Toward a Framework of Caring Relations in Undergraduate Mathematics Education

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Introductory college mathematics courses remain significant barriers to persistence in STEM, especially for students from historically marginalized backgrounds. While recent reforms have emphasized pedagogical changes, relatively little attention has been paid to the social and emotional dynamics of these classrooms. Drawing on work from K-12 education, we argue that relational dimensions of teaching, such as care and cultural responsiveness, are essential for supporting equitable student success in undergraduate mathematics. This paper introduces a conceptual framework for understanding caring relations in college math instruction, using insights from research on warm demander pedagogy and sociocultural theories of learning. The framework centers on the instructor's dual role in challenging students intellectually while supporting them relationally. We offer this as a tool to guide research and professional development, aiming to expand how we define and study effective instruction in ways that humanize and affirm all students.

Keywords: Caring Relation, Mathematically Caring Relationship, Culturally Relevant Care

Despite many reform efforts, introductory college mathematics, especially developmental courses (e.g., intermediate algebra) and gateway courses (e.g., calculus), remain critical barriers for many students. These courses are characterized by high failure and withdrawal rates, and many students leave them with less confidence and a weakened sense of mathematics identity (Benken et al., 2015; Valentine, Konstantopoulos, & Goldrick-Rab, 2017). Developmental mathematics sequences, in particular, often derail students' academic trajectories, especially in community colleges, and disproportionately impact students from racially and socioeconomically minoritized backgrounds (Larnell, 2016; Mishra et al., 2025; Bailey, Jeong, & Cho, 2010). Research has also shown that subsequent courses for STEM majors (e.g., precalculus, calculus) continue to serve as barriers to progressing in their chosen field. Large national studies have shown that disproportionate numbers of students, especially women and underrepresented and minoritized students, leave STEM majors after struggling in calculus even with other indicators of adequate preparation (Bressoud et al., 2015; Ellis, Fosdick, & Rasmussen, 2016; Seymour & Hewitt, 1997).

Mathematics plays a unique role as a gatekeeper to STEM fields, which makes these patterns all the more concerning. Students who hope to pursue health sciences, engineering, or other quantitative fields are often stopped short, not because they lack interest or ability. They are hindered by confusing placement systems (Ngo, 2019; Park et al., 2021), an emphasis on procedural skills over conceptual understanding, or early classroom experiences that leave indelible marks on their mathematics identities. These hurdles disproportionately affect students who are marginalized in STEM, especially those who did not have access to high school calculus or who get misrouted by current systems (Sadler & Sonnert, 2018; Leyva et al., 2021a). These barriers are rarely just academic; they are relational and emotional too. Students who have long struggled in math often need to put in far more cognitive and emotional energy just to engage in the kinds of learning behaviors that support success.

Students' ability to engage in meaningful learning is tightly linked to their sense of belonging, prior experience, self-efficacy, and the ways in which they are invited into or pushed out of mathematical communities. For students who have not historically felt affirmed in mathematics classrooms, engagement becomes even more difficult (Leyva et al., 2021a), and research has shown that providing caring and supportive relationships with students has had great impacts on their achievement (Battey et al., 2016). Without attending to how students feel, identify, and interact in these spaces, we may not be able to adequately support all students' successful mathematics learning (Boaler, 2022; Leyva et al., 2021b).

Affective and Relational Dimensions of Instruction

While reforms in undergraduate mathematics have focused heavily on pedagogy and cognitive engagement, recent work has begun to explore the affective and relational dynamics that shape student experience and success. A small but growing body of research suggests that instructor behaviors and classroom culture significantly influence students' sense of belonging, identity, and persistence, particularly for students from historically marginalized groups. Some studies have ventured to understanding how faculty relate to their students. In their study of a Real Analysis class, Bennett and colleagues (2025) examined how instructors viewed students and analyzed demographic disparities in course outcomes. They also included survey and interview data from students, who reported that their classroom experience was strongly shaped by how the instructor responded to their ideas and contributions. Selbach-Allen and Delaney (2025) presented a case study of a successful community college instructor who exemplified the traits of a warm demander (discussed in more detail later in this paper), a relational teaching model more commonly seen in K–12 education. They described how the instructor intentionally built personal relationships with students and engaged them in conversations beyond course content, demonstrating that he understood them as full people with goals and challenges beyond mathematics.

