Journal of Experimental Child Psychology 226 (2023) 105573

Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp

The roles of school racial climate and science, technology, engineering, and mathematics classroom climate in adolescents' gender and racial peer inclusion and attribution decisions

Angelina Joy *, Channing J. Mathews, Jacqueline Cerda-Smith, Jerica L. Knox, Kelly Lynn Mulvey

North Carolina State University, Raleigh, NC 27695, USA

ARTICLE INFO

Article history:
Received 8 March 2022
Revised 30 September 2022

Keywords:
Gender
Race
Social inclusion
School climate
STEM

ABSTRACT

Adolescents use social identities and reasoning to make peer inclusion and attribution decisions. School climate plays a role in these decisions. Thus, this study analyzed how school racial climate and STEM (science, technology, engineering, and math) classroom climate were associated with the choices of adolescents (N = 294; M_{age} = 15.72 years; 52.3 % female; 36.7 % White/European American, 32.9 % Black/African American, 11.2 % Latino/Hispanic [the most common racial/ethnic groups in the schools where data collection took place]) in two tasks: peer inclusion and attribution of ability. On the peer inclusion task, participants were more likely to choose a non-White peer for a STEM activity if they had lower perceptions of stereotyping at school, and they were more likely to choose a female peer if they were female. Participants were more likely to use reasoning based on personal characteristics when choosing a peer, but female participants who chose a female peer were more likely to use reasoning based on gender. On the attribution task, participants were more likely to choose a non-White peer if they perceived greater STEM connectedness, and they were more likely to choose a White or male peer if they had more positive relationships with their STEM teachers. Therefore, students' perceptions of school racial climate relate to adolescents' peer inclusion decisions, and their perceptions of STEM classroom climate relate to adolescents' ability attributions. Schools may

* Corresponding author.
E-mail address: ajjoy@ncsu.edu (A. Joy).

https://doi.org/10.1016/j.jecp.2022.105573

need to focus on creating welcoming school and classroom environments as a way to promote equity in STEM.

Introduction

Peer inclusion has lasting impacts on students' academic outcomes and general well-being (Begum, 2020). Adolescents who feel socially excluded are more likely to have lower levels of academic self-efficacy and school satisfaction (Begum, 2020). In addition, feelings of exclusion in STEM (science, technology, engineering, and math) fields have been related to a lower sense of belonging (O'Brien et al., 2020), which in turn has been associated with less interest in pursuing STEM majors and careers, specifically for girls and people from underrepresented and minoritized (URM) groups (Cheryan et al., 2009; O'Brien et al., 2020; Rattan et al., 2018). This is especially concerning as girls and people of color continue to be underrepresented in STEM careers, higher education, and even high school classes (National Center for Science and Engineering Statistics, 2021; National Science Board, 2018). Many studies have examined the outcomes of social exclusion from STEM (Killen et al., 2008; O'Brien et al., 2020); however, less is known about what factors contribute to people's inclusion decisions in STEM classrooms. In addition, it is important to consider what factors contribute to people's attributions of others' abilities because these attributions may be related to inclusion/exclusion decisions and can support or reject negative stereotypes that depict girls and URM students as less competent in STEM. Because girls and people of color are still underrepresented in STEM domains, it is important to understand what factors promote their inclusion in these fields and their perceptions of peers' ability in STEM domains to inform interventions aimed at keeping girls and URM students engaged in STEM. To assess what factors are related to peer inclusion decisions as well as adolescents' attributions of ability in STEM contexts, this study examined key factors related to climate, namely adolescents' perceptions of school racial climate and STEM classroom climate.

Peer inclusion and attributions

The social reasoning developmental (SRD) perspective (Rutland et al., 2010), guided by social domain theory (Smetana, 2006; Turiel, 1983), framed this study. The SRD perspective describes how children and adolescents make social decisions, such as peer inclusion and ability assumptions, by considering both group membership and morality (Rutland et al., 2010). In the context of peer inclusion and attributions, adolescents may consider social identities and principles (e.g., unjustness, fairness) when making decisions to include or exclude someone and when making assumptions about others' abilities. Prior research indicates that gender and racial/ethnic group membership are especially influential when it comes to peer inclusion and exclusion decisions (Cooley et al., 2019; Killen et al., 2008). For example, one study found that adolescent boys were more accepting than adolescent girls of rules that excluded girls or people of different ethnicities (Richardson et al., 2014). Another study found that Black adolescents were more likely than White adolescents to believe that all forms of exclusion, regardless of race, were wrong (Cooley et al., 2019). Furthermore, White adolescents were less likely to believe that interracial inclusion would occur in a school scenario than were Black adolescents (Cooley et al., 2019). However, studies have also shown that White, Black, and Latino/Hispanic youths and youths with greater interracial contact were more likely to judge interracial exclusion as wrong than those with less interracial contact (Killen, Clark Kelly, Richardson, Crystal et al., 2010; Ruck et al., 2011). In addition, Ruck et al. (2011) found that children and adolescents with lower interracial contact were less likely to intervene in race-based exclusion scenarios. Taken together, prior research demonstrates that interracial contact is a key factor in shaping how children and adolescents make social inclusion/exclusion decisions.

In terms of STEM, Mulvey and Irvin (2018) examined 3- to 8-year-old children's beliefs about the acceptability of excluding a girl or boy from a counter-stereotypic STEM career and found that generally children believed it was wrong to exclude a girl from a stereotypic career, but younger children believed that the exclusion of a boy from a counter-stereotypic STEM career was more acceptable than older children did. However, their study did not find differences based on the race (Black or White) of the girl or boy being excluded, suggesting that young children might not use or be aware of racial stereotypes about STEM occupations. Research needs to examine adolescents' inclusion decisions and ability assumptions in STEM contexts. Adolescents may be more aware of both gender and racial/ethnic stereotypes in STEM, which may influence their inclusion decisions (Copping et al., 2013; Starr & Simpkins, 2021). If older children make more equitable choices than younger children, as demonstrated by Mulvey and Irvin (2018), then perhaps adolescents will also be more likely to make equitable inclusion decisions.

In addition, ingroup preferences may also play a role in adolescents' inclusion decisions. Although there is not yet research evaluating adolescents' peer inclusion decisions in STEM, one study found that URM high school students placed greater importance on having a STEM mentor with a similar ethnic background than did their White peers (Syed et al., 2012). Therefore, having similar backgrounds or similar experiences in STEM may be an important factor that adolescents consider when making peer inclusion decisions, especially for groups of people who have been underrepresented in STEM.

Although the SRD perspective has previously been used to evaluate children's and adolescents' peer interactions, it can also be used to understand how they use social reasoning to attribute intentions or characteristics to their peers. According to Killen, Clark Kelly, Richardson, and Jampol (2010), when given morally ambiguous scenarios of interracial interactions between people, girls and Black adolescents (aged 14 and 16 years) were more likely to attribute positive intentions to the person than were boys and White adolescents. In addition, when given a scenario of a teacher or another student making negative attributions of intention to the interactions, girls and Black adolescents were more likely to say that this judgment was unfair compared with boys and White students (Killen, Clark Kelly, Richardson, & Jampol, 2010). This study demonstrated that adolescents attend to both social issues and group membership when attributing qualities to others. In terms of attributing STEM ability, McGuire et al. (2020) showed that female adolescents were more likely to believe that both boys and girls should do well in STEM, whereas male adolescents were more likely to believe that boys should do well in STEM. However, less is known about adolescents' attributions of academic ability and peer inclusion decisions in STEM school settings. Therefore, the current study will add to this literature and inform educational practices by (a) evaluating adolescents' peer inclusion and attribution choices in STEM contexts and (b) examining how these choices relate to their perspective of their school and class climates. This study sought to inform strategies that foster more inclusive STEM climates, which is associated with greater persistence in STEM from underrepresented groups (Carter, 2008; McGee et al., 2021).

School climate

School climate captures students' experiences in school by evaluating their perceptions of interpersonal relationships, teaching practices, and structures within the school (Cohen et al., 2009). School climate is an important factor for students' academic achievement and well-being in school (Berkowitz et al., 2016; Thapa et al., 2013). When students perceive their school climate more positively, they are more likely to have better grades, be more engaged in class, and have more positive interactions with peers (Behrhorst et al., 2019; Cornell et al., 2016; Thapa et al., 2013).

School climate may also play a role in peer inclusion; Beld et al. (2019) found that positive classroom climate was related to lower perceptions of social exclusion for Dutch students (aged 12–22 years) in special education classrooms. Furthermore, when schools promote an environment focused on inclusivity, students are more likely to have more positive intergroup attitudes (McGuire et al., 2015). Positive school climate may be an important factor for improving peer inclusivity between students of different racial/ethnic backgrounds and gender, especially in fields where they have typically been excluded such as STEM. Therefore, this study evaluated students' perceptions of two specific aspects of their school climate: school racial climate and STEM classroom climate. Both school racial climate and STEM climate were assessed in this study because students can have different perceptions of their school climate toward racial interactions than of the specific classroom climate in their STEM classes. Both of these may be important given students' experiences in specific classrooms and their own personal characteristics or identities (Rudasill et al., 2018). Given that racial disparities are more prevalent in STEM courses than are gender disparities (National Science Board, 2018), it is important to examine how both students' perceptions of their school racial climate and their perceptions of their STEM classrooms relate to their peer inclusion and attribution decisions because these environments may contribute to the lack of URM students in STEM classes.

