Title

The Few, the Changing, the Different: Pubertal Onset, Perceived School Climate and Body Image in Ethnically Diverse Sixth Grade Girls

Permalink

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Publication Date

2012

UNIVERSITY OF CALIFORNIA

Los Angeles

The Few, the Changing, the Different: Pubertal Onset, Perceived School Climate and Body

Image in Ethnically Diverse Sixth Grade Girls

A thesis submitted in partial satisfaction

of the requirements for the degree Master of Arts

in Education

by

Jessica Morales

2012

ABSTRACT OF THE THESIS

The Few, the Changing, the Different: Pubertal Onset, Perceived School Climate and Body

Image in Ethnically Diverse Sixth Grade Girls

By

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Master of Arts in Education

University of California, Los Angeles, 2012

Processor Sandra Graham, Chair

Professor Carollee Howes

Professor Jaana Juvonen

The present study examined the impact of pubertal onset, race/ethnicity, and school

racial/ethnic composition on girls' body image and perceived school climate (school safety,

school liking, and loneliness in school) during the middle school transition. The sample (N =

1,626) included 6th grade Black, Mexican American, White, and Asian girls from 20 diverse

middle schools. Hierarchical analyses supported both the *early-timing* and *stressful change hypothesis*. That is, experiencing pubertal onset before or during the transition to middle school was associated with more loneliness, less liking of school, and more negative body image. Alternatively, for girls who were non-starters (i.e., who had not begun their first menstruation by the end of the 6th grade), liking of school and feelings of loneliness were buffered. However, findings varied according to students' self-reported race/ethnicity and the ethnic composition of their school. Perceiving oneself as a minority was particularly threatening for girls, especially girls who were White. Findings suggest that both school racial/ethnic contextual factors and pubertal onset status should be considered when examining ways to facilitate the 6th grade transition for girls.

Key words:

Pubertal Onset, school composition, body image, perceived school climate, middle school transition

The thesis of Jessica Morales is approved.

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2012

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Introduction

The elementary to middle school transition has been consistently shown to be a difficult

and disruptive normative transition for students (Anderson, Jacobs, Schramm, & Splittgerber

2000; Crockett, Petersen, Graber, Schulenberg, & Ebata, 1989). Navigating this transition has

been linked to poor academic achievement (Alspaugh, 1998), declines in peer support (Way,

Reddy, Rhods, 2007), and lowered self-esteem (Wigfield, Eccles, Mac Iver, Reuman, &

Midgley, 1991). For girls experiencing the middle school transition simultaneously with the

onset of puberty, the *stressful change hypothesis* predicts that psycho-social concerns during

these co-occurring transitions are more negative (Simmons & Blyth, 1987; Simmons, Burgeson,

Carlton-Ford, & Blyth, 1987; Koenig & Gladstone, 1998). Alternatively, the *early-timing*

hypothesis suggests that experiencing earlier maturation relative to peers is associated with poor

mental health outcomes (Stattin & Magnusson, 1990; Kaltiala-Heino, Marttunen, Rantanen, &

Rimpela, 2003). Though both the *stressful change hypothesis* and the *early-timing hypothesis*

have been previously proposed and tested, few studies have examined how each stands when

investigating the role that pubertal onset (i.e., relative timing of first menstruation) plays on

perceived school climate (i.e., school liking, school safety, and loneliness in school) in

comparison to a more internalizing concern (i.e., body image). Furthermore, few studies have

investigated how each of these outcomes differs across racial/ethnic groups during this

transitional period (the terms *race* and *ethnicity* will be used interchangeably throughout the

paper). Therefore, the first goal of the present study is to examine how a multi-ethnic urban

sample of girls differs on perceived school climate and body image at varying levels of pubertal onset. Three pubertal onset groups are examined: Non-starters who had not begun their first menstruation by the end of 6ᵗʰ grade, early-starters who began their first mensuration before the 6ᵗʰ grade, and changers who began their first menstruation sometime during the 6ᵗʰ grade.

The second goal of the current study is to better understand the role that ethnic composition plays during the 6ᵗʰ grade transition, when considering girls' pubertal onset status. With an increasing preference for same ethnic peers (Hallinan & William 1989; Johnson et al., 2001; Bellmore et al., 2007) and more social comparison in middle school (Feldlaufer, Midgley, & Eccles, 1988), relative ethnic numerical representation in the 6ᵗʰ grade could impact feelings about school and about the self. For example, attending a school where a girl perceives herself as an ethnic minority could serve as a protective factor during this turbulent time. Thus, the present study investigates if pubertal onset in varying school compositional contexts impacts perceived school climate and body image. Seeking to better understand the impact of school composition during this time, both perceived and objective measures of relative representation are examined. With this dynamic study, we hope to contribute to ongoing research examining the impact of pubertal onset for girls during the middle school transition. We also hope to better understand the role that ethnicity plays as both an individual and contextual factor.

Girls' Pubertal onset within the School Transition

Pubertal onset marks the beginning of various physical changes such as increased body fat, the emergence of secondary sexual characteristics, and increased body proportions (Tanner, 1962, Blyth, Simmons, & Zakin, 1985). At a time when the need to fit in with peers is particularly important (Eccles and Midgley, 1989), adolescent girls who are more physically

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developed (i.e., early maturers) relative to their peers, have been found to be at a higher risk for depression, lower self-esteem, eating disorders, and body dissatisfaction (Stice, Presnell, & Bearman, 2001; Graber, Lewinsohn, & Brooks-Gun, 1997; Tobin-Richards et al., 1983; Williams & Currie, 2000). Prior research has also shown that the adaptation to these bodily changes (e.g., weight gain) in conjunction with social pressures (e.g., the desire to be thin) might explain negative mental health concerns for some adolescent girls (Ohring, Graber, & Brooks-Gun, 2002).

Despite evidence suggesting a higher risk of negative body image for early-maturing girls (e.g., Stice, Presnell, & Bearman, 2001; Williams & Currie, 2000) less is known about how girls' body image will be affected during a bio-social transition such as the pubertal and middle school transition. The *early-timing hypothesis* predicts that early maturing girls in comparison to on-time or later maturing peers suffer from worse adjustment (Stattin & Magnusson, 1990). Consistent with the *early-timing hypothesis*, could early-starters (i.e., girls who began first mensuration before the 6th grade) still be at highest risk for negative body image even within a new peer and social context? Or could early-maturation in this case serve as a protective factor for body image since girls are transitioning to a more physically mature context? For example, when examining victimization concerns, being more physically developed during the adjustment to middle school actually protected girls from being bullied (Nansel et al., 2001). In addition to examining if the *early-timing hypothesis* will hold for girls' body image during the adjustment to middle school, the present study also examines if experiencing first menstruation during the transitional year or after the 6th grade also affects girls' body image.

In addition to our interest in body image when taking into account pubertal onset status and the middle school transition, we are also interested in examining how perceived school climate (i.e., school liking, school safety, and loneliness in school) is impacted during this period of change. The school transition alone is a normative change that could be stressful for any adolescent. Unfortunately, adaptation to co-occurring normative transitions like pubertal onset and the school transition may make adolescents' ability to cope more difficult (Crockett, Petersen, Gaber, Schulenber, and Ebata , 1989). Thus, when examining school-related factors, such as perceived school climate, the *stressful change hypothesis* (i.e., distress will be highest during a period of most change) rather than *early-timing hypothesis* (Caspi & Moffit, 1991) may hold. In other words, for girls who have to negotiate adjustment to a new peer and academic context, in addition to the adjustment into puberty (i.e., changers), feelings about middle school could be most negative during this time of multiple changes. Bronfenbrenner's Ecological Theory (1979) is used as an appropriate theoretical framework, since it not only takes into account the school environment but also the individual's biological course. Examining the impact of pubertal timing on perceived school climate is important since it could serve a relevant predictor of school achievement and engagement.

The Need for Ethnically Diverse Urban Samples

Though some studies have investigated the impact of pubertal onset on more diverse groups, most studies have primarily focused on White-middle class girls, which could limit the generalizability of the results to ethnic minorities (Mendle, Turkheimer, & Emery, 2007). Furthermore, the limited studies that have attempted to investigate the impact of puberty on more diverse samples, have focused specifically on the effects of pubertal timing on ethnic minority

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girls' internalizing (e.g., Reynolds and Juvonen, 2010) and externalizing symptoms (e.g., Carter et al. 2009, 2010; Lynne, Graber, Nichols, Brooks-Gunn, Botvin, 2007) rather than school-related concerns like perceived school liking, safety, and loneliness. Furthermore, with more evidence suggesting differences in reported body image across ethnic groups (Nishina et al. 2006; Robinson, Killen, Litt, Hammer, et al., 1996) more studies are needed to investigate if findings replicate. To extend this literature, the current study uses a multi-ethnic urban sample to examine whether any differences on reported perceived school climate and body image exist between four ethnic groups: White, Mexican American, Asian, and Black girls.

