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Longitudinal growth in college student self-efficacy and intercultural competence attenuated by anxiety/depression

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Introduction: A wide range of stakeholders, including prospective students, parents, accreditors, future employers, and the general public, require detailed data on college outcomes. However, there are many challenges to producing such complex research tracking change over time in the higher education setting.

Methods: This multi-method longitudinal study at three different colleges was grounded in Input-Environment-Output and Social Cognitive theoretical frameworks. It examined: potential change on five different key psychosocial outcomes (i.e., self-efficacy, anxiety, intercultural competence, ethnic identity, and cognitive empathy), associations between these variables, and the role of race/ethnicity.

Results: Multilevel growth modeling revealed within and between subject changes over time. The findings provide evidence that liberal arts colleges focused on global learning can produce significant growth for students of all races on self-efficacy and intercultural competence, both outcomes that are valued for workforce readiness. However, the results also show that anxiety and depression symptoms attenuate growth in intercultural competence, which is concerning given other recent data on students' mental health and wellness concerns.

Discussion: We discuss implications for student development practitioners and faculty alongside potential future directions for research in other higher education settings.

KEYWORDS

self-efficacy, anxiety, intercultural competence, ethnic identity, cognitive empathy, race, multilevel modeling, latent growth modeling

1 Introduction

Our modern society and workforce, demands graduates with an array of skills to function and thrive. Higher education institutions must work to cultivate a complex nexus considering mental health, self-efficacy, and intercultural competence, equipping students to thrive in a global, culturally diverse, pluralistic society. Myriad evidence underscores how anxious and depressive symptoms influence academic achievement, quality of life, and long-term psychosocial outcomes (Trolian et al., 2022). Our work aims to explore the interplay between students' coping mechanisms, identities and resiliencies as students prepare to develop the ability to manage the stressors of the modern educational and professional environment successfully.

The developmental trajectory of students within higher education is influenced by a complex interplay of psychological, social, and environmental factors (Trolian et al., 2022). Researchers

face challenges as they seek to understand the mechanisms that shape desired outcomes amidst this intricate web of pre-existing traits and college experiences. This task proves even more challenging given that true, blinded randomization remains virtually impossible within the constraints of the higher education context where students cannot receive intentionally disparate college experiences. The presented study aimed to address some of these challenges by utilizing longitudinal data to trace students' changes over time. Specifically, we examined the developmental trajectory and interactions of five psychosocial outcomes—self-efficacy, ethnic identity, cognitive empathy, anxiety/depression, and intercultural competence—across three timepoints (baseline before starting college, sophomore year, and senior year).

1.1 Theoretical framework

To methodologically examine student outcomes influenced by various factors in their educational environments, we drew upon Alexander Astin's Input-Environment-Output (I-E-O) model (Astin, 1984). The I-E-O model offers a theoretical framework that incorporates inputs, representing the characteristics students possess at baseline, including identity/demographic variables and pre-existing knowledge, skills, and experiences. Furthermore, the model examines the mediating and intervening effects of environmental experiences that link inputs to outcomes, recognizing the bidirectional connection between input and environmental factors. The I-E-O model has been employed to explore the impact and intersections of variables such as institutional policies, student-teacher interactions, curricular approaches, social engagement, and student psychosocial traits, including anxiety, depression, racial/cultural identity markers, and self-efficacy (e.g., Branch, 2021; Renn and Reason, 2021; Boscarino-Green, 2022; Gjini, 2023). It illuminates how these variables shape one another and can influence student outcomes across various student development and change outcomes.

In addition to the I-E-O model, the study also employed Bandura's Social Cognitive Theory (SCT) to examine the mechanisms of action connecting intra- and inter-individual social variables and cognitive processes that may influence student outcomes (Bandura, 2001). Both the I-E-O model and SCT informed the design of the current study, which utilized a longitudinal approach and incorporated race/ethnicity as an input variable alongside psychosocial measures that served as both baseline inputs and outcome variables that related to and influence each other over time (e.g., higher anxiety/depression scores at baseline input may lead to lower self-efficacy outcomes for students).

Albert Bandura's Social Cognitive Theory (SCT) provides a comprehensive framework for examining the dynamic interplay between individuals and their social environments (Bandura, 2001). SCT posits that personal characteristics, environmental factors, and internal cognitive processes jointly shape human experiences and drive outcomes. Grounded in a social constructivist model, SCT recognizes that individuals actively construct their understanding of the world through social interactions and cognitive processes (Yin et al., 2022). Considering that the college years coincide with the developmental period of young adulthood/emerging adulthood, social relationships hold significant influence during this stage (Larsen and James, 2022). Therefore, it is crucial to comprehend the interaction between college students' traits and experiences to elucidate the pathways that drive change and growth. Within SCT, Bandura identified self-efficacy as a pivotal factor that influences motivation, resiliency, and ultimately students' achievements (Chen et al., 2022). Recent research has expanded the theory to foreground the importance of socio-cultural and historical factors, identity, and contextual influences that profoundly shape these processes (Taylor and Trevino, 2022). Hence, our project incorporated race/ethnicity to enhance our understanding of how cultural factors influence the students' outcomes of interest.

1.2 Self-efficacy

Self-efficacy, as a key construct within SCT, encompasses an individual's belief in their capacity to attain goals and accomplish tasks (Li, 2020). It comprises affective and behavioral dimensions of confidence, effort, and persistence, which are influenced by the perceived agency and power of the individual. Importantly, within the SCT framework, prior experiences play a significant role in shaping this sense of agency (Kalender et al., 2020). For instance, individuals from racially historically marginalized groups may recognize systemic limitations that affect their progress, diverging from the culturally individualistic perspective often associated with self-efficacy. Extensive research has established links between self-efficacy in college students and various outcomes, including enhanced academic performance, improved mental health, and successful social relationships (Grøtan et al., 2019; Love et al., 2020). Exploring the influence of race/ethnicity on self-efficacy and other outcomes allows the field of higher education to gain a deeper understanding of how the college experience may impact students' achievements in culturally nuanced ways.