Students' experiences have also been analyzed in an attempt to understand what supports have been beneficial to them. Leyva and colleagues (2021a; 2021b) detailed racialized and gendered experiences of students in college math classrooms along with students' perceptions that these classes were intended to weed them out from STEM trajectories. Other work has shown that STEM mathematics students have indicated that mathematics professors and peers can impact sense of belonging to the classroom due to mathematical, racial, or gendered microaggressions (Cawley et al., 2023; Cawley & Wilson, 2024). Park (2025) explored female students' sense of belonging in college math classrooms, finding that small instructor actions, such as microaffirmations or microaggressions, had measurable impacts on students' perceptions of inclusion and emotional safety. In an analysis of student math autobiographies, Cawley and colleagues (2025), found that many upper-division students reported consistently positive math experiences, and those with more affirming experiences were more likely to reference instructors in their narratives, suggesting that supportive instructor-student relationships may play a defining role in how students perceive their mathematical journey. Stone-Johnstone (2025) studied a co-requisite support course for intermediate algebra and found that students described the class as warm, welcoming, and comfortable. They highlighted the instructor's responsiveness and demeanor as key to why they felt safe seeking help—often preferring her office hours to those of the primary course instructor.

While studies on belonging, identity, and student experience are increasingly visible, the field still lacks a cohesive framing of what instructors could and should be doing to improve students' social and emotional experiences in undergraduate mathematics classrooms. This gap between widespread attention to pedagogy and relative silence around relational dynamics points to a need for further development of theoretical tools that can help us name, study, and support this work. The culture of a mathematics classroom is critically important—especially for students who are most vulnerable due to their demographic background or previous experiences with the subject. These students need environments where they feel supported, and instructors who can successfully encourage them, push them to work hard, set high expectations, and help them navigate the inevitable barriers that arise in the postsecondary learning process.

While at first glance an undergraduate mathematics instructor's job is simply to impart mathematical knowledge to students, the instructor also impacts the way a student engages with and sees themselves as part of the mathematics community. Also known as mathematics identity (Martin, 2012), the "dispositions and deeply held beliefs that individuals develop about their ability to participate and perform effectively in mathematical contexts" (p. 57) can impact a student's learning and engagement with mathematics. Research has identified that students' mathematics learning and identity has often been impacted by their previous experiences (Cawley et al., 2025), and that in many cases this is influenced by their instructors' beliefs, supports, and interactions (Andersson & Wagner, 2017). Mathematics trauma has also been identified to impact students resulting in a negative change in their disposition towards the subject, impacting their mathematical learning (Gunter & Gunter, 2023). General discourses around mathematics (e.g., "I'm not a math person", "mathematics is objective") can also impact a student's mathematics identity (Anderson, 2007). Instructors need to be aware of these possible experiences that are specific to mathematics and consider the power of their interactions with their students.

We argue that learning is a socio-cultural endeavor (Vygotsky, 1978), and that an instructor plays a large role in the way a student engages in their mathematics learning. That is, teaching mathematics content is not the only role that an instructor has—the instructor also nurtures and supports a student's mathematical development and sense of belonging. Evidence has shown that students need to be in an emotionally engaged state to be open to the processes in which we meaningfully learn (Immordino-Yang & Damasio, 2007). A student must feel enough trust in the learning environment to feel vulnerable enough to engage in deep learning (Delpit, 2013; Schonert-Reichl, 2017).

