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Adolescents of Color Have Greater Mathematics Values Than White Adolescents Across Gender: Replication Evidence Across High School and Datasets in the U.S.

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Abstract

The unequal mathematics education system in the U.S. highlights the need to examine racial and ethnic differences in mathematics subjective task values as precursors to participation in mathematics-related careers. We investigated whether and to what extent mathematics subjective task values (i.e., interest, utility, and attainment) vary across the four largest U.S. racial/ethnic groups (i.e., Asian, Black, Latine, and White) among boys and girls, separately. We also tested whether these patterns replicated across high school years and across datasets. Using two U.S. large-scale longitudinal datasets (i.e., CAMP and HSLS), results showed that adolescents of color reported higher mathematics subjective task values than White adolescents, with differences favoring Asian over White adolescents and Black over Latine adolescents. These patterns were consistent across gender, though slightly more pronounced among boys, and replicated across both datasets. The findings demonstrate racial and ethnic variability in mathematics values within gender groups, highlighting the need for intersectional approaches to understanding adolescents' motivational experiences and identifying the barriers that prevent Black and Latine adolescents from fully leveraging their motivational strengths in mathematics learning.

Keywords: racial and ethnic differences; gender; adolescents; mathematics motivation; situated expectancy-value theory

Mathematics is foundational for success in Science, Technology, Engineering, and Mathematics (STEM) fields (Butler-Barnes et al., 2021). Mathematics success during adolescence increases opportunities for STEM degree attainment and career advancement, which can contribute to adults' upward social mobility (Butler-Barnes et al., 2021). According to situated expectancy-value theory (Eccles & Wigfield, 2020), individuals' mathematics experiences, motivation, and performance are situated, and therefore, influenced by structural barriers and opportunities. Not everyone in the U.S. has equal opportunities in mathematics. Historically, racial- and gender-based inequities in U.S. mathematics education have led marginalized adolescents, including female, Black, and Latine adolescents to devalue mathematics-related domains as viable options for their future (Del Toro et al., 2024; Schmidt et al., 2024). This devaluation of mathematics can be especially consequential during adolescence, as it shapes their pivotal decisions about future education and careers (Butler-Barnes et al., 2021). Given this, understanding racial and ethnic differences in adolescents' mathematics subjective task values can offer valuable insights to broadening participation in U.S. mathematics education (Else-Quest et al., 2013; Riegle-Crumb et al., 2011).

In this study, therefore, we examined whether adolescents' mathematics subjective task values vary across the four largest racial and ethnic groups in the U.S. (i.e., Asian, Black, Latine, and White) among boys and girls at each grade level in high school, while controlling for individual backgrounds that are associated with mathematics subjective task values, and with race and ethnicity in the U.S (i.e., prior mathematics achievement, family income, and parental education; e.g., Conwell, 2021, Schmidt et al., 2024). To provide more robust results, we used conceptual replication (i.e., testing the findings across multiple datasets with different measures) to test whether the hypothesized racial and ethnic differences within each gender would be observed consistently across two large-scale U.S. datasets.

Situated Expectancy-Value Theory

Situated expectancy-value theory (SEVT; Eccles & Wigfield, 2020) argues that individuals' mathematics ability self-concepts and subjective task values are the most immediate predictors of their performance and academic choices. Subjective task values encompass four central types of beliefs: interest or intrinsic value (e.g., enjoyment of mathematics), utility value (e.g., usefulness of mathematics to one's goals), attainment value (e.g., importance of mathematics to one's identity), and cost (e.g., perceived costs of doing mathematics in terms of negative experiences). Interest, utility value, and attainment value are positively associated with mathematics-related choices, whereas cost is negatively associated (Eccles & Wigfield, 2020).

SEVT highlights that individuals' motivational beliefs are "situated," meaning they are shaped by their experiences and the information available within their specific sociocultural context. SEVT was first developed to understand gender differences in motivational processes. Eccles and colleagues recognized that motivational processes are situated and influenced by broader societal beliefs and norms. In the U.S., social roles and norms associated with individuals' gender, race, and ethnicity (among other factors) shape the value individuals assign to a particular domain (Eccles & Wigfield, 2020); and, other theories argue that gender and race are two central factors that determine individuals' social position in American society that have numerous cascading effects, such as how much discrimination they experience and the extent to which they have access to high quality schools and neighborhoods (Archer et al., 2015). The significance of sociocultural contexts has been increasingly acknowledged in the field of mathematics education (Hannula, 2012; Schukajlow et al., 2023). Mathematics education in the

U.S. is influenced by race, ethnicity, and gender (Schmidt et al., 2024). Racial, ethnic, and gender stereotypes about mathematics in the U.S. position White, Asian, and male individuals as innately capable, producing discrimination that marginalizes individuals from other racial, ethnic, or gender groups (Riegle-Crumb et al., 2011). Such race- and gender-based privileges and disadvantages influence individuals from different social groups to assign different values to mathematics (Parker et al., 2020). Accordingly, it is imperative to examine how disparities in mathematics subjective task values manifest across individuals defined by race, ethnicity, and gender in the U.S. context.

Replication Study to Identify Racial and Ethnic Differences in Mathematics Subjective Task Values

Racial and Ethnic Differences within Gender

Despite substantial evidence on gender differences in mathematics subjective task values (Hsieh et al., 2021), prior research has not fully examined how racial and ethnic privilege and disadvantage may shape disparities in these values—even among individuals of the same gender. Evidence suggests that racialized patterns of motivational beliefs may differ across boys and girls. For example, recent work with U.S. adolescents suggests that Black boys and girls did not differ in their mathematics ability self-concepts, whereas boys had higher self-concepts than girls among Asian, Latine, and White populations (Rubach et al., 2022). Using a person-centered approach, Hsieh et al. (2021) found that Black girls and boys were overrepresented in the profile with below-average attainment values; however, White girls were overrepresented in the profile with lower attainment values whereas White boys were overrepresented in the high attainment value profile. These findings underscore Hyde's (2005) argument that the variability within each gender may be more substantial than the differences across gender. Collectively, prior work suggests that individuals who share the same gender may hold different motivational beliefs based on their race and ethnicity, and that such racialized patterns can also vary across gender within the U.S. mathematics context.

Previous studies point to cultural factors in the U.S. that help explain differences in mathematics values among adolescents in similar racial positions—underscoring the situated nature of mathematics education (Else-Quest et al., 2013). For example, among Asian adolescents, cultural values that emphasize academic achievement may shape their motivational experiences differently from those of White adolescents (Chang & Shih, 2023). Black and Latine adolescents in the U.S. also draw on cultural strengths—such as cultural pride (Huguley et al., 2019) and gender-egalitarian beliefs about ability (Rowley et al., 2007)—that can bolster their mathematics subjective task values (Starr et al., 2022). Some studies suggest that these benefits may be especially strong for Black adolescents (Hsieh et al., 2021; McKellar et al., 2024; Seo et al., 2019).

Together, an important yet underexplored question is how racial and ethnic differences manifest in adolescents' mathematics subjective task values among boys and girls, separately. Our examination offers several advantages that contribute to a more nuanced understanding of racialized patterns in mathematics subjective task values. Analyzing data separately by gender highlights how racial socialization occurs within a shared gender identity group. This perspective is particularly useful for understanding whether race and ethnicity independently influence academic experiences beyond gender. Furthermore, by examining interest, utility value, and attainment value separately, we build on prior research with mixed findings—much of which has varied in whether mathematics subjective task values were assessed as distinct subcomponents or combined into an overall value measure. This work thus will advance our current understanding and better inform practices to support the most disadvantaged groups in U.S. mathematics education.

Conceptual Replication across Datasets and Grade Levels

Psychology has faced a replication crisis with more than 50% of research failing to reproduce consistent results across multiple datasets (Youyou et al., 2023). One strategy to address this challenge is testing direct or conceptual replication of the findings (Plucker & Makel, 2021). Unlike direct replication, which tests the exact methods of the original study, conceptual replication tests whether the findings are held under different conditions or methods (such as participant demographics, study context; Plucker & Makel, 2021). Conceptual replication is a stronger test of theory because it tests if findings are robust across different methods. In this study, we employed conceptual replication by analyzing two datasets with slightly different operationalizations of mathematics subjective task values and covariates. By conducting conceptual replication with two similar datasets, we increase the amount of cumulative evidence, better account for potential changes in study setting and researcher bias, and enhance the generalizability of our results (Plucker & Makel, 2021).

Moreover, little is known about how racial and ethnic differences in mathematics subjective task values differ across grade levels. Some studies suggest that racial and ethnic differences in mathematics motivational beliefs decrease as students progress through school (Seo et al., 2019). For example, racial and ethnic differences in mathematics ability self-concepts that favored Black boys over White boys in 10th grade were no longer significant in 12th grade (Seo et al., 2019). However, a recent study found that gender differences in mathematics subjective task values were similar across grade levels (Starr et al., 2025). To expand on the existing literature, we investigated the trends in racial and ethnic differences within gender across the high school years.

Current Study

In this study, we investigated whether and the extent to which the mean levels of adolescents' mathematics subjective task values (i.e., interest, utility value, and attainment value) differ across the four largest U.S. racial and ethnic groups (i.e., Asian, Black, Latine, and White) among boys and girls, after accounting for individual backgrounds related to mathematics motivational beliefs (i.e., prior mathematics achievement, family income, and parents' educational level). This approach provides a more nuanced understanding of adolescents' varied motivational experiences across race and ethnicity within the same gender group. Importantly, our use of conceptual replication provides more robust evidence of racial and ethnic gaps among boys and girls across multiple grade levels and datasets compared to the common approach of testing hypotheses in a single dataset. Drawing on theory and prior research, we formulated the following hypotheses:

H1: Racial and ethnic mean-level differences in three mathematics subjective task values would favor Black over Asian, Latine, and White adolescents, Latine over Asian and White adolescents, and Asian over White adolescents among boys and girls, after accounting for individual backgrounds.

H2: Racial and ethnic mean-level differences in three subjective task values as described in Hypothesis 1 would be smaller among older adolescents (e.g., 12^{th} graders) compared to younger adolescents (e.g., 9^{th} graders).

H3: Patterns of racial and ethnic differences outlined in Hypothesis 1 and Hypothesis 2 would replicate across the two U.S. datasets.

Method

Data

We used two large-scale U.S. longitudinal datasets: the California Achievement Motivation Project (CAMP) and the High School Longitudinal Study of 2009 (HSLS). Both datasets measured the focal variables in the current study but varied in study design, survey years, and socio-demographic characteristics; testing these questions on both datasets rather than just one affords an opportunity to test conceptual replication (Plucker & Mackel, 2021). These datasets also included racially, ethnically, and gender-diverse samples of adolescents, allowing us to examine racial and ethnic differences within each gender. The datasets used in the current study were collected in the mid-2000s and early 2010s and capture a critical period of change in U.S. STEM education marked by growing equity initiatives. Therefore, they provide a valuable historical benchmark for understanding patterns in mathematics subjective task values and help contextualize contemporary trends.

Participants

Given our interest in understanding differences in mathematics subjective task values during high school, our study included students who indicated they were in high school (9^{th} to 12^{th} grade), and who provided information on their race, ethnicity, and gender. The datasets available for racial and ethnic comparisons by grade level (Table S1) and the description of the final sample from each dataset (Table S2) are in the supplementary material.

CAMP. CAMP is a longitudinal, cohort-sequential study conducted with middle to high school students from four school districts in Southern California during 2004 to 2006. This study involved a subsample of 8,855 students (M_{age} = 14.46, SD = 1.13 in 9^{th} grade; 51% girls; 13% Asian, 13% White; 74% Latine): 2,363 students in 9^{th} grade, 2,180 students in 10^{th} grade, 2,148 students in 11th grade, and 2,164 students in 12th grade. Around 58% of the sample were eligible for free-/reduced lunch[1] and 16% had parents with at least some college experience.

HSLS. HSLS is a nationally representative, longitudinal study of high school students in 9th (2009) and 11th grade (2012). This study involved a subsample of 21,000 students (M_{age} = 14.49 years old, *SD* = 0.63 in 9th grade; 49% girls; 10% Asian, 13% Black, 19% Latine, 58% White); 10,550 students in 9th grade and 10,450 students in 11th grade. Around 59% of the sample had parents with at least some college experience and the average family annual income ranged from $35,000 or less (27%) to over $95,000 (31%).

Measures

Because mathematics subjective task value beliefs were measured twice per academic year for CAMP and once per academic year for HSLS, we averaged the two scores from the same academic year in CAMP to keep the measurement points consistent across the datasets. Because HSLS only has data at 9th to 11th grade, the two datasets could only be compared for those two grade levels. Additionally, CAMP was the only dataset with attainment value but did not include Black adolescents. Therefore, we could not include Black adolescents in the racial and ethnic comparisons for attainment value.

The measures in each study were based on situated expectancy-value theory (Eccles & Wigfield, 2025). All measures have been validated in prior research (Hsieh et al., 2021; Starr et al., 2025). A list of study items, internal consistency, factor loadings, and response scale by

[1] In the U.S., eligibility for free or reduced-price lunch is determined by federal income guidelines relative to household size and is commonly used as a proxy for socioeconomic disadvantage in social sciences research. The eligibility rates vary across states (e.g., the range from 15% to 64% in 2000–2001, according to the National Center for Education Statistics); the 58% rate observed in CAMP is relatively high, indicating that the sample largely consists of low-income families.

dataset for interest (Table S3), utility value (Table S4), and attainment value (Table S5) are presented in the supplementary material.

Interest. Interest was operationalized as students' enjoyment/liking of mathematics. This construct was measured with three to six items using a 4- or 5-point Likert scale (see Table S3).

Utility value. Utility value was operationalized as students' perceptions of general usefulness of mathematics and usefulness of mathematics for their future (e.g., going to college, getting a job). This construct was measured with three to seven items using a 4- or 5-point Likert scale (see Table S4).

Attainment value. Attainment value was operationalized as students' perceptions of the importance of mathematics in shaping their identity. This construct was only available in CAMP and was measured with seven items using a 5-point Likert scale (see Table S5).

Background Variables. Students' race, ethnicity, and gender were determined based on self-reports in HSLS and through the school district data in CAMP. We included students' prior mathematics achievement, families' socioeconomic status, and parents' education level as covariates, given that they are significantly correlated with mathematics subjective task values (Eccles & Wigfield, 2020). The indicators of prior mathematics achievement were (a) district-reported mathematics scores on the California Standards Test in CAMP and (b) standardized mathematics scores on an algebraic reasoning test in HSLS. Family socioeconomic status was measured using (a) the free/reduced lunch program eligibility in CAMP and (b) family income in HSLS. Across the two datasets, parents' education level was measured using the parents' highest degree.

Analytic Plan

We conducted all analyses separately for each dataset in M*plus* v8.8 (Muthén and Muthén 1998–2017) except for data preparation, which was performed in Stata v.15 (StataCorp, 2017). To satisfy the independence assumption of ANOVA, we used the random assignment option in SPSS to randomly assign each participