Centering Culture in Program Quality: Charting the Associations between Culturally Responsive Practices and Latine Adolescents' Basic Needs in a U.S. Math After-School Activity

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Abstract: Scholars have increasingly argued that we need to attend to adolescents' race, ethnicity, and culture in after-school activities to ensure positive effects. Still, little is known about adolescents' perceptions of culturally responsive practices in after-school activities (i. e., the use of diverse teaching practices, cultural engagement, and affirming diverse language preferences), including whether they are stable over time and beneficial to Latine adolescents, who are minoritized in U.S. society. Theoretically, culturally responsive practices are expected to help after-school activities meet adolescents' three basic needs as conceptualized by self-determination theory: autonomy, competence, and relatedness. Findings based on 134 Latine adolescents (53 % girls, M_{age} =11.74 years) participating in an after-school math enrichment activity suggest adolescents' perceptions of culturally responsive practices in the activity were moderately stable from winter to spring. There were no significant differences in adolescents' perceptions of culturally responsive practices based on gender or preferred language (i. e., English or Spanish), and significant positive associations emerged between adolescents' perceptions of diverse teaching practices and their feelings of autonomy, competence, and relatedness. This study offers insights for future theory development in the after-school field, particularly in the context of program quality, culturally responsive practices, and their implications for adolescent development and well-being.

Keywords: program quality, culturally responsive, after-school, extended education, self-determination theory, adolescents.

Introduction

Adolescents' math achievement is critical to many Science, Technology, Engineering, and Math (STEM) jobs (Watt, 2017), which are projected to grow by more than 10 % in the U.S. by 2032 (U.S. Bureau of Labor Statistics, 2023). Thus, it is essential to consider the experiences of Latine[1] adolescents in the U.S. who often face numerous structural barriers, including discrimination and enrollment in under-resourced schools (De Garmo & Martinez, 2006; Eamon, 2005). After-school activities can serve as a structural resource that supports historically marginalized adolescents in STEM (Krishnamurthi et al., 2014) by meeting their needs for autonomy, competence, and relatedness. These three needs lay the foundation for

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1 Spanish speakers in the U.S. are currently using the term Latine (instead of Latino/a) to refer to people of Latin American origin or descent because it is a gender-neutral, non-binary term (Miranda et al., 2023).

individuals' intrinsic motivation and have been shown to predict their math learning and motivation in a variety of contexts (Ryan & Deci, 2020). Indeed, participating in STEM after-school activities is linked positively with improved standardized math achievement and motivation (e. g., Faust & Kuperminc, 2020; Yu et al., 2022a).

Unfortunately, some Latine adolescents report experiencing discrimination, marginalization, and feeling misunderstood while participating in after-school activities (e. g., Ettekal et al., 2020). As such, scholars have increasingly argued that high-quality after-school activities need to attend to adolescents' race, ethnicity, and culture (e. g., Williams & Deutsch, 2016). Scholars posit that culturally responsive practices can help ensure that after-school activities are relevant, meaningful, and respectful of participants' diverse identities, thereby contributing to adolescents' positive development (Simpkins et al., 2017). Though several scholars have argued that culturally responsive practices are vital to fostering a more inclusive and engaging learning environment in classrooms over the last three decades (Ladson-Billings, 1995), little is known about these practices in after-school activities.

One important next step is to describe adolescents' perceptions of culturally responsive practices and their associations with adolescents' needs for autonomy, competence, and relatedness (Ryan & Deci, 2020). This is a critical consideration given the growing racial and ethnic diversity in the U.S. (U.S. Census Bureau, n.d.) and the potential value of these practices in settings where Latine adolescents have been historically marginalized, such as math learning settings where they often lack feelings of competence and relatedness (Andersen & Ward 2014; Barbieri & Miller-Cotto, 2021). Thus, we examined (a) Latine middle school adolescents' perceptions of culturally responsive practices among those who attend an after-school math enrichment activity, (b) the variability in their perceptions of culturally responsive practices over time and across groups, and (c) the associations between adolescents' perceptions of culturally responsive practices and their needs for autonomy, competence, and relatedness.

Culturally Responsive Practices in After-School Activities

Drawing on multiple theories including critical race theory, cultural wealth (e. g., Yosso, 2005) and social justice education (Adams et al., 2022), culturally responsive practices have historically emphasized creating inclusive formal learning environments and adapting teaching strategies in classrooms to be grounded within students' culturally diverse backgrounds and lives (Gay, 2000). As an extension of Ladson-Billings' seminal work on culturally relevant practices in classrooms (1995), culturally responsive practices aim to reduce educational inequities. Teachers' culturally responsive practices in classrooms include (a) using diverse teaching practices, (b) actively engaging students' cultures and backgrounds, and (c) affirming the value of cultural diversity, such as language preferences (Siwatu, 2007; Dickson, 2016). Culturally responsive practices in the classroom enhance students' academic achievement, foster a sense of belonging, and promote positive socio-emotional development (Gay, 2000).

