

DISSERTATION

INTERSECTIONAL MULTILEVEL MODELING AS A METHOD FOR INTERSECTIONAL
ANALYSIS OF INEQUITY IN MENTAL HEALTH DISTRESS AMONG COLLEGE
STUDENT-PARENTS

Submitted by

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ABSTRACT

INTERSECTIONAL MULTILEVEL MODELING AS A METHOD FOR INTERSECTIONAL ANALYSIS OF INEQUITY IN MENTAL HEALTH DISTRESS AMONG COLLEGE STUDENT-PARENTS

This study applied the Intersectional Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (I-MAIHDA) to explore the intersectional effects of social positioning on mental health among college student-parents. Using data from the American College Health Association-National College Health Assessment (ACHA-NCHA), the study examined relationships between social context variables—campus climate, social support, and loneliness—and psychological distress, while also assessing the utility of I-MAIHDA as a quantitative intersectional method. The student-parent population is a growing yet understudied subgroup in higher education, facing unique challenges that influence their well-being. The study applied multilevel linear regression models to understand the variance in psychological distress across intersectional social strata defined by race, gender, sexual orientation, and food security status. Results indicated that student-parents in more privileged social strata experienced lower levels of psychological distress, more favorable campus climate perceptions, lower loneliness, and higher social support, whereas those from marginalized identities, particularly those with low food security, faced increased distress and more adverse social contexts. I-MAIHDA was demonstrated to be a promising approach for capturing the nuances of intersectionality, effectively addressing issues related to sample size, and revealing significant variability across strata. Findings underscore the importance of inclusive campus policies that better support

student-parents, with a specific focus on addressing disparities stemming from intersecting social identities.

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DEDICATION

To my partner, William Joachin—your unwavering support, endless patience, and deep kindness have been my steadfast anchor throughout this journey. You have not only been by my side, but you've made my dreams your dreams, seeing my success as an act of justice and resistance. You believed in my work as a statement of our shared values and a commitment to creating a more equitable world. Your love has given me the strength to face every challenge, and your belief in me has turned the seemingly impossible into reality.

To my children, Matias and Rafael Joachin—you are my joy, my light, and the reason my world is so vibrant. You kept me grounded when the path felt uncertain and reminded me of life's truest joys. The laughter, wonder, and love that you bring have given meaning to every late night and long day. It is because of you that I remember what is most precious in this life, and it is for you that I strive to make this world better.

Together, we are redefining what it means to uplift one another, what it means for a family to dream together. William, your allyship and partnership have laid a foundation upon which our sons will build their understanding of what is possible. You have shown them that feminism is not a distant ideal but a lived commitment—something they can embody as the Latino sons of an immigrant, as men who uplift and respect, and as members of a family that understands true strength lies in shared dreams. Matias and Rafael, may you always grow with the belief that justice begins at home, and may you carry the stories of resilience and love forward with pride, knowing that our journey together is as much about your future as it is about my path.

This dissertation is not just mine. It belongs to all of you who walked beside me, who lifted me when I stumbled, and who celebrated each victory along the way. None of this would have been possible without your love, courage, and the spirit you brought to each and every day. For that, and for everything, I am endlessly grateful.

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Chapter 1 – Introduction

This study applied the principles of a novel use of multilevel modeling, Intersectional Multilevel Analysis of Individual Heterogeneity and Discriminatory Accuracy (I-MAIHDA) to examine the effects of intersectional social positioning on aspects of college student-parent social context (campus climate, social support, and loneliness) and psychological distress. Social factors have been shown to have a significant effect on student wellbeing and mental health (Navarro-Cruz et al., 2021). While the relationships between these factors are established in the literature, fewer studies have considered them among student-parents. Acknowledging that student-parents likely have very different college-related experiences and challenges compared to traditional college students, and are at higher risk of school attrition, it is important to gain insight into their reality. To have an accurate understanding of student-parent psychosocial factors, we must account for the diversity of the social identities represented among student-parents considering these social identities shape the challenges, risks, and privileges people encounter. Therefore, this study considers several important social identities of student-parents, including race/ethnicity, gender, sexual orientation, and food insecurity, as a proxy for economic status.

Theoretical Orientation

This study was intersectional in terms of its design, methodology, and theoretical underpinnings. It was my hope that this study honored Black feminist theory, the foundation on which intersectionality is scaffolded, and critical race theory (CRT), which has both influenced and been influenced by intersectional theory. Common goals of these theories are to advance social and political justice and to challenge deficit thinking, which is a common and misguided

lens in society and academia. Therefore, I discussed the theoretical orientations inspiring this study to hold this study accountable to the spirit of intersectionality and its foundational theories.

Black Feminist Theory

Black Feminist discourse can be traced back to the mid-nineteenth century in response to the oppression and alienation of Black women by White feminists (Smith, 2013). While White women fought for suffrage, they continued to enslave Black women and silenced Black women for fear that their discourse on race and assigned sex would harm suffrage efforts by connecting the suffrage movement to the emancipation movement (Smith, 2013). A commonly cited illustration of this was Sojourner Truth's 1851 *Ain't I A Woman* speech delivered at the Women's Convention (Davis & Brown, 2017; Smith, 2013; Taylor, 1998). After the passage of the 19th amendment, Black women continued to be denied the right to vote with the indifference of the National Women's Party. By winning the right to vote, White women further secured their power over the Black race prioritizing their alliance with White men over their fellow women. Meanwhile, Black feminism continued to grow and evolve, participating in national discourse and organizations such as the National Association of Colored Women (NACW) and the National Association for the Advancement of Colored People (NAACP) (Smith, 2013). Black scholars and activists, like Anna Julia Cooper and W.E.B. Du Bois, argued for the examination of Black and female experiences in class- and race-based efforts in their respective works *A Voice from the South: By a Black Woman of the South* (1892) and *The Souls of Black Folk: Essays and Sketches* (1903).

Black feminists of the 1960s, 70s, and 80s were influential in arguing the inseparability of race, gender, and class (Combahee River Collective, 1977; Hooks, 1984; Beale, 1970; King, 1988). Their texts critiqued how research typically treated race, gender, and class as isolated

experiences that could be understood when examined separately from one another. Patricia Hill Collins (1990) wrote about how intersecting oppressions are organized and structured as a “matrix of domination.” It is easy to see how early Black feminist thought and activism set the stage for modern day intersectionality. Black feminists have also developed other groundbreaking theories like “controlling images” (Collins, 2000), “deployment of the erotic” (Lorde, 1984), and “respectability politics” (Higginbotham, 1994). However, as Nash (2019) pointed out, Black feminism is more than just an intervention or response to shortcomings in feminist and women’s studies (pp. 15-16); it is an evolving force that stands on its own outside of White feminism and women’s studies.

Current Black feminism emphasizes the inclusion of personal stories of Black people through a variety of media such as music, art, and literature as legitimate sources of knowledge and theory (Springer, 2002). Black feminism has continued to devote itself to political action like the *#Me Too* movement (Ryan, 2019) and *Black Lives Matter* (Bell et al., 2021; Cohen & Jackson, 2016). It also challenges the use, or misuse, of Black feminist theory in academia and popular culture (Cooper et al., 2016; Nash, 2019). Particular to the risk of White-washed or diluted intersectionality, contemporary Black feminist scholars outline potential pitfalls, such as the removal of Black feminism and action-oriented goals from intersectionality (Bilge, 2020) and academia’s habit of “supplanting previous knowledge to prove what is new, novel, and useful about a contribution” (Cooper, 2015). While I do not claim that this project can meet all of the calls within Black feminism, my ultimate goal is to conduct thoughtful research that contributes to the justice and wellbeing of student-parents, particularly those whose identities remain marginalized and oppressed within our society.

Critical Race Theory

CRT originated in American legal scholarship in response to the post-Civil Rights Movement ‘second reconstruction’ period, which not only failed to eliminate implicit and systemic racism, but also began a period of post-racial colorblindness (Ansley, 1989; Crenshaw, 1989; Fernandez, 2002; Harris, 2012; Malagon, Huber, & Velez, 2009). CRT asserts that race and racism are constructed into most, if not all, facets of contemporary human experience and institutions. Solórzano (1997, 1998) developed five basic tenets of CRT that guide CRT scholars in challenging the dominant modes of education scholarship including: a) the intersection of race and racism with other forms of subordination, b) challenging the dominant narrative, c) a commitment to social justice, d) the centrality of experiential knowledge, and e) the transdisciplinary perspective.

Since CRT’s emergence, various critical frameworks have emerged which focus on the unique experiences of Latine (Valdes, 1998), Indigenous (Moodie, 2017), Asian (Museus & Iftikar, 2013), disabled (Annamma et al., 2013), and LGBTQIA+ (Barber & Clark, 2002) communities. Together these sub-areas make up the family of critical theories with the shared aim of examining and challenging systemic oppression and injustice through research and advocacy that confronts the myths of meritocracy and objectivity, which critical scholars argue “camouflage the interests of dominant groups” (Tate, 1997, p.235). The overarching goals of analysis and resistance to oppression do not differ from intersectionality. According to the African American Policy Forum podcast “Intersectionality Matters”, of which Dr. Kimberlé Crenshaw is the co-founder and host, an intersectional approach provides a more holistic understanding of social problems and informs more effective and inclusive care and advocacy (Crenshaw, 2018-2022). Although I applied intersectionality as a standalone framework in this

study, it is impossible to cut out the influence that CRT and intersectionality have had on one another.

Intersectionality

The History and Development of Intersectional Theory. As previously discussed, the term intersectionality can be traced back to critical race and Black feminist thought (Cho et al., 2013). The term was first introduced in Crenshaw's 1989 article "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics," to critique the limitations of antiracist and feminist theory, law, and politics which had treated race and gender as exclusive singular experiences defined by the most privileged of any given group. For example, sex- or gender-related anti-discrimination efforts were limited to the experiences of White women while racial anti-discrimination was based on the experiences of Men of Color.

Crenshaw further expanded on intersectionality as a framework in her 1990 article "Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color." There she examined how efforts fighting violence against women omitted the needs of women of color. She spoke to the importance of using an intersectional framework in advocacy and social movement work as a means for centering the needs of the most vulnerable in our society. Intersectionality was used to understand "differences and sameness" of people's lived experiences along various "axes of power" – i.e., race, ethnicity, gender, class, nation, and sexuality – inform the realities of people's lives (Cho et al., 2013).

Much of the early intersectional discourse focused on the experiences of people who held multiple disadvantaged or oppressed identities such as Women of Color. Of course, there are many positions of power which can oppress or privilege people depending on where one falls on

any given axis. Given that all people hold some combination of privileged and oppressed identities – such as middle-class Black gay men – current scholars argue for the utility of intersectionality in exploring the experiences of privileged groups as well (Cho, 2013). It is also important to consider dynamic in-group differences as Carbado and Gulati (2000) did in their examination of five Black women applying for a job of whom one woman was ostensibly discriminated against due to her characteristics (e.g., hair, name, demeanor, etc.) having stronger “Black racial signification” and therefore being more susceptible to negative stereotype and bias. Carbado and Gulati (2000) coined this phenomenon “intra-intersectional discrimination.”

While the roots of intersectionality are in Black feminist U.S. legal studies, it is not contained only to that niche. Since the 1980s, researchers have found new and important ways to apply this framework across a wide range of identities such as sexuality (Cho, 2013; Galupo et al., 2014), disability (Artiles, 2013; Erevelles & Minear, 2010; Shaw, et al., 2012) and class (Fathi, 2017; Nightingale, 2011). It has also been applied across many racial groups (Chun et al., 2013; Pérez Huber, 2010), nationalities (Gouws, 2017; Tariq & Syed, 2017) and beyond the man-woman binary to include other gender identities (Haines et al., 2014; Nicolazzo, 2016). Similarly, intersectionality has also become increasingly employed in fields other than legal and feminist studies. Systematic reviews have found that scholars have adopted an intersectional lens or framework in many fields including psychology, sociology, public health, medicine, political science, education, business, history, and statistics (Bauer et. al., 2021). These evolutions in intersectionality demonstrate its fluid application as it responds to the social, economic, and political landscape of our lives. Because of this, definitions for intersectionality can vary in their wording and emphasis. For this study, I understand intersectionality to be best defined as a framework for analyzing the interwoven and mutually constituted systems of power and

oppression which manifest in the lives of individuals and communities (Cho et al., 2013; Crenshaw, 1990).

Intersectionality in Psychology. The increased adoption of the intersectional lens across specializations encourages a more nuanced and just perspective on the human experience. In today's socio-cultural and political contexts, fields like psychology, which broadly deal with societal health and wellbeing, should be accountable to justice and liberation of the oppressed. Intersectionality's utility in understanding the social context that affects our inner world and behavior, makes it a valuable framework for psychology topics. The value of intersectionality in psychological research was not as clear until more recently. Concerns of methodological challenges (Bowleg, 2008, Shields, 2008), definition (Collins, 2015), its alignment with the field's norms of parsimony and objectivity (McCormick-Huhn et al., 2019) and its utility in explaining the psychology of individual experiences (Shields, 2008) slowed its expansion into psychological research. Other scholars have argued that psychology remains resistant to intersectionality, seeing it as inferior or lacking credibility (Settles et al., 2020).

Fortunately, the last 8-10 years has seen growth in the adoption of intersectionality by psychology researchers. Many researchers have provided guidance on how to conceptualize intersectionality as a theory and reminded us of how to apply intersectional research towards the ultimate goal of improving lives. For instance, Davis (2008), Else-Quest and Hyde (2016), and Marecek (2016) have contributed an epistemological perspective on the future of intersectional psychology scholarship – critiquing the field for flattening intersectionality as a buzzword rather than a dynamic critical theory and methodology. Cole (2009) wrote an influential article about the importance of researchers considering the diversity within social categories, the role of inequality, and commonalities across groups that seem to be different. Others have provided

guidance on its potential to inform advocacy (Grzanka, 2020; Grzanka et al., 2020; Rosenthal, 2016). Buchanan and Wiklund (2021), Shin et al. (2017), and Moradi and Grzanka (2017) urged scholars to resist the tendency to lean apolitical thereby diluting the framework.

As cited in McCormick et al. (2019), researchers in clinical and counseling psychology, industrial and organizational psychology, developmental psychology, social psychology, and personality psychology have called for the application of intersectionality to their respective subfields. In a content analysis of intersectionality in counseling psychology, Shin et al. (2017) reviewed 40 intersectional publications. Of those, they determined that twenty-nine articles aimed to expand the understanding of a particular marginalized group by considering the experiences of in-group members with other marginalized identities. Twenty-one articles examined how intersecting identities can act as risk factors for some outcomes, fourteen discussed intersectionality as a means for improving research methods, while five articles made direct calls for the adoption of an intersectional lens in their respective areas of interest, and lastly, four articles examined how intersecting identities act as protective factors. The three most common points of intersection examined were race/ethnicity and gender, race/ethnicity and sexual orientation, and race/ethnicity and class (Shin et al., 2017).

Other notable studies have contributed to the development of a scale to measure gendered racial microaggressions of Black women (Lewis & Neville, 2015), examined the effects of gendered racism on mental health outcomes of Black women (Lewis et al., 2017), and described stress and mental health outcomes among lesbian, gay, and bisexual communities (Meyer, 2003), as well as substance use disorders by intersection of race, sex, and sexual orientation (Mereish & Bradford, 2014). In their 2019 systematic review on quantitative studies in intersectional inequalities in mental health, Fagrell Trygg et al. (2019) found that the majority of the 20

included studies looking at depression and anxiety symptoms at the intersections of race, gender, and socioeconomic status (SES) found insignificant results. A minority of the studies either found synergistic or antagonistic effects for certain specific intersection categories. Fagrell Trygg et al. (2019) argued that the lack of significant results could be due to the facts that intersectional mental health remains largely unexplored, more common intersectional quantitative methods lack depth and standardization, and finally that very few mental health studies use both an intersectional framework and method. In fact, many intersectional scholars have criticized psychology's vapid use of intersectionality without consideration of the original philosophy and goals of the framework (McCormick-Huhn et al., 2019; Shields, 2008). Additionally, most of the studies they found relied on additive and multiplicative models of intersectionality, which many scholars have criticized (Crenshaw, 1990; Else-Quest & Hyde, 2016; Hancock, 2007). These models are often regarded as inadequate in fields with more experience in quantitative intersectional methods (McCormick-Huhn et al., 2019). Lastly, very few studies included in the review considered potential explanatory factors for inequalities in mental health outcomes; instead focusing on describing the variance in mental health outcomes across intersectional categories (Fagrell Trygg et al., 2019).

Qualitative methods such as autoethnography and counter storytelling have been at the heart of intersectional discourse and research. Despite this, quantitative methods remain largely privileged in the field of psychology. This fact, along with the growing acceptance of intersectionality as a just practice in human research, has motivated scholars to innovate and expand intersectional quantitative approaches.

Translation of Intersectional Theory into Quantitative Analysis. In recent years, researchers across disciplines have set out to develop and modify quantitative methods to

examine phenomena through an intersectional and critical lens. Especially given the privilege afforded to quantitative methods, it is important to work towards eliminating the silos of critical inquiry and quantitative methods. To do this, we must examine the progress scientists have made in quantitative intersectional analysis and the criticisms and warnings of critical and intersectional scholars about the possible detachment from or dilution of the principles of nuance, structural inequality, and social justice which sit at the heart of intersectional theory.

Crenshaw's early work highlighted several possible arrangements for examining intersectionality of Black women's experiences: *similar experiences*, *unique experiences*, *additive*, and *multiplicative* (Crenshaw, 1990). *Similar experiences* referring to the experiences of many Black women, whereas *unique experiences* referring to the experiences that are not commonplace to Black women and thus define Black women as individuals. The *additive* approach assumes that one's intersectional experience is equal to the sum of the effect of each social identity while a *multiplicative* approach assumes that intersectional identities amplify one another (Hancock, 2007). However, Crenshaw (1990) and Hancock (2007) have urged researchers and activists to move beyond additive and multiplicative approaches. Their argument is that while multiplicative approaches recognize the intersection and interplay of multiple identities, it still assumes that these categories are distinct rather than having converged and mutually reinforcing oppressive consequences. However, there remain many questions and debate over what moving beyond means both theoretically and statistically.