School Racial/Ethnic Composition as a Protective Factor?

With growing ethnic diversity in this country and in public schools, it is important to examine not only the impact of ethnicity on perceived school climate and body image but also how the level of ethnic diversity as a compositional factor in school impacts these outcomes. Research has shown that greater school diversity (e.g., a school that is racially mixed with no clear majority or minority group) was associated with lower social anxiety and less loneliness (Bellmore Witkow, Graham, & Juvonen, 2004). Juvonen et al. (2006) also found that in more diverse schools students felt safer and reported less victimization (Juvonen et al. 2006). Consistent with this research, the present study investigates if more school diversity (measured objectively through school records) between schools serves as protective factor for perceived school climate and body image.

In addition to examining the role of an objective measure of diversity, the present study also investigates how students' perceived ethnic numerical representation in school impacts each outcome. For example, how does girls' perceived school climate and body image differ when

girls perceive themselves as attending a diverse school relative to one where their ethnic group is the perceived minority or majority? With an increased preference toward same-ethnic peers rather than cross-ethnic peers in early adolescence (Hallinan & William 1989; Johnson et al., 2001; Bellmore et al., 2007), the middle school transition presents a unique period of time to examine self-perceived ethnic numerical status. A recent study examining both objective and perceived numbers of same race peers in high school found that in both cases, majority status was associated with less peer ethnic discrimination (Bellmore, Nishina, You, & Ma (2012). While the Bellmore et al. (2012) study supports the importance of using both objective and perceived measures of school composition, studies on self-perceived school composition are generally lacking.

The Present Study

The overall goal of the present study is to better understand the interaction between pubertal onset and ethnicity as an individual and contextual factor during the middle school transitioning year. Both body image and perceived school composition (i.e., school liking, school safety, and loneliness in school) are examined as outcomes. The first research question is (1) does pubertal onset status (i.e., whether a girl is a non-starter, early-starter, or changer) have an effect on girl's self-reported body image and/or perceived school climate? With robust evidence suggesting a link between poor mental health and early-maturation (e.g., Stattin & Magnusson, 1990; Kaltiala-Heino, Marttunen, Rantanen, & Rimpela, 2003), we predict that being an early starter, especially during the middle school transition, could be detrimental for girls' body image. Contrastingly, due to coping with the co-occurrence of pubertal onset and the school transition, we predict that changers who experience first mensuration during the 6th grade are more likely to

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report negative perceived school climate in comparison to girls who experienced first menstruation before the 6th grade (i.e., early-starters) or girls who experienced first menstruation after the 6th grade (i.e., non-starters). Thus, we predict that the *early-timing hypothesis* will hold for body image and the *stressful change hypothesis* will hold for perceived school climate.

The second research question is (2) does pubertal onset status and ethnicity interact when examining girl's body image or perceived school climate? Since African-American girls, in comparison to other ethnic groups, have been found to hold more positive body image due to less ridged standards of beauty (Siegel, 2002; Nishina, Ammon, Bellmore, Graham, 2006) we also predict that Black girls in this study will have the most positive body image relative to other ethnic groups. The role that ethnicity will play when examining perceived school climate, however, is more exploratory.

The third research question is (3) does school ethnic diversity predict girl's body image and school climate? With recent research showing a positive impact of ethnic diversity on school-related concerns (e.g., Juvonen, Nishina, & Graham, 2006), we predict that greater diversity will serve as a protective factor of perceived school climate. Although less is known about the impact of school ethnic diversity on body image, we hypothesize that attending a more ethnicity diverse school could present girls with varying standards of beauty that could serve as a buffer for body image.

In addition to examining school ethnic diversity, the fourth and final research question is (4) does self-perceived ethnic composition of schools interact with pubertal onset and/or ethnicity during the transitional year into middle school? We predict that perceived school composition will matter more than objectively measured school ethnic diversity during the

adjustment to middle school, since it is a time of increased racial awareness and same-race preference (Hallinan & William 1989; Johnson et al., 2001; Bellmore et al., 2007). In accordance with the *stressful-change hypothesis*, we also predict that girls who are changers and in the perceived numerical ethnic minority group in their school will report more negative perceived school climate. Alternatively, since girls are experiencing a time when friendship networks are disrupted (Mizelle & Mullins, 1997 (Bellmore, Nishina, Witkow, Graham, & Juvonen, 2007), perceiving more same-ethnic peers (i.e., being in the perceived majority group) could provide a salient shared characteristic with others girls that could reduce novelty at a time when identifying with peers is important. Findings could have implications for targeted intervention programs or approaches aimed to ease the middle school transition for girls.

Method

Participants

Participants were selected from a larger sample of 5,075 6th grade students (52% were female, *M* age = 11.62 years) who were taking part in an ongoing 3-year, 4-wave longitudinal study examining the psycho-social correlates of racial/ethnic diversity in urban middle schools. The data in the present study were gathered in the Fall (time 1) and Spring of the 6th grade (time 2) and include participants from 20 participating schools. Six schools from the Los Angeles area were recruited in the fall of 2009 and 14 additional schools from the San Francisco Bay and Los Angeles areas were recruited in the fall of 2010. To avoid confounding race/ethnicity and social class, selection of schools was restricted to lower to middle socio-economic status (SES) communities with schools that provided between 20-80% free/reduced lunches to their students. We obtained information on school SES from published data provided by the California

Department of Education (CDE); information retrieved November 1, 2011, from

http://data1.cde.ca.gov/dataquest/. Of the participating schools, four schools were predominately

(more than 50%) Latino, two were predominately Asian, two were predominately African-

American, five had two majority racial groups (each between 35-49%), and seven were diverse

(i.e., no clear majority or minority group). Based on student self-report, the ethnic breakdown of

the sample was as follows: 30.9% Latino/Mexican American, 15.4% White, 12.6%

East/Southeast Asian, and 11.8% Black. Twenty-nine percent of participants self-reported as

other racial/ethnic groups such as American Indian, Middle Eastern, Pacific Islander, South

Asian, and multiethnic/biracial.

Analytical Sample

Despite the ethnically diverse sample, only Black, White, Asian, and Mexican American

students were included since they were approximately numerically equal. However, all ethnic

groups were taken into consideration when accounting for school diversity and relative perceived

school composition. Furthermore, since the study focused on the timing of first menstruation,

boys were excluded in the analyses. A total of $N = 1,626$ met these criteria, of whom 18.4% were

Black ($n = 299$), 22.2% were White ($n = 361$), 20.1% were Asian ($n = 327$), and 34.4% were

Mexican American ($n = 559$). Lastly, cases with missing data pertaining to each dependent

variable or predictor variable were omitted from the analyses. For more details about missing

data decisions, see the section titled *Missing Data*.

Procedure

Participants were recruited and surveyed in non-academic classes during the fall and

spring of sixth grade. To increase return rates of parental consent forms, two $50 gift cards were

raffled in each school for those students who returned a consent form, regardless of parental permission to partake in the study. Across the 20 participating schools 7,458 consent forms were distributed to 6th grade students in their homeroom classes. A total of 6,058 surveys (i.e., 81%) were returned, with 84% of parents granted permission for their child to participate (n = 5,075). In the data collection phase, the surveys were read aloud in each classroom by a trained graduate student researcher as participants followed along and answered the corresponding questions on their response booklets. Some questions required the students to read instructions on their own and answer them accordingly (e.g., pubertal development questions). A trained research assistant circulated around the classroom to make sure students were on the same page as the graduate researcher and answered any clarification questions the students raised. Small monetary gifts (i.e., $5 at each wave in 6th grade) were provided in return for students' participation. Participants were also entered into a raffle for an IPOD and two Shuffles at each school after the Time 1 survey.

Measures

Objective School Diversity

Since middle school classes tend to break into periods rather than one class all day as in elementary, diversity of the schools rather than of classrooms were of interest in this study. The objective school diversity measure captures the number of different racial groups in each school and the relative representation of each group (Simpson, 1949). The percent representation for each racial group was gathered from CDE public data (information retrieved November 1, 2011, from http://data1.cde.ca.gov/dataquest/) from the year students were first surveyed. Objective school diversity was then computed using Simpson's Diversity Index (1949):

$$D_c = 1 - \sum_{i=1}^{g} p_i^2.$$

D_c refers to the racial/ethnic diversity of a given school and *p* represents the proportion of students in a school who belong to one ethnic group *i. P^2i* is summed across groups in a school. Overall, the equation accounts for the probability that any two students who are chosen at random in a school are from different racial/ethnic groups. The possible values range from 0 to 1 with values closer to 1 indicating greater school ethnic diversity. Among the 20 schools in the present sample, ethnic diversity values ranged from .46 to .76 and the average score was .64 (*SD* = .08).