Notion of Care in Mathematics Education

We believe that undergraduate math instructors care about the work they do. We believe they care about their students and imparting mathematical skills to them. However, studies have shown that having high expectations about mathematical understanding alone is not sufficient to support students' mathematical learning and development (Lee et al., 1999). The notion of *care* has been discussed in relation to teaching and learning, and specifically in K-12 instructional spaces (Wentzel, 1997). Care is seen as a fundamental basis of humanity (Heidegger, 1927) and given the nature of teaching, Watson (2021) argues that teaching should be seen "as a caring profession…not only for nurturing intellectual subject-based development but also for the wellbeing of students" (p. 79). Care can be seen as both a virtue ("He is a caring person") or a relation (a relationship between two people; Noddings, 1999). Noddings (2002) contributed a theory of care in which both the teacher and the student participate, requiring reciprocity from both the teacher and the student. In her theory, a *caring relation* is one in which a teacher demonstrates care for a student(s), but one in which a student must show evidence that the care was received. The evidence by a student could be explicit (a smile or "thank you") or implicit (the student finishes a problem successfully or is eager to share a thought in their group; Noddings, 1999). This cyclical communication helps the instructor understand that care has been received, thus maintaining this relation. In this same way, it provides feedback to the instructor if specific caring actions are not being received. Structuring *caring* as relational provides identities for both the cared-for and the carer.

Hackenburg (2010) extends Noddings' notion of a caring relation and defines a *mathematically caring relationship* "as a quality of interaction between a student and a teacher that conjoins affective and cognitive realms in the process of aiming for mathematical learning" (p. 237). Hackenburg (2005) argues that mathematics teachers may act as carers, but that they start "to act as mathematical carers when they work to harmonize themselves with and open new possibilities for students' mathematical thinking, while maintaining focus on students' feelings" (p. 47). This indicates that a mathematics instructor must have pedagogical content knowledge (Ball, Thames, & Phelps, 2008) to know and understand how to help students cognitively arrive at the learning outcome while also being aware of students' feelings. Finding that balance within each student (and a group of students) contributes to this caring relation in a mathematical way.

While Noddings and Hackenburg developed the ideas of care that can be envisioned within mathematics education, they do not attend to care in a critical way. In 1975, Kleinfeld attempted to address the issue of classroom instruction of Native Alaskan students who were placed with non-native teachers. In many cases, this pairing destroyed students' cultural identities in the name of "education". Kleinfeld did see examples, however, of teachers who were successful in building relationships with their students that utilized and respected cultural traditions, leading to successful learning outcomes. Based on her findings, Kleinfeld defined the notion of *warm demander*, which was a teacher who showed both personal warmth and also "active demandingess". That is, a warm demander shows care both in showing concern and attention to students in culturally relevant ways while also holding high academic expectations, demonstrating a belief that students can achieve such goals (Bondy et al., 2013).

In a different vein, Maloney and Matthews (2020) highlight two types of care in their work: transactional care and empathetic care. Transactional care is received by a student from an instructor who is a cheerleader, yet the instructor is not active with the student and waits for initiative from the student. Instructors who engage in transactional care may see students in a deficit mindset or as unmotivated if they do not initiate with the instructor. Instructors that exhibit transactional care demonstrate a care that is inert and a "one size fits all" care for all students, demonstrating that students are "cared about" but not necessarily cared for. The authors separate this from empathetic care, which is an active and constantly shifting care, in which the instructor sees students as complex beings and celebrates mathematical strengths while scaffolding mathematical weaknesses. Instructors who show empathetic care leave students feeling cared *for*, not just cared *about*. Maloney and Matthews found that students can sense the difference between these two types of care exhibited by their instructors, and that students who felt most connected to their math classroom were those with teachers showing empathetic care.