Though scholars have begun to define the dimensions of culturally responsive practices in after-school activities (Simpkins et al., 2017), empirical research is rare. Qualitative studies

suggest that culturally responsive practices have the potential to make after-school activities more inclusive and supportive for marginalized adolescents. For example, diverse teaching practices in activities have helped promote Latine adolescents' math competence beliefs (Soto-Lara et al., 2021), and African American boys' cultural competence and pride (Stevenson, 2003). Cultural engagement (e. g., examining personal experiences of cultural marginalization) has helped Hmong immigrant adolescents build their sense of agency (Ngo, 2017), and was linked to African American adolescents' interest and engagement in STEM (Casler-Failing et al., 2021). Finally, centering adolescents' sociocultural assets, including their preferred language, is key to developing a sense of relatedness among English language learners and bilingual adolescents (Gast et al., 2017). These studies provide qualitative support that culturally responsive practices in after-school activities may help support the needs of diverse adolescents.

However, there are several limitations to the current research. For instance, the existing literature largely relies on qualitative data measured at a single point in time (e. g., Ngo, 2017). Quantitative data provides complementary information concerning generalizability and the extent to which adolescents' perceptions might vary (e. g., across time and groups), which have implications for activity design and implementation (e. g., how often these perceptions need to be assessed).

The Variability in Culturally Responsive Practices Across Time and Groups

Adolescents are active agents in their own development. The extent to which they think settings are supportive has implications for their development (Kataoka & Vandell, 2013). Thus, it is important to consider adolescents' perceptions of whether they believe an activity is culturally responsive and the extent to which their perceptions might vary across time and groups.

After-school activities often change over time due to high staff turnover and because they have the flexibility to change their programming to build on participants' interests. Such changes could prompt adolescents to think an activity is more or less responsive over time (i. e., mean level stability; Peterson, 2023). Adolescents could also shift in terms of their rank ordering, such as if adolescents who think an activity is not responsive might change their views more than others and rate it highly later on (i. e., rank order stability; Peterson, 2023). Previous research on activity quality found that adolescents' perceptions of activities evidenced small declines each year (Seitz et al., 2021), but that adolescents typically maintained their rank order in their perceptions of quality where those who rated an activity highly were likely to rate it highly two years later (Kataoka & Vandell, 2013). In addition to practical implications, these two central developmental processes have implications for theory and our understanding of development, such as whether adolescents attending the same activity experience it in similar or different ways (Peterson, 2023).

Testing group differences can help identify if some groups feel marginalized in an activity, or if they feel an activity is not responsive to them and their needs. Gender and language preferences are important to consider. For example, Latina adolescents exhibit lower math motivation than their Latino peers (Hsieh et al., 2021). Spanish-preferring Latine adolescents face many educational challenges (Ayala, 2022). Culturally responsive practices may help address educational inequities experienced by Latinas and those with diverse language

preferences. However, prior mixed-methods work suggests that Latine adolescents who were more oriented toward their Latine culture actually felt elevated *negative* emotions when they attended activities emphasizing Latine culture (Ettekal et al., 2020); qualitative data revealed that, despite good intentions, staff were not being responsive but rather based their practices on cultural stereotypes or what they *thought* the adolescents wanted to do. Thus, it is important to assess adolescents' perceptions of responsiveness and if there are groups that feel an activity is not responsive.

Adolescents' Basic Needs

Self-determination theory (Ryan & Deci, 2020) suggests that how much autonomy, competence, and relatedness one feels in settings influences their learning and motivation. Autonomy refers to the need for self-direction and control. Competence involves the desire for effectiveness and mastery. Relatedness pertains to the need for social connection and belonging. According to this theory, satisfaction of these needs contributes to optimal functioning and well-being.

