03	.04	.48
T2 CRFs → T3 WB	**.15**	**.06**	**<.01**	-.01	.07	.88	-.03	.04	.48
T1 WB → T2 CRFs	-.002	.003	.5	-.002	.003	.65	.00	.004	.99
T2 WB → T3 CRFs	-.002	.003	.5	-.002	.003	.65	.00	.004	.99

Note. Bolded coefficient estimates were the primary interests of the present study. b = unstandardized estimates; CRFs = cross-race friendships; WB = well-being. T1 = in-school wave; T2 = Wave 1; T3 = Wave 2.
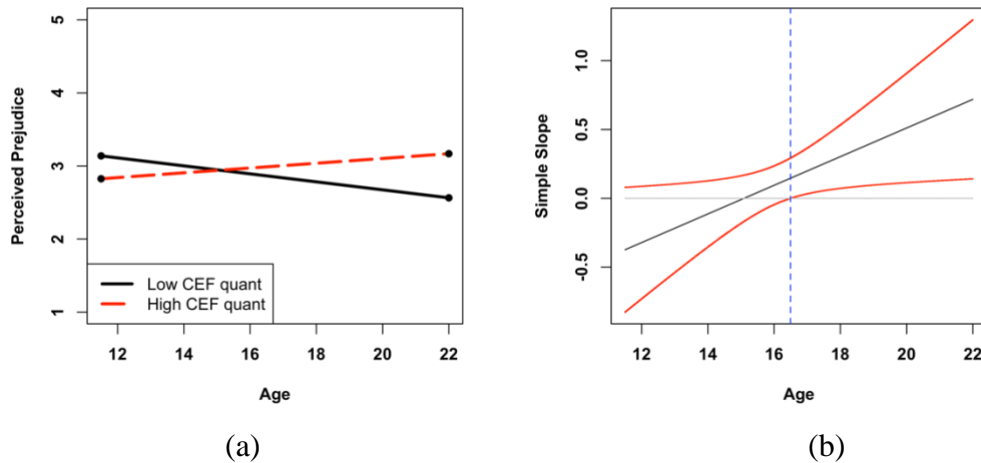
APPENDIX C: Chapter 2 Figures

Figure 2.1. Two-Way Interaction Effects Between Cross-Race Friendships and Age on Perceived Prejudice.
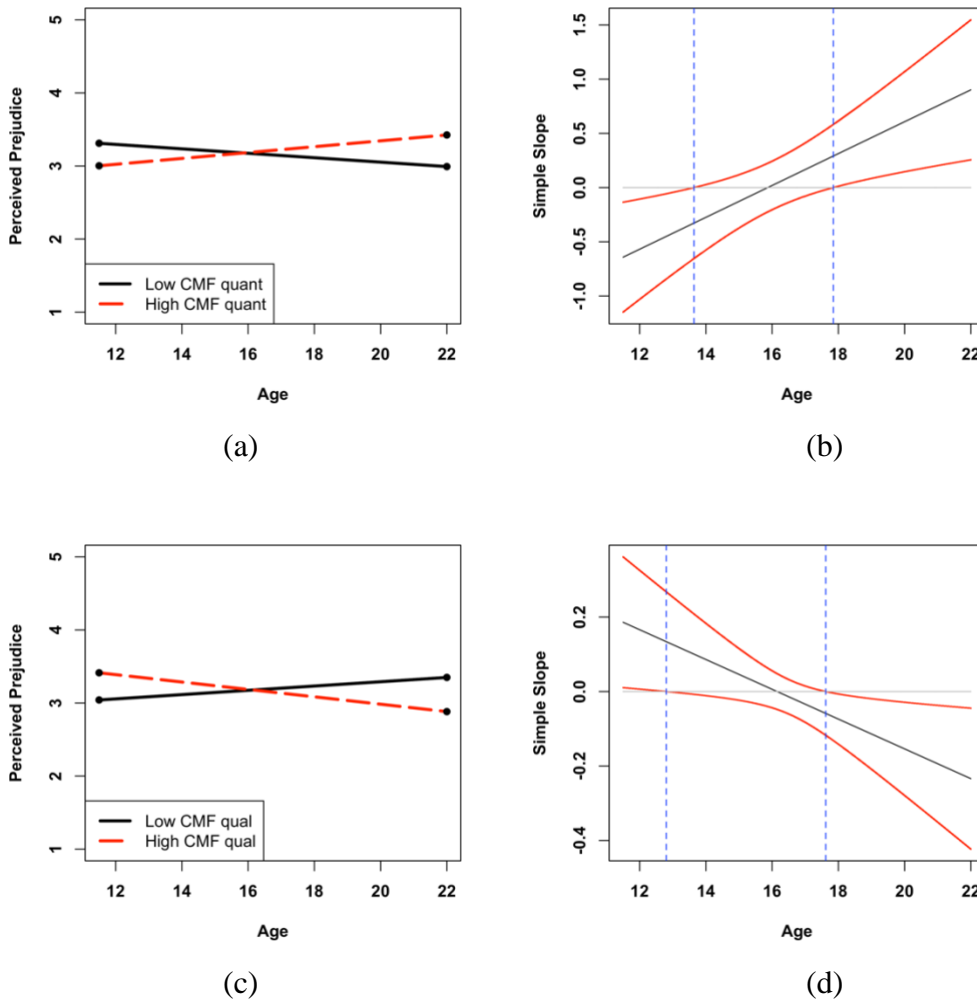