Considering the notion of warm demander and the value of empathetic care, we contend that a caring relation is also attuned to the identities of the student as well as the teacher, understanding that both identities can shape/influence that caring relation. In most considerations of care, "inadequate attention is given to issues of power" (Thompson, 1998), and therefore it is extremely important for an instructor to understand and develop awareness of their identity and inherent power as they demonstrate care for their students. *Culturally relevant care* is "characterized by a strong sense of community, rigorous demands, an integration of different cultures, and a general affirmation of one's humanity" (Watson, Sealy-Ruiz, & Jackson, 2016, p. 981). It extends beyond traditional care presented by Noddings (2002) in that instructors are "expected to recognize the inequities faced by students based on race [or other marginalizations] and work to challenge them" (Watson et al., 2016, p. 985). Culturally relevant care requires an asset-based, justice-oriented perspective for students traditionally marginalized in the schooling system. Culturally relevant care "acknowledges the goal of justice to safeguard the rights of all students—to be respected and to be treated fairly" in which instructors need to have an understanding "of systemic, political, economic, and social structures that disproportionately appropriate opportunity according to race and a commitment to challenge and alter them" (Parsons, 2005, p. 26).

However, through the lens of culturally relevant care, what is seen as "caring" teacher behaviors can be easily misinterpreted as people show and interpret emotion, interest, respect, and body language differently in different cultures (Averill, 2012) and specific "caring" practices can be experienced differently by different students (Thompson, 1998). Cawley & Wilson (2023) describe mathematical microaffirmations as the subtle actions that can support students by affirming they belong in mathematics yet caution that some microaffirmations for students may be received as microaggressions due to these differences.

Because of this, we argue that the cyclical relationship in a caring relation is extremely important to consider. This feedback loop can help instructors to understand how their demonstration of care is being received and make subtle changes to ensure that students are receiving care in the way that supports them best. This means that an instructor needs to understand that caring relations with individual students will be uniquely different. It also implies that an instructor needs to be acutely aware of their identities (e.g., race, gender, language, educational background, etc.) and the way these impact the power dynamic within a caring relation. Being in touch with one's own identity can help bring perspective on the privileges and marginalizations that may exist within a caring relation.

Toward a Conceptual Framework of Care

This paper proposes a conceptual framework of a *caring relation* within the postsecondary mathematics classroom that attends to the theoretical perspectives above. Figure 1 shows a conceptual framework of care in an undergraduate mathematics classroom. A caring relation between an instructor and a student is cyclical and requires interactions from the instructor (the carer) and the acknowledgment of the caring actions by the student (the cared for), whether explicit or implicit. An instructor's interactions should be influenced by:

1) high mathematical expectations for the student which is informed by the instructor's pedagogical content knowledge (PCK) about the mathematics content being learned and for future mathematics content yet to be learned
2) reflection on their personal, cultural, and mathematical identities, bringing awareness to their privileges and marginalizations within the caring relation, acknowledging power dynamics as instructor
3) culturally relevant care in which the instructor learns about students' cultural and lived experiences and incorporates that into the classroom while also being apprised of current systemic, political, and social structures that may impact their students

In this conceptual framework, we see the instructor's caring interactions as malleable based on the three attributes above and that these attributes can be developed and refined both over time and on a student-by-student basis. While instructors cannot control how students respond or receive interactions, we believe that instructors can develop their interactions based on these attributes to shift and better attune care towards their student.