STEM after-school activities can foster adolescents' engagement, motivation, and learning by meeting their three basic needs (i. e., autonomy, competence, and relatedness). More specifically, promoting adolescents' sense of autonomy in activities was associated with higher levels of engagement and motivation (Faust & Kuperminc, 2020) and their sense of accountability and responsibility (Yu et al., 2022b). Supporting adolescents' competence needs in activities was associated with increased content knowledge and skills (Moreno et al., 2016) and increases in motivational beliefs (Yu et al., 2022a). Finally, participants sense of relatedness in STEM after-school activities was associated with social competencies, math and science efficacy and interest (Hoffman et al., 2021), and relatedness is a key predictor of participants' motivation and interpersonal competence (Mulvey et al., 2022). In sum, addressing adolescents' autonomy, competence, and relatedness needs in activities not only enhances their STEM motivation and engagement, but also cultivates skills and attitudes that are essential for their personal and academic development.

Adolescents are at a stage in life when developing a sense of independence and identity are central (i. e., autonomy). Also, they are engaged in learning and mastering new skills (i. e., competency). Finally, they have a strong need for social connections (i. e., relatedness). Consequently, structuring adolescents' experiences in ways that facilitate the formulation and internalization of these developmental lessons may be beneficial (Nagaoka et al., 2015). Moreover, early adolescence marks a critical developmental period for students' math motivational beliefs which, unfortunately, typically decline over time (e. g., Jacobs et al., 2002).

Culturally responsive practices can promote adolescents' three needs in several ways. First, diverse teaching practices that incorporate youth voice allow adolescents to have a say in their educational experiences, thereby promoting a sense of autonomy (Alley, 2019). Second, cultural engagement via (1) curricula reflective of students' cultures, backgrounds, and beliefs, and (2) facilitating connections between students' lives and the content being taught may promote feelings of autonomy, competence, and relatedness (Tan et al., 2021; Kumar et al., 2018). Finally, affirming diverse cultural practices signals to students that they are capable of success, thereby potentially boosting students' sense of agency (Zavala, 2014) and students are more likely to feel a sense of relatedness (Kumar et al., 2018).

Math CEO: The Activity Setting for the Present Study

Math CEO is an organized after-school activity developed in 2014 by math faculty at the University of California, Irvine (UCI) as a research-practice partnership. It serves as the focal activity for this study. Math CEO is an enrichment after-school activity where undergraduate students serve as mentors and work with students from local schools. Each year, Math CEO offers around 20 90-minute sessions that occur once per week on the university campus. During each weekly session, middle school students work with 6–10 peers from their school and 2–3 mentors on enriching, team-based math activities. As an example, to develop students skills using ratios, fractions, and percentages, one activity had students working together to manage a hotel, calculating profits, sales, and expenses.

During the year of this study, the 2018–2019 academic year, Math CEO served approximately 150 middle school students who attended three local middle schools that were low performing and under-resourced. The youth participants were roughly equally distributed among the three schools and were grouped by school into three separate locations at the university (so, all youth from School A were together in one room). At each school, math teachers invited a variety of students, resulting in a mix of students needing additional support in learning math and those seeking out opportunities for additional challenges in math. Because the activity serves students in grades 6–8, it is possible for students to attend for multiple years. Furthermore, although Math CEO was offered throughout the entire academic school year, some students dropped out during the year at which point the math teachers would try to recruit and bring new students to the activity. The demographics of the students who attend Math CEO are similar to the general school populations with approximately 98% of the students identifying as Latine, and over 90% were eligibile for free/reduced-price lunch.

Additionally, approximately 50 undergraduate students are recruited as mentors who serve as front-line staff for Math CEO at any one point in time. UCI uses a quarter system and the students either volunteer or sign up for course credit on a quarterly basis (i.e., fall, winter, and spring quarters). Because Math CEO is offered during all three academic quarters, many of the undergraduate students switch from quarter to quarter, resulting in more than 100 mentors across the entire academic year. To help support the mentors and ensure Math CEO maintains its high quality, mentors attend a weekly 120-minute training session prior to meeting with the youth participants. These weekly training sessions cover basic pedagogical practices (e.g., providing opportunities for students to reflect on their learning experiences), culturally responsive practices (e.g., strategies for making meaningful connections with the middle school students), and the math concepts that will be covered that week (e.g, proportionality, sets, geometry). Of the mentors who participated in Math CEO when the data were collected (i.e., winter and spring of 2019), approximately 58% of the mentors were Asian and/or Pacific Islander, 25% Latine, 20% White, and 5% other. Approximately 69% of the mentors were female, 45% received some form of federal student aid, and 38% were first-generation college students.

Research Aims

The purpose of this study was to examine Latine adolescents' perceptions of culturally responsive practices at an after-school math enrichment activity. The following specific research aims guided our study:

1. Examine the changes in Latine adolescents' perceptions of culturally responsive practices from winter to spring.
2. Test the differences in adolescents' perceptions of culturally responsive practices based on gender and language preference.
3. Test the positive associations between Latine adolescents' perceptions of culturally responsive practices in the winter and their three basic needs in spring.