School racial climate

School racial climate describes people's perceptions of interracial interactions and racial socialization within the school (Byrd, 2015). Ryan and Patrick (2001) showed that students' positive perceptions of their school racial climate, characterized by positive intergroup contact and equal treatment, are related to better academic outcomes. Intergroup contact is especially critical during adolescence because adolescence is characterized by an increase in the formation of many ingroups and outgroups (Grusec & Hastings, 2014). Positive diverse peer relationships are very important because more interactions with students of different races/ethnicities and genders can promote perspective taking and social skills, which can be applied in many different settings (Brown, 2019; Nishina et al., 2019). Within the school environment, intergroup contact can help to improve students' feelings of belonging, which enhances their success and overall well-being in school (Brown, 2019; Farmer et al., 2019). Intergroup contact is also an important factor for social inclusion (Crystal et al., 2008; Rivas-Drake et al., 2019).

Intergroup contact must be reinforced by school authority figures, such as teachers, to effectively create an inclusive environment (Brown, 2019). When teachers emphasize their positive values of diversity and inclusion, their students are less likely to perceive peer discrimination (Brown & Chu, 2012). In addition, teachers' perceptions of other students can influence peer inclusion choices; Sette et al. (2020) found that Swiss teachers' positive perspective of a student was positively related to greater peer inclusion. In other words, students may take into consideration teachers' perspectives of their peers when deciding who to include or exclude from certain activities. For example, Geerlings et al. (2019) suggested that when teachers are not vocal about inclusive multicultural norms, teachers' interactions with majority students may be seen as a preference for majority students, which could lead to more negative attitudes toward outgroup members. Therefore, it is important for teachers to be explicit about their views of diversity and inclusion because their actions can be easily misinterpreted. As such, we included students' perceptions of staff support for positive interracial contact as an aspect of school racial climate.

To create inclusive school environments, it is not only important that students be welcoming and inclusive with each other but also important that teachers support these standards. Although many studies have examined how aspects of school racial climate (i.e., peer intergroup contact, teachers' attitudes) relate to social inclusion, there is a lack of knowledge of how school racial climate relates to adolescents' perceptions of others' abilities and peer inclusion decisions in STEM contexts. Given that STEM environments often lack racial/ethnic diversity (National Center for Science and Engineering Statistics, 2021; National Science Board, 2018), students may be more willing to uphold the inclusive standards by choosing to interact with and include URM students in their STEM classes. Thus, if students perceive that their school and the faculty are fair and inclusive, they may be encouraged to uphold these inclusive standards in their inclusion and attribution decisions within STEM contexts.

STEM classroom climate

STEM fields have been described as having a "chilly climate" because they are characterized by catering to a masculine and White culture that makes women and URM groups feel unwelcomed and excluded (Johnson, 2012; Settles et al., 2006; Simon et al., 2017). The effects of this chilly climate can even be seen in high school; adolescent URM students have indicated that their schools do not offer opportunities to participate in STEM and their teachers do not encourage them in STEM classes

(Aschbacher et al., 2010). Thus, the chilly STEM climate can occur at the school level and classroom level given that both levels capture students' experiences of interpersonal relationships and teaching practices (Rudasill et al., 2018). Given this multilevel unwelcoming atmosphere, it is perhaps unsurprising that Black and Latino/Hispanic students remain underrepresented in high school STEM classes (National Science Board, 2018).

Many studies have examined how STEM classroom climates influence students' sense of belonging and academic success (Aschbacher et al., 2010; Johnson, 2012; Rodriguez & Blaney, 2021). However, it is unknown how STEM climates influence students' decisions regarding who should be included in STEM or their perceptions of others' STEM abilities. It is possible that if students perceive less "chilly" STEM climates, they may view their STEM classes as more welcoming and may be more likely to include groups of students who have typically been excluded from STEM. Furthermore, most of the research on STEM climates has focused on college or professional settings. Therefore, we extended past work on STEM climates by examining the association between STEM classroom climate and adolescents' peer inclusion and attribution of ability choices.

The current study

Adolescents often make peer inclusion decisions based on group membership or equity in unfair situations, particularly in school contexts (Cooley et al., 2019; Elenbaas et al., 2016; Killen et al., 2008), and both school racial climate and STEM classroom climate are important for students' academic success and inclusive behavior (Byrd, 2015; Byrd & Chavous, 2011; Crystal et al., 2008; Rivas-Drake et al., 2019). However, it is unknown how these factors relate to peer inclusion or students' perceptions of their peers' abilities in STEM. This study assessed how school racial climate and STEM classroom climate are related to adolescents' peer inclusion and ability attribution choices as well as how one's own racial and gender group membership plays a role in these decisions. In addition, participants' reasoning for their inclusion and ability decisions were examined. For this study, we defined participants' ingroups and outgroups based on their status within STEM. Thus, we considered Black and Latino/Hispanic students to be in the same ingroup in the context of our study because historically these groups have been underrepresented in STEM (National Center for Science and Engineering Statistics, 2021; National Science Board, 2018) and have faced marginalization and similar forms of discrimination and stereotyping in STEM (Grossman & Porche, 2013).

Hypotheses

1. We hypothesized that Black and Latino/Hispanic participants will be more likely to choose a non-White peer for both the peer inclusion and attribution of ability tasks, whereas White participants will be more likely to choose a White peer for both the peer inclusion and attribution of ability tasks, given evidence that adolescents may take racial/ethnic background into consideration for who they want to work with in STEM contexts (Syed et al., 2012) and given the tendency to include ingroup members (Killen & Rutland, 2011).

2. We hypothesized that female participants will be more likely to choose a female peer for the peer inclusion and attribution of ability tasks, and that male participants will be more likely to choose a male peer for the peer inclusion and attribution of ability tasks, given that past findings document gender ingroup preference in STEM evaluations (McGuire et al., 2020).

3. We hypothesized that, with age, adolescents will be more likely to choose a non-White peer and a female peer for the peer inclusion and attribution of ability tasks given research finding that older children were more likely than younger children to not exclude people in STEM (Mulvey & Irvin, 2018) and that younger adolescents were more likely to make negative attributions of others than were older adolescents (Killen et al., 2010).

4. We hypothesized that positive perceptions of school racial climate will be positively associated with choosing a non-White peer for the peer inclusion and attribution of ability tasks given that previous findings have shown that adolescents with high intergroup contact were more likely to judge race-based exclusion as wrong (Crystal et al., 2008) and positive school racial climate is characterized by frequent quality interracial interactions (Byrd, 2015). However, because stereotyping is a negative

aspect school racial climate, we hypothesized that stereotyping will be negatively associated with choosing a non-White peer for the peer inclusion and attribution of ability tasks.

5. We hypothesized that positive perceptions of STEM classroom climate will be positively associated with choosing a non-White peer and a female peer for the peer inclusion and attribution of ability tasks given that positive school climate has been related to lower perceptions of exclusion and more positive intergroup attitudes (Beld et al., 2019; McGuire et al., 2015).

6. We hypothesized that participants will rely more on reasoning about race/ethnicity and gender when choosing who to include than when making attributions of ability and will rely more on reasoning about personal characteristics when making attributions of ability than for inclusion. Furthermore, we expected that there may be differences in reasoning based on participant characteristics as well as choice of who to include and who would be best. For instance, we expected that female participants and ethnically minoritized participants will be more likely to explicitly reference race and gender given that their ingroups are often underrepresented in STEM contexts.

Method.

Participants

Participants were high school students (9th–12th grade) from five public schools in the Southeastern United States (N = 294; M_{age} = 15.72 years, SD = 1.34, range = 13–19). A majority (52.3 %) of participants identified as female, 38.6 % identified as male, 3.9 % did not identify as male or female, 3.2 % preferred not to say, and 2.1 % were not sure yet. Only participants who identified as female or male were included in this study. In terms of race/ethnicity, 36.7 % of the sample identified as White/European American, 32.9 % as Black/African American, 11.2 % as Latino/Hispanic, 2.8 % as Asian/Asian American, 1.4 % as American Indian/Native American, 0.7 % as Native Hawaiian/Pacific Islander, 0.3 % as Arab/Arab American, and 9.7 % as biracial or other (4.2 % preferred not to say). All five schools received Title 1 federal funds, indicating that they were low-income public schools.

Procedure

This research was approved by the institutional review board at North Carolina State University. The survey was part of a larger study assessing students' experiences in their STEM courses. All students at participating schools were invited to participate, and opt-out consent forms were sent home to families electronically. In total, 694 students who had parental consent assented to participation and began an online survey through Qualtrics. Although 694 students assented to participation, only 294 completed all relevant survey measures; thus, the sample size for all analyses was 294. Students completed the survey between November 2020 and April 2021 and were attending school primarily virtually during the study period due to the COVID-19 pandemic. In terms of school attendance, 48.8 % reported that they were attending school virtually, 33.7 % reported that they were attending school in a hybrid format, and 17.5 % reported that they were attending school in person (0.4 % did not report how they were currently attending school). Participants were entered into a drawing for $10 electronic gift cards to thank them for participation, and 30 participants were randomly selected to receive a gift card.

Measures

Peer inclusion task

Participants read a vignette about a programming project and were presented with 6 drawings of students. There were drawings of 3 girls and 3 boys, and the drawings represented 2 Black, 2 White, and 2 Latino/Hispanic students because those were the most common racial/ethnic groups in the schools where data collection took place. Participants were then asked to rank each student from 1 (*most likely*) to 6 (*least likely*) by who they would likely choose to be in their group to who they would least like to be in their group. Because White people and boys are typically overrepresented in STEM fields and Black and Latino/Hispanic people and girls are underrepresented, we analyzed participants' decisions based on whether they chose a peer who is usually over- or underrepresented in STEM. For these analyses, we used participants' top choice based on race/ethnicity and gender and created four categories: chose a non-White peer, chose a White peer, chose a female peer, and chose a male peer.