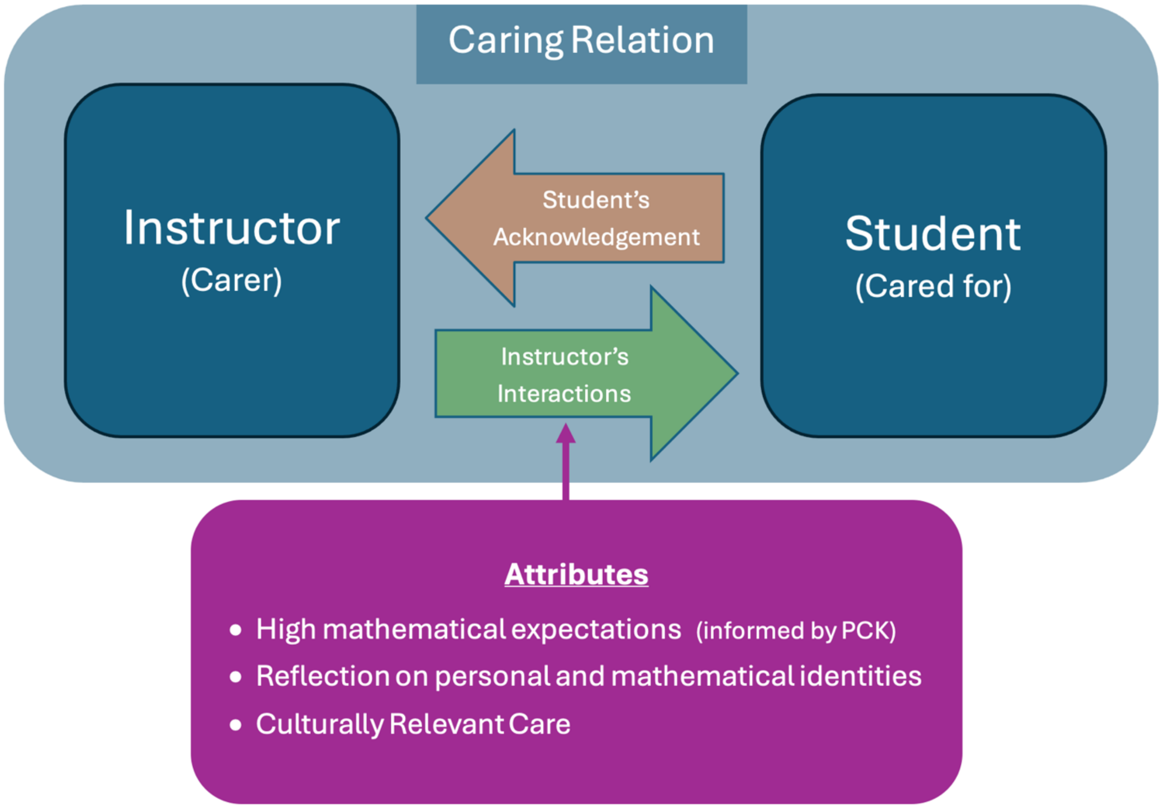

Figure 1. Conceptual Framework of Care in an Undergraduate Mathematics Classroom

So Why Does this Matter for College Mathematics?

We claim that colleges and universities are a unique environment in which to consider this work. College instructors often receive little or no pedagogical training when completing their graduate degrees (Robinson & Hope, 2013) and therefore may not have the skills and tools needed to engage with students. Providing a framework like this with attributes that can be considered in the effort to build a caring relation with students helps instructors to consider the different aspects needed to support a student. This is a unique setting also in that college students are generally adults who may hold different identities/obligations than the instructors. Instructors therefore are expected to enact care with fellow adults, which is seen as different than enacting care with children. College and university students usually hold more responsibility, life experience, and obligations than students in K-12 making it especially important to show sensitivity and culturally relevant care.

We posit that effectively communicating care and building caring relations with students is an important aspect of effective mathematics instruction at the undergraduate level. In a college setting students are transitioning to and expected to be independent learners. Their level of meta-skills to plan and attend to their own learning becomes increasingly important. These meta-skills are also often tied to affective factors that impact students' comfort with engaging with material or inclination to avoidance or procrastination. Higher education is also a choice – students make the choice to pursue college and so it is possible for students to drop out or stop out. Mathematics is well known to be a major reason why students either drop out, stop out, or change majors from STEM to non-STEM (Chen, 2013) and students sometimes struggle with the change from K-12 mathematics expectations to college-level expectations (Hernandez-Martinez, 2016). Students often carry mathematical experiences that impacted their sense of belonging in college mathematics, shaping their perspectives in mathematics and their ability to do mathematics (Cawley & Wilson, 2024). Therefore, mathematics instructors need to make concerted efforts to demonstrate care towards students.

