Disaggregating the Engagement of Students of Color with Disabilities

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Abstract

Quantitative researchers often account for aspects of identity such as race, ethnicity, and disability separately in their analyses. However, scholars have called for a critical approach to these data by disaggregating underserved student groups to better understand the experience of these students. In the current study, we analyzed data from the National Survey of Student Engagement of 16,327 first-year students with disabilities through effect coding, multilevel modeling, and multiple regression analysis to measure engagement patterns related to race and ethnicity. Significant patterns related to the engagement of students of color with disabilities emerged among the dependent variables of *higher-order learning, student-faculty interaction,* and *supportive environment.*

Keywords: students of color with disabilities, student engagement, large dataset

Kimball, Wells, Ostiguy, Manly, and Lauterbach (2016) called for the use of large datasets, such as the National Survey of Student Engagement, to explore generalizable trends regarding the experiences of students with disabilities. When applying a critical perspective in quantitative research, researchers can disaggregate their data to disrupt notions of homogeneity. This consideration is particularly true when studying students with disabilities, who often are treated as one monolithic group (Vaccaro, Kimball, Wells, & Ostiguy, 2015). Students with disabilities as a population differ vastly in terms of demographics as well as disability type (Mamiseishvili & Koch, 2011). Understanding the ways in which these populations are not homogeneous requires research on the experiences of students with disabilities with multiple intersecting identities (Peña, Stapleton, & Schaffer, 2016). In the current study, we explored the differential engagement patterns among undergraduate first-year students of color with disabilities. This research both centers on the experience of an often understudied group and provides methodological considerations for researchers studying small populations. Compared to their White peers, students of color with disabilities may engage differently on college campuses. Educators using the results from this study will be urged not to consider students with disabilities as one group, but to recognize the multiple identities of these students and to curtail policy and practice to support these diverse students.

Terminology and Concepts within the Current Study

For clarification, we want to describe how we use the terms dis/ability, multiple aspects of identity, and intersectionality. We use the term dis/ability in our review of prior scholarship to reduce labeling people based on what they cannot do (Connor, Ferri, & Annamma, 2016). However, the survey item used in the analysis of the current study asked respondents about "disability"; therefore, we use this term for the last half of our manuscript.

Second, there is an important distinction between "multiple aspects of identity" and "intersectionality." "Multiple aspects of identity" refers to a person's in-

dividual identity emphasizing aspects of choice and saliency, whereas intersectionality refers to the interlocking systems of oppression within society and the effects this has on the individual (Evans, Broido, Brown, & Wilke, 2017). Thus, "multiple aspects of identity" connotes a consideration of the various aspects of individual identity at a given point in time (e.g., ability, race/ethnicity), as context can influence which aspects of their identity are more salient than others, whereas intersectionality refers to the macro-level forces in play (e.g., ableism, racism) that influence an individual's day-to-day life and contribute to different inequities present in society. We present this distinction in terms because our study is mostly an exploration within the first concept, and we want to be conscious not to imply this is an intersectionality study.

Systems of Oppression

Although in the current study we review research on multiple aspects of identity, it is important to acknowledge systems of oppression that may influence the engagement of students of color with disabilities. Students from oppressed populations have been more likely to be labeled as having a dis/ability even if there is not enough evidence to properly diagnose one (Parrish, 2002). Such labeling is likely because other systems of oppression, including racism, have been shown to operate within ableism (Wolbring, 2008), which we define as "a pervasive system of discrimination and exclusion of people with disabilities... privileg[ing] temporarily able-bodied people and disadvantag[ing] people with disabilities" (Griffin, Peters, & Smith, 2007, p. 335). The editors of this volume cite another useful dimension of this concept: "a chief feature of an ableist viewpoint is a belief that impairment or disability (irrespective of 'type') is inherently negative and should the opportunity present itself, [should] be ameliorated, cured, or indeed eliminated" (Campbell, 2009, p. 5). An outcome of the shared effects of racism and ableism often cause individuals of color who identify as having a dis/ability to experience isolation. Meanwhile, experiences related to their dis/ability cause further experiences of marginalization beyond isolation based on racial identity alone (Connor, 2006; Ford, 2009; Linton, 2006). Because racism and ableism both may impact students, distinguishing the influences of both race and ability separately can be difficult (Connor et al., 2016).

DisCrit

Dis/ability Critical Race Studies (DisCrit) is an important framework when examining multiple aspects of identity and their interactions with society for students with dis/abilities (Annamma et al., 2016). Scholars who use DisCrit focus on the ways in which race and ability intersect in society and emphasize that both aspects of identity are socially constructed. The tenets of DisCrit assist scholars and practitioners in recognizing the systemic oppression of racism and ableism aiming to disrupt this oppression (Banks, 2017). Historically, students from underserved populations have been more likely to be labeled as having a dis/ability even if there is not enough evidence to properly diagnose (Parrish, 2002). This labeling leads to oppression in multiple spaces in society, including education.

Summary of Relevant Literature

According to the National Center for Education Statistics, (NCES, 2016), 11.1% of college students in the 2011-12 academic year identified as having a dis/ability, remaining consistent with 10.9% in 2007-08. Although the percentage of White students reporting dis/abilities has decreased slightly from 2007-08 to 2011-12, the percentage of students with dis/abilities from several other races and ethnicities has increased over the same time span. These increases do not necessarily indicate that there are increases in the number of students with dis/abilities. Rather, these values indicate an increase in the number of students who self-report as having dis/abilities. This distinction is necessary due to the differences in the experiences of students with disabilities at the K-12 level compared to the postsecondary education level. At the K-12 level, services and accommodations for students with dis/abilities are legally mandated and initiated by the school, with communication and assistance from parents or guardians (Shaw, 2012). However, at the postsecondary level, students must choose to disclose a dis/ability and seek out services themselves through the appropriate office(s) on their campuses (Newman & Madaus, 2015). As more postsecondary students report having dis/abilities, more research is needed to better understand these populations in order to improve services.

In their review of the literature, Kimball et al. (2016) found that most studies about students of color with dis/abilities are qualitative in nature. Conversely, Peña (2014) stated that most articles about students with disabilities published in the highest-impact higher education journals were quantitative, but only 22 were included in these journals between 1990 and 1999 with just three more between 2000 and 2010, and these articles seldom considered multiple identities. Researchers who have considered other aspects of identity often did not disaggregate dis/ability type instead focusing on a single dis/ability or combining the experiences of all students with dis/abilities.

