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Community Wealth and Latine Students' STEM Identity

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Introduction

Many survey research instruments designed to measure STEM students' academic skills and dispositions are, even if inadvertently, used to label some students as successes and others as failures (Garriott, 2019). Such instruments are often based on foundational frameworks in education research that have been normed and tested on White students over many years (Gillborn et al., 2018). Unsurprisingly, such tools regularly show that Students of Color "deviate" from the "norm", using language that emphasizes deficit (Arellano, 2022). Educators, university leaders, employers, and policymakers working to increase diversity in STEM fields can benefit from quantitative survey measures designed, from their inception, to capture the strengths inherent in the families, communities, home languages, cultures, and experiences of Students of Color. Not only do such instruments combat demotivating deficit narratives, but they also point to opportunities for institutions to work *with* students' existing assets to promote their STEM success (Verdín et al., 2021). Unfortunately, developing new, widely tested survey research tools is both costly and time-intensive, and few scholars have undertaken this work (Hiramori et al., 2024).

To address this gap and contribute to the quantitative tools available to researchers and instructors, we use a new instrument - the Academic and Career Cultural Wealth (ACCW) scale - to measure Latine STEM students' Community Cultural Wealth (CCW) and its relationship to STEM identity (Estrada et al., 2011; Yosso, 2005). We focus on Latine students, in particular, because they remain underrepresented in STEM despite a strong desire to enter these fields. Latines make up 16% of the U.S. adult population, but only 6% of STEM research doctorates, and 17% of the U.S. labor force, but only 8% of STEM workers (Fry et al., 2021). These disparities do not result from lack of interest, as the proportion of Latine freshmen intending to major in STEM (42%) remains higher than that of White (37%) students (National Science Board, 2018). Instead, the blame lies in structural and institutional barriers to STEM persistence that disproportionately impact Latine students and their communities - including lack of access to mathematics preparation in high school (Nora & Crisp, 2012), greater financial stress (Kruse et al., 2015; Redford et al., 2017; Salgado, 2018) resulting in longer times to degree (McFarland et al., 2017), "chilly" STEM climates (Palmer et al., 2011), and a lack of culturally relevant

pedagogy (Ladson-Billings, 2014). One way to *begin* addressing these barriers is to measure the resources students use to navigate them, so that educators can support them in achieving their ambitions.

We also focus on Latine students because, as previously mentioned, scale development is a long and arduous process - requiring testing with different subgroups of students in different geographical and institutional contexts. To contribute to this scale's development, we consider whether the ACCW is pertinent to Latine STEM students attending Hispanic Serving Institutions (HSIs) in the Southwestern U.S., and if students' scores relate to STEM-specific measures of interest to engineering educators. To this end, we ask two research questions: **(RQ1)** what forms of Community Cultural Wealth, as measured by the Academic and Career Cultural Wealth (ACCW) scale, do Latine STEM majors possess and **(RQ2)** what is the relationship between students' Community Cultural Wealth and their STEM identity?

The Community Cultural Wealth Framework

Chicana feminist scholar, Dr. Tara Yosso, developed the Community Cultural Wealth (CCW) framework to highlight the assets that Students of Color are likely to possess, but that are undervalued by schools (Yosso, 2005). It is a critique of certain interpretations of the concept of cultural capital (Bourdieu, 1986), which depict Students of Color as lacking the knowledge, skills, tastes, material objects, and credentials necessary for academic and career success (Lamont & Lareau, 1988). The CCW framework identifies six interrelated, mutually reinforcing forms of cultural wealth that students use to succeed in "institutions not created with Communities of Color in mind" (Yosso, 2005, p. 80): Aspirational, Familial, Linguistic, Navigational, Resistant, and Social Capitals.

Aspirational Capital refers to students' hopes for their future, which drive them to pursue their goals, even in the face of obstacles. Familial Capital encompasses knowledge, orientations, intuition, values, a sense of history, and lessons of caring and coping that are nurtured in families or among fictive kin. Linguistic Capital is the ability to mobilize the skills developed through communicating in more than one language or style in various spaces. Navigational Capital is the ability to maneuver through institutions that perpetuate inequality, while Resistant Capital is students' ability to recognize and challenge injustice. Finally, Social Capital consists of networks of people and community resources that

provide instrumental and emotional support. We relied heavily on these definitions, from language in Yosso's (2005) original framework, to create and refine our scale items.