Else-Quest and Hyde (2016) provided a large review as well as guidance on quantitative intersectional methods and analyses. They discuss how most studies frame social categories and identities as person variables, whereas others frame these categories as stimulus variables. The latter considers social categories from the perspective of perceivers, with a focus on stimulus

materials rather than participants by using stimuli such as photos and videos of people with various intersecting identities.

In terms of analyses, intersectional research has most often taken an additive and multiplicative approach which consider social identities as distinct and assumes that some groups are always more marginalized than others leading to a narrative of “oppression Olympics” (Else-Quest & Hyde, 2016). These approaches are limited in their sole reliance on additive effects or multiplicative effects to explain intersectional phenomena. While additive effects, which sum the affects of social identities, and multiplicative affects, or interactions affects between two or more identities, can be useful, they are criticized for only part of the intersectional story (Else-Quest & Hyde, 2016).

Although additional approaches have been developed in the last decade, they still make up a smaller portion of quantitative intersectional studies. In their 2016 review, Else-Quest and Hyde found far fewer studies using multilevel modeling to examine identity interactions nested within specific contexts, such as schools or neighborhoods. They also identified a small subset of studies that used a moderated mediation model. In these cases, the interaction of two social categories may moderate a mediation model. The last analysis method discussed was a class of person-centered methods, such as latent class analysis or latent profile analysis, which organize a population into mutually exclusive and exhaustive classes or subgroups based on behaviors or characteristics. This was believed to have the potential to discern commonalities across intersectional locations by identifying classes of people with similar experiences of disadvantage or privilege (Else-Quest & Hyde, 2016).

Even though additive and multiplicative approaches continue to be commonplace, researchers are actively exploring, debating, and innovating quantitative intersectional methods.

In their 2021 review, Bauer et al. (2021) found that most studies relied on descriptive estimates and main effects regressions which they criticized as overly simple and lacking theoretical justification for the categories included. They also noted several less common analyses that they interpreted as promising. These included the use of classification and regression trees (Cairney et al., 2014), latent profile analysis, or chi-square automatic interaction detection (Shaw et al., 2012). Most methods still face challenges of small sample sizes which ultimately limits the number of identity categories (e.g. gender identity being limited to man, woman, transgender) as well as the number of intersections (e.g. race and gender) one can consider. Additionally, this makes it hard to study the experiences of more vulnerable populations, e.g., Chinese transmasculine students, given that these populations make up a smaller proportion of society and are often considered hard-to-reach. Yet, having a more minoritized social positioning should not limit our understanding and interest in their experiences. In response to this persistent limitation, Dr. Clare Evans has argued that employing multilevel modeling in quantitative intersectional analysis reduces, if not eliminates, the issue of small sample size thus allowing for the analysis of a wider number of identity categories and identity dimensions examined (Evans & Erikson, 2019; Evans et al., 2020). Her I-MAIHDA analysis, described in more detail in the methods section below, controls for the intersectional identities by using them to define the distinct second level strata, thus stabilizing the model to manage smaller sample sizes.

However, statistical power is not the only concern raised about quantitative intersectional methods. As quantitative intersectional and critical research continues to innovate, it is important to respond to the concerns raised around maintaining the integrity of critical inquiry. Zuberi and Bonilla-Silva's often-cited book *White Logic, White Methods: racism and methodology* (2008) argues that although quantitative methods are often portrayed as being "objective" and "value-

free”, they were developed alongside racial reasoning and eugenics. To this point, psychology has its own dark history with many of its “fathers” shaping psychological theory and methodology within the White supremacist values of the time. By recognizing this history, we also have the power to detect how these principles have evolved within current methodology, often hidden in plain sight (Tabron & Thomas, 2023). To start, intersectional researchers have pointed out how research has traditionally been rooted in deficit theorizing (Cabrera, 2019; Dinishak, 2022).

Deficit Theorizing Model. One of the markers of deficit theorizing is the failure to remain open to the inheritable assets of oppressed peoples that create resilience (Solórzano & Yosso, 2005; Tabron & Thomas, 2023). Similarly, it places people with dominant and privileged identities as the automatic referent group, potentially harming both the presumed under-privileged and privileged groups by possibly under- or over-estimating their experiences. Valencia (1997) and Yosso (2005) discuss how deficit thinking continues through the assumption that knowledge gained through the White academic lens is objective and accurate. Yosso (2005) stated that racism, bias, and deficit theorizing enters the research process as early as the formation of the research question(s) and hypotheses. Perhaps then it is not enough for researchers to merely acknowledge problems like deficit thinking, but rather actively challenge it at every step in the research process, from beginning to end. In fact, it is this notion that first inspired a body of critical theories, including intersectionality (Harris, 2012).

Challenging Deficit Theorizing in Quantitative Analysis. Many researchers across fields and methods have incorporated critical thinking in their analyses by framing the results of their studies within a socio-political and historical context, citing systems of oppression as responsible for disparities among social identities and communities. However, it is less commonplace for

researchers to consider deficit theorizing in the earlier stages of research. This may be challenging when the practice of placing White, cis-gender, heterosexual, middle/upper class, and/or men as the automatic referent group(s) is practically a standard in historical and current research practice. This practice can be problematic in that it can imply the idea that it is only worth considering, documenting, and eventually advocating for people's experience when it is done in comparison to more privileged groups. Perhaps less obvious, is that the expectation and normalization of using dominant identity referent groups, despite the criticisms from scholars within these very communities, reinforces the idea that there is one correct way to participate in scientific inquiry. This is not to say that referent groups and comparison study models should be eliminated from all research designs. Rather it is a call to acknowledge the value, rigor, and legitimacy of BIPOC- and justice-led research designs, particularly in studies that invoke critical and intersectional theory.

Dr. Clare Evans has also responded to these critiques throughout her research design. In line with her work, I did not utilize a referent group made up of privileged identities and instead assert that any group can act as the referent group for these analyses (Evans et al., 2020; Evans et al., 2024). This is discussed further in the methods and discussion sections below. In a similar vein, I did not compare student-parents to students who are not parents. As "non-traditional" students, student-parents operate in a system that was not historically designed or implemented with them in mind, thus making them likely less privileged in many regards. It is my perspective that in the case of this study, student-parents are the population of interest, and the nuances of their experiences are worthy of being told without being qualified through a comparison to a more traditional and thus more privileged group.

To counter deficit theorizing, I leaned into a more exploratory model of quantitative research by developing research aims for what I hope to learn about student-parents rather than hypotheses about the population's outcomes based on their intersecting identities. Furthermore, given the lack of information on the mental health and connectedness of student-parents attending four-year colleges and universities, a more exploratory approach to develop a baseline understanding, seemed appropriate. In fact, employing an exploratory spirit and methods in critical quantitative research has become more commonplace (Aguilar et al., 2024; Espinoz et al., 2024; Strong & Escamilla, 2023). Once again, Dr. Clare Evans has also aligned her research with a more exploratory approach (Evans & Erickson, 2018; Evans et al., 2023).

U.S. Student-Parent Population

There are very few empirical sources of information on U.S. college student-parent demographics, statistics, and challenges. To date, most research has focused solely on the experience of community college student-parents. This is understandable considering community college costs and flexibility can be appealing and more accessible to student-parents (Peterson S., 2016). However, the number of student-parents attending 4-year-colleges and graduate and professional schools is rapidly increasing (Institute for Women's Policy Research [IWPR], 2019). Yet there is still limited data on this growing student population. Most of the data that is available is reported by individual schools or by IWPR. Other sources reporting on this sub-group of students include student and education advocacy groups like The Education Trust (Williams, 2022) and investigative news outlets like The Atlantic (Lewis, 2021) and the Urban Institute (Anderson & Green, 2022). Furthermore, there is even less intersectional understanding of the academic and mental health wellbeing of student parents. The lack of empirical nationwide statistics perhaps reflects the lack of institutional and academic attention this student

population receives.

Undergraduate Student-Parents at 4-year Degree Programs

According to IWPR (2019), student-parents had grown by 23% between 2008 - 2018 to represent 22% of all undergraduate students. At 4-year colleges, student-parents made up roughly 16% of the student body equaling approximately 4 million undergraduate student-parents nationwide (IWPR, 2019). When separated out by race/ethnicity, the most recent data shows that undergraduate parents make up 33% of Black students, 30% of Native Hawaiian/ Pacific Islander students, 29% of American Indian/ Alaskan Native students, 21% of White students, 21% of Latine students, 20% of multiracial students, and 13% of Asian students (IWPR, 2019). Student-parents at the undergraduate level are more likely to be women with only 29% identifying as men. Sixty-two percent of women-identified parents identify as single parents as opposed to 39% of self-identified single fathers. This is important considering that student-parents are more likely to experience financial strain (Gerrard & Roberts, 2006; Williams, 2022). Between 2015-2016, it was found that the median debt of student-parents was 2.5 times higher than students without children or dependents (IWPR, 2019). Single parents, and particularly single mothers, are even more financially vulnerable and borrow more than other student-parents (IWPR, 2019). Unfortunately, data about sexual and gender minority (SGM) identities among student-parents is not widely available leaving a dearth of information about SGM parents.

Graduate- and Professional-level Student-Parents

Graduate student-parents remain a largely understudied population as evidenced by the almost total lack of data found on graduate student-parent numbers and demographics. The most recent report from the National Center for Education Statistics (2010) showed that graduate level student-parents made up 35.5% of master's level students, 28.4% of doctoral level students, and

10.5% of professional degrees. Despite the ever-growing representation of student-parents in undergraduate and graduate level studies, graduation rates are low. Of all doctoral student-parents, between 40-50% do not graduate from their program (Litalien & Guay, 20115).

Women continue to enter graduate and professional schools at increasing rates (Dilatush, 2019), with the median age of completion being 33.6 years of age, overlapping with many people's prime reproductive years (Hoffer et al., 2006). As cited in Springer et al. (2009), 24% of graduate student women and 28% of graduate student men reported having dependent children in 2005. Women-identified students and students of color experience greater attrition rates from graduate school programs (Mason et al., 2013; Artiles & Matusovich, 2020). I was unable to find quality data on enrollment and attrition rates for graduate-level parents of color or for SGM graduate student-parents.

College Student Mental Health Challenges and Disparities

College students face several mental health challenges. It is well documented that undergraduate and graduate students report higher levels of depression and anxiety than the general population (Hunt & Eisenberg, 2010). Poor mental health of college students is associated with lower rates of degree completion, poorer academic achievements (Eisenberg et al., 2009), and higher rates of self-injurious thoughts and behaviors including suicide (Pedrelli et al., 2015). Previous research using the American College Health Association – National College Health Assessment (ACHA-NCHA) data found that reported anxiety, depression, ADHD, insomnia, OCD, and panic attacks increased each year between 2009 - 2015 with anxiety and depression leading the way (Oswalt et al., 2020). They found that the frequency of reported anxiety and depression increased from 9.3% to 14.9% and 9.0% to 12.2% respectively. Additionally, they reported that anywhere between 50 - 80% of students who struggled with

mental health symptoms in the last year did not seek mental health care and therefore did not receive any mental health diagnosis or treatment, suggesting that the frequency of students experiencing mental health distress is likely significantly more than what the study found (Oswalt et al., 2020).

Another study using the Healthy Minds Study found a similar pattern in increasing mental health symptoms and disorders each year among college students between the years of 2013-2021 (Lipson et al., 2022). As with the ACHA-NCHA study, college students reported increasing mental health distress each year. This upward trend persisted across all measured races and ethnicities with depression and anxiety increasing the most for students of color (Lipson et al., 2022). Their findings showed 50% increase in mental health distress in 2021 from 2013. While the pandemic is a likely contributor to this dramatic increase, the pattern of increasing reported mental health symptoms among college students has been seen since well before the pandemic, suggesting other contributing factors.

A 2021 meta-analysis found that identifying as female was consistently found to increase risk of mental health problems, which supports existing evidence that a greater proportion of females report mental health difficulties than males (Sheldon et al., 2021). Students with SGM identities endorsed significantly higher rates of mental health distress, non-suicidal self-injury, and suicidal ideation (Gross et al., 2022; Sheldon et al., 2021). Students of color have also been found to experience challenges related to mental health disparities and financial distress (Lipson et al., 2022; Sabaner & Arnold, 2021).

As several critical scholars have pointed out, college institutions were not developed with traditionally marginalized students in mind (Ledesma & Calderón, 2015; Taylor, 2009). Arguably, they were not built with student-parents in mind either and it is not hard to imagine

that the needs and challenges of student-parents may be unique compared to non-parenting students. Research shows that student-parents are more likely to struggle with time (Wladis et al., 2018), financial strain (Brown & Amankwaa, 2007), housing (Brown & Nichols, 2013), attrition (van Rhijn, 2014), and childcare (Holtzman et al., 2019), among other concerns.

Most of our understanding of student-parent experiences is specific to mothers in the context of community colleges (Lovell & Scott, 2020). Student-mothers, particularly student-mothers of color, have been found to report higher levels of depression, anxiety, and stress (Sealey-Ruiz, 2013). While this is an important proportion of the student-parent community, there remain significant gaps in understanding the mental health and predictors of mental health of this broad and diverse community. Brown and Nichols (2013) also found that student-parents felt marginalized in classes and on campus. Perhaps the most important information we have on student-parents thus far is that this growing community's needs and wellbeing are not well served by education institutions (Gault et al., 2020). This in part is likely due to the general invisibility of this subset of students and the lack of information we have on the interplay of intersecting social positions within this community.

Campus Climate, Loneliness, and Social Support

Campus climate generally refers to prevailing attitudes, behaviors, and standards of an academic community regarding diversity, inclusivity, and equity (Hart & Fellabaum, 2008; Macke et al., 2020). Students' experiences of campus climate are very much informed by the students' social identities (Hurtado et al., 2008). Hostile, "chilly", or alienating campus climates have been found to decrease feelings of social connectedness and belonging (Lee et al., 2002; Wang & Degol, 2014), institutional support (Rankin, 2005), and wellbeing (Koo, 2021). Thus far, campus climate is most frequently explored among students of color (Kim et al., 2018),

SGM students (Greathouse et al., 2018), and women (Twenge, 1997). One small-scale study looked at campus climate as experienced by single mothers attending a community college and found that the mothers often experienced a cold and distant academic climate with both their peers and faculty (Duquaine-Watson, 2007). There is also a significant body of research showing how a poor campus climate negatively impacts student mental health. Woodford et al. (2015) and Budge et al. (2020) found that poor campus climate contributed to higher rates of depression and anxiety symptoms as well as higher rates of alcohol consumption among SGM students. Koo (2021) and Banks (2020) found similar relationships among students of color who report higher levels of depression, stress, and lack of well-being. Studies on the impact of campus climate for students experiencing food insecurity found that students experienced lower feelings of belongs, inclusivity, and equitable treatment (Garcia, 2022; Macke et al., 2020; Miller et al., 2021). Unfortunately, much of this research treats perceptions of campus climate as the outcome and do not extend the literature to understand the potential health and wellbeing effects of poor campus climate on students experiencing food insecurity and financial hardship. Campus climate literature is vast, yet there remain intersectional gaps in the campus climate literature. Additionally, few studies consider the unique implications of campus climate on student-parent wellbeing and experiences.

Loneliness is often defined as a subjective experience and feeling caused by a lack of social relationships that causes distress (Trucharte et al., 2021). Like campus climate and social support, loneliness has also been shown to predict depression, stress, anxiety, and general mental health distress among college students (Carr et al., 2013; Duarte and Pinto-Gouveia, 2015; Richardson et al., 2017). Gender differences in reported loneliness appears mixed (Diehl et al., 2018; Liu et al., 2020). Meanwhile, there is less clarity (due to a lack of research) on the

existence of racial/ethnic or sexual disparities of loneliness in U.S. colleges. There is significant speculation and assumption that student-parents are at risk of loneliness (Lin et al., 2022; Sallee & Cox, 2019), yet there is little to no research that investigates this experience. Therefore, this study will likely confirm existing data on the relationship between loneliness and mental health distress while furthering the literature to have an intersectional picture of vulnerable student-parents.

Social support can be conceptualized as the perception of availability and quality of social support from various relationships (Shelton et al., 2017). For college students, it may include feelings of social support from personal and familial relationships, college-based peer or faculty relationships, and even institutional support. It is a well-documented protective factor for mental health distress among college students and contributes to academic success, adjustment to college, health, and overall wellbeing (Wang & Castañeda-Sound, 2008). As with many psychological constructs, identity-related inequality exists in feelings of social support in post-secondary education for racial, ethnic, sexual, disabled, low-income, and gender minoritized students (Hefner & Eisenberg, 2009). Another study found that some cultural values like interdependence and collectivism prevented disparities in social support for certain racial and ethnic groups but also found no gender-based disparities (Shelton et al., 2017). One study found social support from partners, family, friends, and faculty to act as an important enabler of academic persistence and wellbeing (van Rhijn, 2014). Cho et al. (2013) found that when institutions initiated and developed spaces for student-parents to interact, student-parents reported higher levels of social support and reduced stress. There is significant evidence for the relationship between social support and mental health outcomes. However, evidence on feelings of social support within the student-parent community remains mixed and understudied.

Campus climate, loneliness, and social support are important aspects of college students' social contexts and have important implications on their mental health. However, there remain several gaps in the literature around the relations between these aspects of social context and student mental health, particularly when it comes to marginalized and "non-traditional" students. As the demographic makeup of college students changes with increasing student diversity, it is important to reassess the students' contexts and outcomes so that colleges and universities can best address their students' needs.