(a)

(b)

(c)

(d)
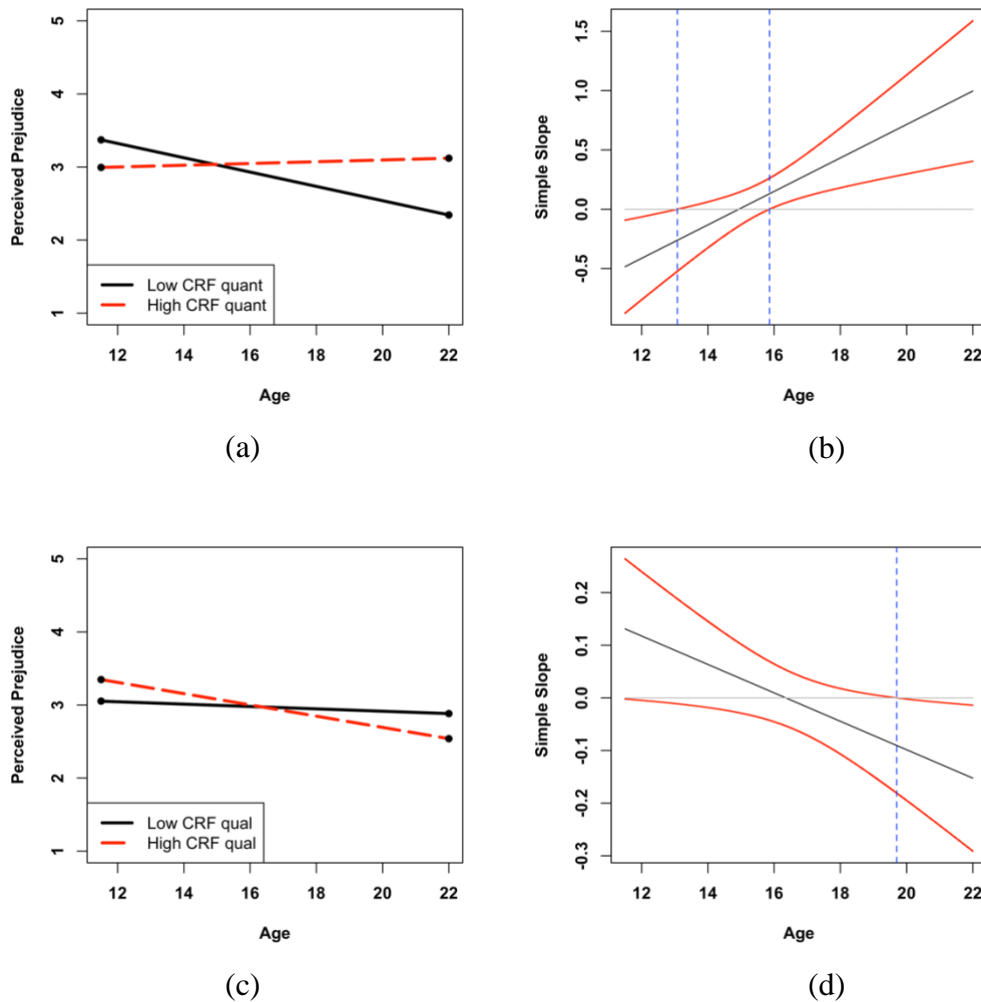
Note. (a) Simple trajectories of perceived prejudice over time as a function of friendship quantity with trajectories shown at -1 *SD* below mean (low = 0) and +1 *SD* above mean (high = .78) of friendship quantity. (b) Confidence bands for effect of friendship quantity on perceived prejudice as a function of age (11.5-22). (c) Simple trajectories of perceived prejudice over time as a function of friendship quality with trajectories shown at minimum (low = 0) and +1 *SD* above mean (high = 2.25) of friendship quality. (d) Confidence bands for effect of friendship quality on perceived prejudice as a function of age (11.5-22). CRF = cross-race friendship.

Figure 2.2. Two-Way Interaction Effects Between Cross-Ethnic Friendships and Age on

Perceived Prejudice.

(a)   (b)

Note. (a) Simple trajectories of perceived prejudice over time as a function of friendship quantity with trajectories shown at -1 *SD* below mean (low = .14) and +1 *SD* above mean (high = .98) of friendship quantity. (b) Confidence bands for effect of friendship quantity on perceived prejudice as a function of age (11.5-22). CEF = cross-ethnic friendship.