Methods

Participants and Procedures

All of the middle school students attending Math CEO were recruited for this study, and 97% consented to participate in the study, resulting in a total of 146 participants. After excluding participants who did not identify as Latine, the resulting analytic sample included 134 adolescents (46% 6th grade, 34% 7th grade, 20% 8th grade; M_{age}=11.74, SD_{age}=.83; 53% girls, 1% other; 19% preferred a language other than English; 36% from School A, 45% from School B, 19% from School C). Students completed surveys during the activity in winter and spring of 2019, prior to the COVID-19 pandemic. By winter, most participants had attended the activity for three to five months. Though the survey was made available in both English and Spanish, all participants opted to complete the survey in English. The surveys took approximately 15 to 20 minutes to complete, and all participants received $5 as compensation for each survey completed. All study procedures were approved by the University of California, Irvine Institutional Review Board.

Measures

Culturally Responsive Practices

Adolescents' perceptions of culturally responsive practices were measured with an adapted scale used in classrooms that has strong reliability and validity among diverse adolescents (e.g., Dickson et al., 2016; Byrd, 2016). The adapted measure (for the 14 items, see Table S1; 1=*Never*, 5=*Always*; α=.84 for both time points) assessed three subscales. First, diverse teaching practices measured perceptions of practices that incorporate participants' cultural knowledge, prior learning, and preferences, and which tailor learning environments to their cultural orientations (7 items, α=.84 [winter] and .74 [spring]). Second, cultural engagement measured perceptions of practices that equip participants with the necessary knowledge and skills to navigate mainstream culture and maintain their heritage culture (5 items, α=.83 and .87). Third, diverse language affirmation measured perceptions of practices that acknowledge

languages other than English (2 items, ρ^2=.42 and .40). We examined adolescents' overall perceptions and the three discrete dimensions.

Adolescents' Basic Needs

Adolescents reported their perceptions of their basic needs being met in the activity during spring of 2019 using an adapted self-determination theory scale that has been used in a variety of contexts with diverse populations and demonstrated good reliability and validity (e.g., Deci et al., 2001; Ilardi et al.,1993). The 12 items (1=*Never*, 7=*Always*) make up three discrete subscales: autonomy, competence, and relatedness (see Table S2). The autonomy subscale measured participants' feelings of independence (3 items, α=.74). The competence subscale measured participants' feelings of competence and mastery over the math material presented (4 items, α=.83). The relatedness subscale measured participants' sense of belonging (5 items, α=.88).

Background Information

Adolescents self-selected their gender (1=*female*, 2=*male*, & 3=*other*) and were asked four questions about which language they used in a range of settings (e.g., "What language do you usually speak at home?"; 1=*Only Another Language [like Spanish]*, 5=*Only English*; Norris et al., 1996). For analytic purposes, we averaged all four language items and created a dichotomous item where scores equal to or greater than 4 were coded as English-preferring students.

Covariates

To control for potential differences due to participants' grade in school (6^{th} to 8^{th}) and the school they attended in our third research question, we created two dichotomous indicators for grade level and two dichotomous indicators for school with 8^{th} grade and School C as the reference groups. Additionally, to control for potential differences pertaining to adolescents' experience with Math CEO, first-year-status in the activity (1=*yes*, 0=*no*) was used as a covariate.

Plan of Analysis

All analyses were performed using SPSS version 29. To explore our first aim regarding continuity over time, we ran dependent *t*-tests to assess mean-level differences and bivariate correlations to examine rank-order stability. To explore our second aim regarding group differences, we ran repeated measures ANOVAs and assessed mean-level differences between adolescents' perceptions of culturally responsive practices based on their gender and preferred language. To explore our third aim regarding the correlates, we used multiple regression to test relations between adolescents' perceptions of culturally responsive practices in winter and their autonomy, competence, and relatedness needs in spring, controlling for grade level, school attended, and first-year-status in the activity.

2 Despite the low Spearman-Brown ρ, we have chosen to retain the scale items for both practical and theoretical reasons: (1) exploratory factor analyses revealed a three-factor structure best fit the data (χ2(297)=551.582, *p*=0.00; CFI=0.823, RMSEA=.082 (90% CI: 0.072–0.093),and SRMR=.066) and the removal of these two items would decrease the α for the composite scale in spring, and (2) adolescents' language preferences represent a distinct theoretical construct within culturally responsive practices that was especially important given our sample population.