1.3 Ethnic identity

Young adulthood offers an opportunity for college students to develop their sense of self. As part of this process, students have the opportunity to engage with their cultural, racial, and ethnic identities. Jean Phinney developed the multigroup ethnic identity measure to capture domains of exploration (taking actions to better understand one's own ethnic/racial identity) and commitment (affective and behavioral markers of connection to and engagement with one's own ethnic/racial identity) (Phinney, 2019). Ethnic identity has been established as a robust protective factor that buffers individuals—especially those from historically marginalized identities—from negative outcomes while heightening self-esteem, academic performance, and overall mental health (Holt and Sweitzer, 2020; Litam and Oh, 2022). In addition to internal, individual benefits, higher ethnic identity also relates to increased empathy and intercultural competence (Peifer, 2022). Those with awareness and active understanding of the role of their ethnic and cultural identities display more sophisticated skills for engaging with others, particularly those different from themselves (Litam and Oh, 2022) With that in mind, many colleges create multicultural, inclusive affinity spaces where students can explore and make sense of their racial and ethnic identities (House et al., 2020).

Within the framework of SCT, ethnic identity may serve as a fulcrum that connects individual, internal traits to the social environment. In order to develop robust ethnic identity, an individual

must develop skills to think of themselves as actors within social, societal, and historical context (Litam and Oh, 2022). Thus, as they develop their perception of their cultural identity and their individual relationship with it, they also consider the social environment. Moreover, the interactions that they have on campus, in peer groups, in the classroom, and more broadly within the world shape their willingness to engage these questions and further develop their ethnic identity (Thelamour et al., 2019). As a dynamic, on-going process, ethnic identity may change as a result of the higher education experience and its context. Our study provided a broad, forest-level look at the developmental trajectory of self-efficacy over time, considering racial and the other psychosocial construct of interest for this research.

1.4 Intercultural competence

Various definitions of intercultural competence (ICC) have been proposed by theorists and researchers. The Intercultural Competence Framework and Model (Dimitrov and Deardorff, 2023) emphasizes the significance of intergroup attitudes (i.e., respect, openness, curiosity, and discovery), knowledge (e.g., self-knowledge and culture-specific knowledge), and skills (e.g., observation and listening) that enable individuals to effectively engage with cultural differences across various types and dimensions. Abe and Wiseman (1983) seminal work highlights the skills required for building effective interpersonal relationships through affective self-regulation and intercultural communication. Other definitions focus on more cognitive features, emphasizing intrapersonal traits, attitudes, and interpersonal abilities that lead to successful interactions with culturally diverse individuals (Chen and Starosta, 2000).

The present study specifically examines the change in intercultural competence over time. In the context of this study, intercultural competence refers to students' awareness, knowledge, and skills necessary for interacting and communicating effectively with individuals from different cultures in empathetic and attuned ways.

The college years often coincide with the stage of emerging adulthood, typically between the ages of 18 and 25. During this developmental phase, students undergo significant growth and engage in identity formation as they explore their place in the world (Gurin et al., 2002). This period presents colleges and universities with a valuable opportunity to influence the development of students' cultural competence (Kitsantas, 2004).

The college experience provides multiple occasions for students to acquire skills for encountering and engaging with cultural diversity, ultimately fostering the development of intercultural competence. Developing intercultural competence has been linked to various positive outcomes for college students, including improved professional prospects (Chae et al., 2020). Given these benefits, it is understandable why higher education institutions widely prioritize the cultivation of intercultural competence (Pistorino, 2020).

1.5 Anxiety/depression

Over the last decade, college students have reported more common, acute, and varied mental health concerns. In 2022, 77% of students reported moderate to serious psychological distress (American College Health Association, 2022). Suicidal ideation in college students has increased 50% since 2007 and suicide attempts have increased by 30% (American College Health Association, 2022). The COVID-19 pandemic exacerbated this already worsening mental health crisis, with 90% of students citing negative mental health related symptomatology at this time (World Health Organization, 2022). College students cite mental health concerns more frequently than any other age group (Kohls et al., 2021).

Notably, students from historically marginalized backgrounds report unique trends, stressors, and protective factors. From 2013 to 2022, mental health concerns grew for students from all racial backgrounds, with multiracial students at the highest risk for having at least one mental health condition when universally screened (67.26% of Multiracial students compared to 60.81% for monoracial white individuals). Additionally, across all diagnoses examined, trans/gender non-conforming students had higher prevalence rates when compared to cis men and cis women (e.g., anxiety prevalence rates of 62% versus 39% for cis women and 18% for cis men) (American College Health Association, 2022).

These differences have significant, sometimes life-threatening implications, with 30% of students considering dropping out of school due to mental health-related concerns and 30% reporting suicidal ideation in the past year (American College Health Association, 2022). In 64% of cases where a student drops out of college, they cite mental health-related concerns (National Alliance on Mental Illness, 2022) In addition multiracial (28.9%) and Black students (27.58%) were least likely to access therapy when identified with a mental health condition compared to white students (39.64%). This disparity may point to inadequate culturally-informed resources, rather than avoidance for Black, Indigenous, and other people of color (BIPOC), given that BIPOC students report a higher likelihood of working to improve their mental health nearly every day (57%) when compared to white students (48%).

