

Relationships Among Autonomy Relevant Instruction, Classroom Racial Climate, and Student Engagement

Amanda Vite, Erika A. Patall, Germiné Awad, Jeanette Zambrano

Author Note

Amanda Vite, Erika A. Patall, Rossier School of Education, University of Southern California, Los Angeles, California, 90089, USA.

Germiné Awad, University of Michigan, Ann Arbor, Michigan, 48109, USA.

Jeanette Zambrano, California State University, San Bernadino, California, 92407, USA.

Published in The Journal of Experimental Education

<https://doi.org/10.1080/00220973.2025.2565158>

Footnotes

Supplemental data for this article is available online
at <https://doi.org/10.1080/00220973.2025.2565158>

Contact

Amanda Vite avite@usc.edu Rossier School of Education, University of Southern California, 3470 Trousdale Parkway, Waite Phillips Hall, Los Angeles, CA 90089-4036, USA

Funding

Research reported in this paper was supported in part by National Institute of General Medical Sciences of the National Institutes of Health under award number R01GM9147147. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Abstract

Extensive evidence shows that autonomy support is a strong predictor of students' psychological needs and classroom engagement. However, for racially/ethnically minoritized students, strategies to support psychological needs may need to extend beyond traditional conceptions of autonomy support rooted in white normative values, requiring explicit support for a positive racial climate. This investigation includes two studies examining the relationships among racially/ethnically minoritized college students' perceptions of instructors' autonomy support and classroom racial climate (CRC) with engagement *via* psychological need satisfaction, as well as interactions between autonomy support and CRC. In Study 1, promotion of cultural competence and cultural socialization were associated with students' need satisfaction and, in turn, classroom engagement over and above perceptions of autonomy support. Study 2 replicated these results, showing that cultural competence and socialization were significantly indirectly associated with engagement through need satisfaction. Multigroup analyses found no significant differences across racial/ethnic groups. Across both studies, non-significant CRC and autonomy support interactions suggested that the CRC did not alter the effect of autonomy support on needs or engagement. Overall, these findings highlight the importance of considering racial dynamics in class as critical contextual factors that influence racially/ethnically minoritized students' basic psychological needs and engagement.

Keywords: Autonomy support; basic psychological needs; college; engagement; racial climate

Relationships Among Autonomy Relevant Instruction, Classroom Racial Climate, and Student Engagement

U.S. higher education classroom contexts often favor the academic success of white students over students of color through Eurocentric curriculum, norms, and definitions of academic success (Cokley, [2006](#); Murrell, [2007](#); Phillips et al., [2020](#)). As an institution that was created by and for white people, educational spaces are historically not designed to support ethnically minoritized students' engagement in school. Although system-level factors are largely responsible for this reality, students' daily interactions with teachers have significant day-to-day impacts on their engagement. Examination of these micro-level interactions can illuminate ways that systemic inequities in higher education trickle down to shape classroom level dynamics and student outcomes. In order to provide greater clarity on how to support racially/ethnically minoritized students' engagement in higher education, the present study focused on the relations between students' perceptions of their instructors' motivating and culturally supportive practices and student engagement.

Self-determination theory (SDT) is a macro theory of motivation that identifies conditions that influence individuals' engagement and motivation in school (Deci et al., [1991](#)). According to SDT, individuals have three basic psychological needs of autonomy (i.e., a sense of volition), competence (i.e., a sense of ability and effectiveness), and relatedness (i.e., a sense of connectedness to others) that, when satisfied, lead to positive outcomes, such as well-being, motivation, engagement, and performance (Deci et al., [1991](#)). Research shows that autonomy supportive instruction predicts students' engagement through the satisfaction of these basic psychological needs (Deci et al., [1991](#); Niemiec & Ryan, [2009](#)). Use of autonomy supportive practices has the potential to foster positive educational spaces for students by

promoting a classroom culture that draws upon students' values, beliefs, feelings, and goals (Patall & Zambrano, [2019](#)). However, autonomy supportive instruction may not be explicitly mindful of racial dynamics in class. Research shows that racially/ethnically minoritized undergraduates may endure microaggressions, subtle expressions of racism, that contribute to students' perceptions of a negative classroom racial climate (Bonilla-Silva & Peoples, [2022](#); Solórzano et al., [2000](#)). These experiences can erode students' well-being, leading to suboptimal academic and mental health outcomes. The classroom racial climate, defined in this study as one's perceptions of racial dynamics in class, such as instructors' treatment of individuals of different racial backgrounds, use of stereotyping, and promotion of cultural socialization and competence, may have distinct and interactive relationships with autonomy-relevant instruction and students' psychological needs (Byrd, [2017](#)). Therefore, in this investigation, we explored whether racially/ethnically minoritized undergraduate students' perceptions of the classroom racial climate (CRC) was associated with their basic psychological need satisfaction and engagement above and beyond autonomy relevant instruction, and whether the CRC moderated relationships between autonomy-relevant instruction with outcomes across two independent samples.

Autonomy Relevant Instruction and Students' Engagement in School

Student engagement is considered a multi-dimensional construct comprised of emotional, behavioral, cognitive, and agentic engagement (Finn & Zimmer, [2012](#); Reeve, [2013](#)). Emotional engagement is defined as one's affectual responses to learning activities. Behavioral engagement is often a more visible dimension of engagement that consists of attention, concentration, participation, and effort. A student is cognitively engaged when they use personalized and self-regulatory learning strategies and are engaged in the pursuit of deep understanding of learning

materials. Finally, agentic engagement is defined as a students' ability to contribute to and shape the flow of the learning environment, characterized by expressing opinions and actively contributing to learning activities. Research consistently shows that the satisfaction of the basic psychological needs of autonomy, competence, and relatedness promote students' engagement in school across all four dimensions of engagement (Jang et al., [2016](#); Vansteenkiste & Ryan, [2013](#)). SDT asserts that these psychological needs are universal, and although there is some contention around this theoretical claim, there is widespread empirical evidence that supports the significant relationship between satisfaction of these needs with positive outcomes across cultural groups (Chen et al., [2015](#); Church et al., [2013](#); Jang et al., [2009](#); Vite et al., [2024](#)).

Instructors can support their students' need satisfaction by utilizing autonomy-supportive instructional practices. Instructors are autonomy supportive when they acknowledge and incorporate students' perspective and feelings in class, use non-controlling language that conveys meaningful rationales for academic tasks, and shape their instruction around their students' interests and goals with opportunities for students to have choices (Patall & Zambrano, [2019](#)). Research suggests that autonomy-supportive instruction effectively satisfies students' needs for autonomy, competence, and relatedness, which in turn promotes students' intrinsic motivation, engagement, and performance in school (Jang et al., [2010](#), [2016](#); Reeve & Cheon, [2021](#)). Evidence from higher education contexts supports the positive relationships between autonomy-supportive instruction and college students' academic motivation, engagement, and performance (Okada, [2023](#)). However, much of the existing research on autonomy-relevant instruction in U.S. higher education contexts includes predominantly white student samples or no information on students' race or ethnicity (Okada, [2023](#)). While SDT offers theoretical justification for the universal importance of autonomy supportive instruction

for academic outcomes and limited existing research with (mostly secondary school level) U.S. students of color suggest autonomy support and psychological needs are consistently linked with desirable student outcomes (e.g., Cho et al., [2023](#); Nadler & Komarraju, [2016](#); Parker et al., [2021](#); Tucker et al., [2002](#)), more research is needed with ethnically diverse U.S. students to support this claim. Given the long history and persistent predominance of Eurocentric curriculum and norms in higher education, students of color often navigate these educational spaces with a unique set of challenges and experiences compared to their white peers. Although SDT seeks to explain motivation and learning for all students, this theory and the conceptualization of autonomy supportive practice remains largely race and culture neutral, and thus may not be ideally suited to supporting the needs of students of color. Thus, we sought examine whether students' perceptions of the racial climate may supplement any benefits of (racially neutral) autonomy support for basic psychological needs and academic engagement.

Classroom Racial Climate

Organizational theories suggest that macro-level ideologies create an overarching framework for organizational structures and micro-level interactions (Bonilla-Silva, [1997](#); Ray, [2019](#)). Considering organizations as racial structures embedded within institutionalized racism allows for greater understanding of their role in sustaining unequal distribution of resources (Ray, [2019](#)). In higher education, the history of whiteness and the current predominantly white teaching force can undermine minoritized students' belonging at school and present challenges to students' academic success (Picower, [2009](#)). As the bearers of power in classroom spaces, teachers, influenced by institutional-level factors, are largely responsible for either reinforcing or mitigating white normative behaviors and values in class. Thus, teachers play an instrumental role in shaping the classroom racial climate.

The classroom racial climate is defined as students' and teachers' perceptions of the norms and values associated with race in the classroom context through students' social interactions (Byrd & Chavous, [2011](#)). In the present study, we measured the CRC along the following dimensions: equal status (i.e., instructors' fair treatment of students from different racial/ethnic backgrounds), stereotyping (i.e., teachers' beliefs and expression of racial/ethnic stereotypes), cultural socialization (i.e., opportunities to learn more about one's own race, ethnicity, and culture), promotion of cultural competence (i.e., opportunities to learn about cultures other than one's own), and colorblind socialization (i.e., encouragement to ignore racial/ethnic differences; Byrd, [2017](#)). The teaching practices associated with these dimensions of the School Climate for Diversity (SCD) measure (Byrd, [2019](#)) were deemed most relevant to undergraduate social science courses because they are most adaptable to a wide array of topics. Subscales related to peer interactions (frequency of interaction, support for positive interaction, and quality of interaction) were included in Study 2 to determine whether teacher practices affected student outcomes above and beyond peer interactions. Further, although instances of mainstream socialization and critical consciousness may be present in some undergraduate social science courses, these subscales capture instruction related to sociopolitical issues within the American context specifically, which may not be applicable across courses and were thus excluded.

Not surprisingly, research shows that racially/ethnically minoritized college students generally perceive more negative school classroom racial climates compared to their white peers (Pieterse et al., [2010](#); Reid & Radhakrishnan, [2003](#)). Empirical evidence also suggests that the CRC significantly affects college students' outcomes, such as graduation rates (Fischer, [2010](#)), academic satisfaction (Leath & Chavous, [2018](#)), belonging (Hurtado & Carter, [1997](#)), motivation

(Leath & Chavous, [2018](#)), and psychological ill-being (Jin et al., [2023](#); Pieterse et al., [2010](#)).