Missing Data

Missing data ranged from 2.7% to 29.5%. We compared the 95 participants with complete data to the 39 participants who were missing some data (Table S3). None of the 16 comparisons were statistically significant and none of the effect sizes met the threshold of a small effect size. To account for missing data, we employed multiple imputation (Enders, 2010). Using all of the available variables in the data set at all time points, 30 imputated datasets were estimated and used. Reported findings reflect the pooled results.

Results

For our first research aim, dependent *t*-tests revealed significant increases in adolescents' perceptions of culturally responsive practices overall ($t(244)=2.022$, $p=.044$, $d=.211$), as well as on the cultural engagement subscale ($t(309)=2.620$, $p=.009$, $d=.267$). There were no significant changes over time in adolescents' perceptions of diverse teaching practices ($t(531)=1.698$, $p=.09$, $d=.164$) nor diverse language affirmation ($t(294)=.107$, $p=.915$, $d=.013$). Bivariate correlations evidenced positive moderate associations suggesting adolescents generally maintained their relative standing compared to their peers over time ($r=.393$ to $.534$, $ps<.01$, see Table 1). That is, adolescents who rated culturally responsive practices highly in winter were moderately likely to rate them highly again in spring. Taken together, these results suggest that even though there were increases in some perceptions of culturally responsive practices, other perceptions were stable, thus highlighting the complexity of these practices over time.

For our second research aim, independent samples *t*-tests using the composite measure of adolescents' perceptions of culturally responsive practices revealed significant differences based on their gender in winter ($t(419)=2.064$, $p=.040$) but not in spring ($t(546)=0.810$, $p=.419$). No significant differences were found based on language preference in winter or spring ($t(465)=0.421$, $p=.674$ and $t(263)=1.748$, $p=.082$).[3] Using the three subscales, winter diverse teaching practices revealed significant differences based on gender ($t(663)=2.245$, $p=.025$), however no significant differences were found across other comparisons based on gender (diverse teaching practices in spring: $t(569)=0.662$, $p=.508$; cultural engagement: $t(2688)=1.419$, $p=.156$ and $t(767)=0.767$, $p=.443$; diverse language affirmation: $t(1304)=1.275$, $p=.203$ and $t(484)=0.923$, $p=.356$) or language preference (diverse teaching practices: $t(1542)=0.686$, $p=.493$ and $t(215)=1.334$, $p=.184$; cultural engagement: $t(5668)=0.250$, $p=.803$ and $t(324)=1.714$, $p=.087$; diverse language affirmation: $t(2840)=-0.269$, $p=.788$ and $t(594)=0.388$, $p=.698$).

For our third research aim, multiple regression analyses controlling for grade level, school attended, and first-year-status at Math CEO indicated adolescents' perceptions of overall culturally responsive practices in winter were positively associated with their perceptions of all three of their basic needs in spring (i.e., autonomy $\beta=.515$, $p<.001$; com-

3 Repeated measures ANOVA tests yielded similar results, however SPSS does not provide pooled results in the output. Thus, given our use of multiple imputation, we are presenting the pooled results from independent *t*-tests using the same variables.

petence, β=.604, p<.001; and relatedness, β=.527, p<.001; see Table 2)[4]. Of the three subscales, only adolescents' perceptions of diverse teaching practices were significantly positively associated with their perceptions of autonomy (β=.711, p<.001), competence (β=.815, p<.001), and relatedness (β=.733, p<.001). Cultural engagement and diverse language affirmation were not statistically significantly associated with adolescents' perceptions of any of the three basic needs.

Discussion

In this study, we examined Latine adolescents' perceptions of culturally responsive practices in an after-school math enrichment activity, differences across time and groups, and their associations with the three basic psychological needs as conceptualized by self-determination theory (Ryan & Deci, 2000). We found that, on average, the stability of adolescents' perceptions of culturally responsive practices varied across the dimensions of cultural responsiveness. With one exception (diverse teaching practices in winter based on gender) there were no significant mean-level differences based on gender or preferred language. Finally, adolescents' perceptions of culturally responsive practices overall and, more specifically, diverse teaching practices, were positively associated with adolescents feeling all three basic needs (i.e., autonomy, competence, and relatedness) were being met. These findings contribute to the nascent literature on culturally responsive practices in promoting positive experiences and outcomes for historically marginalized adolescents in after-school activities.

Our findings reveal some Latine adolescents' perceptions of culturally responsive practices changed from winter to spring whereas others were more stable. These findings are consistent with previous studies that have reported positive correlations between adolescents' perceptions of quality in after-school activities over a two-year period (Kataoka & Vandell, 2013) and extends the existing work on culturally responsive practices, which to our knowledge have not been studied over time. Importantly, mentors at the activity in this study are undergraduate students and many changed between winter and spring. Though this introduces significant instability, the mentors received weekly training in culturally responsive practices, such as information on strategies to make meaningful connections with the middle school students. The stability in adolescents' perceptions suggest that the mentors were successful in creating a supportive and inclusive environment despite changes in mentors from winter to spring. Additionally, the positive correlations between adolescents' ratings of culturally responsive practices at both time points indicate rank-order stability, suggesting that individual differences among adolescents in their perceptions of culturally responsive practices were moderately stable over time (Peterson, 2023). Importantly, although our findings suggest adolescents' perceptions of culturaly responsive practices are relatively stable across two seasons, it will be important to test stability over longer periods of time.

In exploring our second research aim, with the exception of winter diverse teaching practices based on gender, we did not find significant differences in adolescents' perceptions of culturally responsive practices based on gender or preferred language. One interpretation of these mostly null findings is that all participants, regardless of gender or language preference,

4 R^2 = .147-.396

shared similar perceptions of culturally responsive practices, with average means above 2.7 indicating that culturally responsive practices were at least sometimes perceived (i.e., diverse language affirmation), if not nearly always perceived (i.e., diverse teaching practices; see Table 1). In other words, it is possible that the consistency among participants' perceptions means the activity successfully implemented inclusive and accessible practices for diverse adolescents, regardless of their demographic characteristics, suggesting that no particular group of students based on gender and preferred language felt the activity was unresponsive. Another interpretation of these null findings is that the lack of statistical significance may have resulted from data collection issues such as social desirability bias, insufficiently sensitive measures, or unidentified confounding variables. For example, it is possible that students responded in ways they believed were socially acceptable or expected rather than providing genuine reflections on their experiences. Additionally, the measure used to assess adolescents' perceptions of culturally responsive practices may not have been sensitive enough to capture nuanced differences between groups. Finally, unidentified confounding variables, such as varying levels of exposure to culturally responsive practices or differences in personal experiences that were not accounted for in the study could have obscured meaningful differences.

Findings from our third research aim revealed adolescents' overall perceptions of culturally responsive practices, specifically their perceptions of diverse teaching practices, were positively associated with feeling like their basic psychological needs were met months later. This aligns with previous research linking diverse teaching practices to adolescents' feelings of autonomy (Alley, 2019). It also adds to the literature by suggesting diverse teaching practices might also meet adolescents' needs for competence and relatedness. These results highlight the importance of tailoring instructional strategies to match adolescents' learning preferences and cultural backgrounds. That said, cultural engagement and diverse language affirmation were not directly associated with adolescents' needs. This may be due to the fact that, at the time of this study, the primary focus of the weekly mentor training sessions was diverse teaching practices.

Taken together, these findings have several implications for theory, research, and practice. Firstly, our study contributes to the literature on after-school activities by highlighting the potential importance of culturally responsive practices in activities for Latine adolescents. By maintaining stable and inclusive environments, after-school activities can support the academic and socioemotional development of historically marginalized adolescents (Byrd, 2016). Additionally, our findings underscore the need for future research to also identify the specific mechanisms, such as satisfaction of basic needs, through which culturally responsive practices may influence adolescents' adjustment (e.g., Yu et al., 2022a). Future studies could explore how different components of culturally responsive practices in activities contribute to adolescents' sense of autonomy, competence, and relatedness.

From a practical standpoint, our findings and the work of others suggest that it might be worthwhile for activity staff to consider implementation of diverse teaching practices that are centered in students' cultural backgrounds, knowledge, and learning preferences. By doing so, activites can create more inclusive and supportive environments that foster positive experiences for all participants (Alley, 2019). Additionally, our study highlights the importance of ongoing assessment and evaluation of culturally responsive practices to ensure that activities continue to be responsive to the diverse student populations they serve.