Very few extant studies used large datasets to understand the experiences of the overall population of students with dis/abilities, let alone disaggregating by race and ethnicity. Fairweather and Shaver (1990) used a national survey to explore engagement experiences of students with dis/abilities with considerations of ethnicity and dis/ability type, but few others have pursued this line of research. For quantitative researchers, one reason for this dearth of scholarship is the small number of students who identify as having both a dis/ability and a racially minoritized identity. For example, one researcher found individuals who identify as students of color make up approximately 9% of the first-year students with disabilities (Banks, 2014). Among some populations, separating aspects of identity may not be appropriate. For example, dis/ability statuses may act much like a culture, such as Deafness that may offer a shared history and communication style, and even supplant ethnic identities (Stapleton, 2015). It can be the case that this same identity renders these students invisible, especially at institutions where there are few role models who represent shared ethnic and dis/ability identities (Stapleton & Croom, 2017).

Because of these limitations, quantitative researchers in higher education struggle to study the multiple identities of students of color with dis/abilities. In this research, we hope to ameliorate these issues by extending the current literature with information regarding the engagement of this overlooked population. The research questions guiding the current study were:

1. Accounting for student background and major, along with institutional characteristics, how do student race and ethnicity significantly relate to engagement among students with disabilities?
2. Accounting for student background and major, how does type of disability significantly relate to engagement among students of color with disabilities?

Conceptual Framework

The concept of student engagement is the theoretical framework that guided the current study. Engagement can be defined as the effort devoted by students toward educational activities in-class and outside the classroom (Kuh, 2001, 2009). Astin (1984), Tinto (1987), Pascarella and Terenzini (2005), and numerous others have shown that involvement in diverse academic and social experiences are related to desired outcomes. However, preliminary concepts of student engagement have been created by mostly White scholars using data of a majority of White respondents (Patton, Harper, & Harris, 2015). Therefore, new perspectives are necessary to adjust this concept and accommodate diverse populations (Quaye & Harper, 2015).

A few scholars have applied this theory to the understanding of students with disabilities. In their review of engagement literature, Brown and Broido (2015) highlighted the value of academic and co-curricular engagement for students with disabilities and the barriers related to legal issues, ableist attitudes, self-reporting, physical layout, and institutional commitment. In an applied study, Kimball, Friedensen, and Silva (2017) used the concept of student engagement to understand the experiences of eight undergraduate students with cognitive disabilities through interview. Their finding that "disability is a multi-faceted phenomenon that interfaces with engagement in diverse ways" (p. 73) provides credence to the current study's purpose to map the ways engagement is differential for students of diverse races and ethnicities within the disabilities population. In prior scholarship using the National Survey of Student Engagement (NSSE), significant relationships to engagement have been demonstrated related to student gender (BrckaLorenz, Garvey, Hurtado, & Latopolski, 2017; Mayhew, Seifert, Pascarella, Nelson Laird, & Blaich, 2012; Rocconi, Ribera, & Nelson Laird, 2015), transfer status (Webber, Nelson Laird, & BrckaLorenz, 2013; Zilvinskis & Dumford, 2018), first-generation status (Pike, Smart, & Ethington, 2012; Rocconi, Lambert, McCormick, & Sarraf, 2013), and academic major (Rocconi, Ribera, Nelson Laird, 2015; Webber, Nelson Laird, & BrckaLorenz. 2013). This previous research informed covariate selection for our analytical models.

For the outcomes of the study, we chose aspects of engagement (*higher-order learning, student-faculty interaction,* and *supportive environment*) that have been shown in previous scholarship to be related to other desired outcomes, such as the development of leadership skills and self-confidence (Kezar & Moriarty, 2000), persistence rates (Nelson Laird, Chen & Kuh, 2008), and exploration of future career plans (Gonyea & Kinzie, 2015). As defined in the NSSE, *higher-order learning* involves academic coursework that encourages more complex thinking than rote memorization; tasks that involve *higher-order learning* are generally challenging and thought-provoking. *Student-faculty interaction* involves interaction with faculty members outside of the classroom; this interaction can have a positive influence upon student development and persistence (NSSE, 2018). Finally, *supportive environment* involves student perception

of the extent to which the institution supports learning and development; these perceptions can influence student performance and satisfaction.

We reviewed other engagement research more attuned to the group of interest in the current study to guide design. Scholars using data from the NSSE disaggregated multiracial students and found that Latino/White biracial students were one of the largest subgroups (2.1%) of the sample and found (a) this group reported the highest level of *supportive environment* compared with other first-year biracial, monoracial, and multiracial students, and (b) this group reported significantly lower *student-faculty interaction scores* compared with their biracial peers (Harris, Brcka-Lorenz, & Nelson Laird, 2018). Because a sizable population was identified in this prior research and the scholars related the engagement of Latino/White biracial students with the outcomes of interest in the current study, we also disaggregated our sample to include this group.

Additional Research Design Considerations

Two other theoretical constructs, critical quantitative research and an anti-deficit framework, guided the current study. Vaccaro et al. (2015) recommended that researchers using a critical perspective use sophisticated analysis and disaggregate students with disabilities by subgroups by writing research questions that are clear and appropriately answerable with the data available. A critical lens enables researchers to question socially imposed limitations, such as reducing disability to a single bivariate measure, and contributes to the development of institutional policies that liberate this "significant, yet understudied" population (p. 38). Our research does not realize the goal of being critical, because this is not an explicit examination of power (Mackenzie & Knipe, 2006). However, this work does connect to some aspects of critical work in the area of disability. In their treatment of Dis/ability Critical Race Studies (DisCrit), Connor et al. (2016) observed that even descriptive statistics can be helpful in understanding the experiences of students of color with disabilities.

Also employed in the current study is an anti-deficit framework. Based on theories stemming from education, sociology, psychology, and gender studies, using an anti-deficit framework encourages researchers to invert existing paradigms and questions in order to recognize the pathways to success used by individuals from marginalized communities (Harper, 2010, 2012). This framework guided the development of the current study in two ways. First, instead of contributing to a deficit narrative by comparing students with and without disabilities, we restricted the current dataset to only students with disabilities. Second, instead of reinforcing hegemony by modeling White respondents as a reference group, we employed effect coding so the comparison group is all students within the sample—not just White students.