Many theorists, researchers, and practitioners have hypothesized about the root causes driving the college student mental health crisis. Some have pointed to the financial pressures, noting that tuition costs have skyrocketed 179% from 2000 to 2020 (US News and World Report, 2022). Others have highlighted how the pressures to gain admission to colleges—especially selective and elite ones--have increased as well, bringing college students into their higher education experiences with a baseline of heightened anxiety and depression (Zhan et al., 2021). Students indicate higher levels of isolation, loneliness, and more difficulties in interpersonal relationships, exacerbated by the socio-developmental disruptions during the COVID-19 pandemic (Ren et al., 2021).

While many of the driving causes point to systemic and social causes, the majority of institutional interventions targeting student well-being have focused on individualistic solutions. These interventions have included individual counseling on and off-campus, one-on-one mentoring, mindfulness training, and student development professionals working with individual students to navigate accommodations and crises that arise (Mitchell et al., 2019). Within the United States, an individualistic focus on self-determination absent cultural norms of community care interdependence may drive distress. Students in particular cite feeling immense pressure to perform and attain high-paying, prestigious jobs to survive within the systemic structure of capitalism (Chan and Sun,

2021). Thus, students may perceive college experiences, such as attaining an internship or even the process of receiving grades, as threatening and extremely high stakes (Chan and Sun, 2021). These dynamics can drive higher levels of anxiety and depression in US college students. Thus, understanding the trajectory of anxious and depressive symptoms can equip institutions to respond to this increased need.

2 Current study

Our current study examined the trajectory and interactions of student outcomes drawing from a longitudinal database. In our sample, we assessed students' change over time exploring data from three developmental timepoints: baseline (prior to starting college; August 2015), sophomore (spring 2017), and senior year (spring 2019). We examined how the variable of time interacted with our key outcomes of interest for the students (i.e., self-efficacy, ethnic identity, intercultural competence, cognitive empathy, and anxiety/depression) and included race/ethnicity to isolate possible differences by identity/demographic variables. Considering the findings and theoretical frameworks introduced in our literature review, we developed two key research questions and hypotheses:

1 How do college students' change on the key psychosocial outcomes of interest and how do these psychosocial outcomes interact with one another over time?
a. Hypotheses:

1. College students will demonstrate increases in self-efficacy, ethnic identity, and intercultural competence.
1. Students will report heightened levels of anxiety/depression alongside lower levels of cognitive empathy from baseline to senior year.
2. We expect that those with higher levels of anxiety and depression at baseline will have lower cognitive empathy over time.

2 Will these patterns differ by race/ethnicity?
b. Hypotheses:

1. Race/ethnicity will impact this change over time such that students of color demonstrate greater growth in ethnic identity and intercultural competence.
1. Students of color will have higher levels of growth in anxiety/depression symptoms compared to white students.
1. Race/ethnicity will not impact the remaining variables (i.e., cognitive empathy, self-efficacy).

3 Methods

3.1 Participants

The sample included 33 undergraduate students from three small, private higher education institutions in the United States: a historically women's liberal arts college in the Atlanta metropolitan area, a Catholic college for women in Indiana, and a university in Southern California.

Racially and ethnically, in our sample, approximately 41% of students self-identified as White only, 16% as Black, 16% identified as Latino/a, 7% as Asian, 22% as multiracial or as another racial/ethnic group. Ninety-seven percent of the college students in this sample identified as domestic students, with only 3% identified as international students. In terms of gender identity, 76% self–identified as women, 24% identified as men, and 0% identified as transgender or gender-fluid or chose not disclose or identified as another gender identity.

For sexual orientation, 95% identified as heterosexual, while 5% identified as homosexual and 0% identified with another sexual identity (bisexual, pansexual, prefer not to say, do not know/unsure, not listed here). Socioeconomically, 18% percent of the population identified as low–income (as defined as family income less than $30,000), 15% had combined family income above $150,000, and 67% had families with incomes between those.

3.2 Procedures

This analysis drew data from the larger Global Pathways Study (GPS). The GPS is a multi–institutional, longitudinal study investigating college student growth and change each year with a focus on identity and intercultural competence development. This analysis utilizes data from three time points: baseline (prior to starting college; August 2015), sophomore (spring 2017), and senior year (spring 2019). All students received a survey link through Qualtrics online survey software to complete the questionnaire. Initial recruitment and reminder messages were sent via electronic mail to the students' college-affiliated addresses. The survey questionnaire took an average of 15 min to complete. Informed consent was collected from participants and the study was conducted in compliance with the first author's Institutional Review Board.

3.3 Measures

3.3.1 Race

Participants self–reported race via checkbox. Options included: White/Caucasian, Black/African American/African, Latino(a)(x)/Hispanic, Asian, Native American, Pacific Islander, Middle Eastern, and Other. Participants could choose more than one race/ethnicity (e.g., Black and white).

3.3.2 Self-efficacy

The study examined self-efficacy using the 6-item General Self-Efficacy Scale, Short Form (GSE-6) (Schwarzer and Jerusalem, 1995). This measure is widely used as a robust, valid measure of self-efficacy appropriate for a college student population (Schoon and Henseke, 2022). Participants responded to questions related to their belief about their ability to cope with adversity and approach difficult tasks across several domains of functioning. Participants responded on a 4-point scale (1 = not at all true, 2 = hardly true, 3 = moderately true, and 4 = exactly true) to rate their agreement with statements such as "If someone opposes me, I can find the means and ways to get what I want" and "I can usually handle whatever comes my way."

3.3.3 Ethnic identity

The study assessed ethnic identity through the Multigroup Ethnic Identity Measure-Revised (MEIM-R) (Brown et al., 2014). The MEIM-R evaluates participants' self-reported connection with their ethnic group through two dimensions: commitment (three items) which captures the sense of belonging to an identity and the centrality of that group's culture and values to one's self-concept, and exploration (three items) which gauges the refers to the process of learning about one's ethnic group and its history, traditions, and customs. The response scale for the items ranges from (1) Strongly Disagree to (5) Strongly Agree using a five-point Likert scale. The internal consistency for this particular sample was 0.81. This measure was chosen given its validation in a wide, diverse sample. In addition, it fits well with the developmental stage of emerging adults included in the sample, given the dual dimensionality that reflects on the developmental process of exploration of identity alongside more solidified commitment to one's cultural/ethnic identity.