We also have found in our experiences with professional development with community college and university mathematics faculty that the sense of care and concern shared in the aspect of instruction is most usually placed/emphasized on the *mathematical content*. This is often pushed by the urgent need to meet course outcomes and to prepare students with prerequisite material for the subsequent courses. Therefore, the attributes of care mainly focus on the mathematics content, and many times this can be done without pointed concern for the student or setting mathematical expectations that are both reasonably in a student's grasp. Our framework posits that it is simply not sufficient to care that a student "gets" the material (research has shown that students do not always carry forward prerequisite knowledge; Engelbrecht, Harding, & Du Preez, 2007) – students need to be seen and supported as who they are, and this requires more attention and intention. Some mathematics instructors teach with the hope that their students will see beauty in mathematics just like they do. However, it may take a long time for some students to warm up to mathematics as a field and feel confident and happy as a doer of mathematics. We believe that if a student has a caring professor who attends to these attributes in their interactions with students, students will be able to work on their dispositions towards mathematics. In fact, students tend to feel an obligation towards a teacher who acts as a warm demander even if they may not show interest in mathematics (Delpit, 2013). We see this as an intermediary step to bringing students into developing a better relationship with mathematics and shaping their mathematics identity to be one of confidence and positive disposition.

Conclusion

In this paper, we have argued that caring relations are an essential yet under-theorized component of effective undergraduate mathematics instruction. By synthesizing prior research on care, identity, and relational teaching models such as warm demander pedagogy, we proposed a conceptual framework that centers the instructor's role in building supportive and responsive environments for students. This framework underscores that care is not simply a personality trait or a passive orientation, but rather an active, culturally attuned, and pedagogically informed set of practices. We argue that such caring relations are especially important for students from historically marginalized backgrounds, for whom traditional mathematics instruction has often been alienating or exclusionary. Instructors who wish to support students' mathematical development must attend to their students' cognitive, emotional, and identity needs, not as separate concerns, but as deeply intertwined aspects of learning.

This framework offers a starting point for further research and dialogue. Empirical studies can explore how instructors enact care in varied postsecondary settings, how students perceive and respond to these actions, and what institutional structures best support this work. We also invite researchers and practitioners to consider how care interacts with issues of power, positionality, and discipline-specific expectations in college mathematics. By better understanding and enacting caring relations, we believe instructors can help more students persist, thrive, and reimagine their place in the mathematical community.

References

Anderson, R. (2007). Being a mathematics learner: four faces of identity. *Mathematics Educator*, *17*(1), 7-14.

Andersson, A., & Wagner, D. (2017). Love and bullying in mathematical conversations. In A. Chronaki (Ed.), *Mathematics education and life at times of crisis: Proceedings of the Ninth International Mathematics Education and Society Conference* (Vol. 2, pp. 382–392). University of Thessaly Press.

Averill, R. (2012). Caring teaching practices in multiethnic mathematics classrooms: attending to health and well-being. *Math Education Research Journal* 24, 105–128. https://doi.org/10.1007/s13394-011-0028-x

Bailey, T., Jeong, D. W., & Cho, S. W. (2010). Referral, enrollment, and completion in developmental education sequences in community colleges. *Economics of Education Review*, *29*(2), 255-270.

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of teacher education*, *59*(5), 389-407

Benken, B. M., Ramirez, J., Li, X., & Wetendorf, S. (2015). Developmental mathematics success: Impact of students' knowledge and attitudes. *Journal of developmental education*, 14-31.

Bennett A., Cristobal, J., Lai, Y., & Young C. (2025). *Real analysis professors' noticing of equity gaps and minoritized students' perspectives*. In S. Cook, B.P. Katz, & K. Melhuish (Eds.), *Proceedings of the 27th Annual Conference on Research in Undergraduate Mathematics Education* (pp. 624–633). SIGMAA on RUME. Alexandria, VA.

Bondy, E., Ross, D. D., Hambacher, E., & Acosta, M. (2013). Becoming Warm Demanders: Perspectives and Practices of First Year Teachers. *Urban Education (Beverly Hills, Calif.)*, *48*(3), 420–450. https://doi.org/10.1177/0042085912456846

Boaler, J. (2022). *Mathematical mindsets: Unleashing students' potential through creative mathematics, inspiring messages and innovative teaching*. John Wiley & Sons.