Figure 2.3. Two-Way Interaction Effects Between Cross-Race Friendships with Non-Whites and Age on Perceived Prejudice.

(a)

(b)

(c)

(d)

Note. (a) Simple trajectories of perceived prejudice over time as a function of friendship quantity with trajectories shown at minimum (low = 0) and +1 *SD* above mean (high = .48) of friendship quantity. (b) Confidence bands for effect of friendship quantity on perceived prejudice as a function of age (11.5-22). (c) Simple trajectories of perceived prejudice over time as a function of friendship quality with trajectories shown at minimum (low = 0) and +1 *SD* above mean (high = 2.00) of friendship quality. (d) Confidence bands for effect of friendship quality on perceived prejudice as a function of age (11.5-22). CMF = cross-race friendship with non-White groups.

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Figure 3.1. Full Autoregressive Latent Trajectory Model with Correlated Intercept-Intercept, Intercept-Slope, and Slope-Slope.
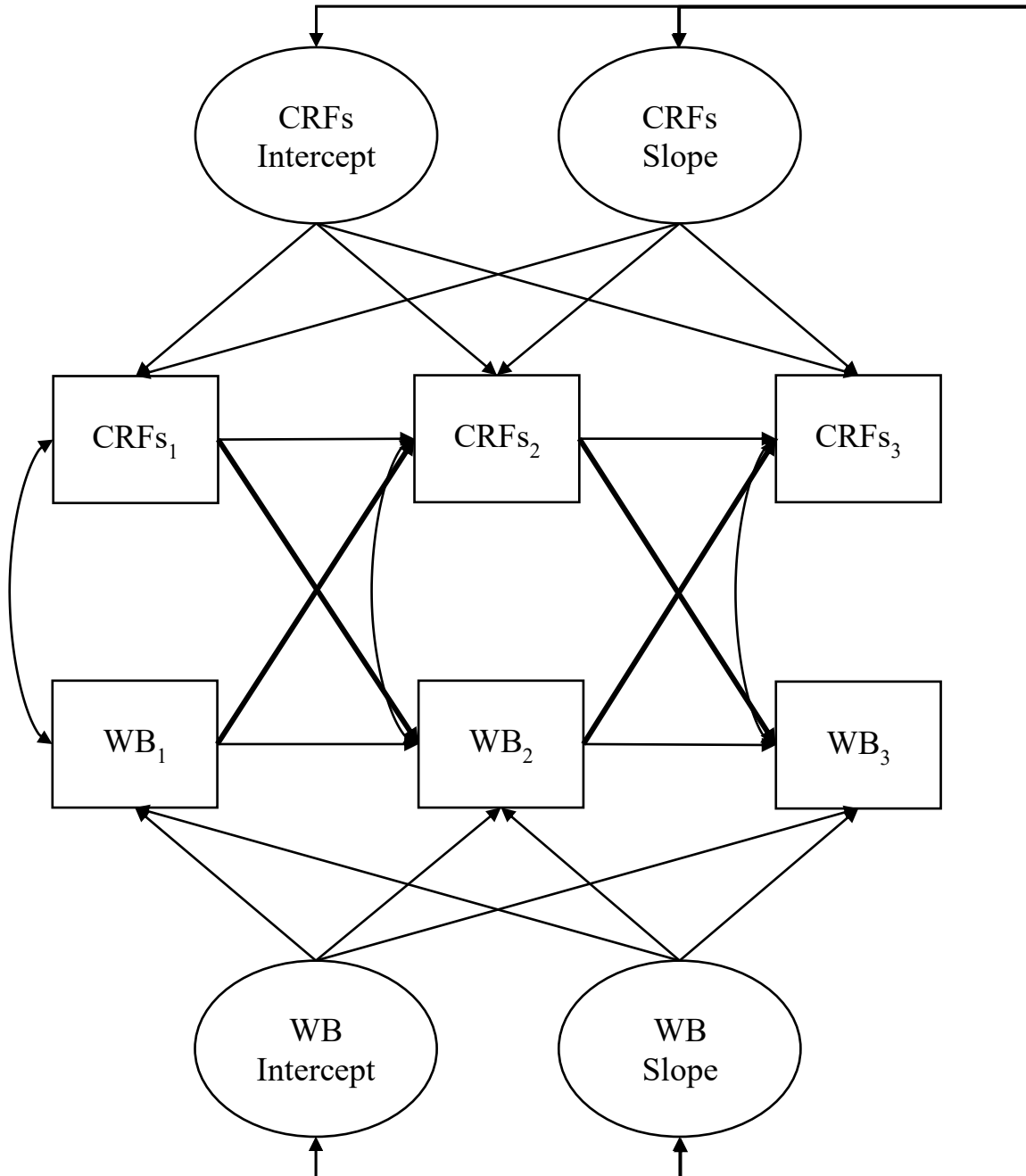
Note. The bold lines represent time-specific lagged effects. CRFs = cross-race friendships; WB = well-being.

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