Many of these studies measured racial climate along the dimensions of experiences of discrimination, stereotyping, racial insensitivity, and racial tension on campus. Further, research suggests that opportunities to learn about one's own culture is positively associated with Black college students' engagement, achievement, and well-being (Banerjee et al., [2015](#), [2017](#)), while classroom climates that ignored racial dynamics in class were positively associated with Asian American college students' psychological distress (Ahn & Keum, [2021](#)). Qualitative research suggests that there are psychological tolls for college students of color who experience racial microaggressions (Huber et al., [2021](#); Solórzano et al., [2000](#)). One study examined middle and high school students' competence and relatedness satisfaction as a mediator between dimensions of the racial climate and intrinsic motivation (Byrd, [2015](#)). Findings from this study suggested that students' relatedness to others mediated the relationship between promotion of cultural competence and intrinsic motivation. Further, colorblind socialization was the only CRC dimension significantly negatively associated with students' competence.

The Independent and Interactive Effects of CRC and Autonomy Support

The present investigation extended previous literature to examine whether the CRC was associated with U.S. college students' needs for autonomy, relatedness, and competence, and whether the CRC moderated the relationship between autonomy-relevant instruction and psychological needs. SDT claims that one's social environment determines the extent to which their needs are satisfied or frustrated (Vansteenkiste & Ryan, [2013](#)). Given that a positive CRC affirms students' identities and communicates a classroom culture of value and respect for diverse students' backgrounds and needs, we expected that students' perceptions of the CRC would have direct effects on their basic psychological need satisfaction. That is, interactions with

teachers that promote fairness, respect, and opportunities to learn more about one's own race, ethnicity, and culture are likely to influence the extent to which students feel connected to their teachers, a sense of volition in their learning, and skillful when completing academic tasks.

When instructors explicitly emphasize the importance of incorporating diverse cultural perspectives and acknowledge how race, ethnicity, and culture are intertwined with course topics, students of color may perceive their instructor as supportive of their unique needs and experiences. Therefore, we expected practices that promote a positive CRC would be supportive of students' psychological needs by fostering a supportive, rather than stigmatizing, learning environment.

Tenets of autonomy supportive instruction, such as incorporating students' interests and perspectives in class and coordinating content with students' goals, align well with aspects of a positive CRC. As they are currently broadly construed, autonomy supportive practices emphasize leveraging students' perspectives, interests, goals, and values in instruction (Patall & Zambrano, [2019](#)). Students' perspectives, interests, goals, and values that are informed by race and culture are not excluded from student information that is leveraged to create more motivating instruction. However, the present conceptual and operational definitions of autonomy-supportive instruction do not explicitly attend to the importance of race, ethnicity, and culture for students' learning, potentially leaving room for practices to be administered in culturally uninformed ways that may not ultimately be supportive of needs or engagement. We argue that overt cultivation of positive race relations in school, in addition to autonomy-supportive instruction is critical given the historical and unrelenting marginalization of students of color in educational spaces.

For example, in classrooms where instructors promote cultural socialization and cultural competence alongside autonomy supportive practices, students of color may particularly benefit, as each approach may have both independent and mutually reinforcing benefits to the extent that instructors would be aligning learning activities with students' cultural backgrounds, as well as other personal perspectives (Kumar et al., [2018](#)). Conversely, instructors may use autonomy supportive strategies, such as incorporating students' interests, perspectives, and goals into course content in ways that prioritize Eurocentric norms and deemphasize diverse cultural perspectives. In this scenario, the instructor has adopted colorblind socialization practices alongside autonomy supportive practices, which may lead students to perceive their instructor as insensitive to their cultural differences. Such an approach may undermine the benefits of autonomy supportive instruction. Similarly, if an instructor implements autonomy supportive instruction, but stereotypes or treats their students unfairly based on race/ethnicity, the benefits of autonomy support on student outcomes may weaken. For instance, a student may perceive that their instructor provides opportunities for choice, but that these opportunities are offered more often to students of a certain racial/ethnic background. In this scenario, in addition to stereotyping likely diminishing psychological needs and engagement directly, this negative aspect of the classroom racial climate may also diminish the overall positive impact of the autonomy-supportive teaching strategy.

Along these lines, we not only predicted that CRC would predict psychological needs and engagement directly, but also that students' perceptions of the CRC would moderate the relationship between autonomy relevant instruction and need satisfaction, such that a more positive CRC would bolster the positive relationship between autonomy support and need satisfaction. We expected that when instructors' incorporation of students' goals, perspectives,

and interests into course content are embedded within a culturally attuned climate, the functional significance of such support may be particularly notable and salient to students of color (Kumar et al., [2018](#)).

The Present Investigation

While tenets of autonomy-supportive instruction align with characterizations of a positive racial climate, the relationship between these two constructs and their simultaneous relationships with need satisfaction and engagement remains unexamined. These studies utilized SDT as a guiding framework to examine the extent to which autonomy relevant instruction and CRC were associated with racially/ethnically minoritized college students' academic engagement through the satisfaction of basic psychological needs. SDT posits that the extent to which one perceives their needs are satisfied versus frustrated is largely dependent on the social environment (Vansteenkiste & Ryan, [2013](#)). Extensive evidence suggests that autonomy-supportive instruction is associated with students' need satisfaction and engagement. However, little existing research establishes this model with racially/ethnically minoritized students in the U.S., especially in higher education. While students of different racially/ethnically minoritized backgrounds experience minoritization uniquely, the experience of being "othered" in U.S. higher education spaces is likely a commonality (Kumashiro, [2000](#); Li & Nicholson, [2021](#)). Students who are othered in school have experiences distinct from normative groups, which are worth examining in isolation without comparison to the normative group (Awad et al., [2016](#); Azibo, [1988](#)). Given this gap in the literature, we examined the relationships between perceptions of autonomy supportive instruction, need satisfaction, and engagement in two independent samples of racially/ethnically minoritized U.S. college students. We expected that these studies would replicate the pattern of relationships found in previous research. We also predicted that the CRC

would be associated with students' experiences of need satisfaction over and above autonomy support. We addressed the following research questions:

1. To what extent is autonomy supportive instruction and the CRC (equal status, stereotyping, colorblind socialization, cultural socialization, promotion of cultural competence) associated with academic engagement among college students of color, and to what extent are these relationships mediated by need satisfaction?
2. To what extent do perceptions of the CRC moderate the relationships between autonomy support and need satisfaction?

We predicted that autonomy supportive instruction would be positively associated with racially/ethnically minoritized college students' academic engagement and that need satisfaction would mediate this relationship. We also expected that students' perceptions of a more positive CRC would be positively associated with engagement through the satisfaction of basic psychological needs. Further, we expected a stronger positive relationship between autonomy support and need satisfaction would emerge for racially/ethnically minoritized students who perceived more compared to less positive racial climates. Some aspects of autonomy-supportive instruction may inadvertently foster a positive CRC through practices, such as incorporating students' interests and goals into the course, yet when these practices are combined with practices that explicitly foster a classroom culture of respect and value for students' racial, ethnic, and cultural backgrounds, we may expect a stronger association between autonomy support and need satisfaction.

Study 1

Methods

Participants were recruited from an undergraduate psychology subject pool at a predominantly white university located in an urban region of California. The total sample included 227 students enrolled in a variety of psychology courses. Given that our research questions pertained specifically to ethnically minoritized students, all students who identified as white or of European descent were excluded from the analyses. In rejecting the comparative research framework, which presents white students as the normative group to compare ethnically minoritized students to, we did not include a white comparison group (Awad et al., [2016](#); Azibo, [1988](#)). The final sample included 167 students. Participants were 72.33% female with ages ranging from 18 to 31 ($M = 20.14$, $SD = 1.87$). Most of the sample identified as Asian or Asian-American at 53.89%, 13.17% were Black or African-American, 19.16% were Hispanic or Latino/a/x, 5.99% were Middle Eastern, and 7.78% identified as an “Other” ethnicity. All students who selected “other” wrote in responses that included more than one race or ethnicity and included at least one of the groups previously listed. Students were also given the option to describe their racial/ethnic identification in their own words. Only 88 students provided us with this more detailed information, which restricted our ability to use this information in analyses. Further, 8.98% of the sample identified as upper class, 38.92% as upper-middle class, 32.93% as middle class, 9.58% as lower class, and 9.58% as working class, suggesting that much of this sample comes from high SES familial backgrounds.

Recruitment took place through the online undergraduate psychology pool SONA system during fall and spring semesters in the same academic year (2021–2022). This study was approved by the University of Southern California IRB board. Data reported on in this study is part of a larger project (https://osf.io/vnkz6/?view_only=eea90cdce0f34e51a11feb3b674ffd9c). Any undergraduate student in the psychology pool who was 18 years or older was allowed to

participate in this study. Individuals who signed the consent form gained access to the online survey through Qualtrics. The survey prompted students to recall a particular psychology course they were currently enrolled in, and to think about their experiences in that course over the past week while answering the survey questions. Students completed surveys during weeks 7–13 of a 20-week academic semester. Upon completion of the survey, students were eligible to receive extra credit for their psychology course. Data was collected once in the middle of the academic semester and again at the end of the academic term. Students were permitted to take the second survey once four weeks had passed since they submitted their first response. Data presented in this paper is from the first time point only, as there was high attrition from time point one to time point two. Students were from 42 psychology courses with 16 different instructors.

Academic Engagement

Students' engagement in their psychology course was measured with 10 items from the Engagement versus Disaffection with Learning Student Report (Furrer & Skinner, [2003](#)) to capture behavioral and emotional engagement, 4 items from the Deep Learning measure (Pintrich & De Groot, [1990](#); Senko & Miles, [2008](#)) to measure cognitive engagement, and 5 items from the Agentic Engagement Scale (Reeve & Tseng, [2011](#)) that measured agentic engagement. All items were rated on a Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree). Example items include, "In this class, I work as hard as I can" for behavioral, "I enjoy learning new things in this class" for emotional, "When reading for this class, I try to connect the ideas I am reading about with what I already know" for cognitive, and "During this class, I express my preferences and opinions" for agentic engagement. See Appendix A in the Online Supplementary Material for all item wordings.

To assess the factorial validity of the four engagement dimensions, we conducted a four-factor conducted confirmatory factor analyses (CFA) in *Mplus* v.8 (Muthén & Muthén, [2017](#)) with full information maximum likelihood estimation (FIML), maximum likelihood estimation with robust standard errors (MLR) that included items for behavioral, emotional, cognitive, and agentic engagement. Two items from the emotional engagement sub-scale and one item from the behavioral engagement sub-scales were excluded due to low factor loadings ($<.40$). CFAs revealed that the four-factor model had adequate fit engagement [χ^2 : 160.28 ($p < .001$), CFI: .93; SRMR = .06, RMSEA: .06]. To reduce the quantity of parameters in the path models, composite mean scores for each of the four engagement dimensions (behavioral: $\alpha = .84$; emotional: $\alpha = .84$, cognitive: $\alpha = .80$, agentic: $\alpha = .83$) were created based on the CFA results and used as indicators of a single-factor overall engagement latent construct. CFA analyses revealed that a single-factor model with the four scale means for emotional, cognitive, agentic, and behavioral engagement had acceptable fit [$\chi^2 = .46$ ($p = .79$), CFI: 1.00, SRMR: 0.01, RMSEA: .00]. See Table S1 for factor loadings.

Basic Psychological Need Satisfaction

The Balanced Measure of Psychological Needs measures students' satisfaction and frustration of autonomy, competence, and relatedness in class (Sheldon & Hilpert, [2012](#)). All items used a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Example items include, "I feel free to be my 'true self' in class" for autonomy, "In class, I feel successful on tasks and projects" for competence, and "I feel connected with people in class" for relatedness need satisfaction. See Appendix A in the Online Supplementary Material for all item wordings.

We conducted a 3-factor CFA that included items from the autonomy, competence, and relatedness subscales, which fit the data well [$\chi^2 = 46.64$ ($p = .004$), CFI: .96, SRMR: 0.04, RMSEA: .08]. Composite mean scores were then created for autonomy, relatedness, and competence need satisfaction (autonomy: $\alpha = .76$ competence: $\alpha = .80$; relatedness: $\alpha = .92$). The CFA with a single factor using scale means was just identified, so fit indices could not be computed. Loadings for autonomy, competence, and relatedness satisfaction on the need satisfaction factor were all $>.39$ (see Table S1), and the fit of the full SEM models that included need satisfaction (as reported in results) were good.

Autonomy-Supportive Instruction

We used the 15-item Learning Climate Questionnaire to measure students' perceptions of their professor's use of autonomy-supportive instruction (Williams & Deci, 1996A Q2). An example item includes, "My instructor listens to how I would like to do things." All items asked students to rate the extent to which they agreed with statements on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). See Appendix A in the Online Supplementary Material for all items. We conducted a CFA to examine the relationship between observed variables and the underlying latent construct of autonomy-supportive instruction. Inspection of fit indices for the model indicated adequate fit [$\chi^2 = 113.80$ ($p = .004$), CFI: .97, SRMR: .03, RMSEA: .05]. One negatively worded item was excluded from the final measurement model due to a low factor loading. We then parceled the remaining 14 items into three mean score variables, which all showed good reliability ($\alpha > .80$) (Nasser-Abu Alhija & Wisenbaker, [2006](#)). CFAs showed that these three parceled items loaded well on a single factor. These three items were used in subsequent SEMs to reduce the quantity of parameters. See Table S1 for factor loadings.

Classroom Racial Climate

We used five sub-scales from the School Climate for Diversity scale to measure students' perceptions of the classroom racial climate (Byrd, [2017](#), [2019](#)).¹ We used 3 items to measure instructors' use of stereotyping (e.g. "My instructor has a lot of stereotypes about my racial or ethnic group"), 4 items for equal treatment (e.g. "My instructor treats students of all races fairly"), 5 items to measure promotion of cultural competence (e.g. "You have opportunities to learn about people of different races and cultures in [course name]"), 3 items for cultural socialization (e.g. "Your coursework in [course name] exposes you to diverse cultures and traditions"), and 4 items to measure colorblind socialization (e.g. "Your instructor for [course name] encourages you to ignore racial differences"). Items were adapted from the university-level to the classroom-level. See Appendix A in the Online Supplementary Material for all item wordings. Items loaded well on 5 separate factors (see Table S1) and fit of the five-factor model was acceptable [$\chi^2 = 215.58$ ($p < .001$), CFI: .93, SRMR: .05, RMSEA: .07]. Following Heggstad's et al. ([2019](#)) recommendations for assessing the validity of adaptations to context, we compared the parameter estimates in the present study to the parameter estimates reported in Byrd ([2019](#)). We found that across all subscales, factor loadings were higher in the present study compared to Byrd ([2019](#)). Future research should continue to investigate the validity of adapting this measure from the university level to the classroom level.

Analytic Plan

To examine the hypothesized relationships between constructs, we ran a series of structural equation model (SEM) analyses in *MPlus* with full information maximum likelihood estimation (FIML). To test for indirect effects, bootstrapping procedures with 10,000 random

draws were employed and 95% confidence intervals were examined to assess the significance. Due to the sample size, we were unable to run SEM analyses separately by racial/ethnic group to examine group level differences in the proposed relationships. However, before SEM analyses, we ran one-way ANOVAs to test for significant mean differences across racial/ethnic group by each of the following variables: autonomy supportive instruction, need satisfaction, stereotyping, equal status, colorblind socialization, promotion of cultural competence, cultural socialization, and engagement. Before running ANOVAs, the Levene's test for equality of variances was conducted to assess whether the variances for the variables of interest differed significantly across racial/ethnic groups. The test revealed a significant result [$F(4, 162) = 5.72, p < .001$] for equal status, indicating the variances were not equal across groups for this measure. Results for all other variables were not significant. We also conducted correlations between these constructs separately by racial/ethnic group to examine whether there were group level differences in the relationships between variables of interest.

To answer research question one, we tested for the direct effect of autonomy support on engagement, as well as the indirect effect of autonomy support on engagement through the satisfaction of basic psychological needs. Similarly, we included a direct and indirect path from each dimension of the CRC to engagement to test for the direct and indirect effects of the racial climate on engagement through need satisfaction in five separate models. Each dimension was examined separately, rather than as a single latent construct, to conform with Byrd's (2015) analytic approach and to reflect the multi-dimensional nature of the racial climate. Finally, we included direct paths from gender (1 = female, 0 = male), age, race/ethnicity, and SES² to need satisfaction and engagement as covariates. We expected these constructs to have potential important social implications in classroom settings that may be associated with one's

engagement in class. In our final models, we excluded gender and age to reduce the quantity of parameters, given the small sample size. Across all models, gender and age were not significantly associated with outcomes.

To test the interactions posed in research question two, we added an interaction between autonomy support and CRC on need satisfaction using a latent moderated structural equation approach (Klein & Moosbrugger, [2000](#)) in five additional models. This model included autonomy support and the CRC as latent variables regressed on latent need satisfaction and engagement variables. The interaction term used the | statement with the XWITH option of the MODEL command in *MPlus* to specify an interaction between the two latent variables (Muthén & Muthén, [2009](#)). This approach does not allow for computation of fit indices (Maslowsky et al., [2015](#)). Students' race/ethnicity, gender, age, and SES were included as observed covariates on need satisfaction and engagement. In our final models, we excluded gender and age to reduce the quantity of parameters. These covariates were not significantly associated with outcomes across all models. Model fit was evaluated using the following fit indices: CFI, RMSEA, chi-square goodness of fit, and SRMR (Kline, [2016](#)). Following Kline's ([2016](#)) recommendations, we evaluated that an RMSEA under .08, SRMR under .08, and CFI over .90 indicated acceptable model fit. Models were not rejected due to significant chi-square goodness of fit tests, due to this test's sensitivity to sample size. 95% confidence intervals were evaluated to determine the significance of indirect effects.

Results

Results from ANOVA analyses revealed that there were no statistically significant mean differences between racial/ethnic groups across the following variables: autonomy supportive

instruction, need satisfaction, stereotyping, colorblind socialization, promotion of cultural competence, cultural socialization, and engagement (see Tables S2 and S3). Given the violation of the homogeneity of variances assumption, the significant F-statistic for mean-level differences in equal status across racial/ethnic groups should be interpreted with caution.

Results from correlation analyses showed that autonomy supportive instruction was moderately positively correlated with promotion of cultural competence, cultural socialization, and equal status. Stereotyping was slightly negatively correlated with autonomy supportive instruction. These findings suggest that students' perceptions of autonomy supportive instruction are associated with their perceptions of a positive CRC. Further, promotion of cultural competence, cultural socialization, and equal status were positively correlated with need satisfaction, suggesting that some dimensions of the CRC are associated with students' basic psychological needs. Descriptive statistics and correlations of the full sample are presented in [Table 1](#).

We also examined correlations among constructs by racial/ethnic group. Across Black, Asian, and Hispanic/Latino student groups, cultural socialization and promotion of cultural competence were positively correlated with engagement, autonomy support, and need satisfaction. The significance of correlations between the CRC dimensions of equal status, colorblind socialization, and stereotyping with autonomy support, engagement, and needs differed among groups. Notably, there were stronger and more consistently significant correlations between these three dimensions of CRC with engagement, autonomy support, and needs for Black students compared to Asian, Hispanic/Latino students, or students who reported another race/ethnicity. However, the correlation results for Black students and students who reported another race/ethnicity should be interpreted with caution given the low *n* for these

groups. Further, aggregating students who reported another race/ethnicity for analytic purposes presents a limitation by obscuring important differences among the different groups included in this broad category. See Tables S4–S7 for correlation results by racial/ethnic group.

SEMs with Autonomy Support, CRC, Need Satisfaction, and Engagement

The structural equation models showed statistically significant paths from autonomy support to need satisfaction and from need satisfaction to engagement across all models. We also tested for the indirect effect of autonomy support on engagement *via* need satisfaction and found that the indirect path was significantly different from zero across all five models. Further, we found that there was not a significant direct path from equal status, stereotyping, or colorblind socialization to either need satisfaction or engagement. Direct paths from promotion of cultural competence and cultural socialization to engagement were also not significant. However, the direct paths from promotion of cultural competence ($\beta = .28$) and cultural socialization ($\beta = .25$) to need satisfaction were significant. Further, the indirect paths from cultural socialization ($\beta = .20$) and promotion of cultural competence ($\beta = .20$) to engagement through need satisfaction were significant, suggesting that need satisfaction mediates the relationships between promotion of cultural competence, cultural socialization, and engagement. See [Tables 2–6](#) for full results of these models, including model fit, which was acceptable in all models.

SEMs with Autonomy Support and CRC Interaction, Need Satisfaction, and Engagement

Results from the models conducted to answer research question two showed that no dimension of the CRC significantly moderated the relationship between autonomy support and need satisfaction. Across all models, autonomy support remained significantly associated with need satisfaction and significantly indirectly associated with engagement through need

satisfaction. Further, consistent with the models specified for research question one, promotion of cultural competence ($\beta = .27$) and cultural socialization ($\beta = .25$) were significantly directly related to need satisfaction. The indirect effect of cultural socialization on engagement was not significant with the inclusion of the interaction term. There were no significant direct effects of equal status, stereotyping, or colorblind socialization on either need satisfaction or engagement. Model fit indices could not be computed due to the specification of the interaction term between two latent variables (Maslowsky et al., [2015](#)). See Tables S8–S12 for full results of these models.

Study 2

In Study 2, we expanded upon our findings in Study 1 with a larger independent sample of undergraduate students. Given the sample size in Study 1, we were unable to run multigroup analyses by students' racial/ethnic group. One main goal of Study 2 was to collect a large enough sample size to run such analyses. We also aimed to corroborate our results from Study 1 with a different sample. Further, we sought to explore how students' perceptions of dimensions of the racial climate related to peer interactions affected students' need satisfaction and engagement, in addition to teacher-related aspects of the classroom racial climate.

Methods

Surveys were administered to 652 undergraduate students of color in May of the Spring 2025 academic semester. This study was approved by the University of Southern California IRB board. Students were eligible to participate if they were at least 18 years old, were a college student, and identified with one of the following racial/ethnic identities: Black/African American, Latino/Hispanic, Asian/Asian American, Indigenous/Native American, Middle Eastern, Pacific Islander/Native Hawaiian. Of the total sample, 142 of the students were recruited

from a private 4-year university in California using a psychology subject pool. These students were given extra credit for their participation. Further, 265 students were recruited from public 4-year universities in California using email outreach to department chairs, and 245 students were recruited using the online research platform Prolific. Students recruited through these two latter approaches were paid \$10 for their participation. This work was supported in part by National Institute of General Medical Sciences of the National Institutes of Health and represents exploratory analyses conducted with data from a broader research project. Students were asked to report on their experiences in the first social science class that met during that current week. For students recruited through Prolific, if they were not enrolled in a social science class, they were instructed to report on the first STEM course that met during that current week.

Students who identified as Indigenous/Native American, Middle Eastern, Pacific Islander/Native Hawaiian were excluded from multigroup analyses due to too few participants in each group. Students who identified as multiracial were asked to report which racial/ethnic group they most identified with and were placed in the corresponding group accordingly. The analytic sample included 618 students who were 59.22% Latino/Hispanic, 22.33% Black/African American, and 18.45% Asian or Asian American. Students were 68.61% female, 29.13% male, and 1.94% non-binary. Further, students were 11.81% freshman, 22.65% sophomore, 31.07% junior, and 33.50% senior.

Academic Engagement

Students responded to the same scales used to measure agentic, cognitive, behavioral, and emotional engagement as in Study 1. See Appendix B in the Online Supplementary Material for

all items. We assessed measurement invariance using CFAs in *MPlus* with robust standard errors (MLR) across Black, Latino, and Asian student groups. Results showed a negative residual variance for the emotional engagement dimension. The exclusion of this factor resulted in a more stable model that met scalar invariance across racial/ethnic groups. See Table S13 for measurement invariance results. To reduce the quantity of parameters in the path models, composite mean scores for each of the three engagement dimensions (behavioral: $\alpha = .81$; cognitive: $\alpha = .83$, agentic: $\alpha = .88$) were created based on the CFA results and used as indicators of a single-factor overall engagement latent construct.

Basic Psychological Need Satisfaction

We used the same scale as Study 1 to measure students' basic psychological need satisfaction. See Appendix B in the Online Supplementary Material for all items. We conducted a multigroup CFA that included items from the autonomy, competence, and relatedness subscales and compared configural, metric, and scalar models to assess measurement invariance. Results showed that a 3-factor model fit the data well and was invariant across Black, Latino, and Asian student groups, due to a CFI difference between models < 0.01 (Chen, 2007). See Table S13 for measurement invariance results. Composite mean scores were then created for autonomy, relatedness, and competence need satisfaction for use in SEMs (autonomy: $\alpha = .75$; competence: $\alpha = .79$; relatedness: $\alpha = .95$).

Because the CFAs for need satisfaction and engagement using composite indicators were just-identified and did not allow for model fit indices to be computed, we conducted additional measurement invariance analyses treating these two variables as separate factors to better assess their invariance. The model included the composite autonomy, relatedness, and

competence variables as indicators of need satisfaction and composite cognitive engagement, agentic engagement, and behavioral engagement variables as indicators of engagement. Results showed that items met scalar invariance across racial/ethnic groups as indicated by a change of $<.01$ in CFI when comparing model fit.

Autonomy-Supportive Instruction

We used the 6-item Learning Climate Questionnaire to measure students' perceptions of their professor's use of autonomy-supportive instruction (Williams & Deci, 1996). All items asked students to rate the extent to which they agreed with statements on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). See Appendix B in the Online Supplementary Material for all items. CFA measurement invariance results confirmed that a single factor was invariant across racial/ethnic groups, as indicated by a change $<.01$ in the CFI when comparing models. One item was excluded due to a low factor loading. See Table S13 for measurement invariance results.

Classroom Racial Climate

We measured eight sub-scales from the School Climate for Diversity scale to measure students' perceptions of the classroom racial climate (Byrd, [2017](#), [2019](#)) including stereotyping, equal status, promotion of cultural competence, cultural socialization, colorblind socialization, quality of interaction (example item: "Students of different races/ethnicities trust each other in this class"), frequency of interaction (example item: "Students of different races/ethnicities work together in this class"), and support for positive interaction (example item: "Students in this class think it's good to study with people of different races"). As with Study 1, items were adapted from the university-level to the classroom-level. See Appendix B in the Online Supplementary

Material for all items. CFA measurement invariance results showed that a 7-factor solution fit the data well and was invariant across racial/ethnic groups, using the criteria of $<.01$ change in CFI between models. The quality of interaction sub-scale was excluded due to low factor loadings. Please see Table S13 for measurement invariance results.

Analytic plan

First, we computed descriptive statistics and correlations (see [Table 1](#)). Then, we conducted a series of multigroup SEMs to examine the relationships among autonomy supportive instruction, CRC, need satisfaction, and engagement across students who identified as Black/African American, Latino/Hispanic, and Asian/Asian American in *MPlus* (Muthén & Muthén, [2009](#)). We followed the analytic approach used in Study 1 to answer our research questions and examined both the direct and indirect effects of autonomy support and each of the five teacher-focused dimensions of CRC on engagement through need satisfaction. We included the following covariates in all models as observed variables: support for positive interaction, frequency of interaction, and students' age. Gender and SES were also included in models with the full sample. Across all models, neither gender or SES were significantly associated with needs or engagement, so they were excluded to create a more parsimonious model. Support for positive interaction and frequency of interaction were included in the models as observed variables, rather than latent variables, to reduce parameter quantity for a more parsimonious model. Given the importance of peer dynamics for students' learning, we controlled for these variables in our models to examine the effect of teacher-related aspects of the CRC above and beyond peer-related aspects of the CRC. All models used FIML to treat missing data. Bootstrapping procedures with 10,000 random draws were used to assess the indirect effects of autonomy support and CRC on engagement through need satisfaction.

Results

SEMs with Autonomy Support, CRC, Need Satisfaction, and Engagement

We began by conducting five SEMs, each with a different dimension of the CRC, with the overall sample. Results were consistent with Study 1 and showed that autonomy support was significantly positively associated with need satisfaction, and that need satisfaction was significantly positively associated with engagement across all five models. The indirect effect of autonomy support on engagement *via* need satisfaction was also significant across all models. Further, consistent with Study 1, cultural competence and cultural socialization were the only dimensions of the CRC that were significantly associated with students' need satisfaction and significantly indirectly associated with engagement through need satisfaction. Results also showed that the positive interaction dimension of the CRC was significantly associated with students' need satisfaction across all five models. The frequency of interaction dimension of the CRC was associated with students' need satisfaction in the models that also included cultural socialization and cultural competence. See [Tables 2–6](#) for full results of these SEMs, including standardized direct effects, indirect effects, and model fit information.

Next, we conducted the same set of models using a multigroup approach to compare relationships across Black, Latino, and Asian groups. First, we compared an unconstrained model, in which all structural paths were freely estimated across groups, with a constrained model, in which all structural paths were held equal across groups for all five models. Results from chi-square difference tests showed no significant differences between the constrained and unconstrained models (see Table S14 in the Online Supplementary Material). Given these results, group differences were not explored further.

SEMs with Autonomy Support and CRC Interaction, Need Satisfaction, and Engagement

We explored the interactive effects of each dimension of the CRC with autonomy support in a series of five additional SEMs. To explore the interaction term using latent variables, we used the XWITH statement option of the MODEL command in *MPlus* (Muthén & Muthén, [2009](#)). This option does not allow for multigroup analyses; therefore, we explored the interactive effects with the full sample. Similar to Study 1, results showed that there were no significant interactions between dimensions of the CRC and autonomy support on need satisfaction. See Tables S8–S12 for full results.

General Discussion

The present investigation examined the relationships between autonomy supportive instruction, students' basic psychological needs, perceptions of the classroom racial climate, and engagement with two samples of racially/ethnically minoritized undergraduate students. Results supported findings from prior literature that autonomy supportive instruction is associated with need satisfaction and engagement. This study demonstrates the importance of autonomy support for need satisfaction and engagement for two samples of racially and ethnically diverse U.S. college students. Further, our findings show that when students perceive their classroom as supportive of their racial/ethnic background, they are more likely to feel competent, autonomous, and related to their teachers. These findings help explain the psychological mechanism behind the importance of the classroom racial climate for students' engagement.

Across both studies, we also found consistent findings in terms of the relationships between dimensions of the CRC with students' need satisfaction. Results showed that the cultural socialization and promotion of cultural competence dimensions of the racial climate were

significantly associated with psychological need satisfaction across both studies, whereas the stereotyping, equal status, and colorblind socialization dimensions of the CRC were not significantly associated with students' need satisfaction. In Study 2, results from multigroup analyses showed that these results did not differ by racial/ethnic group. These results demonstrate that teaching strategies that support cultural competence and socialization are consistently need satisfying and engaging, despite one's racial/ethnic background. This relates to Byrd's ([2015](#)) findings that promotion of cultural competence is associated with a predominantly Black middle and high school student sample's relatedness in school. Although, Byrd did not find support for a significant association between promotion of cultural competence and competence needs. Our analyses treated need satisfaction as an aggregate latent construct, rather than examining each need separately. Future research may expand on our findings to analyze the unique associations among autonomy support, CRC, and engagement with each basic psychological need. The saliency of each psychological need may differ across grade levels and influence the extent to which the CRC is associated with autonomy, competence, and relatedness need satisfaction. For instance, competency beliefs may be more salient in higher education due to increased rigor and academic competition compared to K-12 contexts.