Although researchers typically use the CCW framework in qualitative research (Reyes & Duran, 2021), in recent years, a handful of original quantitative measures of CCW have emerged (Dika et al., 2018; Hiramori et al., 2021, 2024b; Kirnbauer, 2021; Narvaiz, 2023; Sablan, 2019). In general, tests of these original measures offer evidence that the underlying concepts in the CCW framework can be captured quantitatively. They also highlight the complexity of measuring conceptually interrelated concepts through distinct subscales (Yosso, 2005). For example, Sablan (2019) conducted exploratory factor analysis (EFA) for each subscale of CCW separately, checking that all items proposed for a specific form of CCW loaded onto one common factor. Results from this EFA revealed that Navigational and Familial Capital items fit Yosso's (2005) conceptualization as distinct forms of capital. But, because some Resistant and Aspirational Capital items did not load sufficiently onto a factor, Sablan removed three items related to aspirations derived from one's family. Similarly, Hiramori et al (2024) found that some Aspirational Capital items (e.g. those related to internal motivation) loaded with Navigational Capital - leading them to identify a form of CCW they call "Aspirational Navigational Capital" (p. 9). They found that Aspirational and Familial Capital are also closely intertwined. "Aspirational Familial Capital" relates to "the motivational aspects of familial capital that emerge from close family relationships" (p. 10).

We also drew from these previously published scales and the insights emerging from their development when we created the ACCW. We amended and added items in response to our colleagues' findings and considered entirely new additions based on reviews of CCW scholarship (AUTHORS, 2021). For example, our scale is the first to quantitatively measure Spiritual Capital as *una ventaja* (Rendón et al., 2015, p. 94) for Latine and other Students of Color (Pérez Huber, 2009). Students with Spiritual Capital describe being guided by faith in God or another higher power and receiving support from religious or spiritual communities. In turn, this spirituality and faith can inculcate a positive worldview, a sense of purpose, and compassion for others (Park et al., 2020),. We also measure Fictive

Familial Capital, which includes connections with people who are not related to students by birth or adoption, but who may feel like family away from home because of a shared identity or experience (Duran & Pérez, 2019). Table 1, available in the Appendix, offers more information on our scale items and their origins.

Before describing our data and methods in more detail, it is important to note that the CCW framework has increased in popularity among STEM educators and researchers. Indeed, twenty-two papers have been published since 2017 examining the CCW of historically marginalized STEM students - although only five of these have used quantitative data (AUTHORS, forthcoming). This scholarship points to CCW as a specific resource students draw from when facing challenges particular to STEM, including deploying their families' knowledge of science and engineering (Dika et al., 2020; Mobley & Brawner, 2019), resisting racist assumptions about their STEM abilities (Lawson & Fong, 2024), connecting with mentors and role models in their fields (Rincón et al., 2020; Tapia, 2022), using their linguistic skills to learn new STEM terminology (Denton et al., 2020), and returning to community-oriented aspirations when coursework becomes particularly difficult (Rincón & Rodriguez, 2021). These findings also suggest that CCW might have an impact on students' STEM identity, which is an important predictor of STEM attainment for historically marginalized students (Chemers et al., 2011). STEM identity is the degree to which an individual perceives themselves as a member of a STEM community, and is recognized as such by others as well (Estrada et al., 2011). CCW may function as a protective factor against messages that threaten Latine students' STEM identities (Acevedo & Solorzano, 2021), and might also bolster their confidence in STEM by illuminating the resources inherent in their cultures and communities (Batres Spezza et al., 2023). To our knowledge, however, no previous studies have considered the relationship between STEM identity and students' CCW.

Data and Methods

Institutional Context

We developed and validated the ACCW through three rounds of testing between 2021 and 2023, which were informed by DeVellis' (2017) guidelines for scale development. The first two rounds of

testing were with students attending four-year Predominantly White Institutions (PWIs) in the Midwest. We then refined our instrument at four-year Hispanic Serving Institutions (HSIs, at least 25% Latine enrollment) and emerging Hispanic Serving Institutions (eHSIs, between 15% and 25% Latine enrollment) that are part of a large public university system in the American Southwest (Hispanic Association of Colleges and Universities, 2024). While we report the details of our scale development elsewhere (AUTHORS, under review), here we only present data collected during our last phase of testing at HSIs and eHSIs to more closely examine the experiences of Latine students, specifically.