Bressoud, D. M., Mesa, V., & Rasmussen, C. L. (Eds.). (2015). *Insights and recommendations from the MAA national study of college calculus*. MAA Press.

Chen, X. (2013). STEM Attrition: College Students' Paths into and out of STEM Fields. Statistical Analysis Report. NCES 2014-001. *National Center for Education Statistics*.

Cawley, A., Aniceto, R., Ricarte, S., & Wilson, R. (2023). *"Well, it's obvious": Students' experiences with mathematical microaggressions.* In S. Cook, B. Katz, & D. Moore-Russo. (Eds.), *Proceedings of the 25th Annual Conference for the Research in Undergraduate Mathematics Education*. (pp. 1006-1011). SIGMA on RUME. Omaha, NE.

Cawley, A., & Wilson, R. (2023). Mathematical Microaffirmations. *MAA Focus*. pp. 26 – 29.

Cawley, A., & Wilson, R. (2024). *"Really, you're a math major?!": Students' descriptions of racial and gendered microaggressions and sense of belonging in mathematics.* Cook, S., Katz, B., & Moore-Russo, D. (Eds.). *Proceedings of the 26th Annual Conference for the Research in Undergraduate Mathematics Education.* (pp. 896-904). Omaha, NE.

Cawley, A., Huynh, B., Elakesh, S., & Frost-Neto, L. (2025). *"It all started when…": Insights from students' math life stories.* In S. Cook, B.P. Katz, & K. Melhuish (Eds.), *Proceedings of the 27th Annual Conference for the Research in Undergraduate Mathematics Education.* (pp. 733-741). SIGMA on RUME. Alexandria, VA.

Delpit, L. (2013). *Multiplication Is for White People: Raising Expectations of Other People's Children*. The New Press.

Ellis, J., Fosdick, B. K., & Rasmussen, C. (2016). Women 1.5 times more likely to leave STEM pipeline after calculus compared to men: Lack of mathematical confidence a potential culprit. *PloS one*, *11*(7), e0157447.

Engelbrecht, J., Harding, A., & Du Preez, J. (2007). Long-term retention of basic mathematical knowledge and skills with engineering students. *European Journal of Engineering Education*, 32(6), 735-744.

Gunter, M. & Gunter, D. (2023). Connecting Experiences in Mathematics and Math Trauma. In R. Hammack & B. Cory, (Eds.). Proceedings of the 122nd annual convention of the School of Science and Mathematics Association (Vol. 10). Colorado Springs, CO: SSMA.

Hackenberg, A. J. (2010). Mathematical caring relations in action. Journal for Research in Mathematics Education, 41(3), 236-273.

Hernandez-Martinez, P. (2016). "Lost in transition": Alienation and drop out during the transition to mathematically-demanding subjects at university. *International Journal of Educational Research*, *79*, 231-239.

Immordino-Yang, M. H., & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, brain, and education*, *1*(1), 3-10.

Kleinfeld, J. (1975). Effective teachers of Eskimo and Indian students. School Review, 83, 301–344.

Larnell, G. V. (2016). More than just skill: Mathematics identities, racialized narratives, and remediation among Black undergraduates. *Journal for Research in Mathematics Education, 47*(3), 233-269.

Lee, V. E., Smith, J. B., Perry, T. E., & Smylie, M. A. (1999). Social Support, Academic Press, and Student Achievement: A View from the Middle Grades in Chicago. Improving Chicago's Schools. A Report of the Chicago Annenberg Research Project.

Leyva, L. A., McNeill, R. T., Marshall, B. L., & Guzmán, O. A. (2021a). "It seems like they purposefully try to make as many kids drop": An analysis of logics and mechanisms of racial-gendered inequality in introductory mathematics instruction. *The Journal of Higher Education*, *92*(5), 784-814.

