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EMPIRICAL RESEARCH

Early Adolescents' Peer Experiences with Ethnic Diversity in Middle School: Implications for Academic Outcomes

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Abstract As the U.S. becomes increasingly ethnically diverse, opportunities for cross-ethnic interaction at school may be increasing, and these interactions may have implications for academic outcomes for both ethnic minority and White youth. The current study examines how cross-ethnic peer relationships, measured using peer nominations for acceptance and daily lunchtime interactions, relate to academic outcomes for an ethnically diverse sample of 823 (45% boys and 55% girls; $M_{age} = 11.69$) public middle school sixth graders across one Midwestern and two Western states. For White, Black, Asian, Latino/a, and Multiethnic students, self-reported daily cross-ethnic peer interactions were associated with higher end-of-year GPAs in core academic courses and teachers' expectations for educational attainment, but not self-reported school aversion. Making cross-ethnic acceptance nominations was not associated with any academic outcomes. Thus, daily opportunities for cross-ethnic interactions may be important school experiences for early adolescents.

Keywords Cross-ethnic peers · Ethnicity · Diversity · GPA · Middle school · Daily interactions

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Introduction

Across the lifespan, positive peer relations are important to individuals' well being (Hartup and Stevens 1999). Particularly for adolescents, peer interactions and friendships may provide companionship, as well as a context through which individuals learn how others think, feel, and behave (Graham et al. 2014). The developmental importance of peer relationships is also seen in academic domains, such as academic engagement and performance (i.e., Crosnoe et al. 2003). Further, teachers may be directly or indirectly aware of students' peer interactions and this awareness may spill over into their attitudes and interactions with students (Pearl et al. 2007).

Cross-ethnic peer relationships can provide additional benefits to individuals over and above interactions with same-ethnicity peers, such as providing new perspectives to incorporate into one's sense of self (McGill et al. 2012). Interaction with cross-ethnic individuals, particularly for ethnic minority adolescents, is associated with increased academic achievement (Hallinan and Williams 1989). And, a student's choice to affiliate with same- or cross-ethnic peers may influence teachers' expectations for students'

educational future (Tenenbaum and Ruck 2007). Teachers may utilize information from peer associations to rate students' academic performance (Benner and Crosnoe 2011). Understanding how cross-ethnic peer interactions, in particular, may impact students' academic outcomes is important given the current and projected demographic shifts in the United States (Bowman 2013). The U.S. Census Bureau predicts that, by the year 2044, more than half of all Americans will belong to an ethnic minority group (i.e., groups other than non-Hispanic White), although this significant shift will occur much earlier for the school-aged population (U.S. Census Bureau 2015).

The goal of the present study is to examine the association between cross-ethnic peer relationships and academic outcomes for an ethnically diverse sample of public middle school sixth graders across three states. Specifically, we differentiate between cross-ethnic peer acceptance, measured using students' peer nominations of liking given, and cross-ethnic peer interactions, measured by self-reported daily lunchtime interactions. We also examine three distinct academic outcomes—students' self-reported school aversion, GPA in core academic classes at the end of the school year, and teachers' expectations of educational attainment.

Importance of (Cross-Ethnic) Peers for Academic Outcomes

Previously, the benefit of interaction with ethnically diverse peers has been shown to predict long-term academic trajectories of ethnically diverse university student samples (Gurin et al. 2002). Gurin and colleagues (2002) provide a useful framework through which to view the benefit of ethnically diverse environments, showing that genuine interaction with peers from any different ethnic group from one's own were related to cognitive growth and greater academic performance across multiple samples of ethnically diverse university students (Gurin et al. 2002). They found that this was especially the case when examining informal interactions or interactions occurring outside of structured spaces. Gurin and colleagues' framework has also been applied to investigating the value of ethnic diversity and interactions for kindergarteners (Benner and Crosnoe 2011). Similar to findings with college students, interactions with cross-ethnic others were shown to be key pieces of long term academic trajectories for an ethnically diverse sample of children by driving cognitive development through exposure to a greater diversity of ideas. When individuals interact with ethnically diverse peers, this diversity of ideas must be reconciled with their own existing ideas or perspectives (Antonio 2004). Thus, cross-ethnic interactions with peers from any different ethnic group may prompt learning in which individuals are motivated to develop new ways of thinking (Kawabata and Crick 2015), which translate to academic outcomes. Further, when students interact with their peers in positive ways, academic behaviors and achievement often increase (Cappella et al. 2013), and students may be more engaged and feel less aversion to school (De Laet et al. 2015).

Teachers and instructors may also be able to note students' social interactions (Pearl et al. 2007), which may influence their ratings of students on multiple social and academic dimensions (Tenenbaum and Ruck 2007). During the middle school years, teachers may increasingly use social comparisons to assess academic performance (Eccles and Roeser 2009). As such, students' cross-ethnic peer interactions may be influential in shaping teachers' expectations of them. By interacting with cross-ethnic peers, adolescents may gain access to a new pool of resources (Crosnoe et al. 2003), including new knowledge and skills related to education, exposure to a greater number of academically-oriented peers, and access to new and differing forms of social and cultural capital (Gurin et al. 2002). The perception of the added knowledge and skills may further improve teachers' expectations of their students (Eccles and Roeser 2009).

GPA and School Engagement/Aversion

Feeling engaged and connected to peers is essential to academic success and graduation rates (Debnam et al. 2014), and engagement has been shown to predict school completion (Furrer and Skinner 2003). Additionally, in school environments characterized by greater interconnection among peers, students are more likely to engage with academic activities (Booker 2006), whereas students who report less connection are more likely to experience decreased motivation for attendance and may exhibit aversion to school (De Laet et al. 2015). Cross-ethnic peer interactions, in particular, may promote less school aversion, as students may experience a sense of connection to the student body beyond just a narrow segment of same-ethnic peers (Debnam et al. 2014) and feel less lonely at school (Juvonen et al. 2006). Research suggests that students who experienced greater ethnic diversity through informal peer interactions showed greater active thinking, intellectual growth, and motivation for academic activities and had significantly higher grades in both ethnically diverse college (Tam and Bassett 2004) and elementary school settings (Cappella et al. 2013).

Previous research examining potential academic benefits of cross-ethnic friendships have relied on peer nomination procedures (Goza and Ryabov 2009) in which students are asked to name their best friend or closest friends (Newgent et al. 2010). Using this procedure, some research has found

similar academic benefits of cross-ethnic friendships across ethnic groups. For example, a peer nomination study of Black American, White American, Asian American, and Latino/a American early adolescents demonstrated that nominating cross-ethnic friends was concurrently associated with greater academic engagement and more motivation for learning (i.e., less aversion), regardless of the student's own ethnic background (Kawabata and Crick 2015). Further, the self-report of informal interaction with diverse peers was associated with greater engagement with academic activities for White, Black, Asian, and Latino/a individuals in elementary school (De Laet et al. 2015) and at the university level (Gurin et al. 2002). Thus, fostering integrated student communities may lead to students feeling less aversion from school (Cappella et al. 2013).

However, other studies using self-reports of cross-ethnic friends have found ethnic group differences in associations between cross-ethnic friendships and academic outcomes (Kurlaender and Yun 2007). For example, in a study in which high school students were asked to report their own and their best friend's ethnicity, Black American, Latino/a American, Asian American, and Native American students with cross-ethnic best friends had higher reading and math test scores than those with only same-ethnicity best friends (Newgent et al. 2010). However, in the same study, White American students with cross-ethnic friends did not experience the same benefit to reading and math scores, but also did not exhibit decrements in test scores. In another study in which middle and high school students were asked to nominate their best male and female friends, ethnic differences were also found (Goza and Ryabov 2009). Black American students had higher GPAs and greater odds of high school graduation when they had cross-ethnic friendships whereas for Asian American, Latino/a American, and White American students, having cross-ethnic friends served as neither a benefit nor risk factor. Still other studies have suggested that White students, especially when in environments with more same-ethnic peers, may experience greater academic gains relative to ethnic minority students as a function of being in ethnically diverse environments in elementary school (Benner and Crosnoe 2011), and having cross-ethnic friends in high school (Hamm et al. 2005). Although there are inconsistencies in who might benefit from cross-ethnic interactions, at a minimum, these studies collectively suggest that associating with cross-ethnic peers should not undermine the academic success of any ethnic group (Schofield and Hausmann 2004).

One possible explanation for the inconsistencies in prior research is that different academic outcome measures were used across studies (cf. grades and test scores vs. self-reported engagement, motivation, or aversion). Another possible source of inconsistency is that peer nominations do not always capture the degree to which students have actual interactions (i.e., a friendship nomination assumes frequent interactions also take place). Some students may fail to nominate certain cross-ethnic peers as friends or accepted, even though they regularly interact with cross-ethnic peers in classes and during free time. However, this assumption has not been directly assessed, and it is possible that asking students about their actual daily experiences may reflect a more proximal measure of cross-ethnic peer relationships. Thus, it may be that a daily interaction metric of cross-ethnic peer relationships would show more consistent associations with academic outcomes.

Teachers' Expectations

Students' friendships and interactions with others at school may not only be associated with school engagement and performance, but also with how their teachers view them, including their expectations for students' future educational attainment (Pearl et al. 2007). Examining teachers' expectations for students is of particular importance, as teachers' expectations measured even early on in elementary school are related to students' academic outcomes throughout elementary (Entwisle 1993) and secondary school (Eccles and Roeser 2011). Teachers' expectations of educational attainment for their students may be particularly influenced by various factors within the classroom or larger school environment (Pearl et al. 2007). Teachers may note students' cross-ethnic peer affiliations, and utilize information from peer associations to rate students' social and academic efficacy (Benner and Crosnoe 2011). For example, in middle school, teachers may increasingly use the knowledge of the peers with whom students interact in order to evaluate students' academic competency (Eccles and Roeser 2009). When teachers, who are fairly accurate in identifying peer groups, take note of their students' peer associations, they can use this assessment in developing future expectations about their students (Pearl et al. 2007).

Given the increased academic engagement associated with having cross-ethnic friends, as well as the finding that teachers report that students with cross-ethnic friends exhibit better social skills (Kawabata and Crick 2008), it is possible that this translates into teachers having higher educational expectations of such students (Eccles and Roeser 2009). It is also the case that teachers tend to underestimate educational attainment of Black and Latino/a students (Tenenbaum and Ruck 2007). However, in diverse schools, Black and Latino/a students may have increased opportunities for cross-ethnic interaction (Bowman 2013). Taken together, students from ethnic minority backgrounds may particularly benefit from cross-ethnic peer affiliations when it comes to teachers' expectations for their educational attainment. If this is the case, such social experiences could

have implications for long-term educational outcomes for these ethnic minority students.

Current Study

The current study examines the association between cross-ethnic peer relationships and academic outcomes for an ethnically diverse sample of public middle school sixth graders. With increasing ethnic diversity within the U.S., opportunities for cross-ethnic interaction at school may be increasing, with implications for academic outcomes. The current study expands upon prior research by examining both peer nominations given, as a measure of cross-ethnic peer acceptance (Goza and Ryabov 2009)—as nominations have been used in previous research to represent peer interactions (Newgent et al. 2010)—as well as self-reported daily lunchtime interactions with cross-ethnic peers. We also examined three different academic outcome measures (GPA in core academic courses, teachers' expectations of educational attainment, and students' reports of daily school aversion). A sample of 6th grade students was recruited from six different ethnically diverse schools across three states (i.e., California, Oregon, and Wisconsin). Given the diversity of the schools, all students in the schools had opportunities to nominate and interact with diverse peers. We predicted that cross-ethnic acceptance nominations and daily cross-ethnic interactions would predict better academic outcomes in the form of less daily school aversion, higher teachers' expectations of educational attainment, and higher GPAs in core academic courses at the end of the year. Because of the sample size, we were also able to assess whether ethnic minority students (i.e., African American/Black, Asian/Pacific Islander, Latino/a, and Multiethnic) differed from White students in these associations. We assessed two competing hypotheses with regard to ethnic differences. On the one hand, cross-ethnic peer nominations and daily cross-ethnic interactions might predict better academic outcomes for ethnic minority groups (Latino/a, African American/Black, Asian/Pacific Islander, Multiethnic) in comparison to White students. Although prior research is somewhat mixed, several previous studies have shown the benefit of cross-ethnic peer relationships to be greater for ethnic minority compared to White youth (Goza and Ryabov 2009), who are less likely to have to navigate and negotiate schools and neighborhoods with few same-ethnicity peers (Kurlaender and Yun 2007). However, because in each of the schools greater than 50% of all students' peers were from other ethnic groups, all students had ample opportunities to interact with cross-ethnic peers and thus the effects of cross-ethnic interaction and acceptance on academic outcomes may be similar across ethnic groups. Regardless, consistent with prior research (i.e., Newgent et al. 2010), we also expected that White students would not experience decreased academic outcomes as a function of affiliating with cross-ethnic peers.

Methods

Participants

Participants were 823 sixth grade students (55% girls, 45% boys) with valid gender, ethnicity, and daily lunch interaction data, attending one of six public middle schools in California, Oregon, and Wisconsin. Students' mean age was 11.69 years (SD = 1.20). The schools from which the sample was drawn were ethnically diverse (Caucasian/White: $M = .36$, SD = .12; Latino/a: $M = .31$, SD = .09; African American/Black: $M = .17$, SD = .12; Asian/Pacific Islander: $M = .10$, SD = .12; Multiethnic: $M = .06$, SD = .04), with an average total school diversity of .68, (SD = .07; based on 5 ethnic groups) measured by Simpson's (1949) diversity index. None of the schools had a numerical ethnic majority group, so for each student, greater than 50% of their peers in the school context were cross-ethnic. The median for free or reduced price lunch across the schools was 71%.

The sample itself was also ethnically diverse (Caucasian/White: $M = .31$, SD = .12; Latino/a: $M = .29$, SD = .11; African American/Black: $M = .13$, SD = .10; Asian/Pacific Islander: $M = .12$, SD = .12; Multiethnic: $M = .15$, SD = .07), with an average total sample diversity of .72 (SD = .03) measured by Simpson's (1949) diversity index. Slight deviations between school and sample averages appear to reflect a greater proportion of Multiethnic students than the schools from which they were drawn; it is possible that school records of ethnicity data underestimate the number of students identifying as Multiethnic.

All participants received written parent consent and provided assent before participating in the study. Students received $5 for returning a signed parent consent form (either providing or declining consent) and participating students received $15 for completing the daily reports. Payments were made either directly to the student or to the student's class for collective use, depending on the school's desires. Sixty-seven percent of students returned a consent form (parents could actively provide or decline consent). Of those, 90% participated in the study.

Procedure

Data were collected during the Spring semester of the academic year. Students completed daily surveys in class at the end of the school day on 5 randomly selected days during a 2-week period. These daily surveys contained

questions about current feelings of school aversion and descriptive information about lunchtime peer interactions. On Day 1 of the study, students also completed additional questions including the peer nomination measure. The daily report survey administration took about 50 min on the first day of the study and about 10 min on subsequent days. Two trained researchers administered the surveys. Before students began the first survey, researchers discussed the confidentiality and the voluntary nature of the study with participants, and students were instructed to create a private space with folders around them. One researcher read the survey items out loud while the second researcher circulated around the room to answer questions and monitor privacy. Teachers completed teacher surveys for each participating student while their students completed the survey.

Measures

Gender and ethnicity

Gender and ethnicity were assessed using students' self-reports. The ethnicity measure was presented as a checklist, with an option for Multiethnic or "other" youth to write in a response. In the present study, if students wrote in "Multiethnic" or some variation, or wrote in multiple ethnic groups, they were considered Multiethnic. Multiethnic students, independent of which ethnic groups they indicated identifying with, were conceptualized as a single ethnic group (Charmaraman and Grossman 2010), and were considered same-ethnic peers, as students identifying with multiple ethnic groups may identify closer with other Multiethnic individuals and less so with monoethnic individuals (Gaither 2015). For the purpose of analyses, ethnic groups were then condensed into five categories listed above.

Daily interactions with cross-ethnicity peers

Several previous studies (Kiang et al. 2006; Nishina 2012; Nishina and Juvonen 2005; Yip and Fuligni 2002) have shown the value of measuring behaviors and adjustment at multiple time points with a daily survey method. On each of the 5 daily report days, students were asked a series of questions about their experiences during lunchtime at school. One item asked students to indicate whether peers with whom they ate were from the same ethnicity and/or different ethnicity as them. To minimize social desirability and to allow for the fact that both might be true, students were allowed to indicate eating with same ethnicity, different ethnicity, or both types of peers. To further minimize any social desirability effects, this item was purposefully embedded within a number of other questions related to lunchtime at school. A proportion score was then created reflecting the number of days a student reported eating lunch with a cross-ethnic peer divided by the number of days in which a survey was completed, with 0 reflecting a student who never ate lunch with a cross-ethnic peer and 1.0 reflecting a student who reported eating lunch with a cross-ethnic peer on all of the daily report days ($M = .65$, SD $= .43$; range $= 0$–1).

Peer nominations of cross-ethnic peer acceptance

As part of a larger peer nomination procedure, on the first of the 5 daily report days students were presented with the question "who do you like to hang out with?" Students were given a roster that contained the names of all other same-grade students in the study, arranged alphabetically by first name and separated by gender. Using this roster, students were asked to nominate as many peers as they wanted for each item. We examined whether at least one of the peers nominated for the acceptance item was from a different ethnic group (based on the nominee's self-reported ethnicity) from the nominator. Across all participants, 72.2% nominated at least 1 cross-ethnic peer. Importantly, as noted above, because no ethnic group at any of the schools had the numeric majority, each student, regardless of ethnic group, had a large number of available grademates to nominate.

Grade point average in core courses (GPA)

Students' 6th grade GPA was calculated by averaging grades on a 5-point scale ($0 = $ F to $4 = $ A), with grades for both first and second semester aggregated from official school reports at the end of the academic school year. To get a better assessment of students' academic performance, only core academic courses (i.e., Math, Science, Social Studies/History, Language Arts/English) were used in this calculation ($M = 2.80$, SD $= 0.96$; range $= 0$–4).

Teachers' expectations of educational attainment

At 3 of the schools, a teacher also completed a brief survey on each participating student. Using a single item, teachers were asked: "How far in school do you expect this student to go?" Teachers rated expectations on a 7-point scale ($1 =$ less than high school graduation; $7 =$ Obtain a Ph.D., M.D., or other advanced degree). Options of "don't know" or "does not apply" were recoded as missing. The full range was represented in teachers' responses ($M = 4.45$, SD $= 1.61$; range $= 1$–7), with a mean of 4.45 suggesting that for the most part, teachers' expectations for students fell between an expectation for attending a four-year college but not finishing, or expecting students to graduate from college.

Table 1 Ethnic group differences for academic outcome variables and proportion of days students ate with cross-ethnic peers

	Caucasian/White *M* (SD)	African American/ Black *M* (SD)	Latino/a *M* (SD)	Asian/Pacific Islander *M* (SD)	Multiethnic *M* (SD)	*df*	*F*
Core GPA	**3.19**^{abc} (.77)	**2.17**^{adef} (.89)	**2.58**^{bdg} (.96)	**3.27**^{egh} (.79)	**2.50**^{cfh} (.99)	4, 792	**40.89*****
Teachers' expectations	**4.91**^{ijk} (1.33)	**3.31**^{il} (1.46)	**3.80**^{jm} (1.66)	**5.24**^{lmn} (1.37)	**4.21**^{kn} (1.59)	4, 400	**18.04*****
School aversion	2.04 (.98)	2.09 (.96)	2.02 (.85)	1.92 (.90)	2.07 (.98)	4, 813	.44
Prop. days cross-ethnic lunch	**.70**^{op} (.41)	**.56**^{oq} (.46)	**.57**^{pr} (.45)	**.74**^{qr} (.37)	.69 (.43)	4, 813	**5.74*****

Bold notation indicates values with significant differences

Teachers' expectations scale: 1 (less than high school graduation), 2 (high school graduation or GED only), 3 (attend or complete a 2 year school course), 4 (attend college but not complete 4-year degree), 5 (graduate from college), 6 (obtain master's degree or equivalent), 7 (obtain a PhD, MD, or other advanced degree)

Means with same superscripts are significantly different from each other

*$p < .05$; **$p < .01$; ***$p < .001$

Daily school aversion

On each of the 5 daily report days, students were asked to rate a number of items that related to how they were feeling "right now" on a 4-point scale (1 = *No*; 2 = *Not Really*; 3 = *Sort of*; 4 = *Yes*; Nishina and Juvonen 2005). Two school aversion items ("hate school" and "tired of school") were averaged for each day, and then averaged across the 5 daily report days, with higher scores indicating more aversion ($M = 2.03$, SD = 0.93; range = 1–4; average $\alpha = .79$).

Results

The results section is divided into three sections: (1) basic descriptive statistics about the school outcome variables and peer interaction variables, (2) main hierarchical regression analyses assessing cross-ethnic peer interactions as predictors of school outcomes, and (3) brief findings from additional analyses that further explore the main regression results linking cross-ethnic peer interactions and academic outcomes.

Descriptive Statistics

The three school outcome variables were significantly correlated. GPA was strongly correlated with teachers' expectations ($r = .67$, $p < .001$), whereas GPA ($r = -.11$, $p = .001$) and teachers' expectations ($r = -.12$, $p = .012$) were significantly, but weakly correlated with students' self-reported school aversion. Similarly, the proportion of days students ate lunch with a cross-ethnic peer was significantly, but weakly correlated with making at least one cross-ethnic acceptance peer nomination, $r = .19$, $p < .001$.

A series of 2 (gender) × 5 (ethnicity) ANOVAs were run to examine mean level differences in the school outcome variables. There was a significant main effect of gender for GPA, F (1, 792) = 23.76, $p < .001$. Girls ($M = 2.93$, SD = 0.91) had significantly higher GPAs than did boys ($M = 2.63$, SD = .99). There was no main effect of gender for teachers' expectations [F (1, 400) = 0.90, *ns*] or school aversion [F (1, 823) = 1.69, *ns*]. Additionally there were no gender by ethnicity interactions for the three school outcome variables (GPA, teachers' expectations, and self-reported school aversion), F (4, 792) = 0.45; F (4, 400) = 0.24; and F (4, 823) = 1.09, *ns*, respectively.

As illustrated in Table 1, there were significant ethnic group differences for GPA and teachers' expectations consistent with previous research. White and Asian sixth graders attained higher academic GPAs than did Latino/a and Multiethnic students, who in turn had higher academic GPAs than did Black students. Asian students received higher teachers' expectations of educational attainment than their Latino/a, Multiethnic, and Black peers. White students received higher teachers' expectations than Latino/a and Black students, and Multiethnic students had higher teachers' expectations than did Black students. The main effect for ethnicity on school aversion was not significant, F(4, 823) = 0.44, *ns*.

A similar gender × ethnicity ANOVA was run for proportion of days students reported eating lunch with a cross-ethnic peer. Similar to GPA and teachers' expectations, there was a significant main effect of ethnicity. As illustrated in Table 1, Asian students reported eating lunch with a cross-ethnic peer a significantly greater proportion of the days than Multiethnic, Latino/a, and Black students. White students ate lunch with a cross-ethnic peer significantly more than Latino/a and Black students. And Multiethnic students ate lunch with cross-ethnic peers more than Black students. Neither the main effect of gender nor the gender × ethnicity interaction were significant: F (1, 823) = 1.31, and F (4, 823) = 1.970, *ns*, respectively.

Table 2 Academic outcomes as a function of gender, ethnicity, and cross-ethnic peer relationships

	End-of-year GPA				Teachers' expectations				School aversion			
Step/predictor	R^2	ΔR^2	*B*	SE	R^2	ΔR^2	*B*	SE	R^2	ΔR^2	*B*	SE
Step 1	.185				.144				.002			
Constant			**3.08*** **	.09			**4.87*** **	.21			**1.95*** **	.09
Female			**.29*** **	.07			.14	.15			.02	.07
African American/Black			**−.94*** **	.11			**−1.37*** **	.34			.07	.11
Latino/a			**−.54*** **	.08			**−.98*** **	.20			−.004	.09
Asian/Pacific Islander			.15	.11			.33	.22			−.09	.12
Multiethnic			**−.67*** **	.10			**−.70** **	.23			.02	.11
Step 2	.202	.017			.164	.02			.009	.007		
Prop cross-eth lunch			**.29*** **	.08			**.56** **	.19			.14	.08
Cross-eth nomination			−.11	.08			−.12	.20			.09	.09

Bold notation indicates significant values

White males are the reference group

*p < .05; **p < .01; ***p < .001

A chi-square analysis indicated ethnic group differences in nominating at least one cross-ethnicity peer for the acceptance item, χ^2 (4) = 23.74, $p < .001$. Multiethnic students were less likely and Latino/a students were more likely than expected to nominate only same-ethnicity peers.

Cross-Ethnic Peer Relationships and Academic Outcomes

Separate hierarchical regressions were run for GPA, teachers' expectations, and self-reported school aversion, as these three outcome variables were gathered from three separate reporters and are conceptualized as distinct constructs. Gender was included as a control variable in Step 1, with males as the comparison group, dummy coded as *1 = female, 0 = male*. Ethnicity was also included as a control variable in Step 1, with White students as the comparison group and dummy codes for Black, Asian, Latino/a, and Multiethnic ethnic groups. White students were the comparison group because it allowed us to test the hypothesis that White students may differ from ethnic minority students in the association between cross-ethnic peer relationships and academic outcomes. Both proportion of days students reported eating lunch with a cross-ethnicity peer, as well as whether or not they gave at least one acceptance nomination to a cross-ethnicity peer were entered in Step 2. In Step 3, all ethnic group × cross-ethnic peer acceptance and ethnic group × cross-ethnic lunchtime peer interaction variables were added to test whether the associations between different-ethnicity peer experiences and academic outcomes differed by ethnic group. Gender × cross-ethnic lunchtime peer interaction and gender × cross-ethnic acceptance variables were also included as controls. Step 3 interactions did not result in a significant R-square change: F (10, 717) = 0.64; F (10, 356) = 1.74; F (10, 736) = 0.76 for GPA, teachers' expectations, and self-reported school aversion, respectively. Given that there were not differences between Black, Asian, Latino/a, and Multiethnic students compared to White students, or gender differences in the association between cross-ethnic peer experiences and academic outcomes, the results for the two-step models are presented in the interest of parsimony.

As illustrated in the first column of Table 2, for GPA, gender and ethnicity explained 18.5% of the shared variance ($p < .001$) and the cross-ethnic peer variables entered in Step 2 explained an additional 1.7% of the shared variance ($p = .001$). Specifically, eating lunch with a cross-ethnic peer a greater proportion of days was significantly associated with higher GPAs in core academic courses. However, giving at least one acceptance nomination to a different-ethnicity peer was not related to GPA. Similarly, for teachers' expectations, gender and ethnicity in Step 1 explained 14.4% of the shared variance ($p < .001$), and Step 2 explained an additional 2% of the shared variance ($p = .014$). As with GPA, it was proportion of days eating lunch with a cross-ethnic peer and not giving an acceptance nomination to a cross-ethnic peer that predicted increased teachers' expectations of the student's educational attainment (see column 2, Table 2). In contrast to GPA and teachers' expectations, as illustrated in column 3 of Table 2 neither Step 1 control variables (0.2%), nor the cross-ethnic peer variables (0.7%) explained a significant amount of the shared variance in self-reported school aversion ($p > .05$).

Supplementary Analyses Assessing Additional Factors

We ran two sets of supplementary analyses to further assess the significant associations between daily lunchtime cross-

ethnic peer interactions and GPA and teachers' expectations. We omitted school aversion from these supplementary analyses because it was not associated with cross-ethnic peer interactions. First, it is possible that simply being social predicts better academic outcomes, rather than interacting with cross-ethnic peers per se. To assess this, we also asked students on a daily basis whether they had eaten lunch with a same-ethnicity peer using an item that paralleled the cross-ethnicity item. It was calculated similarly, with scores reflecting the percentage of days that students reported eating with same-ethnicity peers ($M = .58$, SD = .45; range 0–1). Students were allowed to indicate yes to both items and therefore the items were not mutually exclusive. Running the final model (i.e., just Steps 1 and 2) and entering daily lunchtime same-ethnicity peer interactions into the model in Step 2, the substantive findings remained the same for both GPA and teachers' expectations, but the daily same-ethnicity lunchtime interactions variable was also significant (cf. $\beta = .12$, $p = .007$; $\beta = .14$, $p = .03$ for GPA and teachers' expectations, respectively). However, the standardized regression coefficients for daily cross-ethnic lunchtime interactions in those models (cf. $\beta = .21$, $p < .001$; $\beta = .24$, $p < .001$ for GPA and teachers' expectations, respectively) were almost twice that of the standardized regression coefficients for same-ethnicity daily lunchtime interactions.

Second, it was possible to account for classroom-level nesting in terms of the class where each student took the survey (Level 2) via multilevel modeling within the data for students with valid classroom data, though it is important to note that middle school students in the study did change classrooms throughout the day. The intra-class correlation coefficients indicated that 22% of the variability in GPA and 26% of the variability in teachers' expectations were explained by between-classroom factors. Here, we expected that the classroom (Level 2) effect may be particularly strong for teachers' expectations, as teacher effects might also be in play. In two separate models we predicted GPA or teachers' expectations as a function of Level 1 variables that were the same as in the regression analyses: dummy codes for girls and Black, Asian, Latino/a, and Multiethnic students (boys and White students were again the comparison), proportion of days students reported eating lunch with a cross-ethnicity peer, and giving at least one acceptance nomination to a cross-ethnicity peer (dummy-coded). We controlled for classroom at Level 2. The results were the same as the regression analyses presented above—daily cross-ethnic lunchtime peer interactions predicted higher GPA and teachers' expectations of educational attainment, whereas peer nominations of cross-ethnic acceptance did not.

Discussion

As the United States becomes increasingly diverse, the potential additional benefits that cross-ethnic peer relationships provide are important to understand. While it is true that all schools across the country are not as ethnically diverse as the schools from which these data were collected, interaction across ethnic groups is possible in any context with some ethnic diversity and with an environment that supports the possibility of cross-ethnic peer interaction. The findings from this study show that more frequent interactions with cross-ethnic peers across a two-week period were correlated with better academic outcomes (specifically higher teachers' expectations of educational attainment and end-of-year GPAs). Thus, schools may be able to leverage the diversity they have to capitalize on the low cost benefits of encouraging cross-ethnic interactions.

One significant contribution of this study is that ethnic minority students did not differ from White students in the association between cross-ethnic peer interaction and improved academic outcomes. Even White and Asian students in the study, who like in other research had significantly higher GPAs than members of other ethnic minority groups, appeared to benefit from daily cross-ethnic interactions. And, while not a longitudinal study, the core academic GPA used in the present study was based on grades reflecting the entire academic school year. The study also attempted to shed light on prior inconsistencies in the literature, by using two measures to assess cross-ethnic peer relationships (acceptance nominations and daily interactions), as well as by focusing on three distinct academic outcomes. In the present study, it was self-reported daily interactions, and not peer nominations, that best predicted academic outcomes by outside raters (i.e., GPA and teacher reports), whereas neither cross-ethnic peer nominations nor daily interactions were associated with self-reported school aversion.

In the present study, the effect sizes for GPA and teachers' expectations may appear small in terms of shared variance, but we argue that they are still meaningful. For example, the difference between students who never reported eating with a cross-ethnic peer and those who reported always eating with a cross-ethnic peer was .29 grade points. This reflects roughly one-third of a standard deviation in GPA, or translated in practical terms, could be the difference between a B+ and A− average. It is important to keep in mind that the GPA variable was composed of only core academic and not elective courses, so the difference in grades associated with cross-ethnic peer interaction occurs in subjects tied to key markers of educational development for middle school students. With

teachers' expectations, the translations are somewhat more ambiguous, but still reflect about one-third of a standard deviation. Especially because teachers' expectations have been shown to predict students' academic performance years in the future (Eccles and Roeser 2011), any increase in expectations may be vital for students' to remain engaged in school long-term (Eccles and Roeser 2009). Further, if interaction with cross-ethnic peers continues to be associated with increased GPA throughout middle school and into high school, students may experience increased options for college enrollment. Beyond academic outcomes, experience interacting with cross-ethnic peers should prepare individuals for working and interacting with cross-ethnic colleagues in increasingly ethnically diverse workplaces (Gurin et al. 2002).

Cross-Ethnic Peer Interactions and Academic Outcomes

Just as previous research has suggested that cross-ethnic friendships and interactions may be beneficial to academic outcomes (Kawabata and Crick 2015), our study suggests that spending lunchtime with a cross-ethnic peer more often is associated with both higher end-of-year GPAs in core academic courses and higher teachers' expectations for educational attainment, supporting our hypotheses. However, contrary to hypotheses, above and beyond the cross-ethnic lunchtime interactions, giving at least one cross-ethnic peer acceptance nomination was not related to GPA or teachers' expectations. It is important to note that the correlation between these two measures was significant, but quite small in magnitude ($r = .19$). It may be the case that cross-ethnic acceptance nominations may not indicate actual behavior exhibited or that is easily identifiable at school (i.e., by teachers). Measuring students' self-reported daily reports of whether they interacted with a cross-ethnic peer at lunchtime allowed for the examination of the students' reports of actual behavior at school, that teachers are more likely to observe. The similar distinction between behavior and sentiment for core GPA may suggest that actual interactions provide more opportunities to incorporate new perspectives into the self (McGill et al. 2012) during the school day, and may be especially beneficial within the school environment.

Our supplementary analyses indicated that more frequently spending lunchtime with a *same*-ethnicity peer was also associated with higher end-of-year GPAs in core academic courses and higher teachers' expectations. Thus, simply being more social, or socially skilled, may also promote positive academic outcomes. This is consistent with prior research showing that social adjustment is associated with academic outcomes (Kawabata and Crick 2015). However, the coefficient for eating with a cross-ethnic peer at lunch a higher proportion of days was almost twice that of eating with a same-ethnicity peer, indicating that perhaps interacting with cross-ethnic peers likely provides some unique social and academic resources to adolescents (Graham et al. 2014). For example, cross-ethnic interactions can provide students with additional perspectives to their own cultural resources (Kawabata and Crick 2015), self-efficacy for positive social interactions with a wide array of ethnically diverse peers, and learning different ways of approaching a problem (Graham et al. 2014). These skills likely enhance students' problem solving skills, which can also translate to the academic realm. This is not to say that interaction with same-ethnicity peers is not important or can be completely replaced by cross-ethnic peer interaction. In fact, previous research underscores the importance of same-ethnicity interactions and affiliations and having a "critical mass" of same-ethnicity peers in a school (Neblett et al. 2012), especially for ethnic minority adolescents (Yip et al. 2010).

Contrary to hypotheses, neither nominating a peer for acceptance nor eating lunch with a cross-ethnic peer were associated with school aversion. It may be that students who are dissatisfied with their peer interactions overall (Stanton-Salazar 2005), or display negative affect toward specific topics of study or teachers (Debnam et al. 2014), are most likely to report feelings of aversion (Furrer and Skinner 2003). The school aversion measure used in this study examines general negative feelings toward school and it is possible that the lack of negative sentiment is not the same as having positive academic sentiment or high academic motivation. Thus, future research using measures that assess positively-valenced school attitudes may be more closely tied with the peer relationship predictors we included in the present study.

It is also likely that other more socially-focused variables would be more closely associated with cross-ethnic peer interactions such as feelings of connectedness or belongingness to school, or social self-efficacy. These variables also have known relevance to students' academic performance (Booker 2006) and therefore may operate as mediators in the association between daily cross-ethnic peer interactions and GPA and teachers' expectations.

Ethnic Group Similarities

Initially, we had two competing hypotheses. On the one hand, White students might differ from ethnic minority students in the association between cross-ethnic peer relationships and academic outcomes. Some previous studies have shown the benefit of cross-ethnic peer relationships to be greater for ethnic minority compared to White youth (Goza and Ryabov 2009), who are less likely to have to navigate and negotiate schools with few same-ethnicity peers (Kurlaender and Yun 2007). On the other hand, White

students may not differ from ethnic minority students, because the self-report of informal interaction with diverse peers has been shown to be associated with greater engagement with academic activities for White, Black, Asian, and Latino/a students in both elementary school (De Laet et al. 2015) and college (Gurin et al. 2002). The latter hypothesis was supported. We expect that this is because in each of the schools, greater than 50% of all students' peers were from other ethnic groups, so all students had ample opportunities to interact with cross-ethnic peers. Thus, while these peer interactions did not serve to narrow the achievement gap between White compared to other ethnic minority students (i.e., Latino/a, Black), the fact that ethnic minority and White students may similarly benefit provides greater leverage to schools to promote interethnic interactions. The finding that Asian students did not differ from White students in cross-ethnic interactions predicting GPA and teachers' expectations is particularly striking given that both of these groups were already doing well in school, and indicates cross-ethnic interaction may be beneficial regardless of current academic performance. However, because the schools in the study were already fairly diverse, students in the school may have had positive attitudes toward diversity. Future research should consider whether these same patterns hold in less diverse schools, where there are fewer opportunities to interact with cross-ethnic peers, as well as in schools in which cross-ethnic interactions are not sanctioned by the broader peer group. In these situations, cross-ethnic interactions may not be as strongly associated with positive academic outcomes.