Race/Ethnicity

Race/ethnicity was measured through self-report at Time 1 (T1) by asking participants "*what is your ethnic group?*" In response to this question, students could choose from 11 ethnic categories or could provide an open-ended answer if they identified as multi-ethnic or if their ethnicity did not fit any of the categories listed. The analytic sample used four primary groups: Black, White, Mexican American, and Asian. Of these groups, the Black group consisted of students who either identified as "*Black/other country of origin (e.g., Belize, Guyana, Caribbean, West Indies)*" or "*Black/African-American.*" The Asian group also consisted of two groups: "*East Asian (e.g., Chinese, Korean, Japanese)*" and "*South East-Asian.*" No statistically significant differences on each dependent variable were found between these groups before they were collapsed.

Perceived Ethnic School Composition

Perceived ethnic school composition was measured by 1-item at Time 2 (T2). Students were asked *"how many students at this school are from your ethnic group?"* to which they responded on a 7-point scale: 1 = *"non or hardly any (less than 10%),"* 2 = *"a few (10-20%)"*, 3 = *"some (20-40%),"* 4 = *"about half (40-60%),"* 5 = *"more than half (60-80%),"* 6= *"most (80-90%),"* or 7 = *"all or almost all (90-100%)."* Data were then grouped into three school composition categories. The first category was labeled perceived numerical minority group (n = 185) and consisted of participants who answered *"none or hardly any"* or *"a few."* Participants who answered *"some"* up to *"about half"* were also combined and labeled as part of the perceived numerically diverse group (n = 811). Lastly, participants who answered *"more than half,"* *"most,"* or *"all or almost all"* were combined and labeled the perceived numerical majority group in their school (n = 517).

Pubertal Onset Status

Pubertal onset status was measured during the fall (T1) and spring (T2) of the 6th grade by 1-item that asked *"have you begun to menstruate (menstruate means to get your period)?"* to which girls responded either *"yes"* or *"no."* On the basis of these responses we created 3 groups: *Early starters* (yes at T1 and T2) (n = 363) who began their first menstruation sometime before beginning the 6th grade, *non-starters* (no at T1 and T2) (n = 755) who began their first menstruation sometime after the end of the 6th grade, and *changers* (no at T1 and yes at T2) (n = 193) who began their first menstruation sometime during the 6th grade transitioning year.

School Liking

School liking consisted of 2-items from the T2 survey. Students were asked to rate "*I like school*" and "*I look forward to going to school*" on a 5-point scale (1 = "*no way*" to 5 = "*for sure yes*"). The mean of the two items was calculated and a composite score was created (α = .82).

School Safety

A 6-item subscale of the Effective School Battery (ESB) (Gottfredson, 1984) from the T2 survey was used to assess student's perceived safety. Items tapped perceived safety at various places in school (e.g., in the restrooms, hallways). Perceived safety in these locations was rated on 5-point frequency scales (1 = "*never"* and 5 = "always"). The mean of these six items was calculated and a composite score was created (α = .79).

Body Image

Body image was assessed using 4-items adapted from the Eating Disorder Inventory (Garner et al., 1983). At T2 of the survey girls were presented with statements about their body image (e.g., *"I feed satisfied with the shape of my body,"* or "*I'm pretty happy about the way I look*") and asked to rate them on a 6-point scale (1 = "*Never*" to 6 = "*Always*"). The mean of the four items were calculated and a composite score was created (α = .83).

Loneliness

To measure loneliness in school 5-items adapted from Asher and Wheeler's (1985) Loneliness Scale were used. Students were presented with statements about loneliness in school (e.g., "*I have nobody to talk*" to or "*I feel alone*") and responded how they felt on a 5-point scale (1 = "*Not true at all*" to 5 = "*Always true*"). The mean of these five items was calculated and a composite score was created (α = .89).

Missing Data

Approximately one third of participants were missing data on school liking and loneliness outcomes, which resulted from a planned and randomized deletion of these measures' appearance in the larger survey. In other words, these participants were chosen at random to receive an alternative measure. In addition, participants with missing data due to lack of report on at least one predictor variable (i.e., ethnicity, pubertal onset, and subjective ethnic composition) were grouped and compared to participants with complete data on these variables. No systematic differences on each DV were found between those with complete and those with missing data, with the exception of the body image measure. Participants with missing data reported significantly lower levels of body image than participants with complete data on all predictors F(1528) = 5.989, p < .05. Overall, participants with missing data on any predictor or planned missing data on liking and loneliness outcomes were excluded from the analyses.

Analysis Plan

Mixed-Effects Hierarchical Regression REML (Restricted Maximum Likelihood) (XTMIXED command in STATA 12) was used to analyze the data. A multilevel approach was implemented because students were nested within 20 schools. The XTMIXED command in STATA allowed for better handling of complex error structures that could result from the nested data (Stata, 2005). The present study investigated whether school liking, school safety, body image, and loneliness in school varied as a function of pubertal onset (early-starter, non-starter, changer), perceived ethnic composition (minority, diverse, majority), and ethnicity (African American, Mexican American, Asian American, and White). White changers in the perceived minority were the reference group. Two levels were used in the hierarchical modeling. Level-1

variables included the predictors (i.e., pubertal onset, subjective perceived racial/ethnic school composition, and race/ethnicity) and the outcome variables (i.e., school safety, school liking, loneliness, or body image). For level-2 objective school ethnic diversity was predicted.

Models

The predicted equations (see Appendix A.) apply to all 4 dependent variables. Analyses were done separately for each dependent variable (DV). Since all predictors were categorical rather than continuous, all level-1 slope parameters were treated as fixed. Alternatively, the intercepts were treated as random. No centering was used. For the analyses a total of three estimated equations were run. First, unconditional means models were estimated, which are characterized by the absence of predictors at every level:

$$\text{Yij (DV)} = \beta_{0j} + \varepsilon_{ij} \text{ and } \beta_{0j} + \mu_{oj}$$

The unconditional means models were used to assess whether there was systematic variation in the outcome that was worth exploring and whether that variance lay within or between individuals. Secondly, Model 1 (Appendix A) was estimated, which included all of the predictors (i.e., pubertal onset, race/ethnicity, and perceived school composition) at level-1 and the corresponding two and three-way interactions. School diversity was also included as a level-2 variable in Model 1. If the 3-way interaction was found to be significant in Model 1, Model 2 (Appendix A) was not run. However, if the 3-way interaction between pubertal onset x race/ethnicity x perceived school composition was found to be non-significant in Model 1, the 3-way interaction was omitted for the third estimated equation (i.e., Model 2). Model 2 (Appendix A.) included each predictor, outcome, and its corresponding 2-way interactions at level 1 and school diversity at level 2.

Post-Hoc Tests of Mean Comparisons

In addition to running Hierarchical Regressions, contrasts were run to further examine the significance of each interaction. Due to the fact that each level-1 predictor was categorical, *contrasts of marginal linear predictions* allowed us to compare marginal means of each group. If interactions were found to be significant, additional post-hoc contrasts were run to determine what level of each predictor significantly differed from the reference group (i.e. White Changers in the perceived minority group) and from any other group. For example, a contrast could assess if White Changers significantly differed from Black Changers on a particular outcome.

Results

Descriptive Statistics

Tables 1, Table 2, and Table 3 (see Appendix B) show the means, standard deviations, and frequencies for each dependent variable as a function of ethnicity, pubertal onset status, or perceived school composition. Of the participants who reported pubertal onset information, 14.7% showed a change in pubertal onset (i.e., changers) from T1 to T2. The number of girls labeled as changers was fairly consistent across ethnic groups ranging from a 2.7% to 6.18% of the analytical sample. Only one outlier was excluded: a girl who reported her first menstruation at age five. The mean age of first menstruation at T1 was $M = 10.54$ ($SD = .733$), ranging from age 8 to 12 years old.

Unconditional Means Model Results

For the unconditional means models, findings across each dependent variable showed a large amount of variation among students within schools (ranging from .405 to 1.25) but little between-school variation (.002 to .023). These estimates suggest that between schools there was little variation in reported school liking, safety, loneliness, and body image; however, there was plenty of variation among students within schools. The intra-class correlations (ICC), which

estimate the relative amount of between and within-person variance, were also calculated for each outcome. ICC values ranged from .006 to .01 across outcomes. Although there was little clustering in each dependent variable within schools, a hierarchical structure was still used to account for the nested nature of the data and to be able to include the level-2 predictor (i.e. school diversity).

School Safety Results

Model 1 contrasts showed that the 3-way interaction (i.e., pubertal onset x perceived school composition x race/ethnicity) was not significant χ^2 (12, $N = 1294$) = 17.35, $p = .1368$. Therefore, Model 2 was run and hierarchical regression findings (Table 4, Appendix B) showed that in schools with no diversity, White Changers who were perceived numerical minorities in school had a school safety constant of $\beta = 3.59$ ($SE = .38$). Table 4 shows the change in the coefficients of safety across individuals. At level-2, school diversity did not significantly predict perceived safety across schools. Contrasts were used to compare level-1 groups' marginal means by examining the significance of each main effect and interactions. Findings showed a significant main effect of ethnicity χ^2 (3, $N = 1294$) = 15.49, $p < .001$.Since a significant interaction between ethnicity x perceived school composition was also found (Figure 1, Appendix B) χ^2 (6, $N = 1294$) = 18.03, $p < .01$, main effect findings were not interpreted. Instead, contrasts were used to determine where the differences in safety were beyond just the reference group. The biggest difference was found in feelings of safety within the perceived minority group (Figure 1). Overall, White perceived minority students felt the least safe overall ($M = 3.81$). More specifically, White perceived minorities felt significantly less safe than White perceived diverse χ^2 (1, $N = 1294$) = 6.50, $p < .01$ and perceived majority students χ^2 (1, $N = 1294$) = 9.73, $p < .01$. Additionally, it was found that among perceived minority girls, Black girls

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(M = 4.50) felt significantly safer than White χ^2 (1, N = 1294) = 16.93, $p < .001$, Asian χ^2 (1, N = 1294) = 7.49, $p < .01$, and Mexican-American girls χ^2 (1, N = 1294) = 5.03, $p < .05$.

School Liking Results

Model 1 contrasts for school liking showed no significant 3-way interaction between pubertal onset x perceived school composition x race/ethnicity χ^2 (12, N = 865) = 14.67, $p = .26$. Model 2 hierarchical regression analyses (Table 4) showed a predicted school liking constant of $\beta = 3.01$ (SE = .60) for White Changers in the perceived minority group who attended schools with no diversity. However, no significant differences were found in change of the coefficients. School diversity also did not significantly predict perceived safety across schools at level-2. When examining differences in means between each categorical predictor a significant main effect of ethnicity was found χ^2 (3, N = 865) = 11.23, $p < .01$. White girls (M = 3.46) showed significantly less liking of school than Black girls (M = 3.73) χ^2 (1, N = 865) = 8.13, $p < .001$ and Mexican American girls (M = 3.74) χ^2 (1, N = 865) = 7.25, $p < .01$. Contrasts also showed a significant interaction between pubertal onset x perceived school composition (Figure 2, Appendix B) χ^2 (4, N = 865) = 14.50, $p < .01$. More specifically, among girls who were in the perceived numerical majority group, non-starters liked school significantly more than early-starters χ^2 (1, N = 865) = 7.96, $p < .01$ and changers χ^2 (1, N = 865) = 9.38, $p < .01$.

Loneliness Results

When examining loneliness in school for Model 1, White changers who perceived themselves to be a numerical minority had a constant of $\beta = 2.73$ (SE =.48) in schools with no diversity. At level 2, school diversity was not found to significantly predict loneliness across schools. Findings in Table 4 show the coefficients for the hierarchical regression analysis. Contrasts revealed a significant 3-way interaction between pubertal onset x race/ethnicity x

perceived school composition χ^2 (12, $N = 839$) = 22.45, $p < .05$. Within this interaction, the perceived minority group (Figure 3, Appendix B) showed the most differences in self-reported loneliness in comparison to the perceived diverse (Figure 4, Appendix B) and perceived majority group (Figure 5, Appendix B). More specifically, mean comparison contrasts showed that Asian early-starters in the perceived numerical minority group ($M = 2.8$) felt significantly lonelier than early starters in the perceived numerical minority group who were White χ^2 (1, $N = 839$) = 4.81, $p < .05$, Black χ^2 (1, $N = 839$) = 6.64, $p < .01$, and Mexican American χ^2 (1, $N = 839$) = 8.43, $p < .01$. In addition, White changers in the perceived minority group ($M = 2.35$) reported significantly more loneliness than changers in the perceived minority group who were Black χ^2 (1, $N = 839$) = 4.56, $p < .05$ and Mexican American χ^2 (1, $N = 839$) = 4.62, $p < .05$. Overall White changers who perceived themselves as a minority and Asian early-starters in the perceived minority group reported the highest loneliness overall in comparison to other groups.

Body Image Results

Results for body image when examining contrasts showed that the 3-way interaction between pubertal onset x perceived school composition x ethnicity was not significant χ^2 (12, $N = 1291$) = 16.16, $p = .18$. Thus, Model 2 findings showed that White changers in the perceived minority group, when school diversity was set to zero, had a constant of $\beta = 5.40$ ($SE = .64$) for body image. Table 4 shows the hierarchical regression output. School diversity at level-2 also did not significantly predict perceived safety across schools Contrasts, however, showed a significant main effect for pubertal onset χ^2 (2, $N = 1291$) = 21.19, $p < .001$. More specifically, early-starters (M = 4.41) reported significantly more negative body image than non-starters (M = 4.80) χ^2 (1, $N = 1291$) = 20.7, $p < .001$. Additionally, a significant main effect of ethnicity was found χ^2 (3, $N = 1291$) = 24.59, $p < .001$ with Black girls (M = 5.02) feeling significantly more

positive body image than White girls (M = 4.56) χ² (1, *N* = 1291) = 17.57, *p* < .001, Mexican American girls (M = 4.59) χ² (1, *N* = 1291) = 13.59, *p* < .001, and Asian girls (M = 4.53) χ² (1, *N* = 1291) = 16.90, *p* < .001.

Discussion

When examining pubertal onset alone, prior evidence suggests that early-maturing girls suffer from more psychological distress, poor body image, and low self-esteem (Ge, Conger, & Elder, Jr., 1996; 2001; Ohring, et. al., 2002). Consistent with the *early-timing hypothesis*, the present study showed that early-starters who began their first menstruation before the 6th-grade, relative to non-starters, suffered from more negative body image especially in comparison to non-starters. Findings suggest that the potential increase in BMI and/or breast development associated with being an early-starter could heighten these girls' awareness of their body, which likely does not fit the 6th grade normative body type. Consequently, deviating from this 6th grade norm could make girls more self-conscious and critical of their body at a time when fitting in with peers is crucial (Eccles and Midgley, 1989).

For Asian girls who tend to have lower BMI scores than other ethnic groups, early-maturation could make them even more at risk for poor emotional adjustment (Lanza, Echols, & Graham, 2012), especially due to greater deviation from the normative context. Accordingly, the present study found that Asian early-starters who are in the perceived minority group in school reported the highest levels of loneliness. Moreover, findings imply that deviation from the contextual norm (i.e., due to ethnicity and relative peer physical development) could make girls even more sensitive to perceptions of their body image. These findings also support the *early-timing hypothesis* but suggest that when examining early-maturation, school and individual contextual factors (e.g., school ethnic context or ethnicity) should be considered.

Findings for school-climate outcomes also brought attention to the importance of examining the contextual match between girls' ethnic background and the relative perceived school ethnic context. Foremost, despite the vulnerability of being a perceived numerical minority in school, Black girls reported significantly higher perceived safety than any other ethnic group within this context and overall. Future studies should examine what factors could be mediating this finding. Contrastingly, White perceived numerical minority girls reported feeling less safe than perceived diverse or majority groups and the least safe across all groups. Since White girls are the racial/ethnic majority in the greater societal context, being part of the minority ethnic group in school could present a mismatched context at a time when greater numbers of same-race peers could be important to their development (Bellmore et al., 2007). This finding is consistent with prior research showing that White students show stronger same ethnicity preferences in middle school than other ethnic groups (Shrum, Cheek, & Hunter, 1988).

Pubertal onset status also played a significant role in self-reported levels of school climate, especially for White girls. For example, White changers in the numerical minority group in school reported more loneliness in comparison to other ethnic groups and were the second loneliest across all groups. Alternatively, for girls who had not yet begun to menstruate during the sixth grade (i.e., non-starters), being a perceived majority served as a protective factor. For example, descriptive statistics showed that non-starters who perceived themselves as a perceived majority reported less loneliness ($M = 1.55$) than any other pubertal onset and school composition group. Additionally, this group also reported higher levels of school liking across all groups. Based on these findings one can infer that in addition to a mismatch in context, the potential stress of pubertal changes (whether early or during the middle school transition) could make these girls especially vulnerable. Thus, both the *early-timing hypothesis* and the *stressful*

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change hypothesis could be supported when considering these multiple contextual changes (i.e.,

transition into middle school, mismatch in racial/ethnic context, and change into puberty). These

findings illuminate the importance of identifying ways to ease the middle school transition for

girls, especially for those who have begun or will begin to menstruate during the transitioning

year.