Data Sources and Methods

The National Survey of Student Engagement (NSSE) is completed each year by first-year and senior students from between 700 to 1,500 institutions (Kuh, 2001). The NSSE provides actionable evidence for institutions to improve the quality of education (Banta, Pike, & Hansen, 2009; Kuh, 2005). Within the NSSE, the relationships between evidence-based practices and learning outcomes are explored through ten Engagement Indicators, enabling institutions to compare annual data to better understand the effectiveness of their practices so that they may design efforts to improve educational quality (McCormick et al., 2013). NSSE data were used with permission from The Indiana University Center for Postsecondary Research.

For the current study, we drew on responses from the 2015 and 2016 administration of the NSSE. Combining years yielded an increase in the number of first-year students with disabilities ($n = 16,368$). For the first research question, because we wanted to account for variance both at level-one (student) and level-two (institution), we removed institutions with fewer than 30 students, which is the recommended group size cut-off for education research (Kreft & De Leeuw, 1998). Using this cut-off resulted in only 39.62% of the total responses being retained from 135 eligible institutions: 32 private, 82 doctoral degree granting universities, 47 master's degree granting institutions, and six bachelor degree granting colleges with one Minority Serving Institution. See Table 1 for level-one sample descriptive statistics.

For the second research question, because institutions have so few students of color with disabilities, the multilevel modeling cut-off of 30 students per institutions would have yielded fewer than ten universities. Therefore, we used multiple regression to answer this question. Using this method allowed us to reinstate responses removed for the first research question. Meanwhile, students who preferred not to respond when asked about their race and ethnicity, mono-racial White respondents, and respondents who did not identify their type of disability were removed from the sample. The survey results of 2,672 first-year students of color with disabilities were analyzed (16.32% of the total responses), and only 273 institutions were retained (110 private, 126 doctoral, 118

master's, 29 bachelor's). See Table 2 for level-one sample descriptive statistics.

Measures

Near the end of the NSSE, respondents are prompted to answer a binary question, "Have you been diagnosed with any disability or impairment?" We removed students who did not answer in the affirmative from the sample. For the second research question, respondents who answered in the affirmative are asked an additional question, "If yes, which of the following has been diagnosed?" and are presented with a check-all survey item with five options of disability. Seven disability groups emerged: a sensory impairment, a mobility impairment, a learning disability, a mental health disorder, a disability or impairment not listed above, learning and mental health disability, and more than one disability or impairment. We considered students with both a learning and a mental health disability independently from students with more than one disability or impairment because this was the largest subgroup of students reporting multiple disabilities. We treated these measures as independent variables for the second research question.

Independent Variables

In the NSSE, respondents are asked, "What is your racial or ethnic identification?" allowing multiple responses to be chosen from among eight options. In the current study, students who selected more than one choice were categorized as "multiracial," unless they only selected "Hispanic or Latino" and "White"; these students made up their own group, "Latino and White biracial." Because in previous NSSE research scholars have demonstrated differential engagement patterns among these students (Harris, BrckaLorenz, & Nelson Laird, 2018), we identified this specific group of multiracial students. For students who did not answer this question in the survey, we backfilled with information from institutionally reported data of the respondent (*n* = 19). Although inferring the racial or ethnic identity of respondents who selected "prefer not to respond" is impossible, we retained these responses in the model to honor the time spent by the students in completing the survey and this option was not backfilled out of respect for respondent choice.

Model Covariates

There are fourteen dichotomous level-one covariates included in the multilevel model and three for the second level. For the first covariate, answers in the affirmative to, "Are you an international student?" were recoded as equal to one and all other responses recoded as zero (a dichotomous variable) for the mea-

sure "International." For gender, respondents were presented the following four options to answer the question, "What is your gender identity?": "Woman," "Man," "Another gender identity," and "Prefer not to respond." The last three responses were recoded into their own dichotomous covariate measures, with "Woman" as the reference group.

For generation status, researchers recently have shown differential relationships of college student outcomes by refraining from a first-generation/non-first-generation dichotomy and using a spectrum of multiple groups instead (Toutkoushian, Stollberg, & Slaton, 2018). Therefore, four groups were derived from responses to the question, "What is the highest level of education completed by either of your parents (or those who raised you)?" The first group, "High School," included two responses, "Did not finish high school" and "High school diploma/G.E.D." The second group "Associates" also included two responses "Attended college but did not complete degree" and "Associate's degree (A.A., A.S., etc.)." The third group, "Bachelor's Degree" only included those who only selected, "Bachelor's degree (B.A., B.S., etc.)." The fourth group, "Advanced Degree" included two responses, "Master's Degree (M.A., M.S., etc.)" and "Doctoral or professional degree (Ph.D., J.D., M.D., etc.)." This last group was the largest of the four (37.44% of the sample) and, thus, served as the reference group in multilevel modeling.

The other seven covariates are dichotomous variables indicative of their corresponding measurement label. First, the response of "Started elsewhere" to the question, "Did you begin college at this institution or elsewhere?" was labeled "Transfer." Second, an age below 21 was re-categorized "Traditional Age" for the first-year sample of the study. Third, a respondent who answered in the affirmative to the question, "Are you a current or former member of the U.S. Armed Forces, Reserves, or National Guard?" was identified as a "Veteran." Fourth, a student who majored in a Science, Technology, Engineering, or Math field was categorized as "STEM." Fifth, a response in the affirmative to, "Are you a member of a social fraternity or sorority?" was labeled "Fraternity or Sorority." Sixth, for the question, "Which of the following best describes where you are living while attending college?" if the responses was either "Dormitory or other campus housing or fraternity or sorority house" was labeled "On Campus." Seventh, a response in the affirmative to the question, "Are you a student-athlete on a team sponsored by your institution's athletics department?" was recoded as "Athlete."

For the level-two covariates, we identified institutions by sector using the label "Private." Also, we

collapsed the institutions' Carnegie Classifications into Doctoral, Master's, and Bachelor's designation, with the Doctoral group being the largest and serving as the reference group. Another level-two covariate is a scale measure of a collapsed version of Barron's selectivity index ranging from 1 = *Noncompetitive* to 6 = *Most competitive*. The last level two variable is the IPEDS value for undergraduate enrollment in the fall of 2014 rounded to the nearest thousand to measure institutional "Undergraduate Enrollment."