Leyva, L. A., Quea, R., Weber, K., Battey, D., & López, D. (2021b). Detailing racialized and gendered mechanisms of undergraduate precalculus and calculus classroom instruction. *Cognition and Instruction*, *39*(1), 1-34.

Martin, D. B. (2012). Learning mathematics while Black. Educational Foundations, 26, 47-66.

Maloney, T., & Matthews, J. S. (2020). Teacher care and students' sense of connectedness in the urban mathematics classroom. Journal for Research in Mathematics Education, 51(4), 399-432.

Mishra, S., Swanson, E., Yucel, E., Ngo, F., Melguizo, T., & Ching, C. (2025). Math Sorting: Unintended Consequences of Developmental Education Reforms in Community Colleges. *Research in Higher Education*, *66*(2), 14.

Ngo, F. (2019). Fractions in college: How basic math remediation impacts community college students. *Research in Higher Education*, *60*(4), 485-520.

Noddings, N. (1999). Caring and competence. *Teachers College Record*, *100*(5), 205-220. https://doi.org/10.1177/016146819910000509.

Noddings, N. (2002). *Educating moral people: A caring alternative to character education* (4th ed.). Teachers College Press.

Park, E. S., Ngo, F., & Melguizo, T. (2021). The role of math misalignment in the community college STEM pathway. *Research in Higher Education*, *62*(4), 403-447.

Park, S. H. (2025). *Female Minoritized Students' Sense of Belonging in College Algebra and Precalculus Classrooms at a Diverse Minority Serving Institution.* In S. Cook, B.P. Katz, & K. Melhuish (Eds.), *Proceedings of the 27th Annual Conference on Research in*

Undergraduate Mathematics Education (pp. 1034–1041). SIGMAA on RUME. Alexandria, VA.
Parsons, E. C. (2005). From caring as a relation to culturally relevant caring: A White teacher's bridge to Black students. *Equity & Excellence in Education*, *38*(1), 25-34.
Robinson, T. E., & Hope, W. C. (2013). Teaching in higher education: Is there a need for training in pedagogy in graduate degree programs? *Research in Higher Education Journal*, *21*.
Sadler, P., & Sonnert, G. (2018). The path to college calculus: The impact of high school mathematics coursework. *Journal for Research in Mathematics Education*, *49*(3), 292-329.
Schonert-Reichl, K. A. (2017). Social and emotional learning and teachers. *The future of children*, 137-155.
Selbach-Allen, M. & Delaney, V. (2025). *Enacting care in a community college math classroom: A case study.* In S. Cook, B.P. Katz, & K. Melhuish (Eds.), *Proceedings of the 27th Annual Conference on Research in Undergraduate Mathematics Education* (pp. 536–544). SIGMAA on RUME. Alexandria, VA.
Seymour, E., & Hewitt, N. M. (1997). *Talking about leaving* (Vol. 34). Westview Press, Boulder, CO.
Stone-Johnstone, A. (2025). Exploring the impact of the corequisite classroom climate on students' attitudes toward mathematics. *International Journal of Research in Undergraduate Mathematics Education*, *11*(1), 91-115.
Valentine, J. C., Konstantopoulos, S., & Goldrick-Rab, S. (2017). What happens to students placed into developmental education? A meta-analysis of regression discontinuity studies. *Review of Educational Research*, *87*(4), 806-833.
Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Cambridge, MA: Harvard University Press.
Wentzel, K. R. (1997). Student motivation in middle school: The role of perceived pedagogical caring. *Journal of Educational Psychology*, 89(3), 411–419.
Watson, A. (2021). *Care in mathematics education: Alternative educational spaces and practices*. Springer Nature.
Watson, W., Sealey-Ruiz, Y., & Jackson, I. (2016). Daring to care: The role of culturally relevant care in mentoring Black and Latino male high school students. *Race Ethnicity and Education*, 19(5), 980–1002. https://doi.org/10.1080/13613324.2014.911169