3.3.4 Cognitive empathy

Cognitive empathy was evaluated by employing two sub-scales, namely perspective taking and empathic concern, extracted from the Interpersonal Reactivity Index (IRI) established (Davis, 1980). The IRI consists of 28 items that measure an individual's self-reported empathy toward the observed experiences of others (Davis, 1983). Participants were asked to rate their agreement with statements on a 5-point Likert scale, ranging from "does not describe me well" to "describes me very well."

The perspective taking subscale, comprising seven items, examines an individual's inclination to adopt the psychological viewpoint and perspective of others. It includes statements such as "I make an effort to consider all sides of a disagreement before reaching a decision" and "I believe there are always two sides to every question and try to consider both."

The empathic concern subscale, also consisting of seven items, assesses the extent to which participants experience sympathy and concern for others. Sample statements such as "I frequently feel compassionate and concerned for those less fortunate than myself" and "I am often deeply moved by events I witness" aim to capture an individual's empathetic and emotionally responsive reaction to another person's subjective experiences.

Composite scores were calculated by combining both sub-scales to evaluate cognitive empathy. The overall reliability of cognitive empathy was found to be good, with a Cronbach's alpha of 0.84 for the sample (Nunnally and Bernstein, 1994). We selected this measure given its established validity and reliability in a range of samples and the insight it offers into both the intellectual and affective domains of empathy.

3.3.5 Anxiety/depression

The study assessed anxious and depressive symptoms using the 4-item Patient Health Questionnaire, 4-item (PHQ4) (Kroenke et al., 2009). This well-validated, widely used, powerful measure includes two items assessing anxious presentation (e.g., feeling nervous, anxious or on edge) and two items exploring depressive symptoms (e.g., little interest or pleasure in doing things). Participants respond on a 4-point scale (0 = not at all, 1 = some days, 2 = more than half the days, and 3 = nearly every day) to queries about their experience of anxious and depressive symptoms. The PHQ-4 has been found to be a robust tool for identifying anxious and depressive symptoms, despite its brevity.

3.3.6 Intercultural competence

Intercultural competence was measured using the Global Perspectives Inventory (GPI) (Braskamp et al., 2014). This measure has robust applications in higher education systems and has been well-validated in samples similar to our own (Hudson and Morgan, 2019). The GPI assesses the comprehensive development of a global perspective through three dimensions, each consisting of two subscales that evaluate internal and interpersonal aspects of intercultural competence. These dimensions are as follows:

Cognitive dimension, which includes the knowing and knowledge subscales. The knowing subscale examines the "level of understanding regarding the significance of cultural context in evaluating what is important to know and value." Meanwhile, the knowledge subscale explores the "level of awareness and comprehension of diverse cultures and their influence on our global society, as well as proficiency in multiple languages."

Intrapersonal dimension, which encompasses the identity and affects subscales. The identity subscales gauge the "awareness of one's unique identity, sense of purpose, and acceptance of one's own identity." The affect subscale measures the "level of respect and acceptance toward cultural perspectives different from one's own, as well as the confidence to navigate complex situations."

Interpersonal dimension, consisting of the social responsibility and social interactions subscales. The social responsibility subscale assesses the "level of interdependence and concern for others within the society." The social interactions subscale captures the "degree of engagement with individuals from different backgrounds and the level of cultural sensitivity displayed in diverse settings" ("GPI Dimensions," 2014).

The overall scale demonstrated good reliability for this sample at both measurement points ($\alpha = 0.85$).

For baseline data collection from incoming first-year students, the New Student form was utilized. This form includes items related to students' academic and co-curricular experiences in high school. Participants responded to 35 items using a 5-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree). The questions focused on students' cultural identity and their attitudes toward individuals from different cultural backgrounds. Sample items included "Some people have a culture and others do not," "I consider myself a global citizen," and "I frequently interact with people from a different race/ethnic group than my own." The overall scale exhibited good reliability for this sample ($\alpha = 0.86$) (Nunnally and Bernstein, 1994).

4 Results

4.1 Replicability and transparency

Data, methods used in the analysis, and materials used to conduct the research will be made available to any researcher for purposes of

reproducing the results or replicating the procedure. To do so, submit a request to the author by e-mail.

4.2 Data analysis

Data were analyzed using SAS 9.4. Descriptive statistics for all five variables for each of the time points are reported in Table 1. Tables 2–4 report the correlations among the five variables at each time point. Considering the context and limitations of longitudinal data, we selected multilevel growth modeling to evaluate students' initial starting point and growth over time with each of the five variables of interest as a dependent variable. Assumptions for the multilevel growth model were tested and met including linearity, normality, and homogeneity of variance. For each of the five dependent variables, we tested a series of four models including: (1) a random effects ANOVA model to calculate the intraclass correlation coefficient (evaluate the proportion of variance due to within student effects and between student effects); (2) an unconditional growth model with just time at Level 1; (a model just looking at change over time in the outcome variables of interest) and (3) an intercepts and slopes as outcomes model with race at Level 2; and (4) any variable that showed a correlation with a dependent variable at any time point, was added as a Level 1 time-varying covariate in a fourth model.

Although we had hundreds of participants participate at each time point, only 33 individuals completed all of the scales of interest across the 4 years of data collection. This is typical given attrition in longitudinal studies, particularly a study like the present one which runs across several years. Our final sample size of 33 was sufficient for multilevel modeling (Hox and Maas, 2002). We chose to apply multilevel growth modeling because it allowed us to employ a model building process for each dependent variable that: partitions the total variance in the dependent variable into that explained by within student effects and between student effects; to add time to the model to determine individual change over time; and to add individual difference variables to determine their impact on time (Table 5).