Researchers often make the assumption that HSIs automatically serve Latine students when, in reality, servingness is dependent on factors like racial diversity among faculty and staff, and whether Title IV funds are used for school-wide or Latine-specific programming (Vargas et al., 2020). Even HSIs that truly serve Latines face chronic underfunding as compared to their PWI counterparts (Ortega et al., 2015), and may struggle to support certain groups of students. HSIs continue to reckon with anti-Blackness (Pirtle et al., 2024), and the unique needs of Mexican citizens who regularly cross the border to attend classes (Mein et al., 2023). Opportunities for improved support for students still exist at HSIs, making these schools an important site for studying the impacts of CCW on STEM identity development.

Data Collection and Analysis

Between February and May 2023, we surveyed 443 Latine students in their junior year who had declared a major in STEM at one of eight public, four-year HSIs or eHSIs in the Southwestern U.S. (Please see Table 2 in the Appendix for more information about the students in our sample.) The survey was administered online, using Qualtrics, and asked students about their demographic characteristics, CCW, STEM identity, experiences with high-impact practices in STEM (e.g., undergraduate research, internships), and social networks, among other variables. The statistical analyses reported below were conducted using R software version 4.3.1 psych and lavaan packages (R Core Team, 2023; Revelle, 2023; Rosseel, 2012).

We measured students' CCW through a revised 42-item ACCW scale (see Table 1). Students indicated how well the statements in each item described them using a 6-point Likert scale (1=Not at all like me; 2=Very slightly like me; 3=Slightly like me; 4=Moderately like me; 5=Very much like me; 6=Exactly like me). We used confirmatory factor analysis (CFA) to test whether items truly measured the underlying constructs of the original CCW framework, including the amendments noted above. We also report the mean and standard deviation of each item below (see Table 1) to further address our first research question regarding the forms of CCW that Latine STEM majors possess. We measured STEM identity by adapting Estrada and colleagues' (2011) Scientific Identity Scale. The five items used in this study were: "I have a strong sense of belonging to the community of scientists", "I have come to think of myself as a 'scientist'", "I derive great personal satisfaction from working on a team that is doing important research", "I feel like I belong in the field of science", and "The daily work of a scientist is appealing to me." Cronbach's alpha coefficient of this scale was .867, indicating the high reliability of the measure. For this preliminary analysis, we used Pearson's correlation coefficient between standardized values (z-scores) to examine the relationship between STEM identity and various forms of CCW, which helps address our second research question.

Findings

RQ1: What forms of Community Cultural Wealth do Latine STEM majors possess?

Table 3 summarizes the results of CFA on the first-order, correlated 9-factor model. The results showed that the model provided an acceptable fit to the data ($\chi^2(783, N = 443) = 1761.374$, $p < .001$, RMSEA = .053, NFI = .866, NNFI/TLI = .912, CFI = .920, SRMR = .050). All standardized factor loading values were above the predetermined criteria (0.45), and all parameter estimates were statistically significant in terms of p-value ($p < .001$). The reliability test results showed that each sub-construct of CCW had good (> 0.8) or excellent (> 0.9) values of Cronbach's alpha. As the tested scale met all our predetermined criteria, we decided to maintain all items tested in this third round in our final ACCW scale. Table 4 indicates that most of the factors in the ACCW are significantly correlated with each other, yet not highly correlated ($r > 0.70$) enough to raise concerns about the discriminant validity of the scale.

The highest correlation was reported between Aspirational and Navigational Capitals ($r = .566$, $p < .001$), followed by Aspirational and Resistant 2 Capitals ($r = .479$, $p < .001$). The lowest correlation was shown between Aspirational and Resistant 1 Capitals ($r = .093$, $p < .10$). Resistant Capital 1 and Spiritual Capital did not show significant correlations. This finding is consistent with Yosso's (2005) assertion that "these various forms of capital are not mutually exclusive or static but rather are dynamic processes that build on one another as part of community cultural wealth" (p. 77). We anticipated that some of these factors might be correlated, particularly those where there is qualitative evidence that students use them in tandem (e.g., focusing on future goals as motivation for navigating campus, Acevedo & Solorzano, 2021).