Dependent variables. The outcomes of this study include measures of a variety of survey items measuring student behavior related to three Engagement Indicators: *higher-order learning, student-faculty interaction,* and *supportive environment* (please email to receive an Appendix reflecting item description and Cronbach's alpha). Reliability statistics for the broad sample (research question one) and the restricted sample (research question two) met the minimum reliability statistic to be included as a scale ($E\rho^2 \geq 0.80$).

Data Analysis

The analysis of these data consisted of three parts. First, we recoded the variables for the first research question describing race and ethnicity using effect coding to offset the norming of the White experience within higher education. For the second research question, we applied effect coding to the types of student disability. Second, we applied multilevel modeling to measure the discriminant relationships between the independent variables (race and ethnicity) and the dependent variables (three measures of student engagement). Third, we conducted multiple regression analysis on the students of color with disabilities to measure the ways disability type relates to these dependent variables within this group.

Effect Coding

Instead of employing indicator codes to represent the race and ethnicity of the respondents (in which White students often serve as a reference group), we employed effect coding in the current analysis. In this process, students who identified as mono-racial White are still excluded from the regression; however, these students are recoded as "-1" in each of the otherwise bivariate representations of the eight other racial and ethnic subgroups (Mayhew & Simonoff, 2015a). The benefit of this process is that, rather than interpreting the effect in relation to the reference group, "interpretations of effect codes are based relative to the unweighted average of the group means" (Mayhew & Simonoff, 2015a, p. 172). This form of coding leads to representation of race and ethnicity

more in line with the respondents' understanding of this aspect of their identity, and improves the accuracy of the analysis (Mayhew & Simonoff, 2015b). We repeated this process for the second research question using students with only a learning disability as the reference group. Therefore, the reader can interpret the effects compared with all respondents in the sample, rather than just those in the reference group. IBM SPSS Statistics 25 was used for effect coding.

Multilevel Modeling

For the first research question, we developed three random intercept multilevel models for each of the dependent variables. During the model building process, we assessed fit to ensure the change in the log-likelihood was above the threshold for the degrees of freedom lost when adding each fixed effect (Snijders & Bosker, 2011). This threshold is established using the chi-square statistic for the *p*-value of 0.05 for each model level: null ($\chi^2_3 = 7.81$), independent variables ($\chi^2_9 = 16.92$), model covariates ($\chi^2_{14} = 23.69$), and institutional characteristics ($\chi^2_5 = 11.07$). For each model, we calculated the Intraclass Correlation (ICC) and the Design Effect (DE) statistics to measure the proportion of variance attributed to the second-level effects along with the appropriateness of multilevel modeling (Peugh, 2010). We cleaned the sample, calculated outcome reliability using IBM SPSS Statistics 25, and performed multilevel modeling using SAS 9.4.

Multiple Regression Analysis. For the second research question, the sample was restricted to only students of color with disabilities. Since so few institutions had the minimum number of these respondents for multilevel modeling, we employed a single-level multiple regression analysis to measure the relationship between the independent variables (student disability type) and the dependent variables, while accounting for the student-level covariates. The analysis included calculation of the Adjusted R^2 to measure the amount of variance in the dependent variables that can be attributed to effects of the independent variables and covariates, along with a calculation of the Tolerance measures for multicollinearity (Hahs-Vaughn & Lomax, 2013). The multiple regression analysis was performed using IBM SPSS Statistics 25.

Results

The first research question was, "Accounting for student background and campus activities along with institutional characteristics, how are levels of engagement of students with dis/abilities significantly

different based on race and ethnic identity compared with other first-year students with dis/abilities?" There were six significant ($p < 0.05$) effects within the multilevel models relating student race and ethnicity to engagement among students with disabilities. For the second research question, "Accounting for student background and campus activities, how are levels of engagement of students with dis/abilities significantly different by type of dis/ability for only first-year students of color?" there were five significant relationships between disability type and the three measures of the engagement.

For each outcome, each set of variables met the fit criteria in the multilevel model building process. The ICC ranged between 0.004 and 0.016 indicating that less than two percent of the variance can be attributed to second-level effects. The DE ranges between 1.18 to 1.78, which is problematic as researchers suggest that the DE should be greater than 2.00 to warrant multilevel modeling (Peugh, 2010). However, researchers recently have tested this criterion and found it not to be definitive, especially if researchers are interested in level-two effects (Lai & Kwok, 2015). This type of analysis was retained since a goal of the current study is to provide robust evidence of the relationships between race and engagement among students with disabilities, which includes accounting for the nested nature of students within institutions.

For the first research question, there were six significant ($p > 0.05$) relationships between the dependent variables and respondent race and ethnicity (see Table 4). For the outcome of *higher-order learning*, Black or African American students with disabilities reported significantly lower scores compared with their peers ($\gamma 00 = -3.11$, *SE* = 0.99) as did multiracial students with disabilities ($\gamma 00 = -1.72$, *SE* = 0.78). For the outcome of student-faculty interaction, American Indian or Alaska Native students with disabilities reported significantly higher scores compared to their peers ($\gamma 00 = 4.38$, *SE* = 2.22), whereas students with disabilities who identified as Latino/White biracial reported significantly lower scores ($\gamma 00 = -2.47$, *SE* = 1.12). For the outcome of *supportive environment*, the scores reported by Latino/White biracial were significantly higher compared with their peers ($\gamma 00 = 2.18$, *SE* = 1.07), whereas respondents who selected "Prefer Not to Respond" when asked about their race reported significantly lower scores ($\gamma 00 = -3.80$, *SE* = 1.08).

For the second research question, the Adjusted R^2 ranged between 0.002 to 0.039, indicating that less than four percent of the variance of the outcomes is explained by the independent variables and covariates. The Tolerance statistic was greater than 0.10

for each variable in each model, indicating no issue related to multicollinearity (Hahs-Vaughn & Lomax, 2013). For the outcome of *higher-order learning,* students with both a learning and mental health disability reported significantly higher engagement ($\beta = 0.06$, *SE* = 0.86) compared with other students of color with disabilities in the sample. This trend was similar for the outcome of *student-faculty interaction* with students with both a learning and mental health disability reporting higher engagement ($\beta = 0.08$, *SE* = 0.91). However, students with a sensory impairment reported a lower level of engagement related to faculty interaction ($\beta = -0.13$, *SE* = 0.70) compared with peers. For the outcome of *supportive environment,* students with a sensory impairment reported a higher level of engagement ($\beta = 0.06$, *SE* = 0.66) compared with other students of color with disabilities, whereas students with more than one disability or impairment reported the environment to be significantly less supportive ($\beta = -0.06$, *SE* = 0.70).

When working to disaggregate data on students with disabilities, it is important to stress the practical significance as well as the statistical significance (Vaccaro et al., 2015). The measures for the first research question represent the unstandardized effects of outcomes scaled to a 0-60 scale; therefore, changes of an absolute value of two or more represent a substantial, practical difference. Five relationships meet this criteria. The measures for the second research question represent the standardized effects. Therefore, an effect with a magnitude of 0.6 indicates a small effect, whereas a magnitude of 0.12 indicates a medium effect (Mayhew et al., 2016). Therefore, these results indicate four cases of small effects and one medium effect, indicating some evidence of practical significance. Though these results may need to be applied cautiously, there is value in their dissemination due to the overall dearth of research in this area.

Limitations

The present study has various limitations that should be taken into consideration. First, the language that is used by NSSE for the disability item presents a limitation not only because it is presented through a medical model (i.e., "diagnosed" with a disability), but it also does not provide a definition for increased comprehension. For example, vision is included as an option under "sensory impairment." It may be unclear to respondents whether or not vision means having prescribed vision-aids such as glasses or contact lenses constitutes a disability. Furthermore, the five categories of disability provided to students in the NSSE may not reflect the categories students

are likely familiar with through seeking services and accommodations in the K-12 setting (Shaw, 2012). Second, there seems to be an under-representation of students with disabilities in the sample. For example, research has indicated that approximately 11% of students attending higher education have a disability (NCES, 2016). However, in our sample only 3% of the population are identified as students with disabilities. This under-representation could be related to the previous limitation regarding how the NSSE disability item is phrased or may be related to the institutions participating. The NSSE represents only respondents from four-year institutions who selected to participate in the survey. Private institutions are over-represented in this group. This factor introduces bias, because it does not encompass a more inclusive data set and the experiences of students with disabilities at these institutions may differ from those who attend public institutions. In addition, a number of students with disabilities enroll in two-year institutions and therefore are excluded from this dataset.

Self-reported data constitutes a third limitation of this study. Many critiques of self-reported data exist primarily in regard to the extent to which individuals are able to interpret their own learning (Bowman, 2011; Porter, 2011). However, use of self-reported data enable researchers to get a more objective understanding of learning experienced by respondents (Baird, 1976; Pike, 1995, 1996). Finally, respondents have the option to select "I prefer not to answer" for the ability question. Due to lack of interpretability, these students were removed from the sample; however, the size of this group from eligible responses the 2015 and 2016 administration of the NSSE was not negligible ($n = 12,906$). It may be the case that students with disabilities selected this option. Future research of the rationale of respondents who selected this option would provide helpful understandings of this sizable trend.

Fourth, combining these limitations, it is difficult to understand the degree to which the sample represents students with disabilities as previous researchers have documented considerations related to disclosure among this group. For example, Newman and Madaus (2015) examined longitudinal data of 3,190 students with disabilities transitioning from high school to college and found a little over a third of them informed their institution regarding their status. The degree to which this trend of disclosure lends to representation via survey responses is unclear; however, this finding indicates a broad inclination among this population not to disclose in higher education spaces. Leake and Stodden's (2014) research on underrepresented populations suggests that

campus climate (e.g., the degree to which disability is understood as an aspect of diversity) contributes to stigma of self-disclosure on campus surveys used to estimate the size of this population. The combined results of studies such as these suggest that the actual number of college students with disabilities is much larger than what is documented.

Discussion

The results of the current study indicate that there are differential engagement patterns for students of color with disabilities. When comparing the results to the rest of the sample, there were significantly different levels of engagement for *higher order learning* (lower for Black or African American students and multiracial students), *student-faculty interaction* (higher for American Indian or Alaska Native students and lower for Latino/White biracial students), and *supportive environment* (higher for Latino/White biracial students and lower for respondents who selected "Prefer Not to Respond"). Results of the Latino/White biracial students are in line with previous engagement research (Harris, BrckaLorenz, & Nelson Laird, 2018). As cited in the conceptual framework, these three engagement measures are important indicators of collegiate quality and have been shown to be related to other desired outcomes within higher education.

When disaggregated by disability for students of color, there were also significantly different levels of engagement. When compared to the rest of the sample, students with both learning and mental health disabilities reported higher engagement related to *higher order learning* and *student-faculty interaction.* Students with a sensory impairment reported much lower *student-faculty interaction* but found their environment more supportive. Students with more than one disability found their environment less supportive than other students of color with disabilities. Our results indicate that the multiple identities of students with disabilities are related to distinct patterns of engagement and speak to broader considerations in this scholarship.

Our methodological choices allowed us to explore two DisCrit tenets: "1) DisCrit privileges voices of marginalized populations, traditionally not acknowledged within research, and 2) DisCrit values multidimensional identities and troubles singular notions of identity such as race or dis/ability or class or gender or sexuality, and so on" (Connor et al., 2016, p. 19). As Peña (2014) pointed out, few studies focus on students with disabilities, and those that do often frame these students within a deficit narrative by compar-

ing them with their peers without disabilities. In this study, we aimed to privilege the voice of this marginalized population by including only students with disabilities for the first research question and including only students of color with disabilities for the second research question. For disability services educators, the structure of our research demonstrates how race may be explored in assessment of students with disabilities. Furthermore, we used effect coding to make the comparisons within the independent variables (race and ethnicity for the first research question and disability type for the second). Therefore, estimates within the models were measured in comparison to the rest of the corresponding subsamples. These choices allowed for these groups to be privileged within the current study, whereas they are typically not acknowledged in research at large.

The second DisCrit tenet realized in this research is the recognition of multidimensional identities. As the independent variables of the two research questions suggest, the current research is focused on understanding the engagement of students with disabilities by race and ethnicity and the engagement of students of color with disabilities by disability type, which trouble the concept that either of these aspects of identity are uniform in how they manifest in engagement on college campuses. For educators on college campuses, these findings provided evidence of the concepts of aspects of identity introduced in the beginning of this study. Further realizing the goal of this tenet is the covariate information within the third and fourth models, in which consistent significant relationships related to gender, first-generation status, and campus experience are related to distinct levels of engagement.

To continue advancing scholarship that recognizes the myriad experiences of students of all identities, survey items should be constructed in ways that respect the ever-changing student population (Wells & Stage, 2015). Though encapsulating all experiences in a survey may be difficult, researchers may wish to include multiple related questions to better address complex topics. For example, while the NSSE utilizes the medical model of disability that measures students' diagnoses, the Community College Survey of Student Engagement (Center for Community College Student Engagement, 2019) uses an interactionist model that measures students' use of disability services (Zilvinskis, 2020 ; Evans et al., 2017). An effort to advance critical quantitative perspectives may strive to employ both question types and triangulate the patterns of students whose experiences differ from a traditional view of students with disabilities.

Implications for Practice

For the first research question, there were six significant relationships in which students of distinct races and ethnicities engaged differently from their peers. Furthermore, the finding that Latino/White biracial students held two of those significant relationships relate to prior research on the engagement of this biracial group (Harris, BrckaLorenz, & Nelson Laird, 2018). For the second research question, there were five significant relationships in which the engagement of students of color with disability differed by type of disability compared to peers within the subsample. Two of those relationships (both positive) exist for students with a learning and mental health disability, whereas students with a sensory impairment also had two significant relationships (one positive, one negative). These findings provide evidence for future researchers who wish to understand the heterogeneous nature of identity within the groups of either students with disabilities or students of color with disabilities.

Considering the sampling limitations of this population such as classification (Banks, 2014), disability cultural norms (Stapleton, 2015), and representativeness (NCES, 2016), it is difficult to suggest that the trends observed within these respondents can be or should be generalized to all students with disabilities in higher education. Therefore, we are not convinced that the current differences should result in specific actions among educators. However, the fact that there are quite a few significant relationships among independent variables and covariates with these outcomes helps provide evidence of the call made by Peña, Stapleton, and Schaffer (2016), urging educators to refrain from treating students with disabilities as a monolithic group and consider how multiple identities may influence student behavior, in this case engagement. These differential relationships may be helpful in guiding the research of scholars invested in the specific groups, as a way to measure their engagement compared to their peers.

As stated above, targeted service delivery may not be the best solution. Rather, training on the intersectionality of marginalized aspects of identity may help ease the discrimination felt by students identifying with multiple marginalized groups, such as students of color with disabilities. Academic advisors, for example, consistently lack training on working with students with disabilities (Preece et al., 2007). Coupled with the fact that cultural competency training has not been ingrained in master's programs for student affairs administration fully or long enough (Kennedy & Wheeler, 2018), educator specialists may lack tools

to connect with students with disabilities who also belong to other underrepresented groups. Faculty and student affairs professionals help constitute the "supportive environment" at a university. Implementing training on working with students with disabilities, and integrating cultural competency training and understanding of intersectionality into these trainings, may make a difference for many students, as it can help them feel more heard, supported, and seen.

Beyond training, disability services educators can evaluate the structure of their services to collaborate with stakeholders on campus to leverage the cultural knowledge of established groups. For example, these offices can partner with other functional areas on campus such as Multicultural Students Programs and Services to create unique educational spaces for students of color with disabilities, while combining the expertise of trained professionals. In their application of DisCrit to higher education practice, Stapleton and James (2020) invite practitioners to "Rethink who is on your team" (p. 220). These scholars recommend disability services educators leverage resources from national organizations such as ACPA and NASPA to increase understandings of students of color with disabilities, while also considering leveraging local expertise on disability through Faculty-in-Residence programs. Disability services educators can also collaborate with student organizations; on our campus, student leaders host a Disability as Diversity tabling event where student organizations share strategies on the ways to support students with disabilities. Events like these provide educators an opportunity to partner with students of color while providing relief for the systems of oppression introduced in the beginning of this study.

Future Research

One area for future research is faculty perceptions of students with disabilities from minoritized identities. Such research could contribute to an understanding of possible barriers to student-faculty interaction for these students. Further investigation into perceptions of the campus environment by students with disabilities from minoritized identity groups also is indicated. One area of investigation might be the relationship between the Engagement Indicator of *supportive environment* and students' sense of belonging on campus. Because almost half of students with disabilities begin their college careers in two-year institutions (NCES, 2016), the engagement experiences of students with disabilities from diverse racial/ethnic groups at community colleges should be studied to give a more complete picture of the postsecondary

experiences of these groups of students. Data from the Community College Survey of Student Engagement (CCSSE) could be used in such an exploration. An additional opportunity for future research is the role of intersectionality in the experiences of students of color with disabilities. With a direct focus on issues of ableism and racism, future research could employ the tenets of DisCrit and challenge power structures that impact student experiences. Other data sets or qualitative investigation may be used to build on this work and continue prioritizing the voices of marginalized populations (Connor et al., 2016).

Beyond role modeling critical quantitative research design, the substantial contribution of the current study to scholarship in this area is dispelling the notion that students with disabilities are a monolithic group. In the current study, we demonstrate the heterogeneity within this group by examining the engagement patterns of subpopulations along the identity aspects of race and ethnicity. Even though we suggest from this national sample that trends in engagement are higher for some than others, this conclusion is not by itself an indicator that institutions are doing a good job supporting students with disabilities (one simply needs to read the qualitative research on this topic to learn how poorly the academy is supporting these students). Instead, these numbers are valuable in that they suggest discriminant engagement patterns for students of color with disabilities, indicating that educators should be aware that their students with multiple identities are engaged in different ways. As a result, educators need to alter their practice to better serve all students.

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Table 1

Descriptive Statistics and Counts of Model Variables for the First Research Question

	n	%	Higher-Order Learning		Student-Faculty Interaction		Supportive Environment	
			M	SE	M	SE	M	SE
Independent Variables								
American Indian or Alaska Native	35	0.01	43.9	2.4	28.3	2.9	38.1	2.6
Asian	185	0.03	38.8	1	21.7	1.2	35.4	1.1
Black or African American	221	0.03	36.8	1	21.2	1.1	36.2	1
Hispanic or Latino	337	0.05	41.2	0.8	22.5	0.8	37.2	0.8
Latino/white biracial	171	0.03	38.6	1.1	19.1	1.1	38.8	1
Multiracial	460	0.07	37.8	0.7	21.1	0.7	35.3	0.7
Native Hawaiian or Other Pacific Islander	12	0	41.3	3	22.5	5.3	41.9	4.3
Other	77	0.01	41.4	1.5	23	1.5	34.4	1.5
Race - prefer not to respond	176	0.03	37.4	1.1	20.3	1.1	31.8	1.1
White*	4,811	0.74	38.1	0.2	20.3	0.2	36.1	0.2
Model covariates								
International	107	0.02	40.2	1.4	26.2	1.7	34.8	1.5
Woman*	4,179	0.64	38.7	0.2	20.5	0.2	36.8	0.2
Man	2,060	0.32	37.6	0.3	20.7	0.3	35	0.3
Another gender identity	141	0.02	37.7	1.2	20	1.2	33.3	1.2
Gender - prefer not to respond	105	0.02	36.8	1.4	19.9	1.3	31.9	1.1
High school	1,014	0.16	39.3	0.4	21.7	0.5	36.2	0.5
Associates	1,101	0.17	38.5	0.4	21.1	0.4	36.3	0.4
Bachelor's degree	1,944	0.3	38.2	0.3	19.7	0.3	35.9	0.3
Advanced degree*	2,426	0.37	37.9	0.3	20.6	0.3	36	0.3
Transfer	643	0.1	38.5	0.6	18.7	0.6	33.3	0.6
Traditional age	5,858	0.9	38.2	0.2	20.9	0.2	36.5	0.2
Veteran	167	0.03	39	1.2	22.4	1.4	33.4	1.2
STEM	1,619	0.25	37.6	0.3	19.9	0.4	35.5	0.3
Fraternity or sorority	859	0.13	38.7	0.5	23.2	0.5	38.2	0.5
Living on campus	4,623	0.71	38.2	0.2	21.2	0.2	37	0.2
Student-athlete	313	0.05	37.9	0.8	24.8	0.9	36.9	0.8

(Table continues)

	n	%	Higher-Order Learning		Student-Faculty Interaction		Supportive Environment	
			M	*SE*	*M*	*SE*	*M*	*SE*
Institutional characteristics								
Private	1,629	0.25	39.5	0.3	19	0.3	35.6	0.3
Doctoral universities*	4,445	0.69	38.3	0.2	20.3	0.2	36.4	0.2
Master's colleges and universities	1,843	0.28	38.1	0.3	20.9	0.3	35.1	0.3
Bachelor's college	197	0.03	39.9	0.9	22.5	1	37.5	0.9
Barron's selectivity								
Noncompetitive	58	0.01	41	1.8	19.8	1.9	34.8	2.1
Less competitive	357	0.06	38.4	0.8	20.4	0.8	34.3	0.8
Competitive	2,932	0.45	37.9	0.3	20.7	0.3	35.8	0.3
Very competitive	1,925	0.3	38.7	0.3	21.3	0.3	37	0.3
Highly competitive	939	0.14	38.5	0.4	19.2	0.4	36.4	0.4
Most competitive	274	0.04	38.8	0.8	19.1	0.8	33.7	0.8

Note. * = Served as a reference group for multilevel model

Table 2

Descriptive Statistics and Counts of Model Variables for the Second Research Question

			Higher-Order Learning		Student-Faculty Interaction		Supportive Environment	
Independent variables	*n*	*%*	*M*	*SE*	*M*	*SE*	*M*	*SE*
A sensory impairment	474	0.13	40	0.7	21	0.7	38.7	0.7
A mobility impairment	172	0.05	40.2	1.1	23.3	1.2	36.1	1.1
A learning disability*	1,053	0.29	38.6	0.4	23.8	0.5	35.9	0.4
A mental health disorder	776	0.21	39.1	0.5	21.6	0.6	35.8	0.5
A disability or impairment not listed above	533	0.15	39.4	0.6	22.8	0.7	37.3	0.6
Learning and mental health disability	243	0.07	41	0.9	23.9	0.9	37	0.9
More than one disability or impairment	391	0.11	39.5	0.8	22	0.8	34.7	0.8
Model covariates								
American Indian or Alaska Native	103	0.03	39.8	1.6	24.7	1.7	34.9	1.6
Asian	397	0.11	39.7	0.7	23.6	0.8	36.1	0.7
Black or African American	706	0.19	38.1	0.6	23.3	0.6	36.6	0.6
Hispanic or Latino	757	0.21	40.6	0.5	21.3	0.5	36.9	0.5
Latino/white biracial	387	0.11	39.4	0.7	21.4	0.7	37.6	0.7
Multiracial*	1071	0.29	38.8	0.4	22.8	0.5	35.9	0.4
Native Hawaiian or Other Pacific Islander	32	0.01	40.9	2.7	27.8	3.1	41.5	2.7
Other	189	0.05	40.9	1	23.2	1.1	34.8	1.1
International	183	0.05	39.7	1.2	27.3	1.3	36.9	1.2
Woman*	2311	0.63	39.8	0.3	22.4	0.3	36.8	0.3
Man	1177	0.32	38.9	0.4	23.3	0.5	36.1	0.4
Another gender identity	88	0.02	35.6	1.8	22.3	1.5	33	1.7
Gender - prefer not to respond	55	0.02	35.7	2	19.8	1.6	31.3	1.8
High school	913	0.25	39.9	0.5	23.3	0.5	36.8	0.5
Associates	768	0.21	39.3	0.5	23.3	0.6	36.7	0.5
Bachelor's degree	873	0.24	39.2	0.5	21.2	0.5	36	0.5
Advanced degree*	1077	0.3	39	0.4	22.8	0.5	36.2	0.4
Transfer	478	0.13	40.9	0.7	21	0.7	34.4	0.7
Traditional age	3069	0.84	39.3	0.3	23.1	0.3	36.9	0.3
Veteran	233	0.06	38.6	1.1	24.4	1.2	34.5	1.1
STEM	875	0.24	39.6	0.5	22.8	0.5	36.6	0.5
Fraternity or sorority	357	0.1	39.3	0.8	28	0.9	37.9	0.8
Living on campus	2227	0.61	39.2	0.3	23.9	0.3	37.1	0.3
Student-athlete	312	0.09	38.7	0.9	29.2	1	37.5	0.9

(Table continues)