The vignette was as follows: "Imagine that you are working on a programming project in your school and you are in school in person. You are working together with some classmates on a project in which you use programming to tell little robots what to do. Your group is struggling with the task. There are 6 more students in the room who do not have project partners yet. Who would you most likely choose for your group? Drag and drop the students to rank them from 1 (*most likely*) to 6 (*least likely*)."

Participants were then asked to explain why they chose their top choice. Responses were coded into one of four categories: race/ethnicity (e.g., "I chose Manuel first because he is also Hispanic"), gender (e.g., "I chose Chris first because guys tend to know more about robots than girls"), personal characteristics (e.g., "Allison looks like a neat person who will help keep the group focused on the task"), or chose at random (e.g., "Chris I chose randomly because I don't know these people personally"). Participants' reasoning was coded as 1 = use of only this code,.5 = use of this code in addition to another code, or 0 = no use and analyses were conducted on proportional usage of the codes. Interrater reliability (based on 25 % of responses) was Cohen's κ =.98.

Attribution of ability task

After choosing who they would want to be in their group, participants were presented with the following instructions: "Now you see all the students again. How good do you think each student is at building robots? Please drag and drop the students in order from best to worst in terms of how good you think they will be at programming robots." Participants proceeded to rank each student from 1 (*best*) to 6 (*worst*). For these analyses, we used participants' top choice again and created four categories: chose a non-White peer, chose a White peer, chose a female peer, and chose a male peer.

Participants were then asked to explain why they chose their top choice. Responses were coded into one of four categories: race/ethnicity (e.g., "Most of the time the 'best' student at STEM projects are White males"), gender (e.g., "I chose Kevin because guys are always the game or computer experts"), personal characteristics (e.g., "Bianca because she looks determined"), or chose at random (e.g., "Maya because she was the first one I randomly picked"). Participants' reasoning was coded as 1 = use of only this code,.5 = use of this code in addition to another code, or 0 = no use and analyses were conducted on proportional usage of the codes. Interrater reliability (based on 25 % of responses) was Cohen's κ =.98.

School racial climate

Participants completed the School Climate for Diversity Secondary Scale (Byrd, 2017) to measure students' perceptions of interracial interactions at their schools. The items in this scale were averaged to create five subscales: equal status, support for positive interaction, quality of interactions, frequency of interactions, and stereotyping. The items were answered using a 5-point Likert scale ranging from 1 (*not at all true*) to 5 (*completely true*). The equal status subscale (3 items, α =.89) measured perceptions of fair treatment ("Students of all races/ethnicities are treated equally at your school"). The support for positive interaction subscale (4 items, α =.87) measured perceptions of encouragement by teachers, principals, and other students for interracial interactions ("Teachers encourage students to make friends with students of different races/ethnicities"). The quality of interactions subscale (3 items, α =.83) measured perceptions of the quality of interracial interactions ("Students here like to have friends of different races/ethnicities"). The frequency of interactions subscale (3 items, α =.89) measured perceptions of interracial interactions in different contexts ("Students of different races/ethnicities hang out together"). The stereotyping subscale (4 items, α =.87) measured perceptions of negative stereotypes toward students' own or others' racial/ethnic group ("Teachers are prejudiced against certain racial/ethnic groups").

STEM classroom climate

Participants completed a version of the School Climate Measure (Zullig et al., 2015) modified to assess school climate in STEM classes. Students read the following definition of STEM at the beginning of the survey: "In this survey, we will use the term 'STEM.' This refers to science, technology, mathematics, and engineering." Then they completed this modified measure, which featured items that were answered on a Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*) that were averaged to create three subscales. The subscales included were positive student–STEM teacher relationships (8 items, α =.92; e.g., "My STEM teachers care about me"), equal STEM opportunities (5 items, α =.90; e.g., "Nobody in my school is excluded from being successful in my STEM classes"), and STEM connectedness (4 items, α =.86; e.g., "My STEM schoolwork is exciting").

Data analyses

Descriptive statistics and correlations were first computed and then preliminary repeated-measures analyses of covariance (ANCOVAs) were used to examine any gender or racial/ethnic differences in the school racial climate and STEM classroom climate measures. ANCOVAs, with Bonferroni corrections applied, were also used to evaluate any differences in participants' reasoning for choosing a non-White or White peer and a female or male peer. For the purposes of these analyses, racial/ethnic groups were divided into Black, Latino/Hispanic, White, and other ethnic groups (Asian/Asian American, American Indian/Native American, Native Hawaiian/Pacific Islander; Arab/Arab American, biracial, or other). Then intraclass correlation coefficients (ICCs) were computed to see whether multilevel modeling was needed to account for students nested in schools. The ICCs for all relevant variables were.01 to.06, which indicated that multilevel modeling was not needed. Next simple logistic regressions were performed to examine what factors (age, gender, race, school racial climate, and STEM classroom climate) were associated with choosing a non-White or female peer compared with choosing a White or male peer for the peer inclusion task and the attribution of ability task. Two simple logistic regressions were conducted that examined race (one for the peer inclusion task and one for the attribution of ability task), both of which included age, gender, race, school racial climate, and STEM classroom climate. Two simple logistic regressions were conducted that examined gender (one for the peer inclusion task and one for the attribution of ability task), both of which included age, gender, race, and STEM classroom climate. Analyses of variance (ANOVAs) were also conducted to examine differences in the school racial climate and STEM classroom climate variables based on school format (i.e., hybrid, in-person, or virtual; see online supplementary material). School format was also examined as a covariate for the ANCOVAS evaluating school racial climate and STEM classroom climate; however, it was not a significant predictor, so it was not included in the final analyses. We also tested whether there were differences based on school format in the logistic regressions, but it was not a significant predictor, so it was not included in the final analyses. Interactions for all four logistic regressions were examined whenever main effects were significant, but no interactions were significant, so we retained the more parsimonious model.

Results

Descriptive statistics and preliminary analyses

Peer inclusion task

When deciding which hypothetical classmate they wanted to join their project group, 29.6 % of participants chose a White peer and 70.4 % chose a non-White peer. In terms of gender, 38.6 % of participants chose a male peer and 61.4 % of participants chose a female peer (see Tables 1 and 2 for percentage by participants race/ethnicity and gender).

Table 1
Peer inclusion task (race) by race/ethnicity and gender of participants.

	Black	Latino/Hispanic	White	Other ethnic groups	Female	Male
Non-White peer	74.4 %	90.6 %	65.7 %	65.1 %	69.1 %	71.8 %
White peer	25.6 %	9.4 %	34.3 %	34.9 %	30.9 %	28.2 %

Note. Percentages are those within each group.

Table 2
Peer inclusion task (gender) by race/ethnicity and gender of participants.

	Black	Latino/Hispanic	White	Other ethnic groups	Female	Male
Female peer	62.1 %	50 %	62.8 %	58.1 %	80 %	34.5 %
Male peer	37.9 %	50 %	37.2 %	41.9 %	20 %	65.5 %

Note. Percentages are those within each group.

Attribution of ability task

When deciding which hypothetical classmate would be the best at completing the project, 37 % of participants thought a White peer would be best and 63 % thought a non-White peer would be best. In terms of gender, 61.1 % of participants thought that a male peer would be best and 38.9 % thought that a female participant would be best (see Tables 3 and 4 for percentage by participants race/ethnicity and gender).

School racial climate

Results from the correlations showed that perceptions of support for positive interactions, quality of interactions, frequency of interactions, and equal status all were negatively correlated with age; however, perceptions of stereotyping at school was positively correlated with age (see Table 5). Furthermore, perceptions of support for positive interactions, quality of interactions, frequency of interactions, and equal status all were positively correlated with each other and the three STEM classroom climate variables, whereas perceptions of stereotyping was negatively correlated with all these variables except STEM connectedness (see Table 5).

A 2 (Gender: female or male) × 4 (Race/Ethnicity: Black, Latino/Hispanic, White, or other ethnic groups) × 5 (School Racial Climate: support for positive interaction, quality of interactions, frequency of interactions, equal status, or stereotyping) ANCOVA with age as a covariate and with repeated measures on the last factor was used to determine differences between the school racial climate variables and gender and racial/ethnic differences. Results showed an effect for school racial climate, $F(1, 225) = 15.76$, $p < .001$, $\eta^2 = .07$, and an interaction effect between school racial climate and race, $F(1, 225) = 2.13$, $p = .04$, $\eta^2 = .03$. These results indicated that White participants tended to have better perceptions of their school's racial climate compared with Black and Latino/Hispanic participants (see supplementary material for full results; see Table 6 for means).

STEM classroom climate

There were no significant correlations between the three STEM classroom climate variables and age; however, all three STEM classroom climate variables were positively correlated with each other (see Table 5). A 2 (Gender: female or male) × 4 (Race/Ethnicity: Black, Latino/Hispanic, White, or other ethnic groups) × 3 (STEM Classroom Climate: positive student–STEM teacher relationships, equal STEM opportunities, or STEM connectedness) ANCOVA with age as a covariate and with repeated measures on the last factor was used to determine differences between the STEM classroom climate measures and gender and racial/ethnic differences. There was a main effect of STEM classroom climate, $F(1, 214) = 6.70$, $p < .001$, $\eta^2 = .03$, such that participants perceived greater equal STEM opportunities ($p = .01$) than positive student–STEM teacher relationships and STEM connectedness ($p < .001$). Participants also perceived greater positive student–STEM teacher relationships ($p < .001$) than STEM connectedness (see Table 6).