As further evidence supporting these forms of CCW as salient to Latine STEM majors, the students in our sample have relatively high levels of CCW across all subtypes. The maximum score possible for each item is six, which indicates that a student believes a particular statement (e.g., "I have the ability to make a difference in society.") describes them exactly. As Table 1 shows, the mean score for most CCW items is above four, with scores for Navigational and Aspirational Capital being particularly high. The items composing Spiritual Capital have lower average scores, which may be due to its bimodal distribution. Students tend to be either spiritual or not spiritual, with few falling in the gray area between. Here, we avoid ranking specific subgroups of students (e.g. first-generation college students, transfer students, women) by their average CCW scores, which runs the risk of reifying the assessment status quo (Garcia et al., 2018). Future researchers might consider using pattern recognition techniques, like cluster analysis, to identify groups with different constellations of CCW (Reeping et al., 2023). Cluster analysis also avoids grouping students by pre-imposed demographic categories that may or may not reflect their lived experiences - instead identifying "shared characteristics that are analytically meaningful" (Reeping et al., 2023, p. 773).

We also found that students tend to group certain sets of CCW forms together. According to our correlational analysis results presented in Table 4, the highest correlation was observed

between Aspirational and Navigational Capitals ($r = .566$, $p < .001$), indicating that students with Aspirational Capital are likely to possess Navigational Capital as well. The second highest correlation was between Aspirational and Resistant 2 Capitals ($r = .479$, $p < .001$). The lowest correlation was found between Aspirational and Resistant 1 Capitals ($r = .093$, $p < .10$). Resistant Capital 1 and Spiritual Capital did not show significant correlations. This finding aligns with Yosso's (2005) assertion that "these various forms of capital are not mutually exclusive or static but rather are dynamic processes that build on one another as part of community cultural wealth" (p. 77).

RQ2: What is the relationship between students' Community Cultural Wealth and their STEM identity? As Table 4 indicates, all CCW scores are significantly and positively correlated with STEM identity. Aspirational Capital (0.472, $p < .001$) and Navigational Capital (0.353, $p < .001$) showed the highest correlations with participants' STEM identity scores. These results indicate that students who maintain hopes for their future, despite any obstacles they may encounter (Aspirational Capital), and who have learned how to navigate large and complex institutions (Navigational Capital) are more likely to view themselves as scientists and STEM professionals.

Familial Capital (0.302, $p < .001$) and Fictive Familial Capital (0.307, $p < .001$) both showed positive and significant correlations with STEM identity. These findings suggest that maintaining connections to one's family history and lessons (Familial Capital) and fostering close friendships and family-like relationships within the same racial/ethnic groups (Fictive Familial Capital) can be sources of support for developing a stronger sense of belonging in the scientific community and reinforcing identification as a scientist and STEM professionals. These findings support Verdín et al. (2021), who also found that engineering students draw on

knowledge, experiences, and skills developed through their familial connections, home environments, and neighborhoods, even when their families and family-like ties are not involved in professions typically considered part of STEM fields.

Resistant Capital 1 showed low but positive correlations with STEM identity (0.113, $p < .05$), while Resistant Capital 2 showed relatively higher correlation with participants' STEM identity (0.311, $p < .001$). The low, albeit positive, correlation between Resistant Capital 1, or maintaining an awareness of social inequality and injustice, may be because awareness without action can engender defeatism (Pérez et al., 2018). In other words, knowing that there are racial inequalities in access to educational resources and stereotypes about Students of Color and their performance in STEM, may lead a student to feel as if these fields are not for them. Indeed, in other work on this subject, we have found that higher levels of Resistant Capital 1 among students is negatively related to students' sense of belonging at Predominantly White Institutions - again, suggesting that awareness without action can lead to feelings of exclusion and isolation (AUTHORS, under review). Given that Resistant Capital 2 represents students' ability to address and tackle injustice, its positive correlation with STEM identity may indicate that challenging unjust practices can help students maintain and further develop their identities as STEM professionals, even in the face of hardships and systemic barriers that may otherwise hinder their sense of belonging and engagement in the field.

Linguistic Capital 1, which highlights students' multilingual abilities used in academic and social settings, also showed low but positive correlations with STEM identity (0.190, $p < .05$). Linguistic Capital 2 - students' ability to switch between different modes or tones of communication, also showed positive correlations with STEM identity (0.264, $p < .001$). The positive but low correlation for Linguistic Capital 1 may be related to the fact that students do utilize their ability to speak multiple languages to pursue their STEM majors and develop identities within the field; however, other influences may temper this process. Studies have

found that students whose first language is not English—who constitute a significant proportion of the multilingual student population—often face additional barriers in STEM academic settings. For example, LaCosse et al. (2020) pointed out that many of these students are posed to learn complex STEM content while simultaneously acquiring STEM-specific vocabulary, which can create additional cognitive and linguistic challenges. Such challenges may affect their STEM identity development, which provides a potential explanation of the low correlation. The relatively higher positive correlation for Linguistic Capital 2 suggests that students' ability to engage with different types of audiences (e.g., academic/non-academic, audiences from different educational levels) can help them successfully navigate the scientific community and identify as members of it.

One especially interesting relationship to highlight is that between Spiritual Capital and STEM identity, which is also positive. While there is a growing literature on religiosity among scientists (Ecklund et al., 2016; Ecklund & Park, 2009), the prevailing wisdom is that those with strong spiritual or religious beliefs are less likely to engage in the creation of scientific knowledge and to trust in scientific authority (Chan, 2018; McPhetres et al., 2021). While further qualitative research is necessary to understand the mechanisms linking these two variables, the existing literature on Spiritual Capital suggests that this form of CCW can help boost students' sense of belonging in college more generally - providing them with access to a family-like community that offers emotional, material, and informational support in the pursuit of STEM fields (Park et al., 2022; Pérez Huber, 2009; Rendón et al., 2015). It is also important to remember that the students in this sample have already chosen to major in STEM, which means that the deeply spiritual among them may have already found a way to reconcile their science identity and spirituality, leaving only the positive benefits of the latter. Students who cannot engage in this type of reconciliation may forego majoring in STEM altogether.

Conclusion

The final set of items included in the ACCW scale are generally consistent with Yosso's original CCW framework, including her description of these constructs as interrelated and mutually reinforcing. However, the ACCW also points to new and varied sub-forms of CCW that warrant further consideration. We find evidence that Spiritual Capital is a distinct construct, and that Linguistic Capital can be further divided into two types of communication skills: multilingualism and code-switching. We find that Fictive Familial Capital - which relates to a broader feeling of kinship with and responsibility for one's racial or ethnic group - is distinct from traditional Familial Capital - which relates primarily to biological or adoptive family. Similarly, Resistant Capital is composed of both awareness of injustice and actions against it. This nuance is important as these various subtypes of CCW may not be related to STEM identity development in exactly the same way. For example, Resistant Capital 1 (awareness) is not as highly correlated with STEM identity as other forms of CCW, which indicates that awareness of inequality on its own may not do enough to help students feel like they belong in STEM.

However, we do find that all forms of CCW are positively correlated with STEM identity. Navigational Capital and Aspirational Capital's relationship to STEM identity are unsurprising, since it is understandable that highly motivated students who confidently navigate complex institutions might also feel comfortable in competitive STEM environments. But, other relationships are more noteworthy - including those between STEM identity, Spiritual Capital, and Linguistic Capital 1 (multilingualism). Students in this sample who are more spiritual are more likely to see themselves as scientists, as are students who speak multiple languages. To our knowledge, this is the first quantitative investigation of the relationship between measures of CCW and STEM identity and, as such, it raises more questions than it answers. What can practitioners and researchers take away from this exercise?

Implications for Research and Practice

In the future, we hope that validated CCW scales can become a regular part of large-scale, longitudinal surveys of college students, as a supplement to traditional measures of student resources (Kirnbauer, 2021). Such scales can also be administered in tandem with quantitative methods that track students' social support (e.g., social network analysis), to note how resources in students' networks

change as they advance in their careers (Wicker et al., 2023). Student support or scholarship programs might use the ACCW to impart the importance of their work to donors or grant-makers. Although this scale was designed for postsecondary students, the growing literature on CCW among younger students suggests that it might have some use for K-12 assessment and improvement as well (DeNicolo et al., 2015; Martinez et al., 2020) - e.g. rewarding schools that cultivate students' cultural assets, on top of improving their test scores. Since numbers remain compelling to decision makers of all kinds (Tabron & Thomas, 2023), there are uses for this instrument outside of traditional scholarship.

Community cultural wealth is not a static resource: institutions have a responsibility to help students cultivate their CCW during their time in college and combine it with other skills and resources employers value (Kolluri, 2020). Career-related programming for Latine STEM majors can recognize their existing skills in navigating complex institutions, for example, while simultaneously giving them new strategies for connecting with mentors and potential employers. The key is to start by helping students identify the strengths they already possess, so that they might grow these resources in a way that is congruent with their values, interests, and experiences. Similarly, for those students who feel that STEM is not for them, early college experiences that highlight the science and engineering knowledge already present in their families and communities (Familial Capital) and focus on the potential for STEM to identify and redress major social problems (Resistant Capital 2) might help boost their STEM identity and attract them to these majors.

To account for all these possible uses and to respect the time of potential future audiences, we aimed for a smaller number of items in our instrument than those presented in previous studies. However, there are limits to a more parsimonious scale that we hope future scholars can address. We recommend using this scale in a way that recognizes how diverse the broad category of "Students of Color" truly is. To reflect the unique experiences of the communities they are working with, we encourage researchers to borrow, modify, add, and disregard subscales as needed. It may be wiser to treat these subscales as a "pool" from which researchers can draw, rather than a fixed scale. For example, multilingualism may not be as useful for understanding the experiences of Black Americans whose cultural identity is not centered

around a distinct second language, but who possess other forms of linguistic solidarity (Jayakumar et al., 2013). Students who are refugees or immigrants may derive unique forms of CCW from navigating American bureaucracies (Pérez Huber, 2009), crossing borders or oceans (Tuliao et al., 2017), or working in seasonal, precarious, or physically demanding jobs (Bejarano & Valverde, 2012). To this end, we urge researchers to use these scales alongside interviews, focus groups, creative self-expression, or participatory action research. Qualitative data add invaluable context to the numbers and ensure that students' voices remain central to the work.

In practice, this scale can help students identify their sources of strength and assess what they contribute to academic programs. Additionally, educators can use it to facilitate student discussions, for example, by guiding students to share the experiences that led to higher scores in certain forms of CCW and organizing group discussions around the forms of CCW they feel most connected to. As mentioned earlier, this scale is not designed to capture the full range of cultural strengths that exist among students with diverse identities. Therefore, we strongly recommend that educators communicate to students that they are not expected to "excel" or achieve high scores on all subscales. With these cautionary notes in mind, such discussions can help students from diverse backgrounds recognize connections between their experiences and the cultural strengths they bring into college classrooms, while shifting the focus away from assessing which forms of CCW they score lower on or are perceived to be "lacking"—a common pitfall that can lead to deficit thinking.

We note that this practical recommendation is partially based on our experience conducting workshops with undergraduate students, which were informed by our research. We invite STEM educators to explore similar approaches in their classrooms, fostering an asset-based perspective that acknowledges and values the diverse strengths students bring to their academic journeys. We also recognize that this scale has a variety of potential applications in

practice, for example, assessing program effectiveness when programs are designed to promote and celebrate students' cultural diversity and strengths. We hope this scale serves as a tool for educators to develop and share practices that could further benefit STEM students' development and success.

Appendix

Table 1. Item Information (42 items, 9 subscales)

Category	Item Code	Item	Mean (SD)	Reference
Aspirational Capital	ASP1	I have pursued my goals despite barriers to my schooling.	4.86 (1.11)	Sablan (2019)
	ASP2	I believe that my dreams for the future are possible.	4.88 (1.13)	Sablan (2019)
	ASP3	I consider myself an ambitious person.	4.70 (1.17)	Sablan (2019)
	ASP4	I can maintain my hope for the future, even when confronted with barriers.	4.65 (1.21)	Dika et al. (2018)
	ASP5	I see myself pursuing a career that I want.	4.93 (1.13)	Hiramori et al. (2021)+
	ASP6	I have the ability to make a difference in society.	4.43 (1.33)	Authors
Navigational Capital	NAV1	I know how to secure essential resources for my education (e.g., tuition, books), even when there is limited opportunity and information.	4.22 (1.31)	Sablan (2019)+
	NAV2	I know how to find help at my institution, even when I have limited resources.	4.12 (1.34)	Sablan (2019)+
	NAV3	I have developed strategies to navigate difficult situations at the university.	4.24 (1.27)	Dika et al. (2018)+
	NAV4	I don't hesitate to reach out to other people (on/off campus) when I need help pursuing my education.	3.67 (1.55)	Authors
	NAV5	I know how to juggle different tasks in my life (e.g., work, college, family) that are necessary for pursuing my education.	4.35 (1.28)	Authors
Resistant Capital 1: Awareness	RES11	I believe there are injustices in my neighborhood or where I grew up.	3.35 (1.74)	Sablan (2019)
	RES12	I believe there are injustices in my ethnic/racial community.	3.83 (1.68)	Sablan (2019)+
	RES13	I believe racism is a major factor for issues in society.	4.33 (1.60)	Sablan (2019)
	RES14	I believe students who share my social identities (e.g., gender, race/ethnicity) face discrimination on my campus.	2.47 (1.57)	Hiramori et al. (2021)
Resistant Capital 2: Action	RES21	I work to make a difference in my racial/ethnic community.	3.81 (1.64)	Sablan (2019)

	RES22	I am contributing to a more just or equitable society.	4.03 (1.47)	Hiramori et al. (2021)+
	RES23	I speak up when I see discrimination.	4.21 (1.42)	Hiramori et al. (2021)+
	RES24	I challenge university practices that seem inequitable.	3.26 (1.59)	Dika et al. (2018)
Linguistic Capital 1: Multilingual	LING11	I speak more than one language.	4.61 (1.86)	Authors
	LING12	I frequently speak a language other than English on campus.	3.35 (2.03)	Authors
	LING13	I frequently speak a language other than English with family members.	4.34 (2.00)	Authors
	LING14	I frequently speak a language other than English that is useful for my education.	3.36 (2.02)	Authors
	LING15	I frequently speak a language other than English that will be useful for my future career.	3.87 (1.99)	Authors
Linguistic Capital 2: Modes of Speech	LING21	I have the ability to switch communication styles based on the environment (academic and/or non-academic).	4.85 (1.21)	Dika et al. (2018)
	LING22	I am able to adjust how I am communicating depending on the audience.	4.81 (1.21)	Authors
	LING23	I find it easy to talk to people from different racial/ethnic backgrounds.	4.91 (1.13)	Authors
	LING24	I find it easy to talk to people with different levels of education.	4.73 (1.19)	Authors
Familial Capital	FAM1	My family's history inspires me to pursue my education.	4.60 (1.66)	Sablan (2019)+
	FAM2	My family members have taught me lessons that are valuable for my education.	4.69 (1.52)	Sablan (2019)
	FAM3	I receive support from my extended family members, such as aunts, uncles, cousins, and others beyond my parent(s) or guardian(s) and siblings.	3.45 (1.90)	Sablan (2019)+
	FAM4	I feel a responsibility to make my family proud.	5.14 (1.38)	Authors
	FAM5	I have role models in my family.	4.47 (1.64)	Sablan (2019)+
Fictive Familial Capital	FFAM1	I feel a sense of responsibility to my racial/ethnic community on campus.	3.43 (1.69)	Authors
	FFAM2	I feel a sense of kinship with my racial/ethnic community members on campus, even if I don't know them very well.	3.57 (1.70)	Authors
	FFAM3	I attend events or participate in groups that represent my racial/ethnic background.	2.83 (1.63)	Authors
	FFAM4	The history of my racial/ethnic community inspires me to work hard to achieve my goals.	4.04 (1.68)	Authors
	FFAM5	I feel pressure to represent my racial/ethnic community on campus.	2.88 (1.71)	Authors
Spiritual Capital	SPI1	I have spirituality or faith that gives my life a sense of purpose.	3.56 (1.91)	Steger et al. (2006)+

	SPI2	I have spirituality or faith that offers me strength in times of trouble and sorrow.	3.60 (1.93)	Gorsuch & McPherson (1989)+
	SPI3	I have spirituality or faith that gives me a positive view of others.	3.65 (1.88)	Rendón et al. (2015)+
	SPI4	I have a spirituality or faith that helps me build community with others.	3.33 (1.87)	Authors

+ Amended from the referenced items.

Note: Response options were on a 1-6 Likert Scale consisting of (1) Not at all like me, (2) Very slightly like me, (3) Slightly like me, (4) Moderately like me, (5) Very much like me, (6) Exactly like me.

Table 2. Participant Demographic Characteristics (N=443)

Age (range: 18-52)	Mean: 22.05 (SD: 3.83)
Gender Identity	
Cisgender Man	176 (39.7%)
Transgender Woman	1 (0.2%)
Transgender Man	2 (0.5%)
Non-binary	10 (2.3%)
Not listed/Other	10 (2.3%)
Prefer not to reply	16 (3.6%)
Racial Identity (Multiple Choice)	
American Indian or Alaska Native	8 (1.8%)
Asian or Asian-American	8 (1.8%)
Black or African American	7 (1.6%)
Hispanic or Latina/o	443 (100.0%)
Native Hawaiian or Pacific Islander	2 (0.5%)
White or Caucasian	58 (13.1%)
Other	1 (0.2%)
First Generation Status	
First generation college student	232 (52.4%)
Continuing generation college student	206 (46.5%)
Does not apply or No response	5 (1.1%)
Enrollment Status	
Full-time or full-time equivalent	387 (87.4%)
Part-time or part-time equivalent	25 (5.6%)
An equal mix of full-time and part-time	31 (7.0%)
Transfer Status	
Transferred from another institution	198 (44.7%)
Did not transfer	245 (55.3%)
Dependent	
Have one or more dependent(s)	31 (7.0%)
Do not have a dependent	396 (89.4%)
Prefer not to reply	16 (3.6%)

Table 3. CFA results on the ACCW

Factors	Cronbach's α	Items	Standardized Factor Loadings	Measurement Errors

Aspirational Capital	.882	ASP1	0.670	0.049
		ASP2	0.772	0.047
		ASP3	0.740	0.049
		ASP4	0.818	0.049
		ASP5	0.748	0.048
		ASP6	0.734	0.056
Navigational Capital	.802	NAV1	0.629	0.060
		NAV2	0.622	0.062
		NAV3	0.786	0.055
		NAV4	0.670	0.070
		NAV5	0.649	0.058
Resistant Awareness Capital	.816	RES11	0.894	0.069
		RES12	0.707	0.071
		RES13	0.709	0.077
		RES14	0.613	0.072
Resistant Action Capital	.852	RES21	0.834	0.066
		RES22	0.821	0.060
		RES23	0.718	0.061
		RES24	0.703	0.068
Linguistic Capital: Multilingualism	.934	LING11	0.903	0.069
		LING12	0.790	0.082
		LING13	0.921	0.073
		LING14	0.799	0.081
		LING15	0.884	0.075
Linguistic Capital: Mode of Speech	.856	LING21	0.790	0.051
		LING22	0.820	0.050
		LING23	0.697	0.050
		LING24	0.786	0.050
Familial Capital	.811	FAM1	0.767	0.070
		FAM2	0.817	0.063
		FAM3	0.462	0.091
		FAM4	0.629	0.062
		FAM5	0.818	0.067
Fictive Familial Capital	.876	FFAM1	0.855	0.066
		FFAM2	0.791	0.069
		FFAM3	0.663	0.071
		FFAM4	0.807	0.068
		FFAM5	0.714	0.073
Spiritual Capital	.972	SPI1	0.947	0.068
		SPI2	0.958	0.068
		SPI3	0.960	0.066
		SPI4	0.925	0.068

Note: All factor loadings' p-values < .001

Table 4. Correlations between ACCW subscales and STEM Identity

	ASP	NAV	RES1	RES2	LING1	LING2	FAM	FFAM	SPI	STEM
ASP	1									
NAV	.566***	1								
RES1	.093+	.120*	1							
RES2	.479***	.416***	.382***	1						
LING1	.202***	.212***	.166***	.266***	1					
LING2	.388***	.331***	.143**	.415***	.148***	1				
FAM	.356***	.347***	.140**	.442***	.270***	.246***	1			
FFAM	.364***	.332***	.403***	.652***	.385***	.300***	.513***	1		
SPI	.396***	.350***	-.066	.302***	.189***	.222***	.393***	.317***	1	
STEM	.472***	.353***	.113*	.311***	.190***	.264***	.302***	.307***	.261***	1

*** p < .001; ** p <.01; * p < .05; + p <.10; STEM = STEM Identity