From just the means and standard deviations of each of the outcome variables over time in Table 1, it appears that the only ones that change significantly over the students' college experience are increasing self-efficacy and most likely also increasing intercultural competence. From the Pearson correlations there were statistically significant positive correlations between intercultural competence and both self-efficacy and cognitive empathy at Time 2 only, and a negative one between ICC and anxiety/depression at Time 3 only. These preliminary analyses guided the below models built to answer our research questions.

4.3 Multilevel growth models

The tested multilevel growth models are illustrated in Table 2. The intraclass correlation coefficient reflects the amount of the total variation observed in the dependent variable that is accounted for by the student versus accounted for by time. For example, for intercultural competence, approximately 49% of the total variability is due to between-person differences; equivalently, the intraclass correlation coefficient implies that repeatedly measured scores on the dependent variable are correlated approximately 0.49 within individuals. For each model, fixed and random effects are reported.

For self-efficacy, the intraclass correlation coefficient is 0, suggesting that self-efficacy is a state that varies primarily within individuals rather than between individuals. Students start at an average score of 2.57 and increase by 0.59 points every 2 years, indicating that students' self-efficacy increases over time. Race played no role in this model. Although intercultural competence was correlated with self-efficacy at time 2, when it was included as a time varying covariate, it did not contribute to the model. The results show that there is significant remaining variability within individuals (sigma squared) that is left unexplained that could be explained by adding additional Level 1 time-varying covariates in future studies to better understand what individual and experiential variables influences students self-efficacy growth.

For ethnic identity, the intraclass correlation is 0.43, suggesting that ethnic identity varies both among students and within students on different occasions. Students start at an average score of 3.12, but do not change in their ethnic identity over time. Surprisingly, race played no role in the model. The results show that there is significant variability within individuals that is left unexplained that could be explained by adding additional Level 1 time-varying covariates to better understand what impacts variations in ethnic identity.

For cognitive empathy, the intraclass correlation is 0.55. Thus repeatedly measured scores on the dependent variable are correlated 0.55 within individuals and 0.45 between individuals. This suggests that cognitive empathy varies both among students and within students. Students start at an average score of 3.87, but do not increase or decrease significantly in their cognitive empathy over time. Race played no role in the model. Although intercultural competence was correlated with cognitive empathy at time 2, when it was included as a time-varying covariate, it did not contribute to the model. The results show that there is significant remaining variability within individuals (sigma squared) that is left unexplained that could be explained by adding additional Level 1 time-varying covariates.

For anxiety and depression, the intraclass correlation is 0.24. Thus repeatedly measured scores on the dependent variable are correlated

TABLE 1 Descriptive statistics for each time point.

	Self-efficacy	Ethnic identity	Cognitive empathy	Anxiety/Depression	Intercultural competence
Time 1	M = 3.08 SD = 0.38	M = 3.06 SD = 0.47	M = 3.93 SD = 0.50	M = 1.79 SD = 0.76	M = 3.79 SD = 0.31
Time 2	M = 3.89 SD = 0.57	M = 2.99 SD = 0.56	M = 4.10 SD = 0.42	M = 1.99 SD = 0.88	M = 3.87 SD = 0.27
Time 3	M = 4.26 SD = 0.60	M = 2.91 SD = 0.68	M = 4.01 SD = 0.47	M = 1.90 SD = 0.79	M = 3.97 SD = 0.26

TABLE 2 Correlations for time 1 (baseline).

	Self-efficacy	Ethnic identity	Cognitive empathy	Anxiety/ depression
Self-efficacy	–	–	–	–
Ethnic identity	$r = 0.13$ $p = 0.52$	–	–	–
Cognitive empathy	$r = -0.10$ $p = 0.64$	$r = -0.30$ $p = 0.14$	–	–
Anxiety/ Depression	$r = -0.10$ $p = 0.61$	$r = -0.01$ $p = 0.94$	$r = 0.02$ $p = 0.92$	–
Intercultural competence	$r = 0.34$ $p = 0.08$	$r = 0.18$ $p = 0.35$	$r = 0.13$ $p = 0.53$	$r = 0.15$ $p = 0.43$

TABLE 3 Correlations for time 2.

	Self-efficacy	Ethnic identity	Cognitive empathy	Anxiety/ Depression
Self-efficacy	–	–	–	–
Ethnic identity	$r = -0.22$ $p = 0.24$	–	–	–
Cognitive empathy	$r = 0.32$ $p = 0.10$	$r = -0.17$ $p = 0.34$	–	–
Anxiety/ Depression	$r = 0.06$ $p = 0.74$	$r = -0.10$ $p = 0.59$	$r = 0.02$ $p = 0.92$	–
Intercultural competence	$r = 0.60$ $p < 0.001$	$r = -0.05$ $p = 0.77$	$r = 0.43$ $p = 0.02$	$r = 0.05$ $p = 0.75$

TABLE 4 Correlations for time 3.

	Self-efficacy	Ethnic identity	Cognitive empathy	Anxiety/ depression
Self-efficacy	–	–	–	–
Ethnic identity	$r = 0.24$ $p = 0.23$	–	–	–
Cognitive empathy	$r = 0.17$ $p = 0.40$	$r = 0.29$ $p = 0.15$	–	–
Anxiety/ Depression	$r = -0.22$ $p = 0.26$	$r = -0.20$ $p = 0.30$	$r = -0.32$ $p = 0.10$	–
Intercultural competence	$r = 0.27$ $p = 0.19$	$r = -0.06$ $p = 0.77$	$r = 0.34$ $p = 0.09$	$r = -0.54$ $p = 0.01$

0.24 within individuals. Thus, anxiety and depression vary primarily among people (0.76). Students start at an average score of 1.74 and they do not increase or decrease significantly in their anxiety and depression over time. Race played no role in the model. Intercultural competence was correlated with anxiety and depression at time 3 and so it was added to the model as a time-varying covariate. However, intercultural competence did not contribute to the model. The results show that there is significant remaining variability within individuals (sigma squared) that is left unexplained that could be explained by adding additional Level 1 time-varying covariates.