Table 3
Attribution of ability task (race) by race/ethnicity and gender of participants.

	Black	Latino/Hispanic	White	Other ethnic groups	Female	Male
Non-White peer	63.5 %	54.8 %	68.8 %	58.5 %	60.8 %	61.3 %
White peer	36.5 %	45.2 %	31.2 %	41.5 %	39.2 %	38.7 %

Note. Percentages are those within each group.

Table 4
Attribution ability task (gender) by race/ethnicity and gender of participants.

	Black	Latino/Hispanic	White	Other ethnic groups	Female	Male
Female peer	40.7 %	25.8 %	36.5 %	52.5 %	39.4 %	35.6 %
Male peer	59.3 %	74.2 %	63.5 %	47.5 %	60.6 %	64.4 %

Note. Percentages are those within each group.

Table 5
Correlations.

Variable	1	2	3	4	5	6	7	8	9
1. Age	–								
2. Support for positive interactions	$-.24^{**}$	–							
3. Quality of interactions	$-.25^{**}$	$.70^{**}$	–						
4. Frequency of interactions	$-.22^{**}$	$.60^{**}$	$.79^{**}$	–					
5. Equal status	$-.26^{**}$	$.59^{**}$	$.72^{**}$	$.73^{**}$	–				
6. Stereotyping	$.14^{**}$	$-.18^{**}$	$-.27^{**}$	$-.21^{**}$	$-.36^{**}$	–			
7. Positive STEM teacher	$-.08$	$.21^{**}$	$.27^{**}$	$.30^{**}$	$.32^{**}$	$-.15^{**}$	–		
8. Equal STEM opportunities	$-.11$	$.19^{**}$	$.26^{**}$	$.30^{**}$	$.34^{**}$	$-.19^{**}$	$.88^{**}$	–	
9. STEM connectedness	.01	$.19^{**}$	$.19^{**}$	$.18^{**}$	$.20^{**}$	$-.06$	$.81^{**}$	$.72^{**}$	–

Note. STEM, science, technology, engineering, and mathematics.
$^{*}p < .05$.
$^{**}p < .01$.

Table 6
Descriptive statistics: Means (and standard deviations).

	Mean (*SD*)	Female	Male	Black	Latino/ Hispanic	White	Other ethnic groups
Support for positive interactions	3.51 (0.88)	3.55 (0.86)	3.46 (0.90)	3.27 (0.85)	3.40 (0.83)	3.83 (0.77)	3.52 (1.00)
Quality of interactions	3.64 (0.83)	3.66 (0.78)	3.62 (0.87)	3.38 (0.74)	3.63 (0.85)	3.93 (0.76)	3.68 (0.94)
Frequency of interactions	3.82 (0.81)	3.86 (0.76)	3.78 (0.86)	3.66 (0.81)	3.85 (0.77)	4.02 (0.69)	3.84 (1.01)
Equal status	3.85 (0.91)	3.83 (0.93)	3.86 (0.88)	3.55 (0.90)	3.95 (0.84)	4.16 (0.78)	3.88 (1.00)
Stereotyping	2.59 (0.91)	2.58 (0.87)	2.63 (0.89)	2.68 (0.87)	2.54 (0.90)	2.51 (0.97)	2.53 (0.90)
Positive STEM teacher	3.53 (0.90)	3.63 (0.85)	3.48 (0.97)	3.47 (0.86)	3.60 (0.99)	3.74 (0.86)	3.30 (0.95)
Equal STEM opportunities	3.69 (0.95)	3.82 (0.87)	3.59 (1.03)	3.68 (0.95)	3.73 (0.91)	3.91 (0.92)	3.37 (0.95)
STEM connectedness	3.31 (0.90)	3.37 (0.83)	3.28 (0.98)	3.24 (0.91)	3.32 (0.90)	3.52 (0.91)	3.13 (0.75)

Note. STEM, science, technology, engineering, and mathematics. The range for all measures was 1 to 5.

Peer inclusion task

To examine Hypotheses 1 to 5, a logistic regression was used (see Table 7). Hypotheses 1 and 4 were partially supported; results showed that the odds of choosing a non-White peer were higher for Latino/Hispanic participants ($B = 3.19$, odds ratio [OR] = 24.16, $p = .004$) and were lower for students with greater perceptions of stereotyping ($B = -0.56$, OR = 0.57, $p = .01$). In addition, quality of interactions was approaching significance, indicating that the odds of choosing a non-White peer may be greater for participants with greater perceptions of quality of interactions ($B = 0.73$, OR = 2.07, $p = .053$).

Table 7
Logistic regression for peer inclusion task: Race.

	B	*SE*	Wald	*df*	Significance	Exp(*b*)
Age	−0.01	0.13	0.01	1	.91	0.99
Gender	−0.03	0.33	0.01	1	.93	0.97
Black	0.82	0.47	3.02	1	.82	2.28
Latino/Hispanic	3.19	1.09	8.49	1	.004	24.16
White	0.17	0.44	0.15	1	.70	1.18
Support for positive interactions	−0.24	0.26	0.84	1	.36	0.79
Quality of interactions	0.73	0.38	3.74	1	.053	2.07
Frequency of interactions	−0.10	0.37	0.08	1	.78	0.90
Equal status	−0.52	0.30	3.05	1	.08	0.59
Stereotyping	−0.56	0.20	7.55	1	.01	0.57
Positive STEM teacher	−0.20	0.42	0.24	1	.63	0.82
Equal STEM opportunities	0.07	0.35	0.04	1	.85	1.07
STEM connectedness	−0.03	0.29	0.01	1	.93	0.97

Note. STEM, science, technology, engineering, and mathematics. Age: ages in years. Gender: 1 = male, 2 = female.

In terms of gender (see Table 8), Hypothesis 2 was supported; the odds of choosing a female peer were higher for female participants (B = 2.08, OR = 8.00, p <.001).

Peer inclusion task reasoning

To examine Hypothesis 6, a 4 (Peer Inclusion Reasoning: gender, race/ethnicity, personal characteristics, or random) × 2 (Gender: female or male) × 4 (Race/Ethnicity: Black, Latino/Hispanic, White, or other ethnic groups) × 2 (Peer Inclusion Race: non-White or White) × 2 (Peer Inclusion Gender: female or male) ANCOVA with age as a covariate was used to determine differences between participants' reasoning by gender and race/ethnicity as well as by inclusion choice. Results revealed that the interaction between peer inclusion reasoning and race/ethnicity, $F(3, 162) = 2.57$, p =.01, η^2 =.05, and the interaction between peer inclusion reasoning and peer inclusion race, $F(3, 162) = 4.33$, p =.01, η^2 =.03, were significant. The interaction among peer inclusion reasoning, race/ethnicity, and peer inclusion race was also significant, $F(3, 162) = 1.91$, p =.05, η^2 =.03. Because the three-way interaction among reasoning, race/ethnicity, and peer inclusion choice based on race/ethnicity was significant, this interaction was interpreted. Black participants who chose a White peer were more likely to use reasoning based on personal characteristics than race/ethnicity (p =.05), gender (p =.01), or choosing at random (p =.01); similarly, Black participants who chose a non-White peer were more likely to use reasoning based on personal characteristics than race/ethnicity (p =.05). White participants who chose a White peer were more likely to say that they chose at random than to say that they used reasoning based on race/ethnicity (p =.02), whereas White participants who chose a non-White peer used reasoning based on personal characteristics more than race/ethnicity (p =.01). They also chose at random more than using reasoning based on race/ethnicity (p =.001) or gender (p =.01). Participants from the

Table 8
Logistic regression for peer inclusion task: Gender.

	B	*SE*	Wald	*df*	Significance	Exp(*b*)
Age	−0.08	0.12	0.52	1	.47	0.92
Gender	2.10	0.32	44.01	1	.00	8.00
Black	−0.08	0.50	0.03	1	.87	0.92
Latino/Hispanic	−0.86	0.59	2.12	1	.15	0.43
White	−0.29	0.49	0.34	1	.56	0.75
Positive STEM Teacher	−0.14	0.42	0.12	1	.73	0.87
Equal STEM Opportunities	0.19	0.34	0.33	1	.57	1.21
STEM Connectedness	0.06	0.29	0.04	1	.84	1.06

Note. STEM, science, technology, engineering, and mathematics. Age: ages in years. Gender: 1 = male, 2 = female.

other ethnic groups who chose a White peer were more likely to use reasoning based on gender than reasoning based on race/ethnicity (p =.01). Participants from the other ethnic groups who chose a non-White peer were more likely to say that they chose at random compared with using reasoning based on race/ethnicity (p <.001), gender (p =.001), or personal characteristics (p =.01). Lastly, there were no differences in reasoning used by Latino/Hispanic participants (see Table 9).

There was also a significant interaction among peer inclusion reasoning, gender, and peer inclusion gender, $F(3, 162) = 3.45$, p =.02, η^2 =.02. Male participants who chose a male peer to be in their group were more likely to use reasoning based on personal characteristics than race/ethnicity (p =.03) or gender (p =.01), and male participants who chose a female peer were more likely to use personal characteristics compared with race/ethnicity (p =.03). They were also more likely to say that they chose at random compared with using reasoning based on race/ethnicity (p =.004) or gender (p =.04). As for female participants, those who chose a male peer were more likely to say that they chose at random than to use reasoning based on race (p =.01) or gender (p =.04). Female participants who chose a female peer were more likely to use reasoning based on gender than race/ethnicity (p =.001) or choosing at random (p =.04) and were more likely to use personal characteristics reasoning than race/ethnicity reasoning (p =.02) (see Table 10).