Limitations and Future Directions

There are some limitations to this study, a few which may be possible to address in future research. One limitation is that a high percentage of students (72%) nominated at least one cross-ethnic peer for the acceptance item, which may explain why nominating at least one cross-ethnic peer was not associated with the academic outcomes. In schools characterized by less diversity or where cross-ethnic peer interactions are less sanctioned by the broader peer group, nominating at least one cross-ethnic peer may carry more weight. Regardless, in addition to the peer nomination strategy, future school-based studies may want to consider using some other metric of cross-ethnic affiliation or sentiment. In the present study, we chose not to include number of cross-ethnic nominations because across the sample, students did not nominate the same total number of peers. A proportion score was also considered; however, a larger proportion of cross-ethnic peers would by definition mean a smaller proportion of same-ethnicity peers. As discussed above, we do not think that having only cross-ethnic nominations would necessarily be better than having some cross- and some same-ethnicity nominations. And, as noted above, same-ethnicity friendships can be important, especially for ethnic minority adolescents. One benefit of the lunchtime interactions variable is that students could report interactions with *both* cross- and same-ethnicity peers.

Another limitation is that the variable for teachers' expectations for educational attainment was composed of a single item. A teacher may not have high general expectations of school achievement for particular students (Murdock et al. 2000), but may still have high expectations for students' domain-specific abilities (Blackwell et al. 2007). Multiple indicators of teachers' expectations for students, such as expectations by academic subject or assessments of academic motivation or commitment, would further bolster the findings. For example, a teacher may not expect a student to go further than the completion of high school, but may still have high expectations for commitment to a future career related to a subject in which the student excels (Lazarides and Watt 2015).

While the findings suggest that cross-ethnic peer interactions are linked to positive academic outcomes for middle school students, it is unclear whether these findings will remain across the adolescent years. Prior research suggests that youth who report greater peer support tend to find transitions from elementary school to middle school less difficult (Furrer and Skinner 2003), so it is possible that students who continue to interact with cross-ethnic peers over time maintain these additional academic benefits. Such a finding would be particularly important given that youth tend to become increasingly self-segregating later in adolescence (Stefanek et al. 2015), and must often face several additional school transitions (i.e., to high school and to college) during this time (Joyner and Kao 2000).

Furthermore, it is unclear whether other types of cross-group interactions (i.e., gender, religious) are also linked to positive academic outcomes for middle school students. Peer interactions that occur across any group may require a reconciliation of one's own views with those of a social partner. However, because cross-gender interactions are developmentally more normative at this middle school age (Tolman and McClelland 2011) and adolescents may be unlikely to discuss or reveal cross-religious beliefs with peers (Regnerus 2003), whether these cross-group relationships provide the same benefit as cross-ethnic interactions to academic outcomes remains a topic for further investigation.

It is also possible that there were third variables that were not measured in the study that account for the association between cross-ethnic peer interaction at lunchtime and academic outcomes. For example, it may be that problem-solving skills or social skills predict both more frequent cross-ethnic interactions and better academic outcomes in middle school. Additionally, if it is the case that cross-

ethnic interactions lead to better academic outcomes, it would be important to identify possible mediators that were not investigated in this study. The mechanisms by which cross-ethnic interactions may ultimately lead to academic outcomes could include cognitive flexibility, critical thinking/problem-solving skills, or general feelings of belongingness within the broader school context.

Finally, it may still be difficult for some adolescents to initiate contact with diverse peers because of feelings of stress or anxiety about interacting with different others (Seiffge-Krenke 2011). At the same time, establishing cross-ethnic friendships and patterns of interactions during the early adolescent years may make it easier for individuals to cross ethnic boundaries later in life. Thus, it would be important for future work to identify individual- and school-level factors, such as beliefs regarding diversity (i.e., Wolsko et al. 2006) or problem-solving-focused coping skills for relationship stressors (i.e, Seiffge-Krenke 2011), that might precede cross-ethnic peer interactions. Additionally, in schools where there is minimal cross-ethnic interaction or low equity between ethnic groups (Debnam et al. 2014), it may be more difficult for youth to cross ethnic boundaries (Cappella et al. 2013). Future research is needed to develop creative ways to both assess and modify school-level sentiment, as the broader norms in the school can also facilitate or inhibit daily cross-ethnic interactions.

Conclusion

The results of the present study suggest that promoting interactions with cross-ethnic peers at school may not compromise academic outcomes for students from high-performing ethnic groups. Instead, daily interactions with cross-ethnic peers appear to provide a similar positive benefit for White and ethnic minority students. Schools may take advantage of ethnic diversity by encouraging teachers to incorporate minority ethnic and cultural messages into the educational environment and curriculum to better support ethnic minority individuals (Carter 2006) and to provide experiences outside the majority ethnic and cultural messages that are the primary ethos at most United States public schools (Kao and Thompson 2003). Further, schools may be able to ensure that lunchtime environments adequately reflect school diversity so as to provide ample opportunity for students to freely interact with cross-ethnic peers. Lunchtime may provide a low cost environment where students can interact over any common interests during mealtime and subsequently develop comfort with cross-ethnic peers (Lowe et al. 2013).

Importantly, this study suggests that the potential benefit of cross-ethnic interactions does not replace that of same-ethnic interactions. Daily interactions with same-ethnicity peers also were associated with better academic outcomes. It may be that a focus on maintaining a moderate level of cross-ethnic interaction while retaining interaction with same-ethnicity peers provides a useful balance during the early adolescent years, when youth are just beginning to think more deeply about their identities. The present study suggests that, as they display a willingness to incorporate diverse others into their friend groups, adolescents may experience concurrent improvements to their academic achievement.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no competing interests.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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