The Present Study

To my knowledge, this study is the first application of I-MAIHDA in psychological research and the first to utilize data from the ACHA-NCHA III database with this method. While student social context and psychological distress have been studied extensively among traditional four-year college students, student-parents remain a largely understudied population despite their growing representation in all levels of post-secondary education. Student-parents are at higher risk of challenges like academic attrition, yet the literature has not sufficiently explored their mental health or the aspects of their social context that may contribute to or protect against psychological distress. Intersectional research has identified increased mental health risks among communities with less privileged social positions, yet most studies remain limited to race and gender intersections, neglecting other important factors. Additionally, as reviewed, campus climate, social support, and loneliness are known to vary across social identities, especially among students of color, women, and sexual and gender minority (SGM) students. However, the literature still lacks an intersectional and nuanced approach to understanding how these social context variables affect student-parents specifically. This study addresses these gaps by 1) exploring the application of multilevel modeling, particularly I-MAIHDA, to intersectional

psychological research and 2) Capturing the diversity and richness of student-parent experiences by exploring potential differences and similarities in their experiences of psychological distress and social context across various intersecting social identities. Using I-MAIHDA (Evans, 2016), I nested student-parents within social strata defined by race, gender, sexual orientation, and food security to differentiate subcommunities of participants. This approach allows for a deeper exploration of the role that intersecting identities play in shaping mental health outcomes and social contexts for student-parents, providing a more comprehensive understanding of their unique experiences.

Hypotheses and Aims

The proposed study sought to test the applicability of I-MAIHDA in psychological research using a large national dataset of college students across the United States and considered its alignment with intersectional theory. By doing so, this study aimed to explore the effects of intersectionality on the social contexts, psychological distress, and the relation between these variables among college student-parents.

Hypothesis 1: Similar to the literature on traditional students, I anticipate that for student-parents there will be significant associations between social context variables (campus climate, social support, and loneliness) and mental health distress, such that lower levels of campus climate and social support will be associated with higher levels of distress, while higher levels of loneliness will be associated with higher levels of distress.

Aim 1: Explore the utility of intersectional strata for predicting student-parent outcomes, including campus climate, social support, loneliness, and psychological distress (model 1 and 2).

Aim 2: Explore to what extent the introduction of level 2 terms capture complex interactions between identity dimensions associated with student-parent outcomes: including campus climate, social support, loneliness, and psychological distress (model 2).

Aim 3: Explore whether inequalities across student-parent outcomes, including campus climate, social support, loneliness, and psychological distress, are differentially associated with specific intersectional strata (model 2).

Aim 4: Explore whether intersectional strata-specific differences account for variability on the impact of social context factors (campus climate, loneliness, social support) on psychological distress (Random Intercepts and Random Coefficients Model).

Chapter 2 – Method

Participants

Data were obtained from the American College Health Association National College Health Assessment (ACHA-NCHA) III, a national survey of college students in undergraduate, graduate, and professional programs. This study used data from the third iteration of the questionnaire, conducted from Spring 2019 to Spring 2022. During this period, 461 institutions participated, and 301,183 students completed the survey. Of these, 18,222 students reported being a parent or guardian of a child under 18.

Table 1 *Self-Reported Demographics*

	<i>N</i>	%
Orientation		
Asexual Spectrum	38	0.22
Bisexual +	1498	8.55
Gay	75	0.43
Lesbian	162	0.93
Queer	185	1.06
Questioning	139	0.79
Heterosexual	15425	88.03
Gender		
Cisgender Woman	11812	67.47
Cisgender Man	5406	30.88
Transgender Woman	28	0.16
Transgender Man	34	0.19
Gender Expansive	214	1.22
Other, Not Listed	13	0.07
Race		
American Indian; Alaska Native	266	1.52
Asian	1783	10.17
Black or African American	1713	9.77
Latine / Hispanic	2400	13.69
Middle Eastern / Arab	267	1.52
Native Hawaiian; Other Pacific Islander	68	0.39
White	9556	54.51
Multiracial	1432	8.17
Other, Not Listed	44	0.25
Food Insecurity		
Low Food Security	5,982	34.69
High Food Security	11263	65.31

According to the American College Health Association (2024), students were randomly selected by their college and invited to participate. The survey was completed online in one sitting, taking approximately 20-30 minutes. Before participation, students were informed about confidentiality and consent. Incentives for participation varied across institutions. The survey covered various health habits, behaviors, perceptions, and experiences.

Measures

All original measures are presented in Appendix A, while Appendix B lists modified measures for easy reference. To handle missing scale items, Likert-scale variables were converted to average scores, which were then multiplied by the number of items to maintain consistency with the original scale's cutoffs. For example, if a scale included 10 items but the participant only completed eight, the composite score would be the sum of the completed items divided by eight. The percentage of missing data for each variable was below 5%, which is generally considered negligible (van Buuren, 2018; Tabachnick & Fidell, 2019). Descriptive statistics for all measures are provided in Tables 1 and 2.

Axes of Identity Intersection

Previous quantitative intersectional research often limited identity dimensions to two, typically race and gender, to maintain statistical power and scalability (Evans et al., 2020). However, this limitation restricted our understanding of how systems of oppression and privilege intersect, failing to reflect the complexity of real-world experiences and excluding smaller, harder-to-reach populations. To address these issues, recent studies have developed innovative quantitative methods to align with the foundational principles of intersectionality. This study tested a novel method of intersectional analyses to examine the student-parents' experiences of certain aspects of student social context (campus climate, perceived social support, and loneliness) among student-parents grouped along four axes of identity intersections: race/ethnicity, gender, sexual orientation, and food security.

Data Preparation. The social identity variables—race/ethnicity, gender, and sexual orientation—offered multiple categories, including an "other" option for respondents to specify additional identities. Qualitative responses were reviewed and recoded based on definitions from

the National Institutes of Health (NIH) and LGBTQIA+ advocacy groups, with input from gender- and sexually-expansive community members. Write-in responses that were racist, homophobic, transphobic, misogynistic, ableist, prejudiced, or erroneous resulted in a participant's exclusion from the study as these responses bring into question the trustworthiness of those participants' responses across the survey. This step reduced the number of individual entries 17,598.

All racial/ethnic categories from the original ACHA-NCHA III survey were retained. Qualitative responses that named countries or ethnicities were reassigned to corresponding racial categories per NIH guidelines (National Research Council Panel on Race, Ethnicity, and Health in Later Life, 2004; National Institutes of Health, n.d.). For example, student-parents identifying with homogenous nationalities (e.g., Irish, Korean) were assigned to the appropriate racial group (e.g. "White" or "Asian or Asian American"). Conversely, participants who selected "other" and wrote in continents with large heterogenous populations (e.g. "Africa") were left coded in the "other" category since it was impossible to confidently assign any racial group. However, participants who endorsed "Black/African American" and selected "other" writing in "Africa" or "African" were coded to "Black/African American". Student-parents who chose "other" and wrote in the name of their tribe or nation (e.g. Shoshone, Inuit, or Mayan) coordinating with current day United States or Canada were recoded to "Native American/Native Alaskan". Student-parents who chose "other" and listed more than one racial group (e.g., "Irish and Ute", "Korean, Japanese, and Haitian") or student-parents who selected an existing racial category and wrote in one or more different racial groups under "other" were recoded as "multiracial". Lastly, student-parents who endorsed two or more races (e.g. "Black/African American" and "White") were recoded as "multiracial."

In the sexual orientation variable, I combined and renamed some of the original categories due to small samples sizes and updated the some of the original categories to reflect sexual spectra. For example, the "asexual" category was renamed "asexual spectrum" to capture a range of related identities including “ace”, “demi”, “demi-asexual”, and “gray-asexual” (The Oxford LGBTQ+ Society, n.d.; T. Schlechter, personal communication, February 8, 2024). The “bisexual” and “pansexual” categories were combined into a new category -“bisexual+”, both due to the small number of student-parents endorsing “pansexual” and due to the fluid and subjective use of bisexual and pansexual terms to describe individuals who are sexually attracted to more than one gender (Bisexual Resource Center, n.d.; T. Schlechter, personal communication, February 8, 2024). Like the asexual spectrum, bisexual+ is also considered a spectrum and student-parents who selected “other” and wrote in terms attributed to this spectrum such as “multisexual”, “omnisexual”, and “polysexual” were recoded to bisexual+. The identity category “queer” is often an umbrella term for individuals who do not identify as heterosexual and/or cis-gender (Clarke, 2021). Originally used as a derogatory term, the term has been reclaimed by a wide variety of members of the LGBTQIA communities as a political identity as much as a gender and sexual identity (Clarke, 2021). Student-parents who selected “other” and wrote in identities like “mostly heterosexual” or “mostly straight” were also recategorized in the “queer” category.

The original gender identity categories did not differentiate between cis- and transgender identities. Therefore, participants' responses were triangulated using questions about sex, gender, and transgender status, resulting in four categories: cisgender woman, cisgender man, transgender woman, and transgender man. Due to a low frequency of endorsement (under 20), some categories were combined. “Genderqueer”, “agender”, “gender fluid”, and “nonbinary”

were combined into a group titled “gender expansive”. Gender expansive is a term used to encompass individuals whose identity, expression, or experience of gender do not align with the cisgender or gender binary (Connelly, 2024; T. Schlechter, personal communication, February 8, 2024). Additionally, the initial survey included “intersex” as a gender identity. However, intersex is considered a category to describe sex assigned at birth, not a gender identity (Cleveland Clinic, 2022). In this case, sex assigned at birth is conflated with a gender identity. A total of four participants endorsed “intersex” and were dropped from the dataset considering we cannot accurately differentiate between their sex and gender identity. Very few participants chose the “other” category. Of those who did, several participants left the response blank, two respondents put “questioning”, four put “two-spirit”, 2 responded “I don’t know”, and one wrote in “gender agnostic.” These participants all remained coded as “other, not listed”.

Food insecurity was measured using the USDA scale (Connell et al., 2004). Participants were assigned a score based on their food security level, ranging from very low (5-6 scale score) to low (2-4 scale score) to marginal/high (0-1 scale score) food security. However, this approach created several strata with fewer than the recommended minimum of 20. I simplified the food security variable into a binary variable to increase the number of strata with adequate sample sizes by combining student-parents with “very low” food security scores with those who endorsed a “low” food security score.

Variables of Interest

Campus Climate. A four-item campus climate scale ($\alpha = .89$ and $\omega = .90$) used a Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Sample items included “At my college/university, we are a campus where we look out for each other” and “feel that I belong at my college/university.”

Loneliness. The 3-item UCLA Loneliness Scale measured self-reported loneliness (Hughes et al., 2004). The scales demonstrated good reliability ($\alpha = .84$, $\omega = 0.85$). Response options ranged from 1 (*hardly ever*) to 3 (*often*). Sample items include “How often do you feel left out?” and “How often do you feel isolated from others?”

Social Support. The perceived social support scale was a single-item measure using a Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*) in response to the statement “My social relationships are supportive and rewarding.”

Psychological Distress. The Kessler 6 (K6) psychological distress scale ($\alpha = .89$, $\omega = .92$) measured depression and anxiety (Mewton et al., 2016). Participants indicated how much each statement applied to them over the past 30 days. Items were rated on a scale ranging from 0 (*none of the time*) to 4 (*all of the time*). Sample items included “During the past 30 days, about how often did you feel nervous” and “During the past 30 days, about how often did you feel worthless?”

Table 2 *Descriptive Statistics for Variables of Interest*

	<i>M</i>	<i>SD</i>	<i>Mdn</i>	Range	Skew	Kurtosis	% Missing
Campus Climate (avg)	4.67	0.97	4.75	5	-1.17	2.05	0.48
Social Support	5.75	1.34	6.00	6	-1.47	2.18	0.35
Loneliness (avg)	1.65	0.62	1.67	2	0.65	-0.59	0.33
Psychological Distress (avg)	1.14	0.87	1.00	4	0.90	0.51	0.32

Analysis Plan

All analyses used version 4.2.3 R (R Core Team, 2023). The study involved a combination of correlation analyses, linear regression models, and multilevel linear regressions to examine the relationships between the predictor (e.g. loneliness) and psychological distress and to explore the intersectionality’s influence.

Multilevel Linear Regression Analysis for Intersectionality

Multilevel modeling (MLM) is an appropriate tool for studies involving a nested data structure. MLM distinguishes between individual-level variables (Level 1) and group variables (Level 2) and has been useful for examining heterogeneity of individual experiences grouped within broader contexts (e.g., neighborhoods or classrooms). Clare Evans (2016, 2019) applied MLM to her intersectional epidemiological research on health inequalities by using identity as a Level 2 variable. MAIHDA (Multilevel analysis of individual heterogeneity and discriminatory accuracy) harnessed the multilevel modeling framework to address sample size limitations that commonly arise in single-level analyses. I-MAIHDA achieves this by treating identity variables (e.g. race, gender, sexual orientation, and SES) as level 2 variables within the model.

By treating identity combinations as group-level (level 2) variables, I-MAIHDA captures the overall influence of each intersectional stratum on the outcome, rather than relying solely on individual-level data. This approach is particularly beneficial when dealing with smaller sample sizes in certain identity groups, as those groups may be prone to instability and unreliable estimates if analyzed using a single-level model. The I-MAIHDA model helps stabilize the analysis by shrinking the estimates of small subgroups closer to the overall average, which reduces instability in the model (Merlo et al., 2012; Snijders & Bosker, 2012). It also includes random effects of the intersectional strata, which "borrow strength" from the overall sample (Merlo et al., 2012; Snijders & Bosker, 2012). By doing so, I-MAIHDA allows for the inclusion of more identity dimensions in the analysis, providing nuanced insights into the complexity of intersectionality.

Furthermore, I-MAIHDA quantifies how much variance in the outcome can be attributed to intersectional groupings versus individual-level factors (Evans, 2016). The model decomposes

variance into two levels—between-group and within-group—and evaluates the discriminatory accuracy of intersectional categories in predicting outcomes. Discriminatory accuracy refers to how well these social identities explain differences in the outcome (Evans et al., 2020). This approach allows researchers to determine whether certain identity combinations are more predictive of the outcome than others. By distinguishing between individual-level and group-level variance, I-MAIHDA reveals whether inequalities are primarily driven by specific social identities or other individual factors not captured by group categories (Keller et al., 2023).

In summary, I-MAIHDA offers a more parsimonious approach compared to traditional fixed-effects models, which often rely on dummy variables to control for group-level effects. In contrast, I-MAIHDA uses hierarchical data structures to separate variance attributable to both individual and group levels, allowing for the identification of cross-level interactions and the estimation of random effects. Unlike fixed-effects models, which estimate average effects and do not differentiate variance attributable to intersectional groupings, I-MAIHDA goes beyond controlling for individual social categories and enables a richer understanding of the variance across intersectional identities (Keller et al., 2023). These differences make I-MAIHDA an elegant advancement in quantitative intersectional analysis.

In this study, I employed the I-MAIHDA model by nesting student-parents within their intersectional social strata, assigning each individual respondent a four-digit code representing their specific identity stratum. The first digit of the stratum represented the respondent's racial identity, the second represented their gender identity, the third their sexual identity, and the fourth their level of food security (used as a proxy for class identity). After organizing respondents into their respective social strata, I used multilevel models to examine social context

factors (campus climate, social support, and loneliness) as well as psychological distress, and to explore the relationships between them.

Model 1: Null Model. The first model calculated in I-MAIHDA is the "null model", which serves to summarize the overall inequity in the sample and the distribution of outcome variability both within and between strata and as a baseline comparison to the results of Model 2 (Evans et al., 2024). This model includes the precision-weighted grand mean (PWGM), which represents the average across all stratum-level means with a significant adjustment—analyses account for the increased variability that is often seen in smaller strata, especially those with extreme values. By using this weighting method, the PWGM reduces the impact of lower reliability associated with small sample sizes, offering a more stable estimate (Evans et al., 2024).

Model 1, and all subsequent models, calculate the Variance Partition Coefficient (VPC), which represents the proportion of the total individual variance that lies between strata (Evans et al., 2024). The VPC serves as an indicator of the degree to which an individual's group membership (e.g., race, gender, sexual orientation, socioeconomic status) affects an outcome like psychological distress. Conceptually, the VPC is equivalent to an intra-class correlation (ICC), reflecting the degree of clustering within each stratum and measuring "discriminatory accuracy"—the extent to which stratum membership helps explain the outcome (Evans et al., 2024; Keller et al., 2023). The VPC values, ranging from 0 to 1 and typically presented as a percentage, how well differences between stratum explain scores on the outcome variable. A high VPC value suggests that members of a given stratum tend to have more similar outcomes, indicating considerable differences across stratum membership, whereas a low VPC suggests

greater variability within strata. In approaches such as Ordinary Least Squares (OLS) regression, the VPC is equivalent to R^2 for the model as it is an index of explained variance.

This approach is particularly relevant to intersectional research because it allows us to quantify the extent to which social identities, rather than individual-level factors alone, contribute to differences in outcomes. This is essential for understanding how unique identity combinations influence psychological distress among student-parents, who are historically underrepresented in such analyses.

Model 2: Additive Main Effects Model. Model 2 adds race, gender, sexual orientation, and food security as predictors. In this model, categorical variables that define strata are treated as fixed level 2 explanatory variables, thus helping quantify additive main effects. Within this framework, three additional measures are calculated: the adjusted VPC, Proportion of Contextual Variance (PCV), and residual effects, which provide further insight into the intersectional dynamics (Evans et al., 2024).

The adjusted VPC in Model 2 indicates the total variance at the stratum level explained by interaction effects after accounting for the additive main effects linked to the social categories (Keller et al., 2023). The PCV quantifies the extent to which between-stratum variance reduces between Model 1 and Model 2 (Axelsson Fisk et al., 2018; Evans, 2019). A high PCV suggests that additive main effects capture most of the between-strata variance. Together, the adjusted VPC and PCV distinguish between additive and interaction-based sources of variability.

The residual effects in Model 2 capture the unique intersectional effects for each stratum, after accounting for additive main effects. An important point to address is that the addition of random intercepts creates results that statistically address interactive effects although these effects are not represented in typical interaction notation (i.e., no A x B effect; this is consistent

with the interpretation of moderated effects in meta-analyses as the outcome addresses difference scores). These strata-level residuals represent the difference between outcomes predicted by both main and interaction effects versus outcomes predicted by main effects alone. If the 95% confidence interval of a residual does not include zero, it indicates statistical significance for that stratum's intersectional effect. In the absence of interaction effects, the main effects would fully account for the variance, resulting in all random effects being zero.