Attribution of ability task

A logistic regression was used to evaluate Hypotheses 1 to 5 (see Table 11). The results, in line with Hypothesis 5, showed that the odds of thinking a non-White peer would be best were higher for participants with greater STEM connectedness (B = 0.75, OR = 2.11, p =.01).

However, contrary to Hypothesis 5, the odds of thinking a non-White peer would be best were lower with greater reported positive student–STEM teacher relationships ($B = -0.88$, OR = 0.42, p =.05) and the odds of thinking that a female peer would be best were also lower with greater reported positive student–STEM teacher relationships ($B = -0.96$, OR = 0.38, p =.02) (see Table 12).

Attribution of ability reasoning

To examine Hypothesis 6, a 4 (Attribution of Ability Reasoning: gender, race/ethnicity, personal Characteristics, or random) $\times$ 2 (Gender: female or male) $\times$ 4 (Race/Ethnicity: Black, Latino/Hispanic, White, or other ethnic groups) $\times$ 2 (Attribution of Ability Race: non-White or White) $\times$ 2 (Attribution of Ability Gender: female or male) ANCOVA with age as a covariate was used to determine differences between participants' reasoning as well as gender and racial/ethnic differences and differences based on the peer who they thought would be best at completing the task. There was a main effect of attribution of ability reasoning, $F(3, 169) = 2.98$, p =.05, η^2 =.02. Overall, participants used more reasoning based on personal characteristics than race/ethnicity (p <.001) or gender (p =.001) and choosing at random than reasoning based on race/ethnicity (p =.01) or gender (p =.01). There was also an interaction between attribution of ability reasoning and attribution of ability race, $F(3, 162) = 4.30$, p =.01, η^2 =.03. Participants who believed that a White peer would be best at completing the task used more reasoning based on personal characteristics than race/ethnicity (p <.001), gender (p <.001), or choosing at random (p =.001). Participants who believed that a non-White peer would be best at completing the task used more reasoning based on personal characteristics than race/ethnicity (p <.001) or gender (p <.001) and also chose at random more than using reasoning based on race/ethnicity (p <.001) or gender (p <.001) (see Table 13).

Differences between peer inclusion reasoning and attribution of ability reasoning

Finally, paired t tests were conducted for each type of reasoning to determine whether there were differences between the two tasks: peer inclusion and attribution of ability. The t tests revealed that there were differences in reasoning based on race/ethnicity ($t = -2.55$, p =.01) and gender ($t = -3.86$, p <.001); participants used these two types of reasoning more in the peer inclusion task than in the attribution of ability task.

Table 9
Peer inclusion reasoning by participant race/ethnicity and peer inclusion task (race).

	Overall mean	Black		Latino/Hispanic		White		Other ethnic groups	
		Non-White peer	White peer	Non-White peer	White peer	Non-White peer	White peer	Non-White peer	White peer
Race/Ethnicity reasoning	.08 (.26)	.12 (.31)[a]	.12 (.33)[b]	.30 (.44)	.00 (.00)	.01(.07)[e,f]	.00 (.00)[h]	.00 (.00)[i]	.00 (.00)[l]
Gender reasoning	.13 (.32)	.13 (.31)	.06 (.24)[c]	.15 (.33)	.00 (.00)	.08 (.27)[g]	.20 (.41)	.12 (.33)[j]	.33 (.50)[l]
Personal characteristics reasoning	.33 (.46)	.27 (.43)[a]	.65 (.49)[b,c,d]	.20 (.41)	1.0 (.00)	.33 (.46)[e]	.50 (.51)	.12 (.33)[k]	.33 (.50)
Chose at random reasoning	.21 (.40)	.19 (.40)	.00 (.00)[d]	.10 (.31)	.00 (.00)	.25 (.42)[f,g]	.15 (.37)[h]	.53 (.51)[i,j,k]	.22 (.44)

Note. Same letters indicate significant differences between reasoning categories: [a,b,h] = p <.05, [c,d,e,g,k,l] = p <.01, [f,i,j] = p <.001. Standard deviations are in parentheses.

Table 10
Peer inclusion reasoning by participant gender and peer inclusion task (gender).

	Overall mean	Female		Male	
		Female peer	Male peer	Female peer	Male peer
Race/Ethnicity reasoning	.08 (.26)	.08 (.26)[a,b]	.06 (.25)[d]	.00 (.00)[f,g]	.10 (.29)[i]
Gender reasoning	.13 (.32)	.20 (.39)[a,c]	.13 (.34)[e]	.10 (.29)[h]	.03 (.16)[j]
Personal characteristics reasoning	.33 (.46)	.36 (.48)[b]	.19 (.40)	.40 (.48)[f]	.30 (.45)[i,j]
Chose at random reasoning	.21 (.40)	.15 (.36)[c]	.41 (.49)[d,e]	.22 (.41)[g,h]	.23 (.42)

Note. The same letters indicate significant differences in reasoning categories: [b,c,e,f,h,i] = p <.05, [d,g,j] = p <.01, [a] = p <.001. Standard deviations are in parentheses.

Table 11
Logistic regression for attribution of ability task: Race.

	B	*SE*	Wald	*df*	Significance	Exp(*b*)
Age	0.05	0.12	0.18	1	.67	1.05
Gender	−0.23	0.31	0.59	1	.44	0.79
Black	−0.04	0.47	0.01	1	.93	0.96
Latino/Hispanic	−0.33	0.54	0.38	1	.54	0.72
White	−0.03	0.46	0.004	1	.95	0.97
Support for positive interactions	0.31	0.25	1.54	1	.21	1.36
Quality of interactions	−0.03	0.36	0.01	1	.95	0.98
Frequency of interactions	0.02	0.33	0.004	1	.95	1.02
Equal status	−0.15	0.25	0.37	1	.54	0.86
Stereotyping	−0.23	0.18	1.50	1	.22	0.80
Positive STEM teacher	−0.88	0.44	3.98	1	.05	0.42
Equal STEM opportunities	0.29	0.35	0.71	1	.40	1.34
STEM connectedness	0.75	0.30	6.25	1	.01	2.11

Note. STEM, science, technology, engineering, and mathematics. Age: ages in years. Gender: 1 = male, 2 = female.

Table 12
Logistic regression for attribution of ability task: Gender.

	B	*SE*	Wald	*df*	Significance	Exp(*b*)
Age	0.04	0.11	0.15	1	.70	1.04
Gender	0.08	0.31	0.07	1	.79	1.09
Black	−0.27	0.45	0.37	1	.54	0.76
Latino/Hispanic	−1.04	0.59	3.13	1	.08	0.35
White	−0.47	0.45	1.12	1	.29	0.62
Positive STEM teacher	−0.96	0.41	5.43	1	.02	0.38
Equal STEM opportunities	0.58	0.34	2.90	1	.09	1.78
STEM connectedness	−0.03	0.27	0.02	1	.90	0.97

Note. STEM, science, technology, engineering, and mathematics. Age: ages in years. Gender: 1 = male, 2 = female.

Table 13
Attribution of ability reasoning by attribution of ability task (race).

	Overall mean	Non-White peer	White peer
Race/Ethnicity reasoning	.04 (.17)	.02 (.11)[a,b]	.07 (.24)[e]
Gender reasoning	.06 (.22)	.04 (.18)[c,d]	.08 (.27)[f]
Personal characteristics reasoning	.33 (.46)	.29 (.44)[a,c]	.41 (.49)[e,f,g]
Chose at random reasoning	.19 (.39)	.26 (.43)[b,d]	.09 (.29)[g]

Note. The same letters indicate significant differences in reasoning categories. All pairwise comparisons were significant at p <.001. Standard deviations are in parentheses.

Discussion

This study assessed how aspects of school racial climate and STEM classroom climate were associated with adolescents' peer inclusion and attribution of ability choices within the context of completing a STEM activity. Our results indicated that for the peer inclusion task, adolescents were more likely to choose a non-White peer if they had lower perceptions of race-based stereotyping at school. In addition, female participants were more likely to choose a female peer as compared with male participants. For the attribution of ability task, participants were more likely to choose a non-White peer if they had greater STEM connectedness. Intriguingly, for the attribution of ability task, participants who perceived that they had more positive relationships with their STEM teachers also tended to think that a White peer and a male peer had the best STEM ability. These findings provide new insights into factors that shape adolescent peer inclusion and ability attribution decisions in STEM contexts. By demonstrating that adolescent perceptions of school racial climate and STEM classroom climate are related to their peer inclusion and attribution of ability decisions in STEM settings, we seek to inform educational strategies that foster inclusive STEM environments for youths.

School racial climate and STEM classroom climate

Age was negatively correlated with all the school racial climate variables except stereotyping, which had a positive association. Because this study was not longitudinal, we cannot make claims based on change in school racial climate over time; however, based on these correlations, it seems that older adolescents have more negative perceptions of their school's racial climate than younger adolescents, which aligns with past research (Ding & Hall, 2007). Adolescents may become more aware of the discriminatory acts of students and teachers the longer they are at their school. More research is needed that further examines the differences in school experiences between older and younger students and to examine whether these differences reflect a decline in school racial climate for older adolescents or whether they reflect an increase in awareness of the problems in school racial climate.