Our results that colorblind socialization, equal status, and stereotyping were not significantly associated with students' outcomes may be attributed to a few things. First, students may have underreported their perceptions of these dimensions due to social desirability bias, wherein respondents tend to underreport undesirable behaviors in favor of responses that conform to perceived social norms or expectations. Alternatively, it could also be that these more overt forms of racist messaging are less likely to occur in class, and therefore do not strongly impact students' need satisfaction or engagement. Nonsignificant results could also be attributed

to group differences not captured in our analyses. In Study 1, our sample size was too small to run multigroup analyses to examine group differences. However, with a sample of predominantly Asian students, it could be that Asian students interpret these dimensions of the CRC differently than their peers, and therefore, there may be differences in their relationship with students' outcomes. Research shows that Asian college students in the U.S. might encounter stereotyping related to the model minority myth, which perpetuates an image of inherent academic success among Asian American students (Wong & Halgin, [2006](#)). Although positively valenced, internalization of the model minority myth can negatively affect a variety of student outcomes (Czopp et al., [2015](#); Wong & Halgin, [2006](#)). However, some research shows that the negative consequences of discrimination on academic outcomes were reduced when Asian students also reported frequent experiences with the model minority stereotype (Lee & Zhou, 2014). That is, for some Asian students, experiences of the model minority myth may serve as a protective factor against negative aspects of the classroom racial climate. Although the School Climate for Diversity scale was validated with a sample of college students that included Asian students, more research is needed to understand the unique associations among the racial climate and psychological and academic outcomes for Asian students (Byrd, [2019](#)). In Study 2, results from multigroup analyses showed that there were no significant differences when comparing the constrained and unconstrained models. Although the current findings did not reveal significant differences in the relationships among racial/ethnic groups, further research employing larger and more diverse samples is warranted to verify and expand upon these results. We also recommend that future research utilize analysis strategies to examine intra-group differences among the relations of these dimensions of the CRC with basic needs and engagement to provide more nuance to the current results.

Although the presence of a positive CRC did not bolster the positive association between autonomy-relevant instruction and psychological needs, we did find evidence for a positive correlation between the promotion of cultural competence ($r = .52$ and $r = .45$) and cultural socialization ($r = .42$ and $r = .40$) dimensions of CRC with autonomy-supportive instruction across both studies. This signifies that when instructors provide opportunities for autonomous learning, they tend to also promote inclusive learning spaces for students of color and vice versa. Findings from this study may also indicate that psychological need satisfaction serves as the psychological mechanism that drives the positive associations between instructors' promotion of a positive racial climate with students' engagement, helping to explain why incorporation of cultural learning in class, and promotion of positive racial relations also support positive student outcomes.

The items used to measure students' perceptions of in-class learning around cultural competence and cultural socialization align with the cultural competence dimension of Ladson-Billings (1995) culturally relevant pedagogy framework. Ladson-Billings defines culturally relevant pedagogy as instruction that (1) develops academic excellence, (2) promotes cultural competence, and (3) develops students' critical consciousness. In comparison, autonomy supportive instruction is characterized by instructors' (1) ability to nurture students' inner motivational resources through instruction that incorporates students' interests, perspectives, and goals, (2) use of informational language that provides students with flexibility, choice, and rationales for course content, and (3) acknowledgement of students' affect (positive or negative) for learning through communication strategies that value students' perspectives and feelings as valid responses (Patall & Zambrano, 2019). While these bodies of work have commonalities, there is a lack of explicit attention to race, ethnicity, and culture in the SDT theoretical

framework. Across theoretical frameworks related to cultural learning, including culturally relevant pedagogy, culturally responsive teaching, culturally sustaining pedagogy, and asset-based pedagogy, scholars agree that culture and learning are intertwined, which should be reflected in students' schooling with the goal of improving educational conditions for marginalized students (Aronson & Laughter, 2016; Kumar et al., [2018](#); Ladson-Billings, 2021). Our results that the promotion of cultural competence and cultural socialization dimensions of the CRC are associated with students' outcomes across racial/ethnic groups are consistent with research that shows the positive effects of culturally oriented education on students' outcomes, despite their racial/ethnic background (Aronson & Laughter, 2016). We recommend that future research examine the extent to which other dimensions of culturally relevant pedagogy (i.e., development of academic excellence and development of critical consciousness skills) are related to autonomy supportive instruction and students' psychological needs.

Utilization of autonomy supportive practices in conjunction with practices that provide students with opportunities to learn about their own and others' race, ethnicity, and culture in class may offer a promising avenue to support racially/ethnically minoritized students' academic success. We encourage researchers and instructors to consider how autonomy-supportive instruction and explicit promotion of a positive racial climate could promote agency, confidence in one's ability to succeed, and meaningful relationships between teachers and students. Given that SDT was not derived from racial theory, we recommend that scholars consider employing race-reimagining strategies (i.e., "traditional constructs...that are reconceptualized to include racially influenced, sociocultural perspectives) to meaningfully center race in their research related to SDT (DeCuir-Gunby & Schutz, [2014](#), [2024](#)). Future research that race-reimagines constructs, such as autonomy-support and basic psychological needs,

would develop SDT as a framework for understanding racially and ethnically diverse students' motivation in school (DeCuir-Gunby & Schutz, [2014](#), [2024](#)). For instance, López et al. ([2022](#)) race-reimagined the conceptual definitions of autonomy, competence, relatedness needs for their mixed-methods study that explored ways Latino students' experiences in ethnic studies courses promoted learning. An example of the race-reimagined definition for autonomy need satisfaction includes, "the need to take initiative and have ownership of one's actions in the pursuit of social justice as liberation from oppression" (López et al., [2022](#), p. 3). These new conceptual definitions served as the primary coding scheme for qualitative analyses, which revealed that ethnic studies courses supported students' psychological needs through course content that challenged systems of oppression and affirmed students' racial/ethnic identities. In another study, Zambrano et al. (2024) race-reimagined five autonomy-supportive instructional practices to be in line with the tenets and goals of culturally relevant and responsive education. For example, a race-reimagined definition of providing choice opportunities was "allowing students to participate in decision making related to which topics are most relevant to students' culture, community, or social justice issues." Findings showed that among student of color (i.e., Black/African American, Latino/Hispanic, Asian/Asian American, and Indigenous/Native American) college students, race-reimagined practices predicted autonomy need satisfaction and emotional engagement, above and beyond traditional autonomy supportive practices that were conceptualized from SDT. This theoretical and methodological approach can be extended to interventions that train teachers on instructional strategies that combine autonomy support and culturally relevant education to fully support the motivational needs of students of color.

Limitations and Future Directions

This research presents one potential explanation for the ways that the classroom racial climate, basic psychological needs, and engagement are related for students of color. Given the recent rise in the prevalence of culturally relevant instruction in U.S. schools, the results of this study may be useful for instructors and administrators who seek to understand how the incorporation of cultural learning in school is related to student outcomes (Muñiz, [2020](#)). Despite these strengths, this study has a few key limitations worth noting. First, in Study 1, our sample size of 167 was not particularly large for the complex SEM analyses conducted. This meant that students from all racially/ethnically minoritized backgrounds were included in the same model, and comparisons between groups were not made. Further, we were unable to run measurement invariance analyses to determine whether the scales used were measured similarly across groups. Although one-way ANOVAs did not reveal significant mean differences between groups for all constructs of interest (except equal status), there could be meaningful variation across groups not captured in these analyses. In particular, there could be variation in the magnitude and direction of the relationships between variables that the ANOVAs would not account for. We addressed this limitation in Study 2 by collecting data from more participants, conducting measurement invariance analyses, and using a multigroup approach in our SEMs. We suggest that future research continue to examine the direction and strength of these relationships using multigroup analyses by students' racial/ethnic group identification. Such an approach provides more nuance to the unique experiences of students from different racial/ethnic backgrounds regarding their perceptions of racial dynamics in class. Because racism manifests differently for different groups, we may expect meaningful differences between racial/ethnic groups, although our results from Study 2 did not confirm this. It is also worth noting that such group comparisons run the risk of homogenizing students' experiences based on their racial or ethnic identification (Urdan

& Bruchmann, [2018](#)). We recommend that future research utilize a race-focused approach when examining students' racialized classroom experiences, such that group comparisons are only made to provide nuance to how, for example, students' perceptions of classroom racial climate differ between racial/ethnic groups (DeCuir-Gunby & Schutz, [2014](#), [2024](#)). Beyond between-group comparisons, examination of intra-group variability and generational status would also strengthen our understanding of how racial dynamics play out differently for students within the same racial/ethnic group. Further, accounting for instructors' race/ethnicity in analyses would provide a deeper contextual understanding of racial dynamics in class.

Another limitation of this project is the cross-sectional design. The inclusion of a second time point would have allowed us to assess change in outcomes over time as a function of autonomy support and CRC. Despite the limitations of a cross-sectional design, this research provides evidence for the theoretical claim that one's social environment critically supports or thwarts psychological need satisfaction or frustration, and subsequent outcomes. Extensive prior research supports the causal precedence of supportive environments for students' engagement (Jang et al., [2016](#); Reeve & Cheon, [2021](#)). In this study, we examined the CRC as one critical component of the classroom social space. Findings from this study provide a first step toward examining the impact of racial dynamics on students' psychological needs and engagement in school. Future research should utilize a longitudinal design to make stronger inferences about the proposed paths. This study also relied exclusively on self-report data, which presents the possibility of participants' response bias, which may have impacted results. Use of observational data to explore the relationships among motivating and culturally relevant instruction with students' basic psychological needs and engagement is an important next step that may provide additional nuance to the findings of the current study. Further, another limitation of our analyses

is that we did not account for the nesting of students within classes or teachers. In most of the classes reported on, only one student was enrolled in each class, indicating unbalanced clusters. Given this imbalance, we did not use cluster-robust standard errors (Cameron & Miller, [2015](#)).

The present research design also does not allow for causal claims. Therefore, we cannot say whether autonomy-relevant instruction or the CRC caused changes in students' need satisfaction or frustration. Intervention research is one way that researchers could make more causal claims about these associations in the future. Extensive existing research suggests that instructor autonomy-support interventions effectively increase instructors' use of autonomy support and subsequently positively impact student outcomes (Reeve & Cheon, [2021](#)). We recommend that future autonomy-support interventions include more explicit discussion about the importance of promoting cultural competencies and socialization in class. Researchers may consider incorporating tenets of culturally relevant education into autonomy support interventions to highlight ways that teachers can effectively promote positive learning spaces for students of color (Ladson-Billings, [1995](#)).

Conclusion

Taken together, our results suggest a relation between instructors' incorporation of teaching about race and culture in class with racially/ethnically minoritized students' basic psychological needs and engagement over and above the relationship between autonomy support and student outcomes. While Study 1 showed these effects with a diverse sample of students with a large portion of Asian students, Study 2 illustrated that these effects were consistent across a larger sample of racially/ethnically diverse students. Future research should continue to explore how culturally supportive teaching practices affect psychological and academic outcomes across

racial/ethnic groups. As social spaces embodied within the larger school and societal context, it is important that teachers meaningfully address race and racism in class. We recommend that instructors utilize aspects of autonomy supportive instruction, such as student perspective-taking, incorporation of students' interests and values, and emphasis on student agency, in addition to intentional inclusion of students' cultural backgrounds in curriculum and learning as one starting point to create more positive classroom spaces for racially/ethnically minoritized students.

Notes

¹One item from the cultural socialization sub-scale and one item from the stereotyping sub-scale were not measured due to their relevance to course text rather than teacher interactions. Similarly, one other item from the stereotyping sub-scale was not measured due to its relevance to peer interactions, rather than teacher interactions. Sub-scales that referred to students' interactions with peers (i.e., quality of interaction, frequency of interaction, and support for positive interaction) were excluded for the purposes of this study. Further, we excluded the critical consciousness and mainstream socialization subscales due to their specificity to American history, which may not be relevant to undergraduate psychology courses.

²SES-UP (1 = upper class, 0 = upper middle class, middle class, lower class, working class), SES-UMC (1 = upper middle class, 0 = upper class, middle class, lower class, working class), SES-MC (1 = middle class, 0 = upper class, upper middle class, lower class, working class), SES-LC (1 = lower class, 0 = upper class, upper middle class, middle class, working class), SES-WC (1 = working class, 0 = upper class, upper middle class, middle class, lower class).

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Ahn, L. H., & Keum, B. T. (2021). The moderating role of parent and school racial socialization on discrimination and psychological distress for Asian Americans. *Journal of College Student Development*, 62(5), 619–624. <https://doi.org/10.1353/csd.2021.0061>
- Awad, G. H., Patall, E. A., Rackley, K. R., & Reilly, E. D. (2016). Recommendations for culturally sensitive research methods. *Journal of Educational and Psychological Consultation*, 26(3), 283–303. <https://doi.org/10.1080/10474412.2015.1046600>
- Azibo, D. A. Y. (1988). Understanding the proper and improper usage of the comparative research framework. *Journal of Black Psychology*, 15(1), 81–91. <https://doi.org/10.1177/00957984880151010>
- Banerjee, M., Rivas-Drake, D., & Smalls-Glover, C. (2017). Racial-ethnic socialization and achievement: The mediating role of academic engagement. *Journal of Black Psychology*, 43(5), 451–463. <https://doi.org/10.1177/0095798416687705>
- Banerjee, M., Rowley, S. J., & Johnson, D. J. (2015). Community violence and racial socialization: Their influence on the psychosocial well-being of African American college students. *Journal of Black Psychology*, 41(4), 358–383. <https://doi.org/10.1177/0095798414539174>
- Bonilla-Silva, E. (1997). Rethinking racism: Toward a structural interpretation. *American Sociological Review*, 62(3), 465–480. <https://doi.org/10.2307/2657316>

- Bonilla-Silva, E., & Peoples, C. E. (2022). Historically white colleges and universities: The unbearable whiteness of (most) colleges and universities in America. *American Behavioral Scientist*, 66(11), 1490–1504. <https://doi.org/10.1177/00027642211066047>
- Byrd, C. M. (2015). The associations of intergroup interactions and school racial socialization with academic motivation. *The Journal of Educational Research*, 108(1), 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. *The British Journal of Educational Psychology*, 87(4), 700–721. <https://doi.org/10.1111/bjep.12179>
- Byrd, C. M. (2019). A measure of school racial socialization and quality of intergroup interactions. *Cultural Diversity & Ethnic Minority Psychology*, 25(2), 137–151. <https://doi.org/10.1037/cdp0000202>
- Byrd, C., & 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>
- Cameron, A. C., & Miller, D. L. (2015). A practitioner’s guide to cluster-robust inference. *Journal of Human Resources*, 50(2), 317–372. <https://doi.org/10.3368/jhr.50.2.317>
- Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Kaap-Deeder, J. V., Duriez, B., Lens, W., Matos, L., Mouratidis, A., Ryan, R. M., Sheldon, K.

- M., Soenens, B., Petegem, S. V., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, 39(2), 216–236. <https://doi.org/10.1007/s11031-014-9450-1>
- Cho, H. J., Levesque-Bristol, C., & Yough, M. (2023). How autonomy-supportive learning environments promote Asian international students' academic adjustment: A self-determination theory perspective. *Learning Environments Research*, 26(1), 51–76. <https://doi.org/10.1007/s10984-021-09401-x>
- Church, A. T., Katigbak, M. S., Locke, K. D., Zhang, H., Shen, J., de Jesús Vargas-Flores, J., Ibáñez-Reyes, J., Tanaka-Matsumi, J., Curtis, G. J., Cabrera, H. F., Mastor, K. A., Alvarez, J. M., Ortiz, F. A., Simon, J.-Y. R., & Ching, C. M. (2013). Need satisfaction and well-being: Testing self-determination theory in eight cultures. *Journal of Cross-Cultural Psychology*, 44(4), 507–534. <https://doi.org/10.1177/0022022112466590>
- Cokley, K. (2006). The impact of racialized schools and racist (mis)education on African American students' academic identity. In M. Constantine & D. Sue (Eds.), *Addressing racism: Facilitating cultural competence in mental health and educational settings* (pp. 127–144). Wiley.
- Czopp, A. M., Kay, A. C., & Cheryan, S. (2015). Positive stereotypes are pervasive and powerful. *Perspectives on Psychological Science: A Journal of the Association for Psychological Science*, 10(4), 451–463. <https://doi.org/10.1177/1745691615588091>

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *Educational Psychologist*, 26(3–4), 325–

346. <https://doi.org/10.1080/00461520.1991.9653137>

DeCuir-Gunby, J. T., & Schutz, P. A. (2014). Researching race within educational psychology contexts. *Educational Psychologist*, 49(4), 244–

260. <https://doi.org/10.1080/00461520.2014.957828>

DeCuir-Gunby, J. T., & Schutz, P. A. (2024). The evolution of race-focused and race-reimagined approaches in educational psychology: Future directions for the field. *Educational Psychology Review*, 36(1), 30. <https://doi.org/10.1007/s10648-024-09873-2>

Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In *Handbook of research on student engagement* (pp. 97–

131). Springer. https://doi.org/10.1007/978-1-4614-2018-7_5

Fischer, M. J. (2010). A longitudinal examination of the role of stereotype threat and racial climate on college outcomes for minorities at elite institutions. *Social Psychology of Education*, 13(1), 19–40. <https://doi.org/10.1007/s11218-009-9105-3>

Furrer, C., & Skinner, E. A. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology*, 95(1), 148–

162. <https://doi.org/10.1037/0022-0663.95.1.148>

Heggestad, E. D., Scheaf, D. J., Banks, G. C., Monroe Hausfeld, M., Tonidandel, S.,

& Williams, E. B. (2019). Scale adaptation in organizational science research: A review

- and best-practice recommendations. *Journal of Management*, 45(6), 2596–2627. <https://doi.org/10.1177/0149206319850280>
- Huber, L. P., Gonzalez, T., Robles, G., & Solórzano, D. G. (2021). Racial microaffirmations as a response to racial microaggressions: Exploring risk and protective factors. *New Ideas in Psychology*, 63, Article 100880. <https://doi.org/10.1016/j.newideapsych.2021.100880>**AQ4**
- Hurtado, S., & Carter, D. F. (1997). Effects of college transition and perceptions of the campus racial climate on Latino college students' sense of belonging. *Sociology of Education*, 70(4), 324–345. <https://doi.org/10.2307/2673270>
- Jang, H., Kim, E. J., & Reeve, J. (2016). Why students become more engaged or more disengaged during the semester: A self-determination theory dual-process model. *Learning and Instruction*, 43, 27–38. <https://doi.org/10.1016/j.learninstruc.2016.01.002>
- Jang, H., Reeve, J., & Deci, E. L. (2010). Engaging students in learning activities: It is not autonomy support or structure but autonomy support and structure. *Journal of Educational Psychology*, 102(3), 588–600. <https://doi.org/10.1037/a0019682>
- Jang, H., Reeve, J., Ryan, R. M., & Kim, A. (2009). Can self-determination theory explain what underlies the productive, satisfying learning experiences of collectivistically oriented Korean students? *Journal of Educational Psychology*, 101(3), 644–661. <https://doi.org/10.1037/a0014241>

- Jin, J., Zhou, V., Taone, T., & Ichimura, E. (2023). # NotTheSame: Asian American subgroups moderate the relation between campus racial climate and perceived burdensomeness during the COVID-19 pandemic. *Frontiers in Public Health*, 11:982535. <https://doi.org/10.3389/fpubh.2023.982535>**AQ5**
- Klein, A., & Moosbrugger, H. (2000). Maximum likelihood estimation of latent interaction effects with the LMS method. *Psychometrika*, 65(4), 457–474. <https://doi.org/10.1007/BF02296338>
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.
- Kumar, R., Zusho, A., & Bondie, R. (2018). Weaving cultural relevance and achievement motivation into inclusive classroom cultures. *Educational Psychologist*, 53(2), 78–96. <https://doi.org/10.1080/00461520.2018.1432361>
- Kumashiro, K. K. (2000). Toward a theory of anti-oppressive education. *Review of Educational Research*, 70(1), 25–53. <https://doi.org/10.3102/00346543070001025>
- Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American Educational Research Journal*, 32(3), 465–491. <https://doi.org/10.3102/00028312032003465>
- Leath, S., & Chavous, T. (2018). Black women's experiences of campus racial climate and stigma at predominantly white institutions: Insights from a comparative and within-group approach for STEM and non-STEM majors. *Journal of Negro Education*, 87(2), 125–139. <https://doi.org/10.7709/jnegroeducation.87.2.0125>

- Li, Y., & Nicholson, H. L. Jr. (2021). When “model minorities” become “yellow peril”-Othering and the racialization of Asian Americans in the COVID-19 pandemic. *Sociology Compass*, 15(2), e12849. <https://doi.org/10.1111/soc4.12849>
- López, F., González, N., Hutchings, R., Delcid, G., Raygoza, C., & López, L. (2022). Race-reimagined self-determination theory: Elucidating how ethnic studies promotes student identity and learning outcomes using mixed-methods. *Contemporary Educational Psychology*, 71, 102119. <https://doi.org/10.1016/j.cedpsych.2022.102119>
- Maslowsky, J., Jager, J., & Hemken, D. (2015). Estimating and interpreting latent variable interactions: A tutorial for applying the latent moderated structural equations method. *International Journal of Behavioral Development*, 39(1), 87–96. <https://doi.org/10.1177/0165025414552301>
- Muñiz, J. (2020). *Culturally responsive teaching: A 50-state survey of teaching standards*. New America. <https://www.newamerica.org/education-policy/reports/culturally-responsive-teaching/>
- Murrell, P. C. Jr. (2007). *Race, culture, and schooling: Identities of achievement in multicultural urban schools*. Routledge.
- Muthén, B., & Muthén, B. O. (2009). *Statistical analysis with latent variables* (Vol. 123, No. 6). Wiley.
- Muthén, B., & Muthén, L. (2017). Mplus. In *Handbook of item response theory* (pp. 507–518). Chapman and Hall; CRC.

- Nadler, D. R., & Komarraju, M. (2016). Negating stereotype threat: Autonomy support and academic identification boost performance of African American college students. *Journal of College Student Development*, 57(6), 667–679. <https://doi.org/10.1353/csd.2016.0039>
- Nasser-Abu Alhija, F., & Wisenbaker, J. (2006). A Monte Carlo study investigating the impact of item parceling strategies on parameter estimates and their standard errors in CFA. *Structural Equation Modeling: A Multidisciplinary Journal*, 13(2), 204–228. https://doi.org/10.1207/s15328007sem1302_3
- Niemiec, C. P., & Ryan, R. M. (2009). Autonomy, competence, and relatedness in the classroom: Applying self-determination theory to educational practice. *Theory and Research in Education*, 7(2), 133–144. <https://doi.org/10.1177/1477878509104318>
- Okada, R. (2023). Effects of perceived autonomy support on academic achievement and motivation among higher education students: A meta-analysis. *Japanese Psychological Research*, 65(3), 230–242. <https://doi.org/10.1111/jpr.12380>
- Parker, J. S., Parris, L., Lau, M., Dobbins, A., Shatz, L., Porush, S., & Wilkins, B. (2021). Perceived teacher autonomy support and self-determination skill expression: Predictors of student engagement among African American high school students. *Journal of Black Psychology*, 47(6), 445–475. <https://doi.org/10.1177/00957984211009190>
- Patall, E. A., & Zambrano, J. (2019). Facilitating student outcomes by supporting autonomy: Implications for practice and policy. *Policy Insights from the Behavioral and Brain Sciences*, 6(2), 115–122. <https://doi.org/10.1177/2372732219862572>

- Phillips, L. T., Stephens, N. M., Townsend, S. S. M., & Goudeau, S. (2020). Access is not enough: Cultural mismatch persists to limit first-generation students' opportunities for achievement throughout college. *Journal of Personality and Social Psychology, 119*(5), 1112–1131. <https://doi.org/10.1037/pspi0000234>
- Picower, B. (2009). The unexamined whiteness of teaching: How white teachers maintain and enact dominant racial ideologies. *Race Ethnicity and Education, 12*(2), 197–215. <https://doi.org/10.1080/13613320902995475>
- Pieterse, A. L., Carter, R. T., Evans, S. A., & Walter, R. A. (2010). An exploratory examination of the associations among racial and ethnic discrimination, racial climate, and trauma-related symptoms in a college student population. *Journal of Counseling Psychology, 57*(3), 255–263. <https://doi.org/10.1037/a0020040>
- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*(1), 33–40. <https://doi.org/10.1037/0022-0663.82.1.33>
- Ray, V. (2019). A theory of racialized organizations. *American Sociological Review, 84*(1), 26–53. <https://doi.org/10.1177/0003122418822335>
- Reeve, J. (2013). How students create motivationally supportive learning environments for themselves: The concept of agentic engagement. *Journal of Educational Psychology, 105*(3), 579–595. <https://doi.org/10.1037/a0032690>

- Reeve, J., & Cheon, S. H. (2021). Autonomy-supportive teaching: Its malleability, benefits, and potential to improve educational practice. *Educational Psychologist*, 56(1), 54–77. <https://doi.org/10.1080/00461520.2020.1862657>
- Reeve, J., & Tseng, C. M. (2011). Agency as a fourth aspect of students' engagement during learning activities. *Contemporary Educational Psychology*, 36(4), 257–267. <https://doi.org/10.1016/j.cedpsych.2011.05.002>
- Reid, L. D., & Radhakrishnan, P. (2003). Race matters: The relation between race and general campus climate. *Cultural Diversity & Ethnic Minority Psychology*, 9(3), 263–275. <https://doi.org/10.1037/1099-9809.9.3.263>
- Senko, C., & Miles, K. M. (2008). Pursuing their own learning agenda: How mastery-oriented students jeopardize their class performance. *Contemporary Educational Psychology*, 33(4), 561–583. <https://doi.org/10.1016/j.cedpsych.2007.12.001>
- Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, 36(4), 439–451. <https://doi.org/10.1007/s11031-012-9279-4>
- Solórzano, D., Ceja, M., & Yosso, T. (2000). Critical race theory, racial microaggressions, and campus racial climate: The experiences of African American college students. *Journal of Negro Education*, 69(1/2), 60. <https://doi.org/10.17763/haer.79.4.m6867014157m707l>
- Tucker, C. M., Zayco, R. A., Herman, K. C., Reinke, W. M., Trujillo, M., Carraway, K., Wallack, C., & Ivery, P. D. (2002). Teacher and child variables as predictors of academic

- engagement among low-income African American children. *Psychology in the Schools*, 39(4), 477–488. <https://doi.org/10.1002/pits.10038>
- Urdan, T., & Bruchmann, K. (2018). Examining the academic motivation of a diverse student population: A consideration of methodology. *Educational Psychologist*, 53(2), 114–130. <https://doi.org/10.1080/00461520.2018.1440234>
- Vansteenkiste, M., & Ryan, R. M. (2013). On psychological growth and vulnerability: Basic psychological need satisfaction and need frustration as a unifying principle. *Journal of Psychotherapy Integration*, 23(3), 263–280. <https://doi.org/10.1037/a0032359>
- Vite, A., Patall, E. A., & Chen, M. (2024). Relationships between experiences of autonomy and well (ill)-being for K-12 youth: A meta-analysis. *Educational Psychology Review*, 36(4), 127. <https://doi.org/10.1007/s10648-024-09967-x>
- Wong, F., & Halgin, R. (2006). The “model minority”: Bane or blessing for Asian Americans? *Journal of Multicultural Counseling and Development*, 34(1), 38–49. <https://doi.org/10.1002/j.2161-1912.2006.tb00025.x>
- Zambrano, J., Patall, E. A., Vite, A., & Lee, D. J. (2024). Race-reimagined autonomy support: Exploring the motivational benefits of instruction that integrates self-determination theory and culturally relevant education. [Manuscript submitted for publication].

Table 1*Descriptive Statistics and Correlations*

Variables	S1 <i>M</i>	S1 <i>SD</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	S2 <i>M</i>	S2 <i>SD</i>
(1) Engage	4.4	0.8	1.0 0	.66	.53	.42	.35	.06	.30	- .11	.05	.18	.00	.01	.02	-	-	4.0	0.7
(2) BPNS	3.9	0.8	.63	1.0 0	.58	.42	.40	.17	.22	.01	-	.13	-	-	.06	.00	-	3.6	0.8
(3) Autsup	3.9	1.1	.60	.58	1.0 0	.45	.40	.09	.33	-	.00	.06	-	.00	.01	.00	.01	3.7	1.0
(4) CC	4.3	1.2	.52	.48	.52	1.0 0	.73	.18	.13	.17	.00	.10	-	-	.00	.02	.00	3.4	1.2
(5) CS	3.7	1.2	.40	.45	.42	.77	1.0 0	.23	.05	.23	-	.13	.00	-	.04	-	-	2.8	1.3
(6) CB	3.3	0.7	-	-	-	-	.08	1.0	-	.35	-	.11	-	-	.01	.04	.08	2.0	1.2
(7) ES	5.5	0.9	.41	.31	.54	.32	.12	.46	1.0	-	.09	-	.04	.02	.02	-	-	4.6	0.7
(8) S	4.3	0.9	-	-	-	-	.11	.30	-	1.0	-	.05	-	.03	-	.06	.04	1.6	1.0
(9) Gender	0.7	0.4	.18	.05	.31	.10			.64	0	.09	-	.07	.03				0.7	0.5
(10) Age	20.1	1.9	-	-	-	-	-	.04	-	.19	-	1.0	.03	.08	.02	-	-	23.9	7.5
(11) SES-UC	0.1	0.3	.05	.03	-	.01	.07	.07	-	.14	-	-	1.0	-	-	-	-	0.1	0.3
(12) SES-UMC	0.4	0.5	-	.06	-	-	-	-	.04	-	.18	-	-	1.0	-	-	-	0.2	0.4
(13) SES-MC	0.3	0.5	-	.00	.03	.02	-	.04	.02	.10	-	.12	-	-	1.0	-	-	0.5	0.5
(14) SES-LC	0.1	0.3	-	-	.05	.05	.13	.02	-	.06	-	-	-	-	-	1.0	-	0.2	0.4

			.01	.03					.04		.03	.06	.10	.26	.23	0	.07		
(15) SES-	0.1	0.3	.01	-	.00	.02	.03	.05	.02	-	-	-	-	-	-	-	1.0	0.0	0.2
WC				.09						.03	.06	.06	.10	.26	.23	.11	0		

Note. Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Autsup = Autonomy Support. CC = Cultural Competence. CS = Cultural Socialization. CB = Colorblind Socialization. ES = Equal Status. S = Stereotyping. SES-UC = Socioeconomic status – Upper class. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. S1 = Study 1. S2 = Study 2. Correlations below the diagonal correspond to Study 1. Correlations above the diagonal correspond to Study 2. Bolded numbers indicate $p < .05$.

Table 2*SEM Results for Models Including Equal Status*

Study 1 - Direct Effects Model			Study 2 - Direct Effects Model		
Predictor	BPNS	Engage	Predictor	BPNS	Engage
Equal Status	.05 (.09)	.11 (.10)	Equal Status	.04 (.05)	.11 (.06)
Autonomy Support	.74***(.07)	.14 (.16)	Autonomy Support	.64***(.05)	-.03 (.08)
BPNS	--	.74***(.17)	BPNS	--	.88***(.07)
SES-UMC	-.12 (.09)	-.13 (.14)	Positive Interaction	.19**(.06)	-.03 (.05)
SES-MC	-.22*(.09)	-.05 (.14)	Frequency of Interaction	.09 (.05)	-.03 (.06)
SES-LC	-.16*(.07)	.02 (.11)	Age	.12**(.04)	.10**(.04)
SES-WC	-.18*(.09)	.02 (.10)			
Asian	-.12 (.10)	-.13 (.11)			
Hispanic/Latino	-.03 (.09)	-.11 (.10)			
Middle Eastern	-.21*(.06)	.01 (.08)			
Other Race/ethnicity	.00 (.06)	-.10 (.07)			
Indirect Effects					
Equal Status		.04 (.07)			.03 (.05)
95% CI		[-.11, .18]			[-.07, .13]
Autonomy Support		.55***(.15)			.56***(.07)
95% CI		[.26, .84]			[.42, .74]
Model Fit	χ^2 (df) = 266.913 (147), p = < .001 CFI = .921 RMSEA = .070 SRMR = .062		χ^2 (df) = 588.349 (92), p = < .001 CFI = .908 RMSEA = .091 SRMR = .143		

Note. Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Students who identified as Black were the reference group for dummy-coded racial/ethnic variables. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. SES-UC = Socioeconomic status – Upper class is the reference group. All effect estimates are standardized. Numbers in parentheses indicate standard errors. 95 % CI = 95% Confidence Interval. * p < .05, ** p < .01, *** p < .001

Table 3*SEM Results for Models Including Cultural Socialization*

Study 1 - Direct Effects Model			Study 2 - Direct Effects Model		
Predictor	BPNS	Engage	Predictor	BPNS	Engage
Cultural Socialization	.25**(.08)	-.08 (.11)	Cultural Socialization	.15**(.05)	.01 (.05)
Autonomy Support	.65***(.07)	.21 (.15)	Autonomy Support	.60***(.05)	-.01 (.08)
BPNS	--	.80***(.19)	BPNS	--	.89***(.08)
SES-UMC	-.05 (.09)	-.12 (.14)	Positive Interaction	.15**(.06)	-.03 (.05)
SES-MC	-.14 (.10)	-.04 (.14)	Frequency of Interaction	.12*(.05)	-.01 (.06)
SES-LC	-.15*(.06)	.03 (.11)	Age	.10**(.04)	.10**(.04)
SES-WC	-.14 (.08)	.02 (.10)			
Asian	-.10 (.09)	-.11 (.11)			
Hispanic/Latino	-.02 (.09)	-.08 (.11)			
Middle Eastern	-.20 (.08)	.04 (.09)			
Other Race/ethnicity	.04 (.05)	-.09 (.07)			
Indirect Effects					
Cultural Socialization		.20*(.08)			.14**(.05)
95% CI		[.03, .36]			[.05, .25]
Autonomy Support		.52***(.15)			.53***(.16)
95% CI		[.24, .80]			[.41, .68]
Model Fit	χ^2 (df) = 239.77 (147), p = < .001 CFI = .935 RMSEA = .061 SRMR = .060			χ^2 (df) = 553.111 (103), p = < .001 CFI = .927 RMSEA = .080 SRMR = .131	

Note. Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Students who identified as Black were the reference group for dummy-coded racial/ethnic variables. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. SES-UC = Socioeconomic status – Upper class is the reference group. All effect estimates are standardized. Numbers in parentheses indicate standard errors. 95 % CI = 95% Confidence Interval. * p < .05, ** p < .01, *** p < .001

Table 4*SEM Results for Models Including Promotion of Cultural Competence*

Study 1 - Direct Effects Model			Study 2 - Direct Effects Model		
Predictor	BPNS	Engage	Predictor	BPNS	Engage
Cultural Competence	.28**(.07)	.08 (.11)	Cultural Competence	.17**(.05)	.08 (.05)
Autonomy Support	.61***(.08)	.19 (.15)	Autonomy Support	.56***(.06)	-.03 (.08)
BPNS	--	.71***(.19)	BPNS	--	.87***(.08)
SES-UMC	-.17 (.09)	-.10 (.14)	Positive Interaction	.14**(.06)	-.05 (.05)
SES-MC	-.18*(.10)	-.03 (.13)	Frequency of Interaction	.12*(.05)	.00 (.05)
SES-LC	-.14*(.07)	.02 (.11)	Age	.11**(.04)	.10**(.04)
SES-WC	-.15*(.08)	.02 (.10)			
Asian	-.09 (.09)	-.12 (.11)			
Hispanic/Latino	-.02 (.09)	-.09 (.10)			
Middle Eastern	-.20**(.08)	.02 (.08)			
Other Race/ethnicity	.05 (.05)	-.07 (.07)			
Indirect Effects					
Cultural Competence		.20**(.09)			.14**(.05)
95% CI		[.03, .37]			[.06, .24]
Autonomy Support		.44***(.14)			.51***(.07)
95% CI		[.17, .71]			[.39, .67]
Model Fit	χ^2 (df) = 344.715 (188), p = < .001 CFI = .912 RMSEA = .071 SRMR = .063		χ^2 (df) = 666.068 (123), p = < .001 CFI = .929 RMSEA = .082 SRMR = .132		

Note Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Students who identified as Black were the reference group for dummy-coded racial/ethnic variables. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. SES-UC = Socioeconomic status – Upper class is the reference group. All effect estimates are standardized. Numbers in parentheses indicate standard errors. 95 % CI = 95% Confidence Interval. * p < .05, ** p < .01, *** p < .001

Table 5*SEM Results for Models Including Promotion of Colorblind Socialization*

Study 1 - Direct Effects Model			Study 2 - Direct Effects Model		
Predictor	BPNS	Engage	Predictor	BPNS	Engage
Colorblind Socialization	-.01 (.08)	-.11 (.08)	Colorblind Socialization	.07 (.04)	-.07 (.05)
Autonomy Support	.77***(.05)	.19 (.16)	Autonomy Support	.64***(.05)	-.01 (.08)
BPNS	--	.75***(.17)	BPNS	--	.91***(.07)
SES-UMC	-.11 (.09)	-.12 (.14)	Positive Interaction	.18**(.06)	-.03 (.06)
SES-MC	-.21*(.10)	-.03 (.14)	Frequency of Interaction	.12*(.05)	-.02 (.06)
SES-LC	-.16*(.07)	.03 (.11)	Age	.12**(.04)	.11**(.04)
SES-WC	-.17 (.09)	.03 (.10)			
Asian	-.10 (.09)	-.09 (.11)			
Hispanic/Latino	-.01 (.09)	-.06 (.10)			
Middle Eastern	-.20*(.09)	.05 (.08)			
Other Race/ethnicity	-.01 (.06)	-.07 (.07)			
Indirect Effects					
Colorblind Socialization		-.01 (.06)			.07 (.04)
95% CI		[-.12, .11]			[-.01, .15]
Autonomy Support		.58***(.15)			.58***(.07)
95% CI		[.28, .87]			[-.12, .13]
Model Fit	χ^2 (df) = 247.238 (167), p = < .001 CFI = .938 RMSEA = .054 SRMR = .058		χ^2 (df) = 513.619 (92), p = < .001 CFI = .908 RMSEA = .084 SRMR = .123		

Note Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Students who identified as Black were the reference group for dummy-coded racial/ethnic variables. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. SES-UC = Socioeconomic status – Upper class is the reference group. All effect estimates are standardized. Numbers in parentheses indicate standard errors. 95 % CI = 95% Confidence Interval. * p < .05, ** p < .01, *** p < .001

Table 6*SEM Results for Models Including Stereotyping*

Study 1 - Direct Effects Model			Study 2 - Direct Effects Model		
Predictor	BPNS	Engage	Predictor	BPNS	Engage
Stereotyping	.15 (.08)	-.13 (.11)	Stereotyping	.00 (.05)	-.15**(.05)
Autonomy Support	.82***(.06)	.11 (.19)	Autonomy Support	.64***(.05)	-.01 (.08)
BPNS	--	.81***(.18)	BPNS	--	.89***(.07)
SES-UMC	-.06 (.09)	-.15 (.14)	Positive Interaction	.19***(.05)	-.02 (.05)
SES-MC	-.19 (.10)	-.04 (.14)	Frequency of Interaction	.11*(.05)	-.03 (.05)
SES-LC	-.14*(.07)	.02 (.11)	Age	.12**(.04)	.11**(.04)
SES-WC	-.16*(.09)	.02 (.10)			
Asian	-.09 (.09)	-.12 (.11)			
Hispanic/Latino	.00 (.09)	-.09 (.10)			
Middle Eastern	-.19*(.09)	.04 (.09)			
Other Race/ethnicity	.03 (.06)	-.10 (.07)			
Indirect Effects					
Stereotyping		.12 (.08)			.00 (.04)
95% CI		[-.03, .27]			[
Autonomy Support		.66***(.18)			.57 (.07)
95% CI		[.31, 1.01]			
Model Fit	χ^2 (df) = 270.302 (147), p = < .001 CFI = .910 RMSEA = .071 SRMR = .067		χ^2 (df) = 557.335 (107), p = < .001 CFI = .921 RMSEA = .080 SRMR = .120		

Note Engage = Engagement. BPNS = Basic Psychological Need Satisfaction. Students who identified as Black were the reference group for dummy-coded racial/ethnic variables. SES-UMC = Socioeconomic status – Upper middle class. SES-MC = Socioeconomic status – Middle class. SES-LC = Socioeconomic status – Lower class. SES-WC = Socioeconomic status – Working class. SES-UC = Socioeconomic status – Upper class is the reference group. All effect estimates are standardized. Numbers in parentheses indicate standard errors. 95 % CI = 95% Confidence Interval. * p < .05, ** p < .01, *** p < .001