Pearson's Correlation and Linear Regression Models. Before analyzing the effects of intersectionality on the relations between the predictor variables—loneliness, campus climate, and social support—and the outcome variable, psychological distress, I conducted Pearson's Correlations and single level linear regressions. To illustrate this process, I will focus on the relation between loneliness (predictor variable) and psychological distress (outcome variable). To assess this relation, I calculated Pearson product-moment correlations (see Table 4). This statistical test provides a correlation coefficient (r), which ranges from -1 to 1, indicating the direction (positive or negative) and the strength of the association (Cohen, 1988). An r value closer to -1 or 1 indicates a stronger relation, while an r value near 0 suggests a weak or no association.

Next, linear regression determined whether loneliness predicted psychological distress. The linear regression provided coefficients that indicate the expected change in psychological distress for a one-unit change in loneliness. This method helped establish whether the relation was statistically significant and provided an estimate of the magnitude and direction of the effect. These analyses were conducted to assess both the presence of a significant relation and the predictive strength of loneliness on psychological distress, thus addressing the study hypotheses.

Once the strength, direction, and predictability of the relations between the predictor variables and psychological distress were established, I used multilevel modeling to evaluate the effects of intersectionality on the study variables and their interrelationships. This approach allowed me to explore whether multilevel modeling is an effective method for detecting intersectional patterns in the mental health of student-parents.

Random Intercept and Random Coefficient Models. Thus far, I-MAIHDA tested and compared Models 1 and 2. This study intended on expanding the utility of I-MAIHDA to examine how relationships vary across strata. To do this, I added a random coefficient model. The random coefficients model set campus climate, social support, and loneliness as level 1 predictors of psychological distress, while allowing their effects to vary randomly across strata. This random coefficient model included both fixed and random components for each predictor, enabling an assessment of whether the relation between psychological distress and each predictor varies across different intersectional groups. More simply, this means that the analysis added estimation of the relations between predictors and outcomes across each strata. In contrast, Model 2 estimated these relations for the overall sample and did not estimate by individual strata. Alternatively, this can be described as moving from a model that estimated a slope that was the same across each strata (Intercepts-only) to a model that estimated slopes for each variable within each strata.

The inclusion of random slopes allows for an examination of whether the relations between each predictor—campus climate, social support, and loneliness—and psychological distress differ across strata. If the random slopes model explains more variance than the intercept-only model, this would indicate that the inclusion of random slopes adds importantly to the explanation of student experiences. It should be noted, however, that a non-significant

improvement for the random slopes model may simply be a product of small sample sizes within each stratum. Thus, Model 3 allows for variability in the effects of predictors across strata, potentially adding depth to the insights obtained from Models 1 and 2.

Retaining the precision-weighted grand mean (PWGM) in the random coefficient model helps to maintain a stable overall estimate that can be compared across models. It continues to be useful for balancing the estimates, especially in smaller strata where random effects may vary significantly across groups. Table 4 summarizes the effects tested and the goal for each model described above.

Table 3 *Model Summaries*

Model	Effects Tested	Goal
Model 1: Null Model	Intercept-only model (a.k.a. null model). No predictors appear in the model.	Establish a baseline for model comparisons (Aim 1).
Model 2: Additive Effects Model	Adds the Level 1 and Level 2 predictors. Intercepts (i.e., means) compared across strata. Slopes not allowed to vary.	Provide a model to compare to the baseline to address if addition of variables improved prediction of outcomes. Provides tests of significance for Level 1 and 2 variables (Aim 1-3).
Random Intercepts and Random Coefficient Models	Slopes allowed to vary.	Provides a model to compare to random intercepts for improvement. Addresses if prediction of outcome from predictor differs across strata (Aim 4).

Chapter 3 – Results

Initially, there were 243 strata. As shown in Table 4, the distribution included 22 strata with a sample size of 100 or more individuals (9.05% of total strata), 10 strata with 50-99 individuals (4.1%), 18 strata with 20-49 individuals (7.4%), 12 strata with 10-19 individuals (4.9%), and 182 strata with fewer than 10 individuals (74.9%). Given the large number of strata with small sample sizes and the potential risk of instability, I lumped together strata with fewer than 20 respondents into an "other" category designated with a code of 9999. Appendix C lists the strata that were combined into the 9999 category along with their sample sizes and mean scores for campus climate, social support, loneliness, and psychological distress. This reduced the total number of strata to 51, including the new "other" category. The updated distribution included 23 strata with 100 or more individuals (45.1%), 10 strata with 50-99 individuals (19.6%), and 18 strata with 20-49 individuals (35.3%). Given the initial prevalence of small sample sizes and the associated risk of making unsupported generalizations, all further analyses used the revised strata distribution.

Table 4 *Distribution of Strata by Size*

Sample size per Stratum	Original Number of Strata	Original % Strata	Modified Number of Strata	Modified % of Strata
100 or More	22	9.1	23	45.1
50-99	10	4.1	10	19.6
20-49	18	7.4	18	35.3
10-19	12	4.9	NA	NA
9 or Less	182	74.9	NA	NA

Intersectional Multilevel Analysis of Individual Heterogeneity and Discriminatory

Accuracy

I employed the lme4 (Bates et al., 2015) package in R to fit these models using maximum likelihood estimation (MLE). Below are the results for Models 1 and 2, which assess the baseline and additive effects of social identities, respectively. I present the random coefficient model that explores the effects of intersectionality on the relation between predictors and psychological distress in Model 3.

Model 1: Null or Intercept-Only Model

Model 1, also known as the null model, provides the foundational parameter estimates of psychological distress (PD) among student-parents as well as their experiences of campus climate (CC), loneliness (ULS), and social support (SS) in four separate analyses focused on each outcome variable. Model 1 addresses the overall inequity in the sample and captures the variance between strata, as indicated by the stratum-level and individual-level random effects. This approach allows for an initial estimation of the level of inequity attributable to intersectional differences, thus offering a starting point for determining the relevance of these strata in explaining key outcomes (Aim 1). As the baseline model, Model 1 allow for comparisons with subsequent models to address if inclusion of other estimates (random intercept, random coefficients) improves model fit.

Table 5 Parameter Estimates for Models of Psychological Distress (PD), Campus Climate (CC), Loneliness (ULS), and Social Support (SS)

Fixed Effects: Regression	PD	PD	CC	CC	ULS	ULS	SS	SS Model 2
Coefficients	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	Est.	Est.	Est.	Est.	Est.	Est.	Est.	Est.
Intercept	8.15***	10.04***	18.34***	17.13***	5.28***	5.58***	5.58***	4.92***
Race								
Asian vs. AI/AN		0.34		0.11		0.22		-0.12
Black vs. AI/AN		-1.14***		0.77*		0.19		0.13
Latine vs. AI/AN		-0.06		0.33		0.08		0.07
Middle Eastern vs. AI/AN		1.73***		0.41		0.33		-0.24
Multiracial vs. AI/AN		0.27		0.33		0.35**		0.01
Native Hawaiian/PI vs. AI/AN		-1.00		0.58		-0.23		0.13
AI/AN								
Other vs. AI/AN		-1.36		0.67		0.16		0.24
White vs. AI/AN		-0.12		0.27		0.25*		-0.04
Gender								
CIS Women vs. CIS Men		0.54***		0.13		0.17***		0.09*
Gender expansive vs. CIS Men		2.49***		0.77*		0.61***		-0.15
Other vs. CIS Men		0.53		-3.87***		0.05		-1.28***
Transgender Men vs. CIS Men		2.73**		-0.74		0.38		-0.17
Men								
Transgender Women vs. CIS Men		1.65		-2.93***		0.15		-0.94***
Sexual Orientation								
Bisexual vs. Asexual		-2.08**		0.81		-0.63*		0.66**
Gay vs. Asexual		-3.21***		1.18		-1.06***		0.77**
Heterosexual vs. Asexual		-4.89***		1.80**		-1.35***		0.99***
Lesbian vs. Asexual		-3.70***		1.42*		-1.12***		1.01***
Queer vs. Asexual		-2.16*		0.32		-0.54		0.78***
Questioning vs. Asexual		-0.85		0.85		-0.05		0.17
Food Insecurity								
Low Food Security vs. High		2.99***		-1.17***		0.83***		-0.48***
Random Effects: Variances								
Stratum Level	4.80	0.004	0.65	0.11	0.38	0.007	0.10	0.004
Individual Level	24.01	23.77	14.69	14.62	3.18	3.17	1.71	1.70
Summary Statistics								
VPC	16.7%	0.01%	4.24%	0.75%	10.67%	0.22%	5.52%	0.23%
PCV		99.9%		83.1%		98.2%		96.0%

As shown in Table 5, the results indicate a significant intercept for each outcome variable. For psychological distress, the intercept was 8.15 ($p < .001$), while for campus climate, loneliness, and social support, the intercept estimates were 18.34, 5.28, and 5.58 respectively (all $p < .001$). These values represent the baseline levels of these variables before considering the impact of social categories. The VPC for psychological distress in Model 1 was 16.7%, indicating that differences between strata explained 16.7% of the variance in psychological distress. For campus climate, loneliness, and social support, the VPC values were 4.2%, 10.7%, and 5.5% respectively. These values suggest that for each outcome, there was variability in the

dependent variable attributable to the different strata levels. The between-strata variance was highest for psychological distress, followed by loneliness.

Model 2: Additive Main Effects Model

Model 2 incorporated the additive effects of social identity categories to examine whether these main effects explained the observed differences in campus climate, loneliness, social support, and psychological distress. This model addresses whether inclusion of the predictor variables improves explanation of outcomes. The inclusion of social categories like race, gender, sexual orientation, and food insecurity into the model allowed for partitioning of variance into additive and interaction effects. By examining these effects, Model 2 provides valuable insight into how combinations of identity characteristics shape the experiences of student-parents, thereby advancing understanding of intersectional influences (Aim 1 & 2).

Campus Climate. For campus climate, there were several significant relations between identity dimensions and campus climate in Model 2. As shown in Table 6, Black student-parents reported better campus climate compared to AI/AN student-parents ($b = 0.77, p < .05$). Additionally, individuals identifying as gender expansive student-parents perceived a worse campus climate compared to cisgender men ($b = -3.87, p < .001$). Compared to asexual student-parents, heterosexual student-parents were also associated with a better perceived campus climate ($b = 1.80, p < .01$). The VPC value for campus climate decreased from 4.2% in the baseline model to 0.75% in Model 2, while the PCV was 83.1%, suggesting that the additive effects of social identities accounted for a significant portion of the between-strata variance in campus climate.

Loneliness. In the case of loneliness, Table 6 shows several notable associations. For instance, Black student-parents reported less loneliness compared to AI/AN student-parents ($b =$

-1.14, $p < .001$). Gender expansive student-parents had significantly higher loneliness levels compared to cisgender men student-parents ($b = 0.61, p < .001$). Additionally, individuals identifying as heterosexual, gay, or lesbian student-parents reported significantly lower loneliness levels compared to asexual student-parents ($b = -1.35, p < .001$; $b = -1.06, p < .001$; $b = -1.12, p < .001$, respectively). The stratum-level variance for loneliness decreased from 0.38 in the baseline model to 0.007 in Model 2, with a VPC dropping from 10.7% to 0.22%. The PCV for loneliness was 98.2%, suggesting that additive effects of social identities explained nearly all the between-strata variance.

Social Support. Model 2 (Table 6) revealed significant associations between social identity categories and social support as well. For instance, compared to AI/AN student-parents, multiracial student-parents reported significantly higher social support ($b = 0.35, p < .01$). Additionally, student-parents identifying as heterosexual reported higher levels of social support compared to asexual individuals ($b = 0.99, p < .001$). Gender expansive student-parents had significantly lower levels of social support compared to cisgender men ($b = -1.28, p < .001$). The stratum-level variance for social support decreased from 0.10 to 0.004 in Model 2, with a VPC dropping from 5.52% to 0.23%. The PCV was 96.0%, indicating that the additive effects of social identities explained nearly all the between-strata variance for social support.

Psychological Distress. In Model 2, the fixed effects estimates indicated significant relations between various social identities and psychological distress (Table 6). For instance, Black student-parents has significantly lower psychological distress than American Indian/Alaskan Native (AI/AN) student-parents ($b = -1.14b, p < .001$). Additionally, heterosexual student-parents experienced significantly less psychological distress compared to asexual student-parents ($b = -4.89, p < .001$). The stratum-level variance for psychological

distress in Model 2 decreased substantially (from 4.80 to 0.004), and the VPC dropped to 0.01%. This suggests that main effects nearly explained all the between-strata variance. The PCV for psychological distress was 99.9%, indicating that nearly all the between-strata variance could be attributed to additive effects.

Overall, the results from Model 2 provide evidence that identity-based factors, such as racial identity, gender, and sexual orientation, are significantly associated with differences in psychological distress, campus climate, loneliness, and social support among student-parents. These findings highlight the complexities of intersectional experiences, demonstrating that student-parents holding marginalized identities often face greater challenges across these outcomes.

Highest and Lowest Strata Means

Next, I ranked the strata from lowest to highest predicted means for all four variables (campus climate, loneliness, social support, and psychological distress). This approach helps determine if certain strata are disproportionately advantaged or disadvantaged in relation to student-parent outcomes, highlighting the differential impact of intersectionality (Aim 3).

Figures 1-4 present these rankings. To better recognize patterns in the strata, Table 6 shows the highest and lowest ranking strata for the independent variables and dependent variable.

Campus Climate. The results for the highest and lowest predicted campus climate scores revealed notable patterns based on race, gender identity, sexual orientation, and food security status. Figure 1 shows the level of campus climate for each strata with the vertical line marking the PWGM. The five highest and lowest ranking strata are ranked in Table 7 for easy comparison.

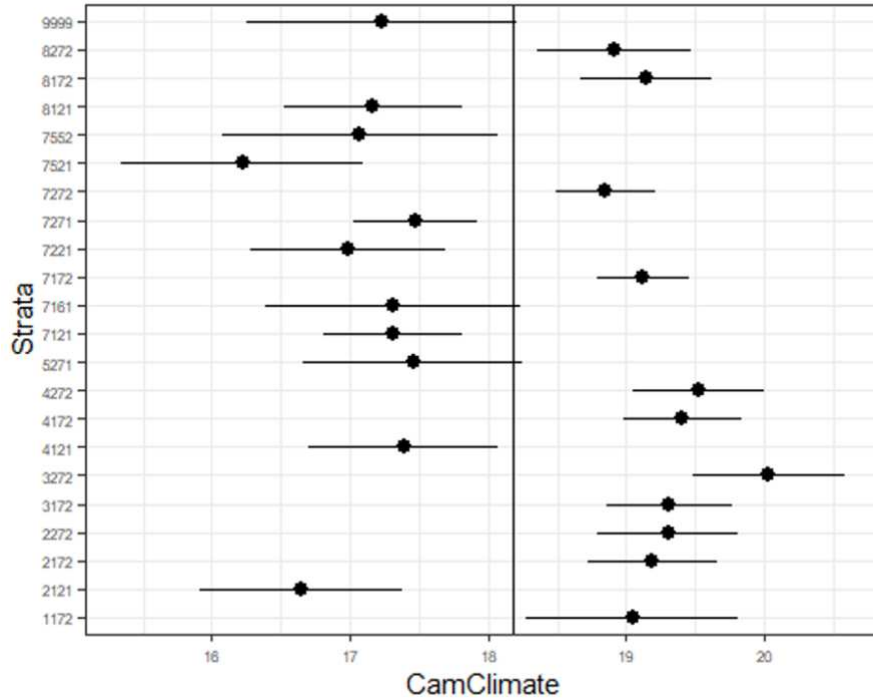


Figure 1 Strata Rankings of Campus Climate Predicted Means

Table 6 Lowest- and Highest-Ranking Strata for Campus Climate

Rank	Strata	Race	Gender ID	SO	Food	Mean CC
Lowest						
	7521	White	Expansive	Bi+	Low	16.21
	7221	White	Cis-man	Bi+	Low	16.64
	7552	White	Expansive	Queer	High	16.98
	8121	Multiracial	Cis-woman	Bi+	Low	17.07
	7161	White	Cis-woman	Questioning	Low	17.17
Highest						
	3272	Black	Cis-man	Hetero	High	20.03
	4272	Latine	Cis-man	Hetero	High	19.52
	4172	Latine	Cis-woman	Hetero	High	19.41
	3172	Black	Cis-woman	Hetero	High	19.31
	2272	Asian	Cis-man	Hetero	High	19.30

For the lowest-ranked strata, individuals were predominantly White student-parents and included both cisgender men and expansive gender identities. Notably, these student-parents primarily identified as belonging to sexual minority orientations, including bisexual and queer, and experienced mostly low levels of food security. This indicated a potential intersection

between sexual orientation, racial background, and food security contributing to poorer campus climate perceptions.

Conversely, the highest-ranked strata were composed of student-parents with more diverse racial identities, including Black, Latine, and Asian student-parents, all of whom were cisgender and identified as heterosexual. These student-parents also consistently reported high food security. These patterns suggested that those with intersecting privileges, such as being cisgender, heterosexual, and having higher food security, tended to perceive their campus climate more positively, while sexual minority students, particularly those who were White, reported lower campus climate perceptions.

Loneliness. The results indicated patterns in the strata with the lowest and highest predicted mean scores for loneliness. Figure 2 shows the level of loneliness for each strata with the vertical line marking the PWGM. The five highest and lowest ranking strata for loneliness are ranked in Table 8 for easy comparison.

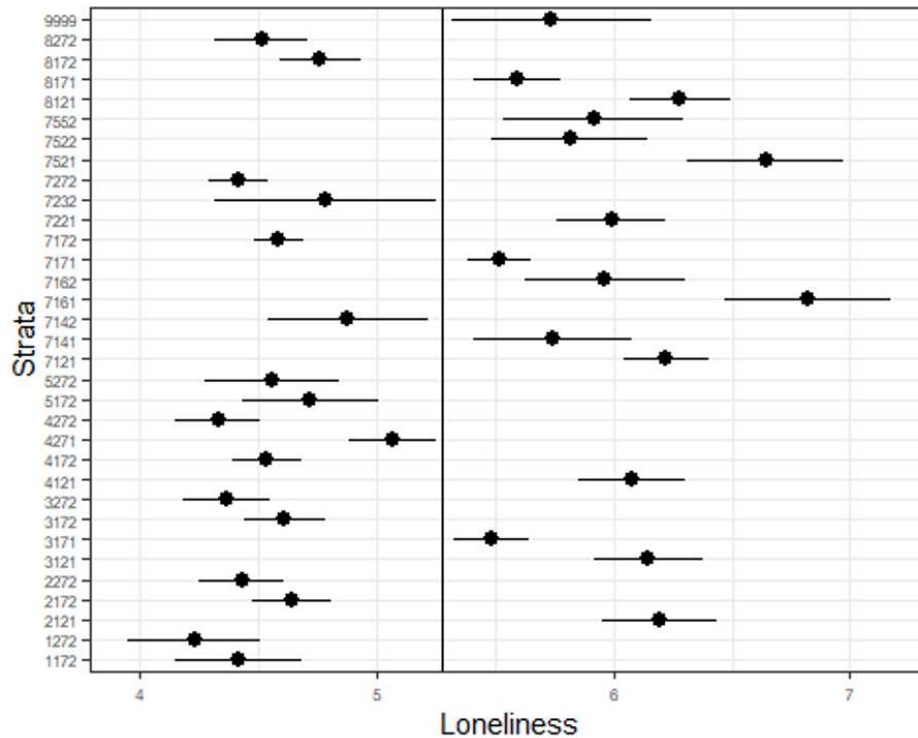


Figure 2 *Strata Rankings of Loneliness Predicted Means*

Table 7 *Lowest- and Highest-Ranking Strata for Loneliness*

Rank	Strata	Race	Gender ID	SO	Food	Mean ULS
Lowest						
	1272	AI/NA	Cis-man	Hetero	High	4.23
	4272	Latine	Cis-man	Hetero	High	4.34
	3272	Black	Cis-man	Hetero	High	4.36
	1172	AI/NA	Cis-woman	Hetero	High	4.41
	7272	White	Cis-man	Hetero	High	4.42
Highest						
	7161	White	Cis-woman	Questioning	Low	6.81
	7521	White	Expansive	Bi+	Low	6.65
	8121	Multiracial	Cis-woman	Bi+	Low	6.29
	7121	White	Cis-woman	Bi+	Low	6.22
	2121	Asian	Cis-woman	Bi+	Low	6.18

For the lowest-ranked strata in terms of loneliness, the individuals were predominantly cisgender men student-parents, identified as heterosexual, and represented various racial identities, including American Indian/Alaska Native (AI/NA), Latine, Black, and White. All

student-parents in these strata reported high food security, which may have suggested that access to resources was associated with lower levels of loneliness.

Conversely, the highest-ranked strata for loneliness were composed mainly of cisgender women student-parents or student-parents with expansive gender identities. These student-parents were predominantly from White, multiracial, and Asian backgrounds. Additionally, most of them identified as bisexual or questioning, and all reported low food security. This suggested that student-parents with minority sexual orientations and lower access to resources experienced higher levels of loneliness. Overall, the findings highlighted that both gender identity and sexual orientation, as well as economic factors such as food security, might have contributed to differences in loneliness among student-parents.

Social Support. Figure 3 shows the level of social support for each strata with the vertical line marking the PWGM. The five highest and lowest ranking strata for social support are ranked in Table 8 for easy comparison.

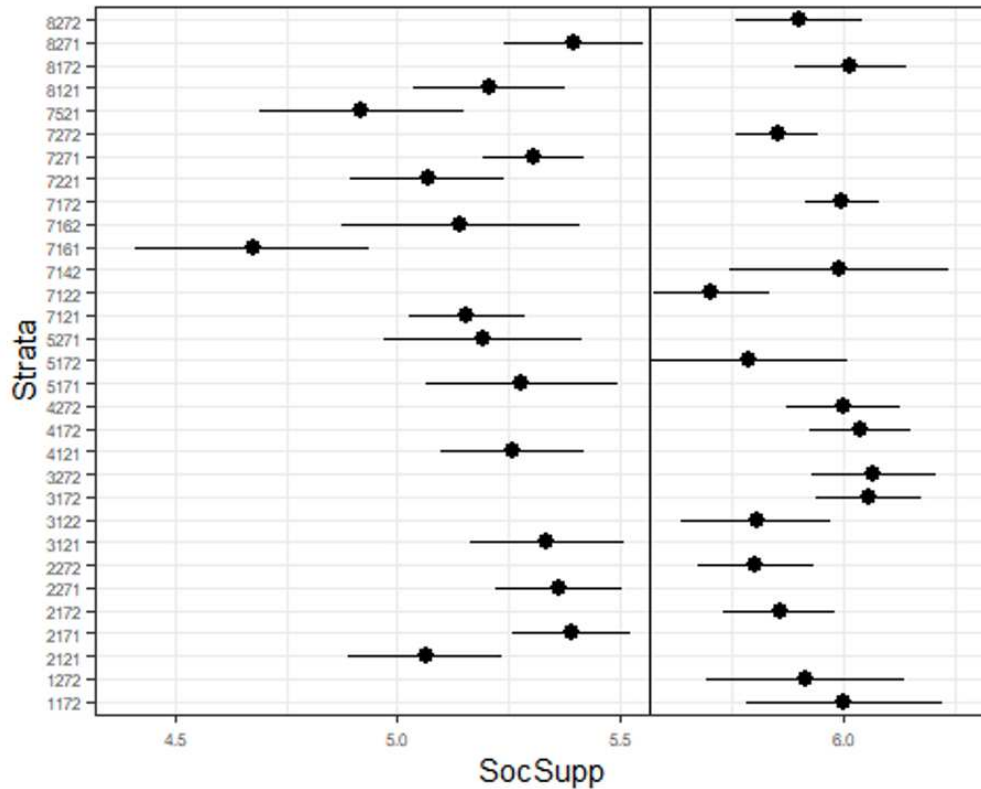


Figure 3 *Strata Rankings of Social Support Predicted Means*

Table 8 *Lowest- and Highest-Ranking Strata for Social Support*

Rank	Strata	Race	Gender ID	SO	Food	Mean SS
Lowest						
	7161	White	Cis-woman	Questioning	Low	4.67
	7521	White	Expansive	Bi+	Low	4.92
	2121	Asian	Cis-woman	Bi+	Low	5.06
	7221	White	Cis-man	Bi+	Low	5.14
	7162	White	Cis-woman	Questioning	High	5.16
Highest						
	1172	AI/NA	Cis-woman	Hetero	High	6.00
	8172	Multiracial	Cis-woman	Hetero	High	6.02
	4172	Latine	Cis-woman	Hetero	High	6.04
	3172	Black	Cis-woman	Hetero	High	6.06
	3272	Black	Cis-man	Hetero	High	6.07

The strata with the lowest mean scores for social support predominantly included White student-parents, with one Asian student-parents. All the student-parents in these strata either

identified as bisexual or questioning, and most had lower food security. The gender identities varied, including both cis-women, one cis-man, and an expansive gender identity.

In contrast, the strata with the highest mean social support scores were composed of student-parents who were primarily American Indian/Alaskan Native, Black, Latine, or Multiracial. All student-parents in these strata were heterosexual and had higher food security. In terms of gender identity, all but one student-parent were cis-women, with one cis-man from a Black racial background.

Psychological Distress. The analysis of psychological distress revealed notable patterns among the strata with the lowest and highest mean scores for psychological distress. Figure 4 shows the level of psychological distress for each strata with the vertical line marking the PWGM. The five highest and lowest ranking strata for psychological distress are ranked in Table 9 for easy comparison.

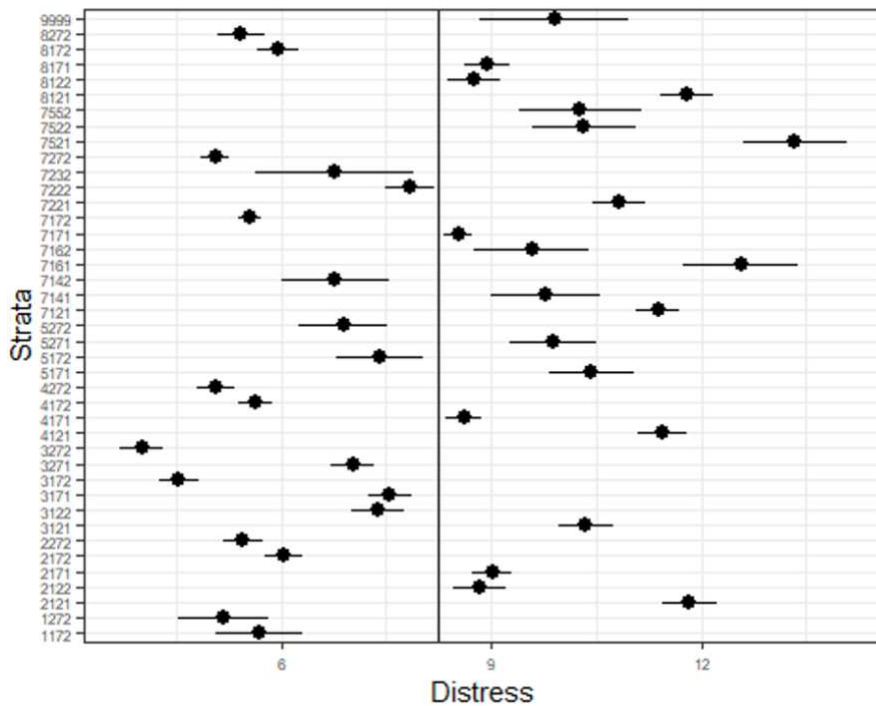


Figure 4 *Strata Rankings of Psychological Distress Predicted Means*

Table 10 *Lowest- and Highest-Ranking Strata for Psychological Distress*

Rank	Strata	Race	Gender ID	SO	Food	Mean PD
Lowest						
	3272	Black	Cis-man	Hetero	High	4.01
	3172	Black	Cis-woman	Hetero	High	4.54
	7272	White	Cis-man	Hetero	High	5.06
	4272	Latine	Cis-man	Hetero	High	5.07
	1272	AI/NA	Cis-man	Hetero	High	5.17
Highest						
	7521	White	Expansive	Bi+	Low	13.34
	7161	White	Cis-woman	Questioning	Low	12.57
	2121	Asian	Cis-woman	Bi+	Low	11.83
	8121	Multiracial	Cis-woman	Bi+	Low	11.79
	4121	Latine	Cis-woman	Bi+	Low	11.44

Among the strata with the lowest psychological distress scores, all student-parents had high food security. They were predominantly cisgender men student-parents, with only one cisgender woman student-parent. The racial identities of these student-parents were diverse,

including Black, Latine, White, and American Indian/Alaska Native (AI/NA). Additionally, all these student-parents identified as heterosexual.

In contrast, the strata with the highest mean psychological distress scores consisted predominantly of student-parents with low food security. These student-parents identified as either bisexual or questioning. In terms of gender, the group consisted primarily of cisgender women student-parents, with one student-parent having an expansive gender identity. The racial backgrounds of student-parents in the highest-ranked strata included White, Asian, Multiracial, and Latine student-parents.

Identity-Based Patterns Across All Variables. Across the four variables—campus climate, loneliness, social support, and psychological distress—distinct patterns emerged, revealing consistent themes related to race, gender, sexual orientation, and food security among the strata with the lowest and highest predicted means.

For the variables of campus climate, loneliness, and psychological distress, those strata with the highest psychological distress and loneliness, as well as the lowest campus climate and social support, tended to include a mix of White, Asian, and Multiracial student-parents. Gender identities for these groups were predominantly cis-women or expansive identities, and most participants identified with a sexual minority orientation, such as bisexual or questioning. These strata were also characterized by lower levels of food security. This overall pattern suggested that student-parents who were White, Asian, or Multiracial and/or had non-cisgender and non-heterosexual identities faced greater challenges with regard to social context (e.g., less favorable campus climate), which may, in turn, have impacted their overall wellbeing, as evidenced by their higher levels of loneliness and psychological distress.

Conversely, the lowest predicted psychological distress and loneliness scores, as well as the highest predicted social support and campus climate scores, were consistently observed among Black and Latine student-parents, predominantly cis-men and women, who identified as heterosexual and had higher food security. The findings for social support were similar, with higher scores found among strata characterized by racial minorities, predominantly American Indian/Alaskan Native, Black, Latine, or Multiracial student-parents, who identified as heterosexual and had higher food security. These patterns suggested that positive campus experiences, stronger social support, and lower psychological distress were more likely to be experienced by student-parents who held more privileged or traditionally normative social identities, particularly related to gender and sexual orientation, even if they belonged to a racial minority.

Pearson's Correlations and Linear Regressions

I performed Pearson's correlations to assess associations between the predictor variables (campus climate, social support, and loneliness) and the outcome variable (psychological distress). As shown in Table 10, significant relations were found between all three predictor variables and psychological distress at the .01 level, with directions that confirmed previous findings in the literature. Table 10 presents correlations between campus climate, social support, loneliness, and psychological distress. Campus climate showed a positive association with social support ($r = .258, p < .01$) and negative associations with loneliness ($r = -.295, p < .01$) and psychological distress ($r = -.258, p < .01$). Social support also showed a significant negative association with both loneliness ($r = -.414, p < .01$) and psychological distress ($r = -.428, p < .01$). Conversely, loneliness was positively associated with psychological distress ($r = .545, p < .01$).

Table 10 *Correlations Between Measures*

	SS	ULS	PD
Campus Climate	.258**	-.295**	-.258**
Social Support		-.414**	-.428**
Loneliness			.545**
Psychological Distress			

Note. ** $p < .01$ (2-tailed)

Given that psychological distress was normally distributed, direct effects were tested using linear regression models for the outcome psychological distress on each of the social context predictors. The overall model was significant, $F(3,17396) = 3302.0, p < .001, Adjusted R^2 = .3627$. Results showed that higher levels of campus climate ($b = -0.09, p < .001, SE = 0.005$) and social support ($b = -0.13, p < .001, SE = 0.004$) were associated with lower levels of psychological distress among student-parents. Conversely, higher levels of loneliness were associated with higher levels of psychological distress ($b = 0.63, p < .001, SE = 0.009$). These findings confirmed Hypothesis 1, which proposed similar associations for student-parents as seen in previous research on traditional students.

Random Intercept and Random Coefficient Models

To investigate the relation between psychological distress and social context variables (campus climate, social support, and loneliness), and to explore whether these relations vary across different intersectional strata (Aim 4), I conducted a series of multilevel models. These models included a null model, a random intercept model, and a random coefficients model. This approach allowed me to assess the appropriateness and value of further analysis and compare model fit across different levels of complexity. The results for each of the models is found in Table 11.

Table 11 *Parameter Estimates for Models of Psychological Distress (PD) predicted by Campus Climate (CC), Loneliness (ULS), Social Support (SS), and Strata*

Fixed Effects: Regression Coefficients	Null Model Est.	Random Intercepts Est.	Random Coefficients Est.
Intercept	1.36***	1.40***	1.47***
Campus Climate		-0.08***	-0.09***
Loneliness		0.57***	0.58***
Social Support		-0.12***	-0.13***
Random Effects: Variances			
Strata Level (Intercept)	0.133	0.043	0.175
Campus Climate			0.002
Loneliness			0.000
Social Support			0.001
Residual	0.667	0.456	0.453
Summary Statistics			
VPC	16.6%	8.6%	28.2%
PCV		67.7%	-75.43
BIC	41976.1	35154.4	35172.8

The first step involved running a null model, which included only the intercept to capture baseline estimates of variance in psychological distress between intersectional strata. The null model is essential for providing a benchmark against which subsequent models are compared and helps establish whether multilevel modeling is justified by assessing the extent of between-group variance. The null model results revealed that 16.6% of the variance in psychological distress was attributed to differences between strata, indicating a meaningful degree of clustering within the data that warranted further modeling to understand these group-level effects.

Following the null model, I conducted a random intercept model, which added the social context predictors (campus climate, social support, and loneliness) as fixed effects. The random intercept model allows the intercept, but not the slopes of the predictors, to vary across intersectional strata. This model showed an improvement in fit, as the strata-level variance in psychological distress decreased from 0.133 in the null model to 0.043. This suggests that incorporating the social context predictors explained some of the between-group variance in psychological distress. The VPC also dropped to 8.6%, indicating that the remaining between-

strata variance was reduced after accounting for the social context predictors. The Bayesian Information Criterion (BIC) value for the random intercept model was 35154.4, lower than the null model's BIC of 41976.1, suggesting that the random intercept model provided a better fit to the data.

Lastly, I ran a random coefficients model, which allowed the slopes of the social context predictors to vary across the intersectional strata, thus enabling an examination of whether the relations between campus climate, social support, and loneliness with psychological distress differed across strata. The random coefficients model revealed that the variance in intercepts increased to 0.175, indicating greater variability when allowing the relation to vary by group. However, the VPC increased substantially to 28.2%, and the BIC value increased to 35172.8, slightly higher than the random intercept model, indicating a decrease in model fit. This suggests that introducing random slopes did not improve prediction and instead added unnecessary complexity. The findings indicate limited evidence for differential relations between predictors and psychological distress across strata.

Overall, the comparison of these models using BIC and the VPCs showed that the random intercept model was the best fitting model. It effectively captured the variance in psychological distress while maintaining parsimony, whereas the random coefficients model did not significantly improve the fit or explain additional variability. This suggests that there may be little to no substantial difference in how campus climate, social support, and loneliness predict psychological distress across different intersectional strata. The limitations associated with high numbers of strata and the increased complexity of allowing multiple predictor variables to vary are further addressed in the discussion section.

Description of the Strata condensed into the 9999 Strata

There were many strata that did not meet the sample size cutoff (20 or greater) set for this study. For the purpose of this analysis, these strata were lumped together into one strata designated a code of 9999. Appendix C includes a list of all these strata. Due to the high variability of identities represented in the 9999 strata, it was excluded from the analyses. However, it is important to describe the 9999 strata.

Many of the strata included in the "9999" group were composed of student-parents from minoritized racial or ethnic backgrounds. Specifically, strata representing American Indian/Alaska Native (AI/AN), Asian, and Multiracial student-parents were quite prevalent. Additionally, White student-parents appeared in these small strata as well, but to a much lesser degree. There is also an overrepresentation of gender minorities, such as gender expansive student-parents, trans student-parents, or those with "other, not listed" gender identities, within the "9999" strata. This pattern highlights how gender minority identities are distributed across smaller sample sizes in the dataset, reflecting that these groups had insufficient representation to stand alone in the analysis. Similar to gender identities, student-parents identifying as belonging to minority sexual orientations, including those on the asexual spectrum, Bi+, queer, and questioning identities, are frequently represented in the "9999" strata. Heterosexual student-parents are less commonly found in this group.

When examining the composition of the "9999" group compared to those strata included in the main analysis, there appears to be a higher representation of participants with three or four marginalized identities. This includes racial minorities, gender-expansive student-parents, sexual minorities, and those experiencing low food security. In contrast, strata with fewer intersecting marginalized identities were more likely to meet the required sample size threshold and thus be

included in the main analysis. For example, participants with only one or two marginalized identities—such as racial minorities who were also cisgender and heterosexual, or cisgender women student-parents experiencing low food security—were more likely to be included in the main analysis strata because they had larger sample sizes.

Model 1: Null or Simple Model

The findings from Model 1 provided important insights into the baseline variability and inequities in psychological distress, campus climate, loneliness, and social support among student-parents. The significant intercept estimates for psychological distress, campus climate, loneliness, and social support indicated that the average baseline levels of these variables were significantly different from zero. These intercepts represented the starting point before accounting for social identity characteristics, establishing an understanding of where these experiences stood for the average student-parent.

The VPCs for each of the outcomes shed light on how much of the variance in each variable was attributable to differences between the social identity strata. For psychological distress, the VPC of 16.7% suggested that a meaningful proportion of the variance was explained by differences between social strata. This indicated that social identity group membership had a substantial impact on psychological distress, highlighting how social context factors contributed to the mental health experiences of student-parents.

For campus climate, loneliness, and social support, the VPCs were 4.2%, 10.7%, and 5.5%, respectively. These findings suggested that while there was some between-strata variance in these outcomes, the extent to which social identities explained variability was more pronounced for psychological distress and loneliness compared to campus climate and social support. The relatively high VPC for loneliness suggested that social identity factors were particularly influential in shaping experiences of loneliness among student-parents.

Overall, the results of Model 1 emphasized that while individual experiences did contribute to the variation in psychological distress, loneliness, campus climate, and social support, the group-level social identity strata also played a significant role in shaping these outcomes. Psychological distress and loneliness, in particular, appeared to be more strongly influenced by differences in social identity, underscoring the importance of examining the intersectional influences on student-parents' well-being. These findings served as a foundation for understanding the role of intersectionality in shaping social context experiences and mental health outcomes, paving the way for more nuanced examination in subsequent models that further considered additive and interaction effects.

Model 2: Additive Main Effects Model

Model 2 provides tests of the study's primary research questions. The results from Model 2 (found in Table 6), also known as the "Additive and Interaction Effects Model," provided additional insight into the impact of social identities on separate analyses addressing psychological distress, campus climate, loneliness, and social support. The addition of identity-based variables (race, gender, sexual orientation, and food security) as fixed level 2 predictors allowed for assessing how these social categories impacted the outcomes of interest.

The random effects for the stratum level showed that adding the social identities substantially reduced the between-strata variance. For psychological distress, the VPC dropped from 16.7% to 0.01%, indicating that nearly all of the variance initially attributed to differences between strata in Model 1 was explained by the identity-based factors in Model 2. Similar reductions in VPC were observed for campus climate (4.2% to 0.75%), loneliness (10.7% to 0.22%), and social support (5.5% to 0.23%).

The PCV provided further evidence of the effectiveness of the social identity variables in explaining between-strata variance. For psychological distress, the PCV value was 99.9%, indicating that nearly all of the between-strata variance was explained by the additive main effects of the identity factors. For the other outcomes, PCV values ranged from 83.1% (campus climate) to 98.2% (loneliness), suggesting that most of the variability between strata could be attributed to additive main effects rather than unexplained variance.

The findings from Model 2 provided insight into the utility of intersectional strata for predicting outcomes such as campus climate, social support, loneliness, and psychological distress among student-parents, thus addressing Study Aim 1. The significant reduction in variance explained between strata after accounting for identity-based variables demonstrated the importance of considering intersectional categories. Specifically, the large decrease in the VPC across all outcome variables, particularly psychological distress, suggested that intersectional social identities played a crucial role in predicting these outcomes among student-parents. This confirmed that using intersectional strata as a level-2 variable was effective for capturing and predicting experiences within the student-parent population, offering a more nuanced understanding of their social contexts and psychological outcomes.

It is important to clarify that, although the variance attributed to between-strata differences decreased substantially in Model 2, indicating that the main effects of identity variables explain much of the variability, this does not diminish the importance of an intersectional approach. Instead, it shows that the additive effects of these social identities are central to understanding disparities among student-parents. Intersectional identities, even when considered as additive main effects, reveal how combinations of race, gender, sexual orientation, and food security collectively influence outcomes. In other words, the high PCV values indicate

that intersectional categories, represented by these identity variables, significantly contribute to the explanation of variance in the outcome variables. This is not a contradiction but rather an affirmation that intersectional identities play a significant role in shaping student-parent experiences, albeit through their additive main effects rather than through unexplained variance.

Overall, the results from Model 2 (Table 6) underscored the substantial role of social identities in explaining the variability in outcomes such as psychological distress, campus climate, loneliness, and social support. By incorporating these identity-based variables, the model highlighted how intersectional factors influenced the experiences of student-parents, leading to a deeper understanding of the patterns of inequity present in this population. This suggested that additive main effects from social identities were critical in understanding disparities in psychological distress and social context among student-parents, rather than these disparities being driven solely by individual-level differences.

When examining the specific intersectionality measures, there were a few notable patterns that emerge when looking across the different outcome variables. For one, Black student-parents consistently reported lower psychological distress and higher levels of social support compared to AI/NA student-parents. This pattern may suggest a relative resilience in psychological distress and perceived social support among Black student-parents compared to AI/NA student-parents, potentially related to a sense of cultural connectedness or community identification. The results also suggest that campus climate perceptions were more favorable among Black, Latine, and Asian student-parents compared to White student-parents, which contrasts with findings that BIPOC students often perceive campus climate less favorably. In this context, intersecting privileges (e.g., gender, sexual orientation, food security) might have

outweighed the negative impact of racial marginalization, leading to these more favorable perceptions among certain groups.

When examining gender identity, cisgender student-parents generally reported more favorable outcomes compared to those student-parents with expansive gender identities. For example, cisgender men and women reported lower levels of psychological distress and loneliness, as well as more favorable campus climate, compared to expansive gender student-parents. This aligns with broader research findings indicating that gender minorities often face unique stressors and barriers in their social environments, contributing to disparities in well-being.

Across multiple outcomes, sexual minority students—particularly those identifying as asexual or bisexual—tended to report higher levels of psychological distress, poorer campus climate, and greater loneliness compared to their heterosexual peers. This finding underscores the challenges faced by student-parents who belong to minority sexual orientations and aligns with the literature indicating that LGBTQ+ individuals often face additional stressors, including discrimination and minority stress, which can negatively impact mental health and social experiences.

Higher food security consistently correlated with better outcomes across all variables. Student-parents who reported higher food security tended to have lower psychological distress, higher social support, better campus climate, and less loneliness. This suggests that economic stability, as indicated by food security, plays a protective role in the overall well-being of student-parents, likely because it enables better access to resources, reduces stress, and promotes a more positive overall experience.

In summary, it appears that student-parents with multiple intersecting privileges—such as being cisgender, heterosexual, and experiencing higher food security—generally reported better outcomes for campus climate, psychological distress, and loneliness. This suggests that these intersecting privileged identities offer cumulative protective effects, buffering student-parents against adverse outcomes and enhancing their perception of the social environment.

Model 2: Highest and Lowest Strata Means

Campus Climate. The results of the comparison between strata with the highest and lowest predicted campus climate scores reveal significant patterns of disparities based on the intersection of race, gender identity, sexual orientation, and food security status among student-parents. The findings suggest that marginalized social identities, particularly those characterized by sexual minority status and racial identity, appear to be associated with less favorable campus climate perceptions.

Specifically, the student-parents who were part of the lowest-ranked strata for campus climate, meaning they had the lowest predicted campus climate scores, were predominantly White, identified as belonging to sexual minority orientations (e.g., bisexual, queer), and included both cisgender men and student-parents with expansive gender identities. This group experienced varying levels of food security, with both low and high food security reported.

Interestingly, these findings diverge from previous research, including the work by Koo (2021), who found that students of color were more likely to report poorer perceptions of campus climate compared to White students. This suggests that, in this study, racial privilege alone did not necessarily translate into a more positive campus climate experience for White student-parents, particularly when sexual minority status was a factor. The presence of sexual minority identities in the lowest-ranked strata may indicate that oppression, discrimination, and exclusion

based on sexual orientation can have a substantial impact on perceptions of campus inclusivity, even for student-parents who might benefit from racial privilege.

Conversely, the highest-ranked strata for campus climate, meaning strata with the highest predicted scores for campus climate, were composed of student-parents from more diverse racial backgrounds, including Black, Latine, and Asian identities, who were all cisgender, identified as heterosexual, and consistently reported high food security. This suggests that these student-parents, who are beneficiaries of intersecting privileges—being cisgender, heterosexual, and having high food security—are more likely to perceive their campus climate more positively. This finding supports previous research by Koo (2021), which found that women tend to report poorer campus climate as opposed to men. This disparity may be due to the additional challenges women face in academic environments, such as experiences of gender discrimination, lack of representation in leadership, or perceptions of lower inclusivity, which contribute to less favorable perceptions of campus climate (Johnson et al., 2020; Settles et al., 2007). Women often navigate biases and microaggressions that can make campus environments feel less supportive and more exclusionary (Harper & Hurtado, 2007).

Additionally, there is limited data regarding how sexual and gender minorities or students with food insecurity perceive campus climate, making these findings particularly valuable for understanding these groups' unique experiences. The results underscore the importance of considering the intersections of privilege and marginalization, rather than focusing solely on a single identity category. Sexual minority status, gender identity, and food insecurity emerged as important factors in shaping students' perceptions of campus climate, even more than racial identity in some instances.

These findings highlight the need for educational institutions to develop more targeted interventions that address the intersecting challenges faced by marginalized student-parent groups, including sexual minority students-parents, gender-expansive student-parents, and student-parents experiencing food insecurity. By recognizing and addressing these intersectional disparities, institutions can better support student well-being and foster a more inclusive campus climate for all students.

Loneliness. The results on loneliness highlight distinct identity-based patterns in the strata with the lowest and highest predicted mean scores of loneliness (i.e. lowest- and highest-ranking strata). The student-parents in the lowest-ranking strata for loneliness are predominantly cisgender men who identify as heterosexual and represent various racial identities, including American Indian/Alaska Native (AI/NA), Latine, Black, and White. All of these student-parents report high food security, which suggests that access to resources plays a crucial role in mitigating loneliness. The presence of high food security might be associated with reduced financial stress, better access to basic needs, and enhanced opportunities for social interaction, which collectively contribute to lower levels of loneliness.

On the other hand, the highest-ranking strata for loneliness are composed primarily of cisgender women or student-parents with expansive gender identities. These student-parents are predominantly from White, multiracial, and Asian backgrounds and identify as bisexual or questioning. All student-parents in these strata report low food security, indicating a strong link between limited access to resources and increased loneliness. Consistent with previous literature, food insecurity has been found to be associated with greater loneliness among various populations (Burriss et al., 2021; Oh et al., 2022). The lack of financial resources may limit social opportunities, intensify stress, and contribute to isolation, which can lead to heightened feelings

of loneliness by limiting a student's ability to engage in social activities, access support services, or participate in campus life, which can lead to fewer opportunities for connection and increased isolation. As one small example, student-parents who cannot afford meal plans for their family are less likely to eat (and socialize) in dining halls where large groups of students get to interact. Student-parents facing financial challenges may also need to work multiple jobs or manage complex schedules to provide for themselves and their families, further limiting their ability to socialize with peers or access supportive environments. The stress and emotional burden of financial insecurity may also contribute to feelings of stigma and disconnection, making it difficult to reach out and form meaningful connections.

Furthermore, gender identity and sexual orientation appear to play significant roles in the experience of loneliness. The highest-ranking loneliness scores are seen among cisgender women student-parents and those with expansive gender identities, particularly those who identify as bisexual or questioning. Studies indicate that sexual minorities are more vulnerable to loneliness due to the stigma and discrimination they face, which can lead to social exclusion and reduced opportunities for meaningful social connections (Gorczyński & Fasoli, 2022; Busby et al., 2020). Moreover, cisgender women are often subjected to gender-based expectations, such as caregiving responsibilities, that may increase stress and limit opportunities for social interaction, further contributing to their experience of loneliness (Purtell et al., 2021; Wodika et al., 2024).

Interestingly, the findings suggest that racial community identification and belonging may be protective against loneliness for some BIPOC communities. Prior research has shown that student-parents who strongly identify with their racial or cultural community report lower levels of loneliness, as a sense of community fosters social support and connection (McNamara et al., 2021). This might explain why the lowest loneliness scores are seen among racial minority

student-parents, especially when combined with cisgender and heterosexual identities and high food security. The sense of belonging within one's racial community might be a protective factor that helps mitigate loneliness among these groups.

Overall, these findings emphasize that loneliness among student-parents is not uniformly experienced but rather is influenced by intersecting identities such as gender, sexual orientation, race, and economic stability. It highlights the need for targeted interventions to support those at higher risk of loneliness, particularly student-parents who are food insecure, sexual minorities, or cisgender women. Creating inclusive support systems and policies that ensure access to resources for student-parents with intersecting marginalized identities could be a significant step towards reducing loneliness in this population.

Social Support. The findings for social support reveal interesting intersectional patterns among the strata with the lowest and highest average scores of perceived social support. For the strata with the lowest mean scores for social support, the predominant characteristics include being White and identifying as bisexual or questioning student-parents. Additionally, most of the student-parents in these strata report lower food security. The gender identities in these groups varied, including both cis-women, one cis-man, and student-parents with an expansive gender identity. These findings align with previous research that has found that student-parents identifying as sexual minorities often report lower levels of social support compared to their heterosexual counterparts, as they may face additional social stressors and a lack of acceptance from mainstream society (Christie, 2021). Moreover, these findings are consistent with literature that highlights the impact of food insecurity on social support, particularly among vulnerable populations. Studies have shown that lower food security is associated with lower perceived social support, particularly among older adults (Burriss et al., 2021). The lack of resources and

financial instability could potentially contribute to difficulties in establishing or maintaining social networks, thereby decreasing perceived social support.

In contrast, the strata with the highest mean scores for social support were composed of student-parents who primarily identified as American Indian/Alaska Native, Black, Latine, or Multiracial student-parents. All student-parents in these strata were heterosexual, and nearly all had higher food security. In terms of gender identity, all but one student-parent identified as cis-women, with one cis-man from a Black racial background. These findings are supported by the literature that indicates that social support plays a particularly significant role in the well-being of women student-parents. It has been found that women are more likely to have more robust social connectedness, which is a critical factor in their perceived social support (Kneavel, 2021). This greater degree of social support among women could contribute to the higher levels of perceived support seen in these strata. Further, the presence of a strong racial or community identity, as seen in the higher support scores of student-parents from American Indian/Alaska Native, Black, and Latine backgrounds, could provide a substantial protective factor. Racial community identification is known to be associated with increased social support and better overall well-being among individuals in marginalized racial groups (McNamara et al., 2021). Community belonging may enhance resilience and provide a network of support that is otherwise unavailable in broader social contexts.

Overall, the findings emphasize the complex intersection of race, gender identity, sexual orientation, and socioeconomic factors in shaping social support among student-parents. For student-parents with minority sexual identities, lower food security, and diverse gender identities, there are barriers that may impede their access to social support, potentially impacting their mental health and well-being. On the other hand, having intersecting privileges — such as

higher food security, being cisgender, and being heterosexual — may enhance perceptions of social support. These results suggest the importance of considering multiple dimensions of identity when examining perceived social support, as different aspects of one’s identity may confer either risk or resilience in developing social connectedness. Addressing disparities in social support for marginalized student-parents, particularly those facing economic hardship and minority sexual identities, could be a critical pathway to improving the well-being of diverse student-parent populations.

Psychological Distress. The patterns observed in psychological distress highlight significant relations between gender, sexual orientation, food security, and mental health outcomes among student-parents. Consistent with existing literature, food security emerged as a key protective factor against psychological distress, as all student-parents in the strata with the lowest psychological distress scores reported high food security. Previous research, such as studies by Oh et al. (2022) and Burris et al. (2021), supports the link between food security and improved mental health outcomes, suggesting that access to resources, including adequate food, can significantly mitigate mental health challenges among college students and other populations.

Gender also appeared to be a notable factor, with cisgender men student-parents predominantly making up the strata with the lowest psychological distress scores, alongside one cisgender woman. This is consistent with the literature indicating that men often report lower levels of psychological distress compared to women, particularly in contexts involving caregiving and economic stress (Wodika et al., 2024). The lower distress reported by cisgender men may reflect the broader social dynamics in which caregiving responsibilities, often

disproportionately borne by women, contribute to higher stress levels and mental health challenges.

In contrast, the strata with the highest psychological distress scores were characterized by student-parents who experienced low food security and identified as either bisexual or questioning. These findings align with the literature indicating that sexual minority student-parents tend to experience greater psychological distress compared to their heterosexual counterparts (Busby et al., 2020; Gorczynski & Fasoli, 2022). Sexual minority student-parents may face unique stressors related to discrimination, lack of identity affirmation, and challenges associated with balancing their intersecting roles, which contributes to their elevated levels of distress.

Furthermore, the higher prevalence of cisgender women in the strata with the highest psychological distress scores also aligns with prior studies showing that women generally report higher rates of psychological distress compared to men, particularly in caregiving roles (Wodika et al., 2024). This supports the idea that gender identity intersects with other social factors, including sexual orientation and food security, to influence mental health outcomes. Women, particularly those who identify as sexual minorities and face economic insecurity, may experience compounded challenges that result in heightened psychological distress.

The racial diversity seen in both the lowest and highest distress groups highlights the complexity of how intersecting identities shape mental health. Both White student-parents and BIPOC student-parents — including Black, American Indian/Alaska Native (AI/NA), Asian, Multiracial, and Latine student-parents — were represented across these extremes. This indicates that while race alone may not fully determine psychological distress, the interaction of race with other factors, such as gender, sexual orientation, and food security, plays a crucial role. The

protective influence of racial community identification and belonging on loneliness, as highlighted by McNamara et al. (2021), may also extend to psychological distress, helping to explain the variability observed in BIPOC student-parents across high and low distress strata. Those who identify strongly with their racial community and have a sense of belonging may benefit from social support and resilience that mitigates distress.

Overall, the findings emphasize that psychological distress among student-parents cannot be attributed to a single social identity; rather, it is the confluence of multiple intersecting factors — including gender, sexual orientation, race, and economic security — that influences mental health outcomes. This underscores the importance of intersectional approaches like I-MAIHDA in capturing the nuanced experiences of marginalized populations and identifying the varying levels of psychological distress associated with specific identity combinations.

Identity-Based Patterns Across All Variables. The findings for campus climate, loneliness, social support, and psychological distress revealed distinct identity-based patterns that provide important insights into the wellbeing of student-parents, a population facing unique challenges. As highlighted in the introduction, student-parents often contend with significant barriers such as financial strain, time constraints, and limited institutional support (IWPR, 2019; Peterson D., 2016). The experience of student-parents is not monolithic; their wellbeing is influenced by intersecting identities such as race, gender, and food security, which collectively shape their mental health and social experiences. These findings align with existing literature on intersectional disparities among students, demonstrating how marginalized identities are typically linked to poorer campus climate, increased loneliness, and reduced psychological wellbeing and social support (Gross et al., 2022; Sheldon et al., 2021).

Strata with the lowest psychological distress and loneliness scores, as well as the highest campus climate and social support scores, were predominantly composed of Black and Latine student-parents. These student-parents mostly identified as cisgender men and women, were heterosexual, and experienced high food security. In contrast, those with the highest predicted psychological distress and loneliness scores, as well as the lowest campus climate and social support scores, were more likely to include White student-parents, as well as some Asian and Multiracial student-parents, who identified as cis-women or expansive gender identities, with most reporting a sexual minority orientation, such as bisexual or questioning. Notably, these student-parents also reported low food security, highlighting the importance of economic resources as a determinant of wellbeing.

The overwhelming representation of student-parents from Black, American Indian/Alaskan Native, and Latine backgrounds among the strata with the best outcomes may be surprising given the broader literature suggesting poorer outcomes for students of color in predominantly White institutions. However, some evidence suggests that attending diverse colleges or HBCUs (Harper & Hurtado, 2007), or being members of racially-based organizations, like fraternities or sororities (Strayhorn, 2008), may improve perceived campus climate, social support, psychological wellbeing, and reduce loneliness. Furthermore, community identification and a sense of belonging with one's racial community can reduce feelings of isolation and promote wellbeing (McNamara et al., 2021). This sense of community connectedness could help student-parents from these backgrounds manage the dual challenges of caregiving and academic responsibilities. It is also worth considering that student-parents within these strata often hold traditionally privileged identities, such as being cisgender and heterosexual and experiencing food security, which could mitigate the challenges associated with

being a racial minority in academic settings. Future research should further explore possible resilience and protective factors for student-parents of color, particularly to better understand these positive outcomes.

An important finding from this study is the poor outcomes observed across all four variables for Bi+ and questioning women student-parents. While it is true that cisgender and gender-expansive identities were among the most represented in the strata analyzed, and thus more likely to be found at the extremes, the heavy representation of traditionally marginalized genders among the strata with poorer outcomes is striking. This may reflect the undue burden of child-rearing and domestic responsibilities that women, femmes, and gender minorities often face (Schnabel & Keuroghlian, 2024), compounded by navigating academic environments where it is difficult for student-parents with marginalized gender and sexual identities to feel a sense of belonging, support, visibility, and acceptance. Further exacerbating this is the isolation associated with the parenting experience (Purtell et al., 2021). Studies also show that Bi+ women who are parents are at greater risk for mental health challenges such as loneliness, psychological distress, and a lack of support compared to other minoritized parents (Ross et al., 2012). Gender and sexual minorities may experience heightened distress and reduced support due to interfamilial discrimination or the lack of representation and visibility within their communities.

Food security emerged as a major factor in determining student-parent outcomes and may even undermine some protective factors in this study, like privileged racial identity. Student-parents who reported high food security consistently exhibiting better mental health and social outcomes, including lower psychological distress, higher levels of social support, better campus climate perceptions, and reduced loneliness. These findings align with Maslow's Hierarchy of Needs, which posits that basic physiological needs, such as food, must be met before individuals

can focus on higher-level needs like belongingness, esteem, and self-actualization (Maslow, 1943) or in the case of this study, social connectedness and broad psychological wellbeing. Essentially, it seems that when food security is lacking, the stress associated with meeting basic survival needs can overshadow opportunities for social connection, emotional stability, and academic engagement.

This theory is supported by research showing that food insecurity among parents was related to increased rates of depression, anxiety, and stress (Cain et al., 2022). Similarly, food insecurity is known to be linked to psychological distress and loneliness among college students, particularly those from marginalized communities and limits students' ability to participate in campus life, access resources, and maintain social connections (Oh et al., 2022; Burris et al., 2021). Sadly, food insecurity is an increasing issue, both in the U.S. more broadly (U.S. Department of Agriculture Economic Research Service, n.d.) and among college students (Mahaffey et al., 2022), which calls for significant policy intervention. For example, a student needs study conducted by The California State University found that 42% of their students were experiencing low to very low food security (Crutchfield & Maguire, 2018). Addressing food insecurity on college campuses is, therefore, not only essential for fulfilling basic human rights but also a crucial step in fostering improved mental health, social connection, and overall academic success for student-parents. Thus, it is no surprise that student-parents in strata reporting low food security experienced worse outcomes across the measures in this study.

Overall, the identity-based disparities across campus climate, loneliness, social support, and psychological distress are deeply concerning. Marginalized gender and sexual identities, as well as low food security, are consistently linked to poorer outcomes across these domains. Supporting the unique needs of student-parents requires a comprehensive approach that

addresses the intersecting barriers they face, aiming to improve access to resources, social support, and equitable campus environments. Colleges should work toward more effectively identifying student-parents in these intersecting communities and should focus on providing inclusive services, support systems, and equitable resource distribution. Ensuring that food security, gender inclusivity, and community support are prioritized can help foster environments in which student-parents, particularly those who are marginalized, can thrive.

Pearson's Correlations and Linear Regressions

There were significant bivariate associations between the predictor variables (campus climate, social support, and loneliness) and psychological distress. Specifically, both campus climate and social support were negatively correlated with psychological distress, indicating that improved campus climate and greater social support related to lower levels of distress. In contrast, loneliness demonstrated a strong positive correlation with psychological distress, highlighting the detrimental impact of social isolation on mental health. Hypotheses predicted that relations aligned with prior findings in the literature, emphasizing the crucial role of positive social context factors in mitigating psychological distress among college student-parents.

Linear regression analyses further confirmed these associations thus supporting Hypothesis 1. The overall model significantly predicted psychological distress, suggesting that approximately 36% of the variance in psychological distress could be explained by the three social context variables. The linear regression provided additional insights into the magnitude of each relationship. The findings underscore the importance of fostering a supportive and inclusive campus environment, enhancing social networks, and addressing loneliness to support the psychological wellbeing of student-parents effectively.

Random Intercept and Coefficient Models

When comparing the random intercept model to the random coefficients model, the evidence indicated that adding random slopes for social context predictors did not improve the model. On the contrary, the strata-level variance increased, indicating that allowing the slopes to vary across strata introduced additional, unexplained variability. This suggests that the relations between social context factors and psychological distress did not differ meaningfully across the intersectional groups in a way that warranted the increased complexity of the random coefficients model. Furthermore, the BIC value increased by 18.4 from the random intercept to the random coefficients model, providing positive evidence that the random intercept model is superior to the random coefficients model. The higher BIC value indicates that the additional complexity of the random coefficients model did not yield enough explanatory power to justify its use, further supporting the choice of the random intercept model as the most appropriate model.

Thus, the random intercept model emerged as the best fitting model to explain the relations in this study. The findings from this model revealed significant associations between social context factors and psychological distress. Specifically, better campus climate and higher levels of social support were associated with lower levels of psychological distress, while greater loneliness was associated with increased psychological distress. These findings align with the existing literature on student populations and suggest that these associations hold true for student-parents as well. The results emphasize the importance of fostering a supportive campus climate and building strong social support networks to mitigate psychological distress in this population. Conversely, loneliness emerged as a significant predictor of increased psychological distress, underscoring the need for interventions to reduce loneliness among student-parents.

In summary, the analysis demonstrates that the random intercept model provided the most robust and parsimonious explanation for the data, effectively accounting for the variability in psychological distress across intersectional strata while maintaining model simplicity. The random coefficients model did not add explanatory value beyond the random intercept model, suggesting that the associations between social context predictors and psychological distress were consistent across intersectional strata rather than varying significantly by group. These results underscore the stability of the relations between campus climate, social support, loneliness, and psychological distress for student-parents, and point to the importance of targeting these areas in efforts to improve mental health outcomes for this population.

Description of the Strata condensed into the 9999 Strata

The "9999" strata represented student-parents who fell into identity groups with fewer than 20 participants per stratum, necessitating their aggregation into a single category to ensure statistical power. The composition of these combined strata reveals significant patterns that are important to consider in understanding the experiences of highly marginalized groups. The "9999" group was characterized by a higher representation of student-parents with three or four marginalized identities. This included student-parents who identified as people of color, were gender minorities, belonged to sexual minority groups, and experienced low food security. The aggregation of these groups suggests that those experiencing the most complex intersectional identities were underrepresented in the primary analyses, as their individual strata had insufficient sample sizes.

Limitations

The I-MAIHDA method is a powerful approach for examining intersectionality and understanding health and social disparities, but it comes with several limitations. While I-

MAIHDA certainly improves upon other quantitative intersectional methods by allowing for the inclusion of multiple axes of identity, and by offering more nuanced categorizations (e.g., beyond simply "men," "women," and "other" for gender), it does not do so without challenges. From the start of the data preparation process, I had to combine certain categories within gender, sexual orientation, and food security due to limited representation among some groups. Even with these adjustments, a significant number of strata with fewer than 20 student-parents remained.

Though the model can produce results for strata with smaller sample sizes, this capability raises ethical concerns about drawing conclusions for groups with limited representation. This ability comes with an even greater responsibility: researchers must ensure they do not overgeneralize or make potentially harmful assumptions about groups represented by small sample sizes. To adhere to ethical research practices and stay aligned with the literature, I considered only strata with sample sizes greater than 20, reducing the risk of producing unstable or misleading estimates.

Another limitation of the I-MAIHDA model relates to the challenges associated with having sufficient sample sizes for reliable estimates. Minoritized gender, sexual orientation, and racial groups advocate for more nuanced representation in research, yet as the identity groups become more specific, the strata representing them become smaller. Often, the smaller strata are underrepresented, resulting in sparsely populated categories that yield unreliable parameter estimates. This forced me to combine smaller strata, thereby reducing the specificity of the intersectional analysis and potentially diminishing the model's ability to fully capture identity-based heterogeneity. Specifically, the "9999" stratum aggregated student-parents from identity groups with fewer than 20 participants per stratum to ensure statistical power. This stratum was

characterized by a higher representation of student-parents with three or four marginalized identities.

The need to aggregate student-parents into the "9999" group diminished the ability to examine the unique experiences of those with complex intersections of marginalized identities. Many of the student-parents in this stratum represented those with three or four marginalized identities, suggesting that the statistical power required to analyze these groups separately was insufficient. As a result, the analyses ended up including strata that often consisted of student-parents with fewer marginalized identities, such as those who were racially minoritized but identified as cisgender, heterosexual, or had high food security. Consequently, the findings reflect the experiences of groups with fewer intersecting forms of marginalization, potentially underestimating the experiences of those with more complex and overlapping forms of disadvantage.

Another key limitation of this study is the decreased representation of minoritized gender, sexual orientation, and racial groups in the final analyses. This reduced diversity means the generalizability of these findings is limited, particularly for student-parents with multiple marginalized identities. The aggregation of diverse, marginalized identities into a single stratum ultimately constrains the ability to accurately assess the nuanced barriers faced by these individuals.

The use of I-MAIHDA also presents risks related to model stability and convergence. The models require large, diverse sample sizes to produce reliable estimates. When convergence issues occur, simplifying assumptions must be made, which can reduce the robustness of the findings. Misclassification in assigning student-parents to social identity categories also poses a

risk, as it can increase heterogeneity of social identities, introduce measurement error, bias the results, and limit the accuracy of the conclusions.

Another significant limitation of I-MAIHDA is its loss of parsimony when attempting to assess random coefficients, especially in studies examining multiple predictors. Although my study found that the random intercept model provided the best fit, I considered whether expanding the analysis to random coefficients could yield additional insights. However, the complexity of attempting to model intersectional influences on the slopes of relationships between campus climate, loneliness, social support, and psychological distress proved cumbersome and led to reduced statistical power. The exponential increase in model parameters would not only make interpretation difficult but would also compromise model stability. One of the major strengths of I-MAIHDA lies in its parsimonious design in Models 2, allowing for clearer conclusions while maintaining model reliability. Expanding beyond random intercepts to random coefficients, particularly with smaller sample sizes, remains a challenge for complex social and psychological studies and represents a limitation of I-MAIHDA at this time.

An additional limitation of the current study is related to factors that we could not account for due to limitations with the data set. For instance, there was no information available about the type of university students attended, such as whether it was an HBCU or another traditionally diverse institution. Similarly, data on whether students were attending via funded programs, self-paying, or using student loans, as well as information on the number of children they had, were not included. These factors likely influence the experiences of student-parents, particularly regarding social context and psychological outcomes, and their omission may limit the comprehensiveness of the findings. Furthermore, other variables of interest, such as relationship status and whether students were studying full-time or part-time, were not included

in the analyses. While these variables are important, incorporating them would have further reduced the size of the social strata, leading to instability in the models. Future studies should build on these findings by incorporating such variables to gain a more nuanced understanding of the student-parent experience.

Despite these challenges, I-MAIHDA is an important advancement in quantitative intersectional analysis, allowing for a more nuanced understanding of disparities compared to conventional models. Importantly, while I-MAIHDA presents certain challenges related to smaller sample sizes, it also offers a unique advantage in studying more narrowly defined groups of student-parents, particularly those identified in this study as being at higher risk of poorer outcomes. This includes Bi+ student-parents, women and gender-expansive identities, those with lower socioeconomic status, and other minoritized gender and sexual orientation groups who were underrepresented or not represented in this study. The precision-weighting and multilevel structure of I-MAIHDA help stabilize estimates for smaller groups by borrowing strength from the overall population. As a result, even when these subgroups are not highly represented, I-MAIHDA can still provide useful quantitative estimates while acknowledging the associated limitations.

For future research, I-MAIHDA can be an effective tool for quantitatively verifying the effects of intersectionality on specific outcomes in more targeted samples. However, this method would be best paired with qualitative approaches that can better describe the mechanisms behind these effects. Qualitative insights can provide context to the quantitative findings, helping to explain the "how" and "why" behind disparities, especially in groups with multiple intersecting forms of marginalization. This mixed-methods approach would enable a richer understanding of

how and why certain student-parent groups face the barriers they do and identify ways to support them more effectively.

The limitations identified in this study highlight the need for careful interpretation of results, particularly when working with underrepresented groups, and underscore the value of integrating qualitative research to provide context for quantitative findings. Future research should aim to expand sample sizes for highly marginalized groups and develop more inclusive strategies to ensure equitable representation in intersectional analyses. By doing so, researchers will be better equipped to address disparities and propose interventions that more accurately reflect the needs of diverse student-parent populations.

Conclusion

This study highlights the utility of I-MAIHDA as a powerful method for quantitatively examining the effects of intersectionality on social and psychological outcomes, offering an essential tool for understanding how multiple marginalized identities interact to influence the lived experiences of student-parents. Across the examined outcomes—psychological distress, campus climate, loneliness, and social support—intersectional identities emerged as critical factors shaping disparities. The results demonstrate that food security, gender identity, and sexual orientation play particularly prominent roles in determining student-parent outcomes, with those holding multiple intersecting marginalized identities, such as Bi+ women or gender-expansive individuals with low food security, experiencing poorer outcomes across all measures. These findings underscore the importance of addressing the cumulative impact of intersecting disadvantages, especially among student-parents, who are already navigating the dual challenges of caregiving and academia.

At the same time, the limitations of I-MAIHDA reveal both its promise and its challenges. While the method allows for more nuanced categorizations and insights into intersectional effects, it also highlights the difficulty of analyzing groups with smaller sample sizes, as seen in the aggregation of the "9999" strata. This points to a need for researchers to exercise caution in interpreting results for underrepresented groups, ensuring that findings are contextualized and not overgeneralized. Moreover, while I-MAIHDA excels at identifying additive effects, the loss of parsimony in exploring interaction effects (e.g., random coefficients) limits its applicability for more complex analyses. These limitations suggest that future research should pair I-MAIHDA with qualitative methods to provide a richer understanding of the mechanisms underlying intersectional disparities and expand sample sizes for marginalized

groups to improve representation. Ultimately, this study reinforces the critical need for inclusive research practices and targeted interventions that address the unique needs of student-parents, particularly those navigating intersecting forms of marginalization.

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Appendix A

N3Q2 Please select your level of agreement with the following statements:

	Strongly disagree (1)	Disagree (2)	Somewhat disagree (3)	Somewhat agree (4)	Agree (5)	Strongly agree (6)
I feel that I belong at my college/university. (N3Q2A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that students' health and well-being is a priority at my college/university. (N3Q2B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At my college/university, I feel that the campus climate encourages free and open discussion about students' health and well-being. (N3Q2C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
At my college/university, we are a campus where we look out for each other. (N3Q2D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

N3Q12 For the following statements, please say whether the statement was **often true**, **sometimes true**, or **never true** for you in the last 30 days.

	Often True (2)	Sometimes True (1)	Never True (0)
The food that I bought just didn't last, and I didn't have money to get more. (N3Q12A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I couldn't afford to eat balanced meals. (N3Q12B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

N3Q12C In the last 30 days, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?

- Yes, almost every day (3)
- Yes, some days, but not every day (2)
- Only 1 or 2 days (1)
- No (0)

N3Q12D In the last 30 days, did you ever eat less than you felt you should because there wasn't enough money for food?

- Yes (1)
- No (0)

N3Q12E In the last 30 days, were you ever hungry but didn't eat because there wasn't enough money for food?

- Yes (1)
- No (0)

RUSDAFI – USDA Food Security 6-item Short Scale Score collapsed

- (1) Very low food security (5-6)
- (2) Low food security (2-4)
- (3) High or marginal food security (0-1)

N3Q41 Below are 8 statements with which you may agree or disagree. Using the scale below, indicate your agreement with each item by indicating that response for each statement.

	Strongly disagree (1)	Disagree (2)	Slightly Disagree (3)	Neither agree nor disagree (4)	Slightly agree (5)	Agree (6)	Strongly Agree (7)
My social relationships are supportive and rewarding. (N3Q41B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

N3Q44 The next 6 questions ask about how you have been feeling during the past 30 days. For each question, please select the response that best describes how often you had this feeling.

During the past 30 days, about how often did you feel...

	All of the time (4)	Most of the time (3)	Some of the time (2)	A little of the time (1)	None of the time (0)
...nervous? (N3Q44A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...hopeless? (N3Q44B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...restless or fidgety? (N3Q44C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...so sad nothing could cheer you up? (N3Q44D)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...that everything was an effort? (N3Q44E)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
...worthless? (N3Q44F)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RKESLER6 – Kessler 6 Screening for Non-Specific Serious Mental Illness Score Collapsed

- (1) No or low psychological distress (0-4)
- (2) Moderate psychological distress (5-12)
- (3) Serious psychological distress (13-24)

N3Q45 Indicate how often each of the statements below is descriptive of you.

	Hardly ever (1)	Some of the time (2)	Often (3)
How often do you feel that you lack companionship? (N3Q45A)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you feel left out? (N3Q45B)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How often do you feel isolated from others? (N3Q45C)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

RULS3 – UCLA Loneliness Scale Score Collapsed

(1) Negative for loneliness (3-5)

(2) Positive for loneliness (6-9)

N3Q67A What sex were you assigned at birth?

Female (1)

Male (2)

Intersex (3)

N3Q67B Do you identify as transgender?

No (1)

Yes (2)

N3Q67C Which term do you use to describe your gender identity?

- Woman or female (1)
- Man or male (2)
- Trans woman (3)
- Trans man (4)
- Genderqueer (5)
- Agender (7)
- Genderfluid (8)
- Intersex (10)
- Non-binary (9)
- My identity is not listed above (please specify) (6) _____ N3Q67CTEXT _____

N3Q68 What term best describes your sexual orientation?

- Straight/Heterosexual (9)
- Bisexual (2)
- Gay (3)
- Lesbian (4)
- Pansexual (5)
- Queer (6)
- Questioning (7)
- My identity is not listed above (please specify) (10) _____ N3Q68TEXT _____

N3Q69 How old are you?

_____ Years

N3Q72 What is your year in school?

- 1st year undergraduate (1)
- 2nd year undergraduate (2)
- 3rd year undergraduate (3)
- 4th year undergraduate (4)
- 5th year or more undergraduate (5)
- Master's (MA, MS, MFA, MBA, MPP, MPA, MPH, etc) (6)
- Doctorate (PhD, EdD, MD, JD, etc) (7)
- Not seeking a degree (8)
- Other (please specify) (9) _____ N3Q72TEXT _____

N3Q75A How do you usually describe yourself? (Please select ALL that apply) (“0” indicates that the option was not selected, “1” indicates that the option was selected)

- American Indian or Native Alaskan (1)
- Asian or Asian American (2)
- Black or African American (3)
- Hispanic or Latino/a/x (4)
- Middle Eastern/North African (MENA) or Arab Origin (5)
- Native Hawaiian or Other Pacific Islander Native (6)
- White (7)
- Biracial or Multiracial (8)
- My identity is not listed above (please specify) (9) N3Q75TEXT

N3Q85 Are you a parent or guardian of a child under the age of 18 or do you have primary responsibility for someone else's child/children under the age of 18?

- No (1)
- Yes (2)

Appendix A. Original ACHA-NCHA Survey Items

Appendix B

N3Q2 – **campus climate scale**

- 4 questions
- 1 = strongly disagree, 2 = disagree, 3= somewhat disagree, 4= somewhat agree, 5 = agree, 6 = strongly agree

New Variable: Campus Climate

- Scale score
- 1 = poor campus climate (4-8), 2 = moderate campus climate (9-16), 3 = good campus climate (17-24)

N3Q67C **Which term describes your gender identity?**

- 1 = woman/female
- 2= man/male
- 3=trans woman
- 4 = trans man
- 5= genderqueer
- 7=agender
- 8=gender fluid
- 9 = non binary
- 10 = intersex
- 6 = other

New Variable: Gender Identity

- 1 = cis woman
- 2 = cis man
- 3 = trans woman
- 4 = trans man
- 5 = gender expansive
- 6 = other, not listed

N3Q68 – **sexual orientation**

- nominal (categorical) variable
- 1 question
- 9 = heterosexual, 1=asexual, 2 = bisexual, 3= gay, 4=lesbian, 5=pansexual, 6=queer, 7=questioning, 10 = other

New Variable: Sexual Orientation

- 1 = asexual spectrum
- 2 = Bi+
- 3 = gay
- 4 = lesbian
- 5= queer
- 6 = questioning
- 7 = heterosexual

New Variable: student status (a combination of age and year in school)

- 1 = traditional undergraduate
- 2 = nontraditional undergraduate
- 3 = graduate student

RUSDAFI

- 1 = very low food security (5-6)
- 2 = low food security (2-4)
- 3 = high or marginal food security (0-1)

New Variable: RUSDAFI2

- 1 = low food security (2-6)
- 2 = high or marginal food security (0-1)

Appendix B. Modified Questionnaire Items

Appendix C

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
1121	12	10.500000	17.58333	6.166667	4.583333
1122	4	13.500000	17.50000	6.500000	4.000000
1131	1	0.000000	22.00000	3.000000	7.000000
1141	1	4.000000	20.00000	4.000000	6.000000
1142	1	9.000000	20.00000	3.000000	6.000000
1151	1	14.000000	8.00000	7.000000	5.000000
1152	1	7.000000	22.00000	4.000000	5.000000
1161	1	14.000000	18.00000	5.000000	7.000000
1162	1	11.000000	24.00000	6.000000	7.000000
1222	2	15.500000	17.00000	7.500000	5.500000
1232	1	17.000000	19.00000	5.000000	7.000000
1321	2	11.000000	12.50000	5.500000	3.500000
1371	1	4.000000	24.00000	7.000000	5.000000
1471	1	0.000000	24.00000	9.000000	7.000000
1572	2	8.500000	15.00000	4.000000	5.500000
1632	1	8.000000	17.00000	4.000000	6.000000
1652	1	0.000000	5.00000	3.000000	6.000000
2131	1	7.000000	5.00000	6.000000	7.000000
2141	2	12.000000	22.00000	5.500000	6.500000
2142	2	5.500000	17.00000	4.500000	5.500000
2151	5	11.400000	18.25000	6.000000	5.800000
2152	5	9.600000	19.60000	5.800000	6.000000
2161	6	14.500000	16.83333	6.166667	5.000000
2162	5	11.200000	16.40000	6.200000	5.200000

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
2221	6	11.200000	17.50000	5.166667	5.166667
2222	9	5.888889	16.77778	5.333333	5.777778
2231	5	16.400000	12.80000	6.600000	3.400000
2232	2	6.000000	16.00000	6.000000	5.000000
2251	3	7.666667	16.00000	5.333333	5.000000
2252	1	8.000000	20.00000	6.000000	6.000000
2261	3	14.000000	15.66667	6.666667	3.000000
2321	1	12.000000	8.00000	6.000000	7.000000
2371	3	11.666667	13.66667	5.666667	4.333333
2421	1	11.000000	16.00000	9.000000	3.000000
2472	1	14.000000	22.00000	3.000000	7.000000
2521	1	16.000000	12.00000	5.000000	3.000000
2522	2	13.500000	12.00000	7.500000	3.500000
2531	1	6.000000	16.00000	6.000000	6.000000
2551	1	8.000000	13.00000	8.000000	5.000000
2552	2	13.500000	15.50000	6.500000	6.000000
2562	1	5.000000	24.00000	5.000000	6.000000
2571	2	13.500000	6.50000	6.000000	2.000000
2661	1	0.000000	4.00000	3.000000	1.000000
3111	1	17.000000	15.00000	9.000000	5.000000
3141	7	7.571429	18.85714	6.000000	6.285714
3142	6	4.166667	19.50000	4.166667	6.666667
3151	2	16.000000	18.50000	7.000000	5.000000
3152	7	9.428571	17.14286	6.285714	5.285714
3161	6	13.000000	17.16667	6.500000	5.500000

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
3162	1	5.000000	20.00000	9.000000	6.000000
3211	1	11.000000	19.00000	7.000000	5.000000
3221	8	5.250000	17.87500	5.500000	5.625000
3222	2	7.500000	22.00000	6.500000	3.500000
3231	4	6.000000	18.00000	4.000000	5.750000
3232	1	2.000000	24.00000	3.000000	7.000000
3242	1	18.000000	24.00000	6.000000	3.000000
3251	2	6.500000	11.00000	6.500000	3.000000
3252	2	3.500000	18.50000	5.000000	6.500000
3331	1	13.000000	12.00000	4.000000	4.000000
3372	1	4.000000	18.00000	4.000000	7.000000
3421	1	15.000000	14.00000	6.000000	4.000000
3431	1	18.000000	9.00000	3.000000	2.000000
3521	3	10.666667	13.33333	7.666667	6.333333
3541	1	11.000000	17.00000	7.000000	4.000000
3551	2	12.000000	13.50000	5.500000	5.500000
3552	2	7.500000	17.50000	6.000000	4.000000
3621	1	24.000000	4.00000	3.000000	1.000000
3671	1		11.00000		2.000000
4141	9	11.000000	16.22222	5.333333	5.666667
4142	14	4.214286	19.57143	4.285714	5.571429
4151	6	10.500000	15.16667	5.500000	6.000000
4152	2	12.000000	18.00000	3.500000	7.000000
4161	8	14.000000	18.50000	6.875000	5.000000
4162	8	11.750000	17.87500	6.500000	5.500000

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
4212	1	15.000000	6.00000	8.000000	3.000000
4221	15	12.333333	16.53333	6.066667	5.133333
4222	9	5.777778	19.88889	5.111111	5.888889
4231	3	6.000000	19.00000	5.000000	6.000000
4232	4	4.500000	20.75000	4.500000	6.250000
4262	2	4.500000	20.00000	4.000000	6.500000
4421	2	16.000000	12.00000	6.000000	1.500000
4422	1	24.000000	11.00000	8.000000	6.000000
4471	2	13.000000	20.50000	6.000000	6.000000
4511	1	24.000000	14.00000	9.000000	5.000000
4521	9	14.000000	16.55556	6.555556	5.444444
4522	1	9.000000	20.00000	8.000000	4.000000
4551	1	17.000000	12.00000	9.000000	5.000000
4552	4	12.750000	14.75000	6.500000	5.250000
4561	1	18.000000	16.00000	7.000000	4.000000
4572	2	7.000000	19.00000	4.000000	6.000000
5112	1	11.000000	19.00000	7.000000	3.000000
5121	3	17.000000	19.33333	6.000000	4.000000
5141	1	4.000000	17.00000	3.000000	6.000000
5152	1	24.000000		4.000000	7.000000
5161	2	12.500000	18.50000	8.500000	3.500000
5162	1	16.000000	11.00000	5.000000	4.000000
5221	2	7.500000	11.00000	4.500000	4.500000
5331	1	21.000000	16.00000	5.000000	3.000000
5521	1	10.000000	8.00000	7.000000	5.000000

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
5621	1	12.000000	11.00000	7.500000	4.000000
6121	1	0.000000	5.00000	5.000000	7.000000
6122	2	2.000000	22.00000	4.500000	6.000000
6172	19	5.315789	19.10526	4.631579	6.052632
6232	1	6.000000	23.00000	3.000000	6.000000
6271	7	8.571429	17.42857	4.428571	6.000000
6272	6	3.000000	20.16667	3.833333	6.500000
6541	1	20.000000	16.00000	5.000000	6.000000
6562	1	12.000000	18.00000	3.000000	4.000000
7111	6	15.166667	16.66667	7.500000	4.166667
7112	11	8.818182	19.54545	5.181818	5.181818
7131	1	9.000000	22.00000	6.000000	6.000000
7132	3	5.666667	19.66667	5.333333	5.333333
7151	16	11.937500	15.93750	5.500000	5.062500
7212	1	4.000000	12.00000	6.000000	6.000000
7231	8	12.750000	15.75000	7.000000	4.250000
7242	1	0.000000	24.00000	9.000000	7.000000
7251	1	1.000000	19.00000	3.000000	6.000000
7252	7	7.142857	17.00000	5.285714	6.142857
7261	3	12.333333	15.33333	6.333333	5.000000
7262	11	10.200000	18.18182	5.545455	5.636364
7321	3	14.666667	15.00000	4.666667	4.666667
7322	4	6.250000	14.50000	5.750000	4.500000
7342	1	6.000000	17.00000	6.000000	5.000000
7352	1	10.000000	13.00000	6.000000	6.000000

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
7362	2	6.500000	16.50000	5.000000	4.000000
7372	1	8.000000	20.00000	5.000000	5.000000
7411	2	11.500000	15.00000	6.000000	6.000000
7421	3	12.000000	18.00000	7.000000	5.333333
7422	5	8.400000	19.00000	4.400000	6.400000
7431	2	9.000000	17.00000	4.000000	6.500000
7452	1	11.000000	19.00000	7.000000	5.000000
7461	1	13.000000	18.00000	6.000000	3.000000
7472	3	7.000000	21.00000	6.333333	6.333333
7511	6	14.500000	15.00000	6.666667	4.500000
7531	2	18.500000	12.50000	5.500000	3.000000
7541	3	11.333333	13.66667	6.333333	6.666667
7542	4	12.000000	17.00000	6.250000	6.000000
7551	15	10.733333	17.86667	6.133333	5.466667
7561	1	0.000000	20.00000	3.000000	4.000000
7562	1	19.000000	15.00000	8.000000	
7571	5	14.000000	15.40000	6.600000	4.400000
7572	7	10.857143	18.42857	6.142857	4.428571
7621	1	2.000000	11.00000	5.000000	5.000000
7642	1	3.000000	22.00000	8.000000	3.000000
7671	1	19.000000	24.00000	3.000000	6.000000
8112	2	11.500000	17.50000	6.000000	4.500000
8132	1	2.000000	24.00000	4.000000	7.000000
8141	10	10.700000	17.60000	5.700000	4.800000
8142	9	6.222222	20.11111	5.111111	6.333333

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
8151	6	12.666667	18.333333	6.666667	5.166667
8152	4	10.750000	13.250000	6.250000	5.000000
8161	2	17.000000	16.500000	8.500000	3.500000
8162	4	11.000000	14.500000	7.500000	5.250000
8211	2	11.000000	11.500000	7.500000	4.000000
8212	1	16.000000	21.000000	8.000000	5.000000
8221	8	10.875000	15.125000	6.625000	5.000000
8222	9	6.111111	17.750000	5.000000	5.666667
8231	3	13.733333	16.000000	6.333333	6.333333
8232	1	7.000000	20.000000	6.000000	6.000000
8241	1	24.000000	7.000000	5.000000	6.000000
8261	2	3.500000	22.000000	4.500000	7.000000
8262	2	12.000000	14.500000	6.000000	2.500000
8321	1	7.000000	17.000000	6.000000	6.000000
8341	1	20.000000	4.000000	9.000000	1.000000
8371	1	17.000000	18.000000	7.000000	2.000000
8421	2	17.000000	15.000000	7.500000	4.500000
8431	1	16.000000	10.000000	4.000000	3.000000
8451	1	13.000000	15.000000	8.000000	6.000000
8452	1	15.000000	9.000000	6.000000	5.000000
8471	1	10.000000	14.000000	6.000000	3.000000
8511	1	24.000000	4.000000	9.000000	1.000000
8512	1	14.000000	21.000000	5.000000	6.000000
8521	13	14.615385	18.15385	6.769231	5.692308
8522	9	10.000000	16.22222	5.222222	6.444444

Strata	Sample Size (n)	mean_PD	mean_CC	mean_ULS	mean_SS
8541	2	17.000000	16.50000	9.000000	5.000000
8542	1	9.000000	20.00000	5.000000	7.000000
8551	4	16.750000	16.25000	7.250000	6.000000
8552	4	9.500000	19.00000	6.250000	5.250000
8561	2	20.500000	16.00000	6.000000	3.000000
8571	2	6.500000	18.00000	4.500000	5.500000
8572	3	6.666667	21.33333	5.000000	5.666667
8622	2	13.000000	12.50000	7.500000	5.000000
8651	2	13.500000	17.00000	9.000000	4.000000
8661	1	12.000000	11.00000	6.000000	4.000000
8672	1	6.000000	24.00000	4.000000	5.000000
9121	4	7.750000	20.75000	5.750000	6.000000
9171	14	8.076923	17.85714	5.538462	6.071429
9172	11	3.818182	19.63636	3.727273	6.636364
9251	1	3.000000	20.00000	6.000000	6.000000
9271	5	7.800000	19.20000	7.000000	4.400000
9272	6	4.833333	17.66667	4.833333	5.166667
9331	1	12.000000	12.00000	6.000000	4.000000
9522	1	8.000000	23.00000	3.000000	7.000000
	3				

Note: The table presents the sample size and mean scores for psychological distress, campus climate, loneliness, and social support for the original strata recoded as 9999.
Appendix C. Descriptive Statistics for Original Strata Recoded to 9999 (sample sizes < 20)