When holding pubertal onset and perceived school composition constant across ethnic

groups, differences between ethnic groups were also found. Foremost, Black girls reported

significantly more positive body image than other ethnic groups. Findings were consistent with

prior literature suggesting that Black girls hold a less rigid ideal body type and thus report less

body dissatisfaction than White girls (Siegel, 2002; Nishina, Ammon, Bellmore, Graham, 2006).

It was also found that White girls liked school the least, especially relative to Black and Mexican

American girls. Less is known, however, about what could be influencing this difference. Since

White girls seem to also be most vulnerable in the case of other school climate factors (e.g.,

school safety and loneliness in school), future studies should examine what other influences like

academic engagement and victimization could be mediating these relationships.

Lastly, when examining the impact of school diversity across schools (at level 2), it was

found that school diversity did not significantly predict school climate or body image. Perceived

school composition between individuals, however, played a dominant role in self-reports of

school climate. Thus, more studies should consider how student's perception of school ethnic

composition influences the middle school transition. For instance, future studies could examine if

the availability of same-race peers matters more for girls who have a higher sense of ethnic

identity than for girls who do not. Studies could also investigate if ethnic stereotypes or acts of

ethnic discrimination could heighten the importance that ethnic context plays during the

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simultaneous transition into puberty. Lastly, since the present study takes into account ethnic school composition within a school transition year, level of ethnic congruence between the elementary and middle school could also be examined in a future study to see if it plays a significant role in adjustment into middle school.

Notwithstanding some limitations, this study adds to the literature by examining the impact of perceived school composition, pubertal onset, and ethnicity during the middle school transition. Despite the relatively small sample sizes in some sub-categories (e.g., minority changers), numbers in these groups were still evenly distributed between schools. This small group size was also expected since perceived ethnic minority students by definition represent a small percentage of each school. Another limitation was that pubertal onset was measured using a single item. Validity of this measure could have increased with other proxies of pubertal development such as breast development or Tanner's Stages (1962), which unfortunately were unavailable in the larger survey. Lastly, some outcome measures (i.e., school liking and body image) were also limited in that they only had a few items. Therefore, despite the good alpha levels of each outcome measure, more items would have been more informative.

Conclusion

The present study further highlighted the vulnerability of girls during the adjustment to the middle school transition, especially when dealing with pubertal onset. This study added to the literature by examining the impact that perceived ethnic composition, race/ethnicity, and pubertal onset had on school climate and body image during the middle school transition. Findings supported prior research on the *early-timing hypothesis* showing that early-maturing girls reported lower levels of positive body image than other pubertal status groups. Among ethnic groups, Black girls reported higher levels of positive body image. When examining loneliness it

was found that Asian early-starters who were a perceived numerical minority in their school felt

the loneliest perhaps due to their increased deviation from the relative physical norm in school.

Alternatively, for White girls in the minority, being a pubertal changer also led to higher levels

of loneliness. In this case, the *stressful-change hypothesis* was also supported since these girls

had to adjust to the simultaneous transition into school, puberty, and shift in racial/ethnic

demographics relative to the larger societal norm. Furthermore, it was found that across schools,

diversity did not significantly predict levels of body image or school climate, whereas perceived

school composition between individuals did. For example, Black girls relative to all other ethnic

groups felt the safest in school. In summary, when considering the interaction between pubertal

onset, perceived school composition, or ethnicity it is important to realize the perceived

contextual norm that students are in, in order to understand the impact it has on girls.

Overall, maturation (whether early or during the school transitioning year) seemed to

play a relevant role on girls' perceptions of school climate and body image. Contrastingly, being

a non-starter who was in the majority seemed to buffer some aspects of self-reported school

climate. For example, these girls reported more liking of school and less loneliness. Findings

highlight the importance of finding ways to assist girls who may be most vulnerable during the

middle school transition. For instance, establishing school organized clubs where girls could

identify ethnically or culturally to others of similar backgrounds could help facilitate the

transition. Overall, this research also recognizes the importance of targeted transition programs

(e.g., ones specifically for girls), which could provide an opportunity for the development of

friendships with other girls and eventually decrease feelings of loneliness, increase school liking,

etc. early in the transition process. Future studies, should also continue to investigate school

climate or body image concerns as they relate to pubertal onset and school ethnic composition by

better explaining what could be mediating certain outcomes.

References

Alspaugh, J. W. (1988). Achievement loss associated with the transition to middle school and high school. *The Journal of Educational Research*, *92*(1), 20-25.

Anderson, L.W., Jacobs, J., Schramm, S., Splittgerber, F. (2000). School transitions: beginning of the end or a new beginning? *International Journal of Educational Research, 33*, 325-339.

Asher, S. R. & Wheeler, V. A. (1985). Children's loneliness: A comparison of rejected and neglected peer status. *Journal of Consulting and Clinical Psychology, 53*(4), 500-505.

Bellmore, A., Witkow, M., Graham, S., & Juvonen, J. (2007). The influence of classroom ethnic composition on same-and other-ethnicity peer nominations in middle school. *Social Development, 16,* 720-740.

Bellmore, A. D., Witkow, M. R., Graham, S., & Juvonen, J. (2004).Beyond the individual: The impact of ethnic context and classroom behavioral norms on victims' adjustment. Developmental Psychology, *40*: 1159–1172.

Benner, A. & Graham, S. (2007). Navigating the transition to multi-ethnic urban high school: Changing racial/ethnic congruence and adolescents' school-related affect. *Journal of Research on Adolescence, 17,* 207-220.

Blyth, D. A., Simmons, R. G., & Zakin, D. F. (1985). Satisfaction with body image on early adolescent females: The impact of pubertal timing within different social environments. *Journal of Youth and Adolescence, 14*(3), 207-225.

Bronfenbrenner, U., (1979). *The ecology of human development.* Cambridge: Harvard University Press.

Carter, R., Caldwell, C., Matusko, N., Antonucci, T., & Jackson, J. (2010). Ethnicity, perceived

pubertal timing, externalizing behaviors, and depressive symptoms among black adolescent girls. *Journal of Youth and Adolescence, 40*, 1394–1406

Carter, R., Jaccard, J., Silverman, W. K., & Pina, A. A. (2009). Pubertal timing and its link to behavioral and emotional problems among 'at-risk' African American adolescent girls. *Journal of Adolescence, 32*(3), 467–481.

Caspi, A. & Moffitt, T. E. (1991). Individual differences are accentuated during periods of social change: The sample case of girls at puberty. *Journal of Personality and Social Psychology, 61*(1), 157-168.*l*

Eccles, J. S., and Midgley, C. (1989). Stage/environment fit: Developmentally appropriate classrooms for early adolescents. In Ames, R. and Ames, C. (eds.), *Research on Motivation in Education* (*Vol. 3*. pp. 139–186). Academic Press, San Diego, CA.

Eccles, J. S., Wigfield, A., Flanagan, C. A., Miller, C., Reu-man, D. A., & Yee, D. (1989). Self-concepts, domain values, and self-esteem: Relations and changes at early adolescence. *Journal of Personality, 57*: 283-310.

Garner, D. M., Olmstead, M. P., and Polivy, J. (1983). Development and validation of a Multidimensional Eating Disorder Inventory for anorexia nervosa and bulimia. *Int. J. Eating Disordor 2:* 15-34.

Ge, X., Conger, R. D., & Elder, Jr. G. H. (1996). Coming of age too early: Pubertal influences on girls' vulnerability to psychological distress. *Child Development, 67(6),* 3386-3400.

Ge, X., Conger, R. D., Elder Jr. G. H. (2001). Pubertal transition, stressful life events, and the emergence of gender differences in adolescent depressive symptoms. *Developmental Psychology, 37*(3), 404-417.

Gottfredson, G. (1984). *Effective School Battery*. Psychological Assessment Resources.

Juvonen, J., Nishina, A., & Graham, S. (2006). Ethnic diversity and perceptions of safety in urban middle schools. *Psychological Science*, *17*(5), 393-400.

Kaltiala-Heino, R., Marttunen, M., Rantanen, P., & Rimpela, M. (2003). Early puberty is associated with mental health problems in middle adolescence. *Social Science & Medicine, 57:* 1055-1064.

Koenig, L. J., & Gladstone, T. R. G. (1998). Pubertal development and school transition: Joint Influences on depressive symptoms in middle and late adolescents. *Behavior Modification*, *22*(3), 335-357.

Killen, J. D., Taylor, C. B., Hayward, C., Haydel, K. F., et al. (1996). Weight concerns influence the development of eating disorders: A 4-year prospective study. *J. Consult. Clin. Psychol.* 64: 936–940.