Limitations and Future Directions

Although this study contributes to our understanding of culturally responsive practices in after-school activities, certain limitations warrant consideration. Firstly, our sample may include participants with diverse motivations for attending the after-school activity (i.e., those needing additional support in learning math as well as those seeking opportunities for additional challenges in math). Though we controlled for some differences among participants with the covariates, differences among adolescents in terms of motivation for participation and math abilities may have confounded the results, making it difficult to determine whether observed effects are due to the program itself or the inherent differences among adolescents. Secondly, although adolescents are the only ones who can report if an activity is responsive to them, self-report measures can introduce bias. Complementary data, such as observations on diverse teaching practices, would be helpful in determining which specific practices are helpful or engaging to participants. Additionally, to the best of our knowledge, the only validated quantitative measure available to assess participants' perceptions of culturally responsive practices is the Student Measure of Culturally Responsive Teaching (SMCRT; Dickson et al., 2016), originally designed for classrooms, which we adapted for after-school activities. Despite some similarities between after-school and classroom settings, the literature clearly identifies after-school activities as unique developmental contexts (Witt & Caldwell, 2018) and scholars have emphasized the importance of additional dimensions beyond those measured in the SMCRT (e.g., Simpkins et al., 2017). As such, we need to continue to refine our understanding of culturally responsive practices in activities and should consider additional factors. It is also possible that the low reliability of the two-item diverse language affirmation subscale impacted our findings. Finally, due to our reliance on a small sample of voluntary Latine adolescent participants at a single after-school activity, potential selection effects may have influenced the results. Larger studies should examine the generalizability of these findings across different activities and populations.

Conclusion

The present study has practical and theoretical implications for after-school activity practitioners and researchers. First, this study contributes to our understanding of adolescents' perceptions of culturally responsive practices in activities and whether these perceptions vary across time and key groups. Second, as the first study to establish quantitative links between culturally responsive practices and adolescents' basic psychological needs, our findings contribute to the limited body of quantitative research on culturally responsive practices. Overall, this study underscores the potential for integrating culturally responsive practices in after-school activities, highlighting their associations with adolescents' positive outcomes by addressing basic psychological needs and enhancing overall experiences in these settings.

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Table 1. Correlations Among Perceptions of Winter and Spring Culturally Responsive Practices and Spring Basic Needs

Measure	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11
Winter													
1. Culturally Responsive Practices (Composite)	3.67	0.67											
2. Diverse Teaching Practices	4.29	0.63	.647***										
3. Cultural Engagement	3.16	1.05	.719***	.348***									
4. Diverse Language Affirmation	2.74	1.14	.564***	.291***	.425***								
Spring													
5. Culturally Responsive Practices (Composite)	3.53	0.62	.481***	.382***	.421***	.342***							
6. Diverse Teaching Practices	2.99	0.59	.397***	.498***	.197	.235*	.519***						
7. Cultural Engagement	4.18	0.97	.470***	.233***	.534***	.258**	.585***	.285***					
8. Diverse Language Affirmation	3.15	1.11	.236***	.097	.193*	.393***	.443***	.209*	.310***				
9. Autonomy	5.95	1.12	.353***	.519***	.150	.208*	.163	.300**	.057	.040			
10. Competence	5.75	1.18	.348***	.520***	.125	.170	.181	.300**	.067	.039	.693***		
11. Relatedness	6.05	1.09	.399***	.540***	.228**	.144	.168	.292**	.102	-.084	.682***	.680***	

Note. * Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level. *** Correlation is significant at the 0.001 level.

Table 2. Unstandardized Coefficients for Adolescents' Spring Basic Needs Predicted by Winter Culturally Responsive Practices Controlling for Grade in School, School Attended, and First-Year-Status in the Program

	Basic Needs Predicted by Culturally Responsive Practices Overall			**Basic Needs Predicted by Culturally Responsive Practices Sub Scales**		
	Autonomy[a] B(SE)	Competence[b] B(SE)	Relatedness[c] B(SE)	Autonomy[d] B(SE)	Competence[e] B(SE)	Relatedness[f] B(SE)
Culturally Responsive Practices (Composite)	**.515*** (.140)**	**.604*** (.146)**	**.527*** (.145)**			
Diverse Teaching Practices				**.711*** (.164)**	**.815*** (.181)**	**.733*** (.160)**
Cultural Engagement				-.007 (.110)	-.032 (.111)	-.048 (.105)
Diverse Language Affirmation				.054 (.098)	.099 (.098)	.086 (.093)
6th grade	-.443 (.350)	-.185 (.360)	-.383 (.333)	-.525 (.341)	-.270 (.342)	-.460 (.333)
7th grade	-.024 (.285)	.149 (.293)	.157 (.272)	-.043 (.276)	.125 (.272)	.131 (.255)
School A	-.907** (.308)	-.804** (0.301)	-1.001*** (.283)	-.692* (.311)	-.574 (.316)	-.782** (.299)
School B	-.619* (.303)	-.502 (.322)	-.704* (.287)	-.584 (.301)	-.479 (.320)	-.674* (.291)
First Year in program	.545 (.265)	.645 (.269)	.581* (.244)	.575* (.257)	.669** (.257)	.605** (.233)
Constant	4.493*** (.595)	3.639*** (.629)	4.504*** (.619)	3.117*** (.700)	4.504*** (.619)	3.105*** (.671)

Note. 8th grade and School C are the omitted groups. Standard errors are in parentheses. *p<0.05. **p<0.01. ***p<0.001.

[a] R^2 = .147-.323. [b] R^2 = .170-.374. [c] R^2 = .176-.396. [d] R^2 = .219-.426. [e] R^2 = .251-.503. [f] R^2 = .256-.529.

Supplemental Material

Table S1. Student Measure of Culturally Responsive Teaching (Dickson et al., 2016)

Subscale	Scale Item
Diverse Teaching Practices	1. Explain to me what we are learning in different ways to help me learn
	5. Provide me with visual examples (like pictures) when explaining things
	9. Want students from different cultures to respect one another
	10. Use what I already know to help me understand new ideas
	11. Treat all students like they are important members of [activity name]
	12. Try to find out what interests me
	13. Use real-life examples to help explain things
Cultural Engagement	2. Use examples from my culture when teaching
	3. Ask about my school or home life
	4. Are interested in my culture
	6. Speak about contributions that my culture has made to Science, Technology, Engineering and Math
	8. Help me learn about other people and their cultures
Diverse Language Affirmation	7. Have spoken to me or to other students who speak another language (for example Spanish)
	14. Allow students to speak another language (for example Spanish) at times during [program name] sessions

Note. The question stem was "[Program name] mentors and adults…". Scoring was as follows: 1=*Never*,2,3=*Sometimes*,4,5=*Always*.

Table S2. Basic Need Satisfaction in Relationships Scale (La Guardia et al., 2000)

Subscale	Scale Item
Autonomy	I am free to decide for myself at [activity name]
	I generally feel free to express my ideas and opinions at [activity name]
	I feel like I can pretty much be myself at [activity name]
Competence	I feel very smart at [activity name]
	I have been able to learn interesting new skills at [activity name]
	Most days I feel a sense of accomplishment from what I do at [activity name]
	In [activity name] I have a chance to show how capable I am
Relatedness	I really like the people I interact with at [activity name]
	I get along with people I come into contact with at [activity name]
	People at [activity name] care about me
	People are generally pretty friendly towards me at [activity name]
	I feel that there are many people I am close to at [activity name]

Note. Scoring was as follows: 1=*Never*, 2, 3, 4=*Sometimes*, 5, 6, 7=*Always*.

Table S3. Comparisons Between Sample with Complete Data and with Some Missing Data From the Entire Analytic Sample

	Sample with complete data			Sample with missing data			Effect Size
	n	*M*	*SD*	*n*	*M*	*SD*	
Gender	95	1.49	0.52	132	1.47	0.52	<0.01†
Grade	95	2.11	0.91	134	2.13	0.89	<0.01†
School	95	1.88	0.77	134	1.84	0.73	<0.01†
First Year in Math CEO	95	1.35	0.48	134	1.34	0.48	<0.01†
Preferred Language	95	0.24	0.43	134	0.22	0.42	<0.01†
Winter Culturally Responsive Practices	95	4.29	0.63	112	4.3	0.63	0.00‡
Winter Diverse Teaching Practices	95	2.97	1.03	112	2.99	1.05	0.02‡
Winter Cultural Engagement	95	3.19	1.15	112	3.16	1.14	0.03‡
Winter Diverse Language Affirmation	95	3.66	0.67	112	3.67	0.68	0.01‡
Spring Culturally Responsive Practices	95	4.24	0.56	100	4.2	0.59	0.06‡
Spring Diverse Teaching Practices	95	2.76	0.99	100	2.73	0.97	0.03‡
Spring Cultural Engagement	95	3.13	1.12	100	3.16	1.11	0.02‡
Spring Diverse Language Affirmation	95	3.55	0.62	100	3.53	0.62	0.04‡
Spring Autonomy	95	6.00	1.09	100	5.95	1.12	0.05‡
Spring Competence	95	5.81	1.13	100	5.75	1.18	0.05‡
Spring Relatedness	95	6.12	1.01	100	6.05	1.09	0.07‡

Note. † indicates phi. ‡ indicates Cohen's *d*. Convention for phi: small = .1, medium = .3, large = .5. Convention for Cohen's *d:* small = .2, medium = .5, large = .8.