For intercultural competence, the intraclass correlation is 0.49. Thus nearly half of the total variability is due to differences between individuals and half is due to differences within individuals. When time was added to the model, results showed that students start at an average score of 3.68 and increase over time by 0.09 points. Race played no role in the model. For this model, self-efficacy and cognitive empathy were correlated with intercultural competence at time 2 anxiety and depression were correlated with intercultural competence at time 3. The three variables were tested separately as time-varying covariate and none were significant.

5 Discussion

As initially hypothesized, college students in this longitudinal study demonstrated both increased self-efficacy and intercultural competence over the course of their college experience. This finding is affirming to educators who strive to scaffold such development through high-impact practices, and important in empirically establishing the value of college, especially given the relevance of these two outcomes to workforce readiness. On the other hand, this study found no significant change in ethnic identity (where growth was anticipated), nor in cognitive empathy or anxiety and depression (where decline was expected). This last finding is perhaps one of the most surprising given the widespread recent reporting on concerns around student mental health. It could be that these symptoms emerge more in high school and then stay steady throughout college, on average.

As far as the relationships between these outcome variables over time, the positive correlation observed between intercultural competence and both self-efficacy and cognitive empathy, did not turn out to be significant over all three time periods in the multilevel growth modeling. The only interaction between outcome variables that was significant over time in the modeling was that between intercultural competence and anxiety and depression, as foreshadowed by their preliminary negative correlation at Time 3 only. In other words, while the students on average showed increases in intercultural competence over their college years, this was less true for students with more anxiety/depression. While this finding is not especially surprising given the deleterious impact of mental health on functioning and development, it underscores the importance of attending to all students' mental health needs while implementing intercultural education. Finally, the relationship between anxiety/depression and cognitive empathy did not manifest at any point, contrary to our hypotheses and research in this area.

Perhaps the most unexpected finding was that race and ethnicity played absolutely no role in the model when added. Substantial research indicates that students of color experience many aspects of college differently, and especially issues of ethnic identity and intercultural relating, given the asymmetries in their lived experiences in relationship to these psychosocial dimensions. In addition, the trauma and stress of navigating systemic racism could be expected to have a negative impact on their mental health. Further research and replication would be helpful to confirm these promising results that indicate that the overall findings of this study of growth in self-efficacy and intercultural competence (especially for those with less anxiety and depression) hold true for all students regardless of race or ethnicity. While this sample was adequately diverse to disaggregate by race and

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TABLE 5 Multilevel growth models.

Dependent variable	Model 1: random effects ANOVA model Level 1: Yij = B0j + rij Level 2: B0j = y00 + uij	Model 2: unconditional growth model level 1: Yij = B0j + B1jtimeij + rij Level 2: B0j = y00 + u0j B1j = y10 + u1j	Model 3: race as a level 2 predictor Level 1: Yij = B0j + B1jtimeij + rij Level 2: B0j = y00 + y01racej + u0j B1j = y10 + y11racej + u1j	Model 4: addition of correlated predictor as a time-varying covariate Level 1: Yij = B0j + B1jtimeij + B2jtvci + B3jtvc*time + jrij Level 2: B0j = y00 + u0j B1j = y10 + u1j
Self-efficacy	Intraclass coefficient: 0 **Fixed effects** Intercept: 3.73, $p < 0.001$ **Variance estimates** $\tau00 = 0$, $p = 1$ $\sigma2 = 0.51$, $p < 0.001$	**Fixed effects** Intercept: 2.57, $p < 0.001$ Time: 0.59, $p < 0.001$ **Covariance/Variance estimates** $\tau00 = 0$, $p = 1$ $\tau11 = -0.03$, $p = 0.13$ $\sigma2 = 0.25$, $p < 0.001$ $\tau10 = -0.03$, $p = 0.24$	**Fixed effects** Intercept: 2.51, $p < 0.001$ Time: 0.66, $p < 0.001$ Race: 0.09, $p = 0.76$ Race*Time: −0.10, $p = 0.53$ **Covariance/Variance estimates** $\tau00 = 0$, $p = 1$ $\tau11 = 0.04$, $p = 0.11$ $\sigma2 = 0.27$, $p < 0.001$ $\tau10 = -0.03$, $p = 0.24$	*Intercultural competence:* **Fixed effects** Intercept: −1.80, $p = 0.50$ Time: 0.73, $p = 0.58$ ICC: 1.13, $p = 0.11$ ICC*Time: −0.04, $p = 0.90$ **Covariance/Variance estimates** $\tau00 = 0.45$, $p = 0.43$ $\tau11 = 0$, $p = 0.49$ time1$\sigma2 = 0.12$, $p = 0.04$ time2$\sigma2 = 0.22$, $p = 0.01$ time3$\sigma2 = 0.35$, $p = 0.01$ $\tau10 = 0.0$, $p = 0.50$
Ethnic identity	Intraclass coefficient: 0.43 **Fixed effects** Intercept: 2.95, $p < 0.001$ **Variance estimates** $\tau00 = 0.15$, $p = 0.01$ $\sigma2 = 0.20$, $p < 0.001$	**Fixed effects** Intercept: 3.12, $p < 0.001$ Time: −0.09 $p = 0.17$ **Covariance/Variance estimates** $\tau00 = 0$, $p = 1$ $\tau11 = 0.02$, $p = 0.25$ $\sigma2 = 0.25$, $p < 0.001$ $\tau10 = 0.02$, $p = 0.50$	**Fixed effects** Intercept: 2.91, $p < 0.001$ Time: −0.10, $p = 0.29$ Race: 0.42, $p = 0.09$ Race*Time: 0.12, $p = 0.94$ **Covariance/Variance estimates** $\tau00 = 0.03$, $p = 0.41$ $\tau11 = 0.03$, $p = 0.18$ $\sigma2 = 0.15$, $p < 0.001$ $\tau10 = -0.01$, $p = 0.91$	
Cognitive empathy	Intraclass coefficient: 0.55 **Fixed effects** Intercept: 4.01, $p < 0.001$ **Variance estimates** $\tau00 = 0.12$, $p < 0.001$ $\sigma2 = 0.10$, $p < 0.001$	**Fixed effects** Intercept: 3.87, $p < 0.001$ Time: 0.06 $p = 0.18$ **Covariance/Variance estimates** $\tau00 = 0.14$, $p = 1$ $\tau11 = 0$, $p = 1$ $\sigma2 = 0.10$, $p < 0.001$ $\tau10 = 0.00$, $p = 0.91$	**Fixed effects** Intercept: 3.91, $p < 0.001$ Time: 0.06, $p = 0.43$ Race: −0.07, $p = 0.77$ Race*Time: 0.01, $p = 0.92$ **Covariance/Variance estimates** $\tau00 = 0.03$, $p = 0.41$ $\tau11 = 0.03$, $p = 0.18$ $\sigma2 = 0.15$, $p < 0.001$ $\tau10 = -0.01$, $p = 0.91$	*Intercultural Competence:* **Fixed effects** Intercept: 4.12, $p = 0.03$ Time: −0.73, $p = 0.37$ ICC: −0.05, $p = 0.92$ ICC*Time: 0.20, $p = 0.34$ **Covariance/Variance estimates** $\tau00 = 0.26$, $p = 0.08$ $\tau11 = 01$, $p = 1$ time1$\sigma2 = 0.20$, $p = 0.04$ time2$\sigma2 = 0.10$, $p = 0.08$ time2$\sigma2 = 0.11$, $p < 0.001$ $\tau10 = 0$, $p = 0.64$
Anxiety/ Depression	Intraclass coefficient: 0.24 **Fixed effects** Intercept: 1.92, $p < 0.001$ **Variance estimates** $\tau00 = 0.16$, $p = 0.07$ $\sigma2 = 0.52$, $p < 0.001$	**Fixed effects** Intercept: 1.74, $p < 0.001$ Time: 0.10, $p = 0.34$ **Covariance/Variance estimates** $\tau00 = 0$, $p = 1$ $\tau11 = 0.06$, $p = 0.19$ $\sigma2 = 0.47$, $p < 0.001$ $\tau10 = -0.01$, $p = 0.84$	**Fixed effects** Intercept: 1.41, $p < 0.001$ Time: 0.29, $p = 0.11$ Race: 0.63, $p = 0.16$ Race*Time: −0.33, $p = 0.14$ **Covariance/Variance estimates** $\tau00 = 0.15$, $p = 0.38$ $\tau11 = 0.08$, $p = 0.25$ $\sigma2 = 0.46$, $p < 0.001$ $\tau10 = -0.07$, $p = 0.73$	*Intercultural Competence:* **Fixed effects** Intercept: −7.80, $p = 0.17$ Time: 2.65, $p = 0.33$ ICC: 2.48, $p = 0.10$ ICC*Time: −0.64, $p = 0.35$ **Covariance/Variance estimates** $\tau00 = 0.67$, $p = 0.13$ $\tau11 = 0.04$, $p = 0.38$ time1$\sigma2 = 0.60$, $p = 0.01$ time2$\sigma2 = 0.71$, $p = 0.13$ time3$\sigma2 = 0.14$, $p = 0.24$ $\tau10 = 0$, $p = 0.20$

(Continued)

TABLE 5 (Continued)

Dependent variable	Model 1: random effects ANOVA model Level 1: Yij = B0j + rij Level 2: B0j = y00 + uij	Model 2: unconditional growth model level 1: Yij = B0j + B1jtimeij + rij Level 2: B0j = y00 + u0j B1j = y10 + u1j	Model 3: race as a level 2 predictor Level 1: Yij = B0j + B1jtimeij + rij Level 2: B0j = y00 + y01racej + u0j B1j = y10 + y11racej + u1j	Model 4: addition of correlated predictor as a time-varying covariate Level 1: Yij = B0j + B1jtimeij + B2jtvci + B3jtvc*time + jrij Level 2: B0j = y00 + u0j B1j = y10 + u1j
Intercultural competence	Intraclass coefficient: 0.49 **Fixed effects** Intercept: 3.85, $p < 0.001$ **Variance estimates** $\tau00 = 0.05$, $p = 0.01$ $\sigma2 = 0.05$, $p < 0.001$	**Fixed effects** Intercept: 3.68, $p < 0.001$ Time: 0.09, $p = 0.01$ **Covariance/Variance estimates** $\tau00 = 0.10$, $p = 0.04$ $\tau11 = 0.01$, $p = 0.20$ $\sigma2 = 0.04$, $p < 0.001$ $\tau10 = -0.02$, $p = 0.34$	**Fixed effects** Intercept: 3.68, $p < 0.001$ Time: 0.09, $p = 0.09$ Race: 0.00, $p = 0.97$ Race*Time: −0.01, $p = 0.89$ **Covariance/Variance estimates** $\tau00 = 0.10$, $p = 0.07$ $\tau11 = 0.01$, $p = 0.27$ $\sigma2 = 0.04$, $p < 0.001$ $\tau10 = -0.02$, $p = 0.43$	*Self-Efficacy*: **Fixed effects** Intercept: 3.36, $p < 0.001$ Time: −0.01, $p = 0.96$ Self-Efficacy: 0.13, $p = 0.44$ Self-Efficacy*Time: 0.00, $p = 0.96$ **Covariance/Variance estimates** $\tau00 = 0$, $p = 0.50$ $\tau11 = 0$, $p = 0.50$ time1$\sigma2 = 0.03$, $p = 0.02$ time2$\sigma2 = 0.02$, $p < 0.001$ time3$\sigma2 = 0.03$, $p < 0.001$ $\tau10 = 0.00$, $p = 0.43$ *Cognitive Empathy*: **Fixed effects** Intercept: 4.11, $p < 0.001$ Time: −0.30, $p = 0.19$ CogEmp: −0.08, $p = 0.56$ CogEmp*Time: 0.09, $p = 0.12$ **Covariance/Variance estimates** $\tau00 = 0.06$, $p = 0.11$ $\tau11 = 0.00$, $p = 0.34$ time1$\sigma2 = 0.05$, $p = 0.02$ time2$\sigma2 = 0.05$, $p = 0.01$ time3$\sigma2 = 0.02$, $p < 0.001$ $\tau10 = 0.00$, $p = 0.46$ *Anxiety/Depression:* **Fixed effects** Intercept: 3.44, $p < 0.001$ Time: 0.23, $p = 0.01$ Anx/Dep: 0.16, $p = 0.16$ Anx/Dep*Time: −0.08, $p = 0.09$ **Covariance/Variance estimates** $\tau00 = 0.01$, $p = 0.34$ $\tau11 = 0.00$, $p = 0.34$ time1$\sigma2 = 0.04$, $p = 0.01$ time2$\sigma2 = 0.04$, $p = 0.08$ time3$\sigma2 = 0.02$, $p = 0.10$ $\tau10 = 0$, $p = 0.50$

definitively conclude that, it is also important to remember that none of these results can be generalized beyond liberal arts colleges that focus especially on global learning and have relatively diverse student bodies.

We recommend that researchers take this same model building process when applying multilevel modeling. For our models, future research should include additional Level 1 time-varying covariates and Level 2 individual difference predictors.

5.1 Limitations and future directions

Several study limitations contextualize our findings and their generalizability including the participant melt across longitudinal data collection yielding a small sample size, reliance on self-report data, and absence of other identity variables that may shape outcomes. First, significant participants melt across the three data collection points suggests that the remaining sample likely differs significantly from the

original, full sample. Those who completed all three data collection points across 4 years may have different motivations, traits, and perspectives. While the data met analytical assumptions for hierarchical linear modeling (HLM) despite the small final sample size, future research would benefit from intentional, target recruitment methods to retain samples across data collection periods. This is challenging for research completed annually (the likelihood of having full data for each collection period is low) and future researchers may use text-based reminders, partnerships with institutional communications, events, and structures, incentives, and individualized reminders and calls to support data collection. Next, our data relied on self-reported measures on outcomes. In future studies can incorporate observational, faculty/staff rating, and behavioral and objective measures (e.g., registrar data on classes taken, GPA, academic performance) to better understand the growth and change over time. In addition, subsequent studies can integrate an intersectionality-informed layers of identity data, in larger final samples with more gender and ethnic/racial diversity, to better understand the role of historic marginalization and cultural identity as it expresses and impacts student development. In particular, further research can follow-up on our findings related to Middle Eastern students to better understand their risk and other stressors related disorders. Finally, further research can identify specific interventions that help attend to mental health/well-being and intercultural competence simultaneously.

5.2 Practical implications

While findings from the study remain preliminary based on the limited scope of our data, our findings have practical implications for higher education professionals. First, professors and other college educators can incorporate practices that enhance student's self-efficacy, independence, and sense of agency. Teaching techniques that encourage accountability and scaffolded learning attuned to students' developmental stage may aid students as they internalize schemas of their own capabilities (Saleh et al., 2020). Experiential learning, internships, and applied opportunities may be one pathway to further attend to growth in students' self-efficacy (Wang and Hsieh, 2022). Second, educational institutions can work to integrate mental health awareness, prevention, early identification, and intervention throughout the college years in counseling center, coursework, and through the support of professional and peer mental health supports (Hamza et al., 2021). In particular, our findings recommend attention to the interplay between intercultural competence and students' anxiety/depression, and recognizing the role that poor mental health may play in attenuating the effect of inclusion and equity initiatives.

6 Conclusion

Our study provides early evidence of growth on key outcomes that relate to personal and professional functioning. In a time when higher education institutions must justify and defend their value, longitudinal research provides one way to establish how students change across and as a result of their college experience. Our findings indicate significant growth in self-efficacy--a psychosocial construct related to grit, sense of agency, and locus of control and intercultural competence--related to the ways individuals engage effectively, cognitively, and behaviorally with culturally-different others. Both constructs save substantial implications in occupational spheres that increasingly prioritize self-direction and the ability to work in culturally diverse, inclusive spaces. These interplay between intra- and interpersonal outcomes indicates that the college experience plays a role in how we develop individually and how we relate to the world around us. Surprisingly, our particular findings suggested that these pathways hold true largely regardless of race. As a field, as we continue to work toward equitable and culturally-informed approaches to higher education, finding consistent outcomes across race/ethnicity provides a cautiously hopeful portrait, worthy of more reflection. In sum, the methodologies, outcomes, and lessons learned from this research provide a roadmap and template for further inquiry into understanding how higher education shapes college students in key ways.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the University of Richmond—Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

JP: Conceptualization, Data curation, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Writing – original draft, Writing – review & editing. GT: Data curation, Formal analysis, Investigation, Methodology, Software, Writing – original draft, Writing – review & editing. EM-L: Conceptualization, Investigation, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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