Lanza, H. I., Echols, L., & Graham, S. (2012). *Deviating from the norm: Body mass index (BMI) differences and psychological adjustment among early adolescent girls.* Manuscript submitted for publication.

Lynne, S.D., Graber, J.A., Nichols, T.R., Brooks-Gunn, J., & Botvin, G. J. (2007). Links between pubertal timing, peer influences, and externalizing behaviors among urban students followed through middle school. *Journal of Adolescent Health, 40*(2), 181-192.

Mendle, J., Turkheimer, E., & Emery, R. E. (2007). Detrimental psychological outcomes associated with early pubertal timing in adolescent girls. *Developmental Review, 27*(2), 151–171.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., and Scheidt, P.

(2001). Bullying behaviors among us youth: Prevalence and association with psychosocial adjustment. *JAMA,* 285, 2094–2100.

Nishina, A., Ammon, N. Y., Bellmore, A. D., Graham, S. (2006). Body dissatisfaction and physical development among ethnic minority adolescents. *Journal of Youth and Adolescence, 35*(2), 189–201

Ohring, R., Graber, J.A., Brooks-Gunn, J. (2002). Girls' recurrent and concurrent body dissatisfaction: Correlates and consequences over 8 years. *International Journal of Eating Disorder*, *31*(4), 404-415.

Reynolds, B. M & Juvonen, J. (2010). The Role of Early Maturation, Perceived Popularity, and Rumors in the Emergence of Internalizing Symptoms Among Adolescent Girls. *J Youth Adolescence, 40*(11), 1407-1422.

Robinson, T. N., Killen, J. D., Litt, I. F., Hammer, L. D. et al. (1996). Ethnicity and body dissatisfaction: Are Hispanic and Asian girls at increased risk for eating disorders?. *Journal of Adolescent Health 19*: 384–393.

Shrum, W., Cheek, N. H., & Hunter, S. M. (1988). Friendship in school: Gender and racial homophily. *Sociology of Education*, *61*: 227–239

Siegel, J. M. (2002). Body image change and adolescent depressive symptoms. *J. Adolesc. Res.* 17: 27–41.

Simpson, E. H. (1949, April 30). Measurement of diversity. *Nature, 163*, p. 688.

Simmons, R. G., & Blyth, D. A. (1987). *Moving into adolescence: The impact of pubertal change and school context*. New York: Aldine De Gruyter.

Simmons, R. G., Burgeson, R., Carlton-Ford, S. & Blyth, D. A. (1987). The impact of cumulative change in early adolescence. *Child Development, 58,* 1220-I 234.

Stata (2005). *Stata Reference Manual Release 9.0*. College Station, TX: Stata.

Stice, E. Presnell, K., & Bearman, S. K. Relation of early menarche to depression, eating

disorders, substance abuse, and comorbid psychopathology among adolescent girls.

Developmental Psychology, 37(5), 608-619.

Tanner, JM (1962) *Growth at Adolescence*. Springfield, Massachusetts: Thomas.

Way, N., Reddy, R. & Rhodes, J. (2007). Students' perceptions of school climate during the

middle school years: Associations with trajectories of psychological and behavioral

adjustment. *American Journal of Community Psychology, 40*(3), 194-213.

Williams, J. M. & Currie, C. (2000). Self-esteem and physical development in early adolescence:

Pubertal timing and body image. *The Journal of Early Adolescence, 20*(2), 129-149.

Appendix A. Estimated Hierarchical Models

<u>Model 1.</u> The reference group was White changers in the perceived minority group. The predicted equation represents all of the predictors at level-1 and 2 with their corresponding interactions, which were run at the same time in the form of:

Level 1

$$Y_{ij} \text{ (Predicted DV)} = \beta_{0j} + \beta_{1j}(\text{Non-Starter}_{ij}) + \beta_{2j}(\text{Early-Starter}_{ij}) + \beta_{3j}(\text{Black}_{ij}) +$$

$$\beta_{4j}(\text{Asian}_{ij}) + \beta_{5j}(\text{Mexican American}_{ij}) + \beta_{6j}(\text{Diverse}_{ij}) + \beta_{7j}(\text{Majority}_{ij}) + \beta_{8j}(\text{Non-starter}_{ij},$$

$$\text{Black}_{ij}) + \beta_{9j}(\text{Non-starter}_{ij}, \text{Asian}_{ij}) + \beta_{10j}(\text{Non-starter }_{ij}, \text{Mexican American}_{ij}) +$$

$$\beta_{11j}(\text{Early-Starter}_{ij}, \text{Black}_{ij}) + \beta_{12j}(\text{Early-Starter}_{ij}, \text{Asian}_{ij}) + \beta_{13j}(\text{Early-Starter}_{ij}, \text{Mexican}$$

$$\text{American}_{ij}) + \beta_{14j}(\text{Non-starter}_{ij}, \text{Diverse}_{ij}) + \beta_{15j}(\text{Non-starter}_{ij}, \text{Majority}_{ij}) + \beta_{16j}(\text{Early-}$$

$$\text{Starter}_{ij}, \text{Diverse}_{ij}) + \beta_{17j}(\text{Early-Starter}_{ij}, \text{Majority}_{ij}) + \beta_{18j}(\text{Black}_{ij}, \text{Diverse}_{ij}) +$$

$$\beta_{19j}(\text{Black}_{ij}, \text{Majority}_{ij}) + \beta_{20j}(\text{Asian}_{ij}, \text{Diverse}_{ij}) + \beta_{21j}(\text{Asian}_{ij}, \text{Majority}_{ij}) + \beta_{22j}(\text{Mexican}$$

$$\text{American}_{ij}, \text{Diverse}_{ij}) + \beta_{23j}(\text{Mexican American}_{ij}, \text{Majority}_{ij}) + \beta_{24j}(\text{Non-starter}_{ij}, \text{Black}_{ij},$$

$$\text{Diverse}_{ij}) + \beta_{25j}(\text{Non-starter}_{ij}, \text{Black}_{ij}, \text{Majority}_{ij}) + \beta_{26j}(\text{Non-starter}_{ij}, \text{Asian}_{ij}, \text{Diverse}_{ij})$$

$$+ \beta_{27j}(\text{Non-starter}_{ij}, \text{Asian}_{ij}, \text{Majority}_{ij}) + \beta_{28j}(\text{Non-starter}_{ij}, \text{Mexican American}_{ij}, \text{Diverse}_{ij})$$

$$+ \beta_{29j}(\text{Non-starter}_{ij}, \text{Mexican American}_{ij}, \text{Majority}_{ij}) + \beta_{30j}(\text{Early-Starter}_{ij}, \text{Black}_{ij},$$

$$\text{Diverse}_{ij}) + \beta_{31j}(\text{Early-Starter}_{ij}, \text{Black}_{ij}, \text{Majority}_{ij}) + \beta_{32j}(\text{Early-Starter}_{ij}, \text{Asian}_{ij}, \text{Diverse}_{ij})$$

$$+ \beta_{33j}(\text{Early-Starter}_{ij}, \text{Asian}_{ij}, \text{Majority}_{ij}) + \beta_{34j}(\text{Early-Starter}_{ij}, \text{Mexican American}_{ij},$$

$$\text{Diverse}_{ij})) \beta_{35j}(\text{Early-Starter}_{ij}, \text{Mexican American}_{ij}, \text{Majority}_{ij}) + \varepsilon_{ij}$$

Level 2

$$\beta_{0j} \text{ (Predicted DV)} = \gamma_{00}$$

$$+ \gamma_{01}(\text{Objective School Diversity}) + \mu_{0j}$$

$$\beta = \gamma$$

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Model 2. The estimated equation of each predictor with each two way interaction between Pubertal Onset Status x Perceived School Composition, Race/Ethnicity x Perceived School Composition, and Pubertal Onset Status x Race/Ethnicity take the form of:

Level 1

Y_{ij} (Predicted DV) =

β_{0j} + $\underline{\beta_1}$(Pubertal Onset Status x Perceived School Composition) + $\underline{\beta_2}$ (Race/Ethnicity x Perceived School Composition) + $\underline{\beta_3}$ (Pubertal Onset Status x Race/Ethnicity + ε_{ij}

Level 2

β_{0j} (Predicted DV) = γ_{00}

+ γ_{01}(Objective School Diversity) + μ_{oj}

$$\beta = \gamma$$

Appendix B

Table 1

Means, standard deviations, and frequencies of each outcomes variable by race/ethnicity

		Black	Asian	Mexican-American	White
School Liking					
	M	3.73	3.615	3.695	3.529
	SD	0.9972	0.9672	1.008	0.0957
	N	185	221	329	241
School Safety					
	M	4.301	4.105	4.219	4.255
	SD	0.6733	0.633	0.6732	0.6201
	N	279	316	536	343
Loneliness					
	M	1.48	1.7761	1.578	1.688
	SD	0.7739	0.7531	0.7135	0.6982
	N	184	197	366	205
Body Image					
	M	5.01	4.489	4.541	4.64
	SD	1.023	1.043	1.171	1.125
	N	278	314	535	343