The results from the ANCOVA indicated that there were no significant gender or racial/ethnic differences for the STEM classroom climate measure; however, there were significant racial differences for all the school racial climate measures except stereotyping. We found that Black students perceived less support for positive interactions, quality of interactions, frequency of interactions, and equal status subscales than White students. In addition, Latino/Hispanic students perceived less support for positive interracial interactions than White students, and students from the other ethnic groups perceived more quality of interactions and equal status than Black students. This supports past work showing that White students tend to have more positive perceptions of their school's racial climate compared with Black and Latino/Hispanic students (Voight et al., 2015; Watkins & Aber, 2009). Black and Latino/Hispanic students are more likely to experience discrimination from both peers and teachers, which contributes to their more negative perceptions of their school (Benner & Graham, 2013; Sellers et al., 2006; Voight et al., 2015; Watkins & Aber, 2009). Given the small sample sizes of the subgroups within this other ethnic groups category, we were unable to compare differences among Asian/Asian American, American Indian/Native American, Native Hawaiian/Pacific Islander, Arab/Arab American, and biracial students. However, future research with more diverse samples should further investigate these racial/ethnic groups' perceptions of their STEM classroom climate given that many of these groups are also underrepresented in STEM and this might not be a homogeneous group. To ensure that all students feel welcomed and safe in their school, all individuals in the school environment need to collaborate to create norms that foster inclusion and positive intergroup contact.

Peer inclusion

Our results from the logistic regressions indicated that there were racial/ethnic and gender differences in the peer inclusion task. Ingroup preferences likely affected participants' choices on the peer inclusion task; in line with our first and second hypotheses, Latino/Hispanic participants were more likely than non-Latino/Hispanic participants to choose a non-White peer, and female participants were more likely than male participants to choose a female peer. Past research has shown that Latino/Hispanic students and girls often feel that they do not belong in STEM spaces (Johnson, 2012; Rodriguez & Blaney, 2021; Settles et al., 2006). Perhaps due to their own experiences of marginalization, they may wish to work with someone they perceive as having similar experiences as their own in order to support their sense of belonging.

Our results from the logistic regression, which partially supported our fourth hypothesis, indicated that if participants felt that the students and teachers held negative racial/ethnic stereotypes, they were less likely to choose a non-White peer. The stereotyping items included in this study did not specify which racial/ethnic groups these negative stereotypes targeted. Perhaps when adolescents perceive that their school upholds stereotypes that favor White students, they may be more likely to stick with this status quo by choosing to interact with White students rather than students of other racial/ethnic backgrounds.

Although research from Crystal et al. (2008) and Rivas-Drake et al. (2019) demonstrated the importance of intergroup contact for racial/ethnic peer inclusion, and contrary to our fourth hypothesis, our intergroup contact measures (school racial climate subscales: support for positive interactions, quality of interactions, and frequency of interactions) were not significantly related to choosing a non-White peer. Our measures for school racial climate may better capture perceptions of intergroup contact at the school level, which might not translate to actual intergroup preferences within STEM contexts. Research is needed to investigate whether perceptions of support for intergroup interactions on a broader school level can trickle down to foster equitable peer inclusion choices in STEM contexts.

Peer inclusion reasoning

Contrary to our sixth hypothesis, for inclusion reasoning, Black participants, regardless of whether they chose to include a White or non-White peer, relied heavily on personal characteristics. Many participants chose a peer because they thought that peer would help the group the most. For example, one participant stated that he/she chose a peer because he/she thought that peer would "help the group get a good grade by putting in her thoughts of the project." This may reflect Black participants desire to ensure that the group functions effectively given that they were invested in selecting a peer who had the characteristics that would benefit the group. Black participants who chose a White peer often gave reasons such as "he looks smart," which may reflect some internalized stereotypes about White students.

White participants were more likely to indicate that they were choosing at random when they chose a White peer and referenced personal characteristics for the choice of a non-White peer. It is interesting that White participants indicated that their choice was at random when they selected a White peer for inclusion. The majority of White participants did not select to include a White peer, but for those who did it is possible that this may in fact reflect an ingroup preference even though participants indicated that they were making a random selection. In addition, social desirability may have played a role in White participants' reasoning for choosing non-White peers because choosing peers based on personal characteristics or randomly may seem more socially appropriate than saying their reasoning was based on race/ethnicity (Norton et al., 2006).

Furthermore, there were no differences in reasoning used by Latino/Hispanic participants, but those from other ethnic groups used gender reasoning more than race when selecting a White peer and indicated that their choice was random when selecting a non-White peer. The gender-based reasoning may simply reflect that they were attending to multiple dimensions of the targets' social identities when making their inclusion choice. They had an equal number of male and female White and non-White targets who they could select, so gender and racial group were not confounded. Further research should explore how adolescents consider intersectionality when making inclusion decisions.

In terms of inclusion reasoning related to the gender of the target and participant, male participants generally focused on personal characteristics when making their inclusion decision. Fully 65 % of male participants selected a male peer to include, and some explained that they chose the peer "because I think we can be very good friends" or "because he looks cool." This attention to personal characteristics may in fact reflect some ingroup preference as well. For female participants, 80 % selected to include a female peer and they were more likely to use reasoning based on gender to support this decision. Many female participants explained that they chose a female peer because they "worked better with females" or "felt more comfortable working with people of the same gender." Therefore, girls may prefer to work with other girls because they may have similar experiences that they can relate to, especially in STEM-related activities where girls might not feel welcomed (Dasgupta et al., 2015; Dasgupta & Stout, 2014). For the minority of female participants who did select a male peer, however, they indicated that they made this choice at random.

Attribution of ability

Contrary to Hypotheses 1 to 3, there were no racial/ethnic or gender differences in the attribution of ability task and there were also no age differences found for the race-based or gender-based analysis on either the peer inclusion task or attribution of ability task. This finding somewhat differs from prior research, which has documented that younger adolescents make more negative attributions about others' intentions than older adolescents (Killen, Clark Kelly, Richardson, & Jampol, 2010) and younger children are less likely to make equitable STEM inclusion choices (Mulvey & Irvin, 2018). However, these past studies looked only at interracial interactions or gender exclusion, whereas our study focused on both gender and racial/ethnic peer inclusion specifically in STEM contexts. In addition, this prior work focused on attributions of intentions (Killen, Clark Kelly, Richardson, & Jampol, 2010), whereas we focused on attributions of ability. It may be that adolescents show less developmental change in their perceptions of others' abilities (where they may have ample sources of reference such as performance in class) than in their attributions of intentions, which may rely more on mental-state reasoning processes, such as theory of mind, that continue to develop across adolescence (Bosco et al., 2014; Devine & Hughes, 2013; Dumontheil et al., 2010).

This study extends prior research that demonstrates the importance of general school climate for social inclusion and positive intergroup attitudes (Beld et al., 2019; McGuire et al., 2015) by showing that STEM class climate can also relate to adolescents' perceptions of their peers. Our findings, in line with our fifth hypothesis, indicated that participants who tended to find their STEM classes interesting and enjoyable, were more likely to believe that a non-White peer would be best at completing the project. Our sample was mostly made of URM students and girls, which are the groups that encounter negative STEM stereotypes (Chen, 2013; Gaertner & McLaughlin, 1983; Kurtz-Costes et al., 2014). However, if URM students and girls feel that they can participate in STEM and find it enjoyable, they might not endorse stereotypes that depict their groups as less competent in STEM and thus would be more likely to believe that other URM students are capable of succeeding in STEM.

Unexpectedly and inconsistent with our fifth hypothesis, we found that participants who had more positive relationships with their STEM teachers were less likely to think that a non-White peer or female peer would be best at completing the project. From past research, we know that if norms of diversity and inclusion are not explicit, teachers' relationships with students can have negative effects on students' outgroup attitudes (Geerlings et al., 2019). It is possible that the teachers in participants' schools might not explicitly express support for inclusion or may condone stereotypical beliefs about girls and URM students, which may influence students' peer ability attributions within STEM classrooms. In our study, students perceived more frequent and quality interracial interactions at school than support for positive interracial interactions by teachers and administrators. Therefore, although students may feel close to their teachers, if their teachers lack a commitment to prosocial norms, then this can be reflected in their students' attribution of ability decisions. Therefore, teachers may want to be more explicit about their support for diversity and inclusion within STEM classrooms because this may reinforce to students that their peers from different ethnic and gender backgrounds are capable of doing well in STEM. This finding indicates that future research should examine STEM teachers' stereotypical STEM beliefs more closely to better understand how this student–teacher relationship translates to adolescents' perceptions of their peers' abilities.

Attribution of ability reasoning

In line with our sixth hypothesis, for reasoning related to attribution of ability, participants generally used reasoning based on personal characteristics, such as "he looks like a hard worker" or "they look like they know a lot about technology and mechanics," with some also indicating that they made a random selection. For both participants who selected a White peer and those who selected a non-White peer, personal characteristics reasoning featured prominently, but those who selected a non-White peer also used more references to a random selection than to race/ethnicity or gender. Interestingly, there were no significant differences in reasoning based on whether participants selected a male or female peer, nor were there differences based on participant race/ethnicity or gender. Thus, attributions generally seemed to be driven by assumptions about personal characteristics. These assumptions, however, may be rooted in stereotypes (Elenbaas & Killen, 2016; Rutland et al., 2007). Although participants might not explicitly state that their reasoning is based on gender or race/ethnicity, their implicit stereotypic expectations of certain gender or race/ethnic groups may influence their personal characteristics reasoning. For example, one of our participants explicitly stated that he/she thought that a White male peer would be best at the task "because the majority of the engineers I've met are white and male"; therefore, others' beliefs that a White male peer would be best based on personal characteristics, such as "he looks smart and creative" and "he looks like he knows more about robots," may be influenced by the stereotypical representation of STEM professionals.

Limitations

This study expands our understanding of school climate and peer inclusion and attributions; however, it is not without limitations. First, causal claims cannot be made due to the use of cross-sectional data. Our data were also collected during the COVID-19 pandemic, which forced the students to participate in school in different formats (online or a hybrid form). This atypical form of schooling may have affected participants' perceptions of their school racial climate and STEM classroom climate. Lastly, our peer inclusion and attribution of ability task only gave participants drawings of racially/ethnically and gender diverse students with no other information about the students or the other hypothetical group members in the vignette; thus, participants may have made their choices based on social desirability. The current sociopolitical context may have made participants feel that choosing White or male peers may be viewed more poorly, which could have influenced them to answer more equitably. Future studies should explore adolescents' peer inclusion and attribution decisions given different contexts such as different racial/ethnic and gender compositions of the project group or providing more information about the potential students they could pick. In addition, studies with larger sample sizes should consider looking at peer inclusion and attribution of ability decisions based on more specific cross-race and same-race analyses. Lastly, this study did not have a comparison group to evaluate whether students would have different peer inclusion or attribution of ability decisions in STEM or non-STEM environments. It is possible that these results could look different across different contexts.

Conclusion

In support of the social reasoning developmental perspective (Rutland et al., 2010), this study demonstrated the complexities of adolescents' peer inclusion decisions as well as their beliefs about their peers' abilities. These findings suggest that schools should focus on creating better school and STEM classroom climates as a way to promote racial and gender diverse interactions in STEM specific activities. Many girls and URM students do not feel that they belong in STEM domains (O'Brien et al., 2020; Rodriguez & Blaney, 2021); however, increasing positive STEM classroom climates may indicate to these groups of students that they are welcomed and can succeed in STEM contexts.

Data availability

Data will be made available on request.

Acknowledgments

This work was supported by the National Science Foundation (NSF; DRL-1941992, 2020) awarded to the last author and an NSF Graduate Research Fellowship awarded to the first author.

Author contributions

A.J. participated in the study design, developed the hypotheses, performed the statistical analysis, and drafted the manuscript. C.J.M., J.C-S., and J.L.K. participated in the study design and helped to draft the manuscript. K.L.M. supervised data collection, participated in the study design and data analytic approach, and helped to draft the manuscript.

Data availability

Materials and analysis code for this study are available by emailing the corresponding author.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jecp.2022.105573.

References

Aschbacher, P. R., Li, E., & Roth, E. J. (2010). Is science me? High school students' identities, participation and aspirations in science, engineering, and medicine. *Journal of Research in Science Teaching, 47*(5), 564–582. https://doi.org/10.1002/tea.20353.

Begum, S. (2020). Social exclusion and adolescent wellbeing: Stress, school satisfaction, and academic self-efficacy as multiple mediators. *The Educational and Developmental Psychologist, 37*(1), 67–74. https://doi.org/10.1017/edp.2020.7.

Behrhorst, K. L., Sullivan, T. N., & Sutherland, K. S. (2019). The impact of classroom climate on aggression and victimization in early adolescence. *Journal of Early Adolescence, 40*(5), 689–711. https://doi.org/10.1177/0272431619870616.

Beld, M. H. M., Van den Heuvel, E. G., van der Helm, G. H. P., Kuiper, C. H. Z., de Swart, J. J. W., Roest, J. J., & Stams, G. J. J. M. (2019). The impact of classroom climate on students' perception of social exclusion in secondary special education. *Children and Youth Services Review, 103*, 127–134. https://doi.org/10.1016/j.childyouth.2019.05.041.

Benner, A. D., & Graham, S. (2013). The antecedents and consequences of racial/ethnic discrimination during adolescence: Does the source of discrimination matter? *Developmental Psychology, 49*(8), 1602–1613 https://doi/org.10.1037/a0030557.

Berkowitz, R., Moore, H., Astor, R. A., & Benbenishty, R. (2016). A research synthesis of the associations between socioeconomic background, inequality, school climate, and academic achievement. *Review of Educational Research, 87*(2), 425–469. https://doi.org/10.3102/0034654316669821.

Bosco, F. M., Gabbatore, I., & Tirassa, M. (2014). A broad assessment of theory of mind in adolescence: The complexity of mindreading. *Consciousness and Cognition, 24*, 84–97. https://doi.org/10.1016/j.concog.2014.01.003.

Brown, C. S. (2019). The importance, and the challenges, to ensuring an inclusive school climate. *Educational Psychologist, 54*(4), 322–330. https://doi.org/10.1080/00461520.2019.1655646.

Brown, C. S., & Chu, H. (2012). Discrimination, ethnic identity, and academic outcomes of Mexican immigrant children: The importance of school context. *Child Development, 83*(5), 1477–1485. https://doi.org/10.1111/j.1467-8624.2012.01786.x.

Byrd, C. M. (2015). The associations of intergroup interactions and school racial socialization with academic motivation. *Journal of Educational Research, 108*, 10–21. https://doi.org/10.1080/00220671.2013.831803.

Byrd, C. M. (2017). The complexity of school racial climate: Reliability and validity of a new measure for secondary students. *British Journal of Educational Psychology, 87*(4), 700–721. https://doi.org/10.1111/bjep.12179.

Byrd, C. M., & Chavous, T. (2011). Racial identity, school racial climate, and school intrinsic motivation among African American youth: The importance of person–context congruence. *Journal of Research on Adolescence, 21*(4), 849–860. https://doi.org/10.1111/j.1532-7795.2011.00743.x.

Carter, D. J. (2008). Achievement as resistance: The development of a critical race achievement ideology among Black achievers. *Harvard Educational Review, 78*(3), 466–497 https://doi.org/10.17763/haer.78.3.83138829847hw844.

Chen, X. (2013). *STEM attrition: College students' paths into and out of STEM fields*. National Center for Education Statistics.

Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology, 97*(6), 1045–1060. https://doi.org/10.1037/a0016239.

Cohen, J., McCabe, E. M., Michelli, N. M., & Pickeral, T. (2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record, 111*(1), 180–213. https://doi.org/10.1177/016146810911100108.

Cooley, S., Burkholder, A. R., & Killen, M. (2019). Social inclusion and exclusion in same-race and interracial peer encounters. *Developmental Psychology, 55*(11), 2440–2450. https://doi.org/10.1037/dev0000810.

Copping, K. E., Kurtz-Costes, B., Rowley, S. J., & Wood, D. (2013). Age and race differences in racial stereotype awareness and endorsement. *Journal of Applied Social Psychology, 43*(5), 971–980. https://doi.org/10.1111/jasp.12061.
Cornell, D., Shukla, K., & Konold, T. R. (2016). Authoritative school climate and student academic engagement, grades, and aspirations in middle and high schools Article 2332858416633184. *AERA Open, 2*(2). https://doi.org/10.1177/2332858416633184.
Crystal, D. S., Killen, M., & Ruck, M. (2008). It is who you know that counts: Intergroup contact and judgments about race-based exclusion. *British Journal of Developmental Psychology, 26*(1), 51–70. https://doi.org/10.1348/026151007x198910.
Dasgupta, N., Scircle Melissa, M., & Hunsinger, M. (2015). Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering. *Proceedings of the National Academy of Sciences of the United States of America, 112*(16), 4988–4993. https://doi.org/10.1073/pnas.1422822112.
Dasgupta, N., & Stout, J. G. (2014). Girls and women in science, technology, engineering, and mathematics: STEMing the tide and broadening participation in STEM careers. *Policy Insights From the Behavioral and Brain Sciences, 1*(1), 21–29. https://doi.org/10.1177/2372732214549471.
Devine, R. T., & Hughes, C. (2013). Silent films and strange stories: Theory of mind, gender, and social experiences in middle childhood. *Child Development, 84*(3), 989–1003. https://doi.org/10.1111/cdev.12017.
Ding, C., & Hall, A. (2007). Gender, ethnicity, and grade differencesin perceptions of school experiences among adolescents. *Studies in Educational Evaluation, 33*(2), 159–174. https://doi.org/10.1016/j.stueduc.2007.04.004.
Dumontheil, I., Apperly, I. A., & Blakemore, S.-J. (2010). Online usage of theory of mind continues to develop in late adolescence. *Developmental Science, 13*(2), 331–338. https://doi.org/10.1111/j.1467-7687.2009.00888.x.
Elenbaas, L., & Killen, M. (2016). Research in developmental psychology: Social exclusion among children and adolescents. In P. Riva & J. Eck (Eds.), *Social exclusion: Psychological approaches to understanding and reducing its impact* (pp. 89–108). Springer International. https://doi.org/10.1007/978-3-319-33033-4_5.
Elenbaas, L., Rizzo, M. T., Cooley, S., & Killen, M. (2016). Rectifying social inequalities in a resource allocation task. *Cognition, 155*, 176–187. https://doi.org/10.1016/j.cognition.2016.07.002.
Farmer, T. W., Hamm, J. V., Dawes, M., Barko-Alva, K., & Cross, J. R. (2019). Promoting inclusive communities in diverse classrooms: Teacher attunement and social dynamics management. *Educational Psychologist, 54*(4), 286–305. https://doi.org/10.1080/00461520.2019.1635020.
Gaertner, S. L., & McLaughlin, J. P. (1983). Racial stereotypes: Associations and ascriptions of positive and negative characteristics. *Social Psychology Quarterly, 46*(1), 23–30. https://doi.org/10.2307/3033657.
Geerlings, J., Thijs, J., & Verkuyten, M. (2019). Preaching and practicing multicultural education: Predicting students' outgroup attitudes from perceived teacher norms and perceived teacher–classmate relations. *Journal of School Psychology, 75*, 89–103. https://doi.org/10.1016/j.jsp.2019.07.003.
Grossman, J. M., & Porche, M. V. (2013). Perceived gender and racial/ethnic barriers to STEM success. *Urban Education, 49*(6), 698–727. https://doi.org/10.1177/0042085913481364.
Grusec, J. E., & Hastings, P. D. (2014). *Handbook of socialization: Theory and research* (2nd ed.). Guilford.
Johnson, D. R. (2012). Campus racial climate perceptions and overall sense of belonging among racially diverse women in STEM majors. *Journal of College Student Development, 53*(2), 336–346. https://doi.org/10.1353/csd.2012.0028.
Killen, M., Clark Kelly, M., Richardson, C., Crystal, D., & Ruck, M. (2010a). European American children's and adolescents' evaluations of interracial exclusion. *Group Processes & Intergroup Relations, 13*(3), 283–300. https://doi.org/10.1177/1368430209346700.
Killen, M., Clark Kelly, M., Richardson, C., & Jampol, N. S. (2010b). Attributions of intentions and fairness judgments regarding interracial peer encounters. *Developmental Psychology, 46*(5), 1206–1213. https://doi.org/10.1037/a0019660.
Killen, M., & Rutland, A. (2011). Children and social exclusion: Morality, prejudice, and group identity. *Wiley/Blackwell*.
Killen, M., Rutland, A., & Jampol, N. (2008). Social exclusion in childhood and adolescence. In K. H. Rubin, W. Bukowski, & B. Laursen (Eds.), *Handbook of peer relationships, interactions, and groups* (pp. 249–266). Guilford.
Kurtz-Costes, B., Copping, K. E., Rowley, S. J., & Kinlaw, C. R. (2014). Gender and age differences in awareness and endorsement of gender stereotypes about academic abilities. *European Journal of Psychology of Education, 29*(4), 603–618. https://doi.org/10.1007/s10212-014-0216-7.
McGee, E. O., Main, J. B., Miles, M. L., & Cox, M. F. (2021). An intersectional approach to investigating persistence among women of color tenure-track engineering faculty. *Journal of Women and Minorities in Science and Engineering, 27*(1), 57–84. https://doi.org/10.1615/JWomenMinorScienEng.2020035632.
McGuire, L., Mulvey, K. L., Goff, E., Irvin, M. J., Winterbottom, M., Fields, G. E., ... Rutland, A. (2020). STEM gender stereotypes from early childhood through adolescence at informal science centers. *Journal of Applied Developmental Psychology, 67*. https://doi.org/10.1016/j.appdev.2020.101109 101109.
McGuire, L., Rutland, A., & Nesdale, D. (2015). Peer group norms and accountability moderate the effect of school norms on children's intergroup attitudes. *Child Development, 86*(4), 1290–1297. https://doi.org/10.1111/cdev.12388.
Mulvey, K. L., & Irvin, M. J. (2018). Judgments and reasoning about exclusion from counter-stereotypic STEM career choices in early childhood. *Early Childhood Research Quarterly, 44*, 220–230. https://doi.org/10.1016/j.ecresq.2018.03.016.
National Center for Science and Engineering Statistics (2021). *Women, minorities, and persons with disabilities in science and engineering: 2021* (Special Report NSF 21-321). https://ncses.nsf.gov/pubs/nsf21321/report
National Science Board (2018). *Science and engineering indicators 2018* (NSB-2018-1). https://www.nsf.gov/statistics/indicators
Nishina, A., Lewis, J. A., Bellmore, A., & Witkow, M. R. (2019). Ethnic diversity and inclusive school environments. *Educational Psychologist, 54*(4), 306–321. https://doi.org/10.1080/00461520.2019.1633923.
Norton, M. I., Sommers, S. R., Apfelbaum, E. P., Pura, N., & Ariely, D. (2006). Colorblindness and interracial interaction: Playing the political correctness game. *Psychological Science, 17*, 949–953. https://doi.org/10.1111/j.1467-9280.2006.01810.x.
O'Brien, L. T., Bart, H. L., & Garcia, D. M. (2020). Why are there so few ethnic minorities in ecology and evolutionary biology? Challenges to inclusion and the role of sense of belonging. *Social Psychology of Education, 23*(2), 449–477. https://doi.org/10.1007/s11218-019-09538-x.

Rattan, A., Savani, K., Komarraju, M., Morrison, M. M., Boggs, C., & Ambady, N. (2018). Meta-lay theories of scientific potential drive underrepresented students' sense of belonging to science, technology, engineering, and mathematics (STEM). *Journal of Personality and Social Psychology, 115*(1), 54–75. https://doi.org/10.1037/pspi0000130.

Richardson, C. B., Hitti, A., Mulvey, K. L., & Killen, M. (2014). Social exclusion: The interplay of group goals and individual characteristics. *Journal of Youth & Adolescence, 43*, 1281–1294. https://doi.org/10.1007/s10964-013-9967-8.

Rivas-Drake, D., Saleem, M., Schaefer, D. R., Medina, M., & Jagers, R. (2019). Intergroup contact attitudes across peer networks in school: Selection, influence, and implications for cross-group friendships. *Child Development, 90*(6), 1898–1916. https://doi.org/10.1111/cdev.13061.

Rodriguez, S. L., & Blaney, J. M. (2021). "We're the unicorns in STEM": Understanding how academic and social experiences influence sense of belonging for Latina undergraduate students. *Journal of Diversity in Higher Education, 14*(3), 441–455. https://doi.org/10.1037/dhe0000176.

Ruck, M. D., Park, H., Killen, M., & Crystal, D. S. (2011). Intergroup contact and evaluations of race-based exclusion in urban minority children and adolescents. *Journal of Youth & Adolescence, 40*(6), 633–643. https://doi.org/10.1007/s10964-010-9600-z.

Rudasill, K. M., Snyder, K. E., Levinson, H., & Adelson, J. L. (2018). Systems view of school climate: A theoretical framework for research. *Educational Psychology Review, 30*(1), 35–60. https://doi.org/10.1007/s10648-017-9401-y.

Rutland, A., Killen, M., & Abrams, D. (2010). A new social-cognitive developmental perspective on prejudice: The interplay between morality and group identity. *Perspectives on Psychological Science, 5*(3), 279–291. https://doi.org/10.1177/1745691610369468.

Rutland, A., Killen, M., & Jumpol, N. S. (2007). Social exclusion in childhood and adolescence. In K. H. Rubin, W. Bukowski, & B. Laursen (Eds.), *Handbook of peer relationships, interactions, and groups*. Guilford.

Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal, 38*(2), 437–460. https://doi.org/10.3102/00028312038002437.

Sellers, R. M., Copeland-Linder, N., Martin, P. P., & L'Heureux Lewis, R. (2006). Racial identity matters: The relationship between racial discrimination and psychological functioning in African American adolescents. *Journal of Research on Adolescence, 16*, 187–216. https://doi.org/10.1111/j.1532-7795.2006.00128.x.

Sette, S., Gasser, L., & Grütter, J. (2020). Links between teachers' liking of students, peer inclusion, and students' academic achievement: A two-wave longitudinal study. *Journal of Youth & Adolescence, 49*(3), 747–756. https://doi.org/10.1007/s10964-019-01048-5.

Settles, I. H., Cortina, L. M., Malley, J., & Stewart, A. J. (2006). The climate for women in academic science: The good, the bad, and the changeable. *Psychology of Women Quarterly, 30*(1), 47–58. https://doi.org/10.1111/j.1471-6402.2006.00261.x.

Simon, R. M., Wagner, A., & Killion, B. (2017). Gender and choosing a STEM major in college: Femininity, masculinity, chilly climate, and occupational values. *Journal of Research in Science Teaching, 54*(3), 299–323. https://doi.org/10.1002/tea.21345.

Smetana, J. G. (2006). Social-cognitive domain theory: Consistencies and variations in children's moral and social judgments. In M. Killen & J. G. Smetana (Eds.), *Handbook of moral development* (pp. 119–154). Lawrence Erlbaum.

Starr, C. R., & Simpkins, S. D. (2021). High school students' math and science gender stereotypes: Relations with their STEM outcomes and socializers' stereotypes. *Social Psychology of Education, 24*(1), 273–298. https://doi.org/10.1007/s11218-021-09611-4.

Syed, M., Goza, B. K., Chemers, M. M., & Zurbriggen, E. L. (2012). Individual differences in preferences for matched-ethnic mentors among high-achieving ethnically diverse adolescents in STEM. *Child Development, 83*(3), 896–910. https://doi.org/10.1111/j.1467-8624.2012.01744.x.

Thapa, A., Cohen, J., Guffey, S., & Higgins-D'Alessandro, A. (2013). A review of school climate research. *Review of Educational Research, 83*(3), 357–385. https://doi.org/10.3102/0034654313483907.

Turiel, E. (1983). *The development of social knowledge: Morality and convention*. Cambridge University Press.

Voight, A., Hanson, T., O'Malley, M., & Adekanye, L. (2015). The racial school climate gap: Within-school disparities in students' experiences of safety, support, and connectedness. *American Journal of Community Psychology, 56*(3), 252–267. https://doi.org/10.1007/s10464-015-9751-x.

Watkins, N. D., & Aber, M. S. (2009). Exploring the relationships among race, class, gender, and middle school students' perceptions of school racial climate. *Equity & Excellence in Education, 42*(4), 395–411. https://doi.org/10.1080/10665680903260218.

Zullig, K. J., Collins, R., Ghani, N., Hunter, A. A., Patton, J. M., Huebner, E. S., & Zhang, J. (2015). Preliminary development of a revised version of the School Climate Measure. *Psychological Assessment, 27*(3), 1072–1081. https://doi.org/10.1037/pas0000070.