Independent variables	n	%	Higher-Order Learning		Student-Faculty Interaction		Supportive Environment	
			M	SE	M	SE	M	SE
Institutional characteristics								
Private	1625	0.45	40.1	0.4	22.8	0.4	36.3	0.4
Doctoral universities*	1626	0.45	39.3	0.4	21.7	0.4	36.1	0.4
Master's colleges and universities	1476	0.41	39	0.4	22.8	0.4	36.2	0.4
Bachelor's college	540	0.15	40.3	0.6	25.2	0.7	37.7	0.6
Barron's selectivity								
Noncompetitive	65	0.02	42.8	1.9	25.4	2	37.4	1.8
Less competitive	421	0.12	39.1	0.7	22.9	0.8	36.8	0.7
Competitive	1725	0.47	39.1	0.4	22.6	0.4	36.3	0.3
Very competitive	806	0.22	39.2	0.5	23.1	0.5	36.7	0.5
Highly competitive	271	0.07	39.7	0.9	22.2	0.9	35.8	0.8
Most competitive	152	0.04	40.1	1.1	22.2	1.2	36.5	1.1

Note. * = Served as a reference group for multilevel model

Table 3

Multilevel Modeling Results Measuring the Relationship between Engagement with Race and Ethnicity

	Higher-Order Learning			Student-Faculty Interaction			Supportive Environment		
	β		*SE*	β		*SE*	β		*SE*
Fixed Effects									
Intercept	38.86	*	1.35	19.78	*	1.56	34.21	*	1.50
Independent variables									
American Indian or Alaska Native	4.16		2.16	4.38	*	2.22	1.20		2.13
Asian	-0.92		1.08	-1.04		1.11	-1.16		1.07
Black or African American	-3.11	*	0.99	0.11		1.02	0.19		0.98
Hispanic or Latino	1.53		0.87	0.80		0.90	0.62		0.87
Latino/white biracial	-0.84		1.08	-2.47	*	1.12	2.18	*	1.07
Multiracial	-1.72	*	0.78	-0.55		0.81	-1.33		0.77
Native Hawaiian or Other Pacific Islander	1.86		3.59	-0.52		3.69	4.10		3.54
Other	1.99		1.50	1.60		1.55	-1.25		1.48
Race - prefer not to respond	-1.73		1.10	-0.69		1.13	-3.80	*	1.08
Model covariates									
International	1.75		1.42	4.23	*	1.47	-0.20		1.41
Man	-1.13	*	0.39	0.25		0.40	-1.77	*	0.38
Another gender identity	-0.75		1.18	-0.70		1.22	-3.42	*	1.17
Gender - prefer not to respond	-1.77		1.40	-0.53		1.44	-2.96	*	1.38
High school	0.92		0.55	1.73	*	0.57	1.45	*	0.55
Associates	0.58		0.51	0.77		0.53	0.99		0.51
Bachelor's degree	0.39		0.42	-0.94	*	0.43	-0.06		0.42
Transfer	-0.27		0.61	-0.92		0.62	-1.84	*	0.60
Traditional age	-0.77		0.77	2.40	*	0.81	1.70	*	0.78
Veteran	-0.14		1.22	1.93		1.26	0.06		1.21
STEM	-0.45		0.41	-0.92	*	0.43	-0.33		0.41
Fraternity or sorority	0.58		0.52	2.15	*	0.54	1.82	*	0.52
Living on campus	0.00		0.44	1.87	*	0.46	2.64	*	0.44
Student-athlete	-0.69		0.82	2.90	*	0.85	0.25		0.812

(Table continues)

	Higher-Order Learning			Student-Faculty Interaction			Supportive Environment		
	β		SE	β		SE	β		SE
Institutional characteristics									
Private	1.46	*	0.52	-1.57	*	0.65	-0.23		0.63
Master's colleges and universities	-0.08		0.49	0.54		0.61	-0.67		0.59
Bachelor's college	1.72		1.18	1.92		1.42	2.09		1.37
Barron's selectivity	0.06		0.23	-0.2		0.29	-0.32		0.28
Undergraduate enrollment	0.04		0.02	-0.06	*	0.03	0.04		0.03
Random Effects									
$\tau^2 0$	0.70		0.64	3.19	*	0.91	3.07	*	0.86
σ^2	187.11	*	3.33	197.02	*	3.49	181.08	*	3.21
Cases	6485			6485			6485		
Groups	135			135			135		
Average cluster size	48.04			48.04			48.04		
ICC	0.00			0.02			0.02		
Design Effect	1.18			1.75			1.78		

Note. $*p < 0.05$

Table 4

Multiple Regression Analysis by Disability Type

	Higher-Order Learning			Student-Faculty Interaction			Supportive Environment		
	β		SE	β		SE	β		SE
Constant	-	*	1.1	-	*	1.2	-	*	1.1
Independent variables									
A sensory impairment	-0.01		0.7	-0.13	*	0.7	0.06	*	0.7
A mobility impairment	0.02		1.0	0.01		1.1	0.00		1.0
A mental health disorder	-0.03		0.5	-0.03		0.6	-0.04		0.5
A disability or impairment not listed above	-0.01		0.6	0.05		0.7	0.04		0.6
Learning and mental health dis-ability	0.06	*	0.9	0.08	*	0.9	0.03		0.9
More than one disability or im-pairment	-0.01		0.7	-0.03		0.7	-0.06	*	0.7
Model covariates									
International	0.01		1.2	0.03		1.3	0.01		1.2
Man	-0.03		0.6	0.02		0.6	-0.01		0.6
Another gender identity	-0.04	*	1.6	-0.01		1.7	-0.04	*	1.6
Gender - prefer not to respond	-0.03		2.1	-0.02		2.3	-0.05	*	2.1
High school	0.02		0.7	0.05	*	0.7	0.04		0.7
Associates	0.01		0.7	0.03		0.8	0.03		0.7
Bachelor's degree	0.00		0.7	-0.04		0.7	0.00		0.7
Transfer	0.03		0.8	-0.02		0.9	-0.02		0.8
Traditional age	-0.01		0.9	0.07	*	0.9	0.06	*	0.9
Veteran	-0.02		1.2	0.02		1.3	-0.01		1.2
STEM	0.02		0.6	0.00		0.6	0.00		0.6
Fraternity or sorority	0.01		0.9	0.08	*	0.9	0.04	*	0.9
Living on campus	0.00		0.6	0.07	*	0.6	0.04	*	0.6
Student-athlete	-0.03		1.0	0.08	*	1.0	0.01		1.0
Adjusted R²	0.002			0.039			0.014		

Note. $*p < 0.05$