Table 2

Means, standard deviations, and frequencies of each outcomes variable by pubertal onset

		Non-Starter	Early-Starter	Changer
School Liking				
	M	3.658	3.644	3.5349
	SD	0.9952	0.9696	0.9925
	N	488	257	129
School Safety				
	M	4.244	4.185	4.245
	SD	0.6382	0.6943	0.6134
	N	755	363	193
Loneliness				
	M	1.596	1.6432	1.732
	SD	0.7004	0.7627	0.8659
	N	496	227	128
Body Image				
	M	4.796	4.453	4.556
	SD	1.06	1.154	1.148
	N	754	362	192

Table 3

Means, standard deviations, and frequencies of each outcomes variable by School Composition

		Minority	Diverse	Majority
School Liking				
	M	3.647	3.6419	3.6447
	SD	0.996	0.98633	0.998
	N	121	539	342
School Safety				
	M	4.119	4.267	4.1924
	SD	0.74489	0.6087	0.6884
	N	182	811	516
Loneliness				
	M	1.7652	1.598	1.5962
	SD	0.8387	0.7209	0.7033
	N	112	518	337
Body Image				
	M	4.54	4.615	4.576
	SD	1.145	1.119	1.135
	N	182	807	516

Table 4

Hierarchical Linear Regression Models for each outcome

	Outcome						
	Body Image		School Liking		School Safety		Loneliness
Parameter	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1
	Fixed Effects						
Level 1							
Constant	5.4*** (.64)	4.8*** (.49)	3.2*** (.70)	3.0*** (.60)	3.4*** (.46)	3.6*** (.38)	2.7*** (.48)
Pubertal Onset Status (ref = Changers)							
Non-Starter	-.74 (60)	-.00 (.33)	.47 (.55)	.57 (.35)	-.07 (.34)	-.21 (.19)	-.46 (.47)
Early-Starter	-1.4 (.70)*	-.67 (.39)	.31 (.85)	.27 (.43)	.18 (.40)	-.30 (.23)	-.56 (.53)
Perceived School Composition (ref = Minority)							
Diverse	-.27 (.60)	.24 (.34)	.16 (.54)	.42 (.36)	.58 (.34)	.27 (.20)	-.70 (.48)

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Majority	-1.2 (.62)*	-.20 (.36)	.28 (.58)	-.02 (.38)	.48 (.35)	.43 (.21)*	-.66 (.48)
Race/Ethnicity (ref = White)							
Black	.49* (.62)	.55 (.36)	-.53 (1.1)	.68 (.41)	.45 (.48)	.53** (.21)	-.1.2* (.59)
Asian	-1.5* (.70)	-.03 (.35)	.01 (.65)	.04 (.36)	.39 (.40)	.16 (.20)	-.17 (.53)
Mexican-American	-.41 (.77)	.05 (.36)	.76 (.84)	.44 (.39)	.65 (.44)	.15 (.21)	-.1.2* (.55)
Pubertal Onset Status x School Composition x Race/Ethnicity (ref = Changer Minority White)							
Non-Starter x Black x Diverse	.42 (.97)		-1.4 (1.2)		-.21 (.56)		-.1.2 (.75)
Non-Starter x Black x Majority	-.84 (1.0)		-.58 (1.2)		-.51 (.58)		-.42 (.77)
Non-starter x Asian x Diverse	-1.7 (.86)		-.55 (.84)		.33 (.49)		-.03 (.69)
Non-starter x Asian x Majority	-.2.7 (.90)		.43 (.88)		-.07 (.52)		-.00 (.72)
Non-starter x Mexican x Diverse	-.26 (.90)		-.14 (1.0)		.90 (.52)		-1.3 (.70)
Non-starter x Mexican x Majority	-.73 (.94)		.94 (1.0)		.52 (.54)		-1.3 (.72)
Early-starter x Black x Diverse	.14 (1.1)		-1.7 (1.4)		.54 (.62)		-1.5 (.83)
Early-starter x Black x Majority	-.57 (1.1)		-1.5 (1.4)		.30 (.65)		-1.8 (.86)*
Early-starter x Asian x Diverse	-.1.3 (1.0)		.67 (1.1)		.98 (.58)		-1.3 (.82)
Early-starter x Asian x Majority	-.2.1 (1.1)*		.48 (1.2)		.35 (.61)		-1.7 (.85)
Early-starter x Mexican x Diverse	-.92 (1.1)		.60 (1.3)		.41 (.64)		-.54 (.91)
Early-starter x Mexican x Majority	-.1.4 (1.2)		1.0 (1.3)		-.01 (.66)		-1.1 (.92)
Pubertal Onset Status x Perceived School Composition (ref = Changer Minority)							
Non-starter x Diverse	.71 (.65)	.13 (.32)	-.12 (.61)	-.49 (.35)	-.16 (.37)	.12 (.18)	.42 (.54)
Non-starter x Majority	1.6 (.68)*	.41 (.33)	-.24 (.65)	.15 (.36)	.09 (.39)	.07 (.19)	.27 (.54)
Early-starter x Diverse	.84 (.77)	.24 (.36)	-.44 (.90)	-.45 (.40)	-.57 (.45)	.11 (.21)	.57 (.63)
Early-starter x Majority	1.3 (.82)	.20 (.37)	-.41 (.96)	-.30 (.41)	-.35 (.47)	-.02 (.21)	.93 (.64)
Pubertal Onset Status x Race/ Ethnicity (ref = Changer White)							
Non-starter x Black	.15 (.89)	.07 (.28)	.59 (1.1)	-.47 (.31)	.49 (.51)	.19 (.16)	.52 (.66)

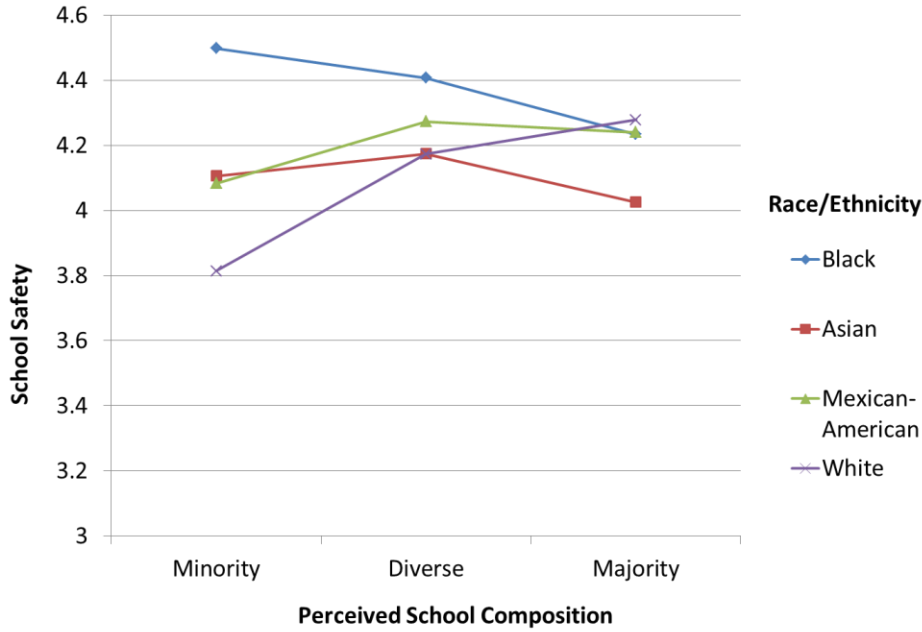|							
Non-starter x Asian	1.8* (.77)	.01 (.28)	.06 (.73)	-.12 (.29)	-.00 (.44)	.15 (.16)	-.15 (.60)
Non-starter x Mexican	.38 (.85)	-.00 (.24)	-.56 (.94)	-.32 (.26)	-.63 (.49)	.07 (.14)	1.2 (.64)
Early-starter x Black	.56 (.97)	.42 (.34)	1.4 (1.3)	-.02 (.35)	-.21 (.56)	.15 (.19)	1.2 (.71)
Early-starter x Asian	1.9* (.89)	.48 (.33)	-.19 (1.0)	.33 (.34)	-.46 (.52)	.17 (.19)	1.2 (.70)
Early-starter x Mexican	1.4 (1.0)	.33 (.28)	-.55 (1.2)	.21 (.30)	-.11 (60)	.29 (.16)	.43 (.82)
Pubertal Onset Status x Perceived School Composition (ref = Changer x Minority)							
Black x Diverse	-.86 (.90)	-.38 (.29)	1.3 (1.2)	-.20 (.33)	-.45 (.51)	-.45** (.17)	1.53* (.67)
Black x Majority	.53 (.93)	-.08 (.32)	.80 (1.2)	-.08 (.36)	-.49 (.53)	-.73*** (.18)	.97 (.69)
Asian x Diverse	1.2 (.79)	-.22 (.28)	.33 (.76)	.12 (.31)	-.72 (.46)	-.29 (.16)	.43 (.62)
Asian x Majority	2.2 (.82)	-.04 (.31)	-.39 (.76)	-.00 (.34)	-.56 (.47)	-.54** (.18)	.33 (65)
Mexican x Diverse	.15** (.82)	-.20 (.32)	-.13 (.90)	-.09 (.35)	-.84 (.47)	-.17 (.19)	1.1 (.62)
Mexican x Majority	.79 (.84)	.01 (.34)	-.79 (.93)	-.05 (.37)	-.65 (.49)	-.31 (.20)	1.3* (.63)
Level 2							
School racial/ethnic diversity	-.40 (.53)	-.39 (.51)	-.06 (.76)	08 (.74)	.73 (.52)	.66 (.50)	-.59 (.36)
Random Parameters							
Between-school variance	.01 (.01)	.01 (.01)	.04 (.02)	.04 (.02)	.03 (.01)	.02 (.01)	.00 (.00)
Between-observation variance	1.2 (.05)	1.2 (.05)	.93 (.05)	.94 (.05)	.39 (.02)	.39 (.02)	.53 (.03)

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

Figure 1. The two-way interaction between race/ethnicity and perceived school composition on self-reported school safety means. Higher values mean more school safety.
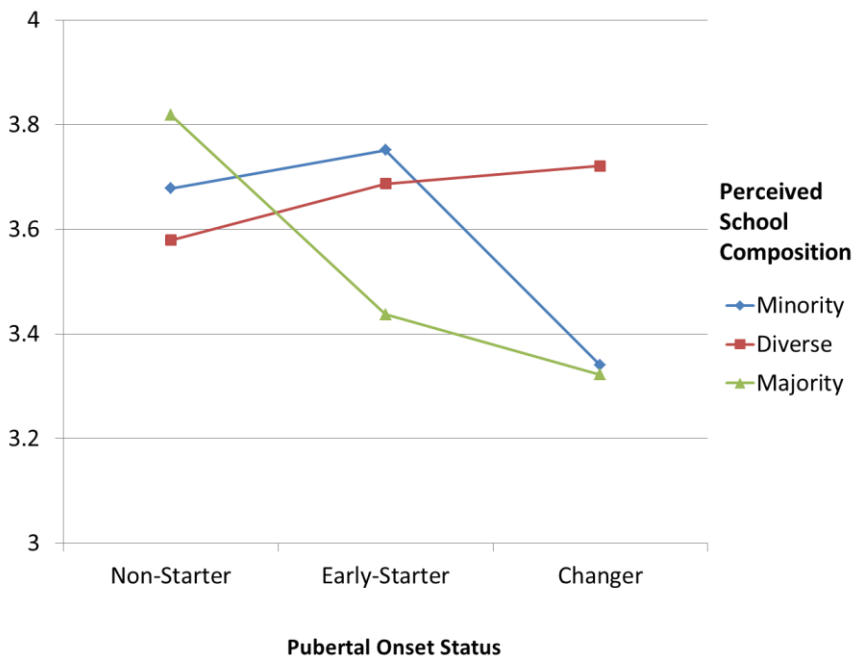
Figure 2. The two-way interaction between pubertal onset and perceived school composition on self-reported school liking means. Higher values mean more school liking.
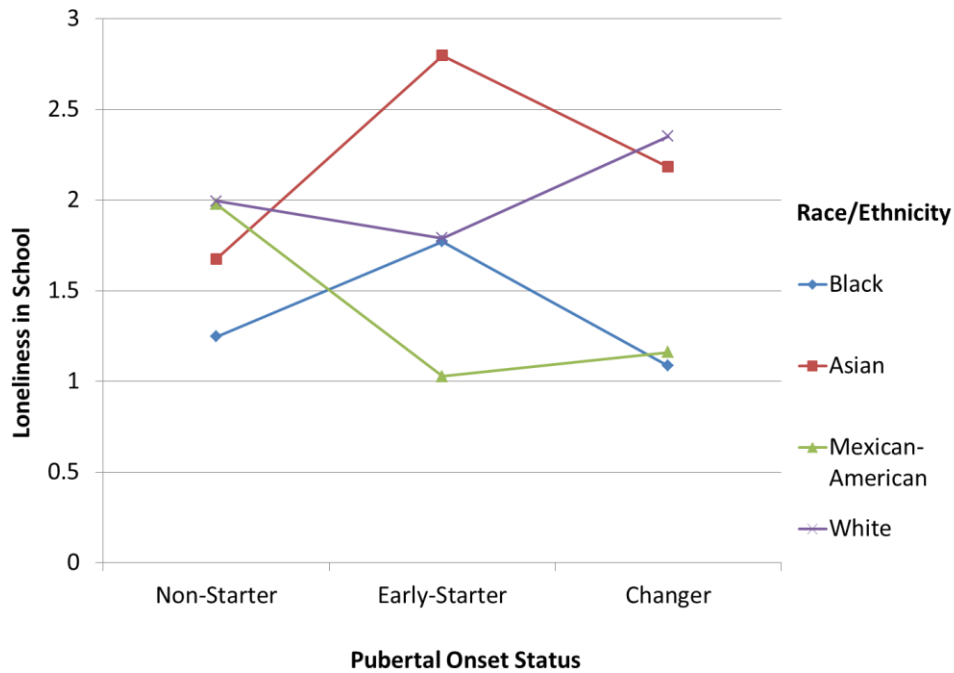

Figure 3. This figure shows the perceived majority group in the three-way interaction between race/ethnicity, pubertal onset status, and perceived school composition on self-reported loneliness in school. Higher values mean more loneliness.
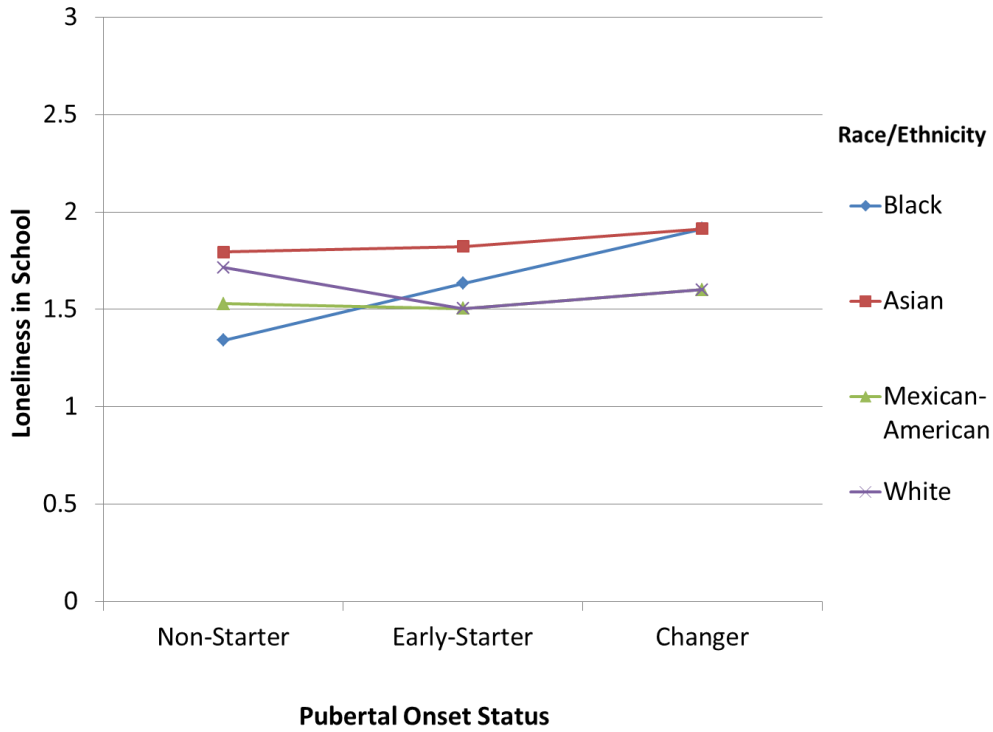
Figure 4. This figure shows the perceived diverse group in the three-way interaction between race/ethnicity, pubertal onset status, and perceived school composition on self-reported

Figure 5. This figure shows the perceived majority group in the three-way interaction between race/ethnicity, pubertal onset status, and perceived school composition on self-reported loneliness in school. Higher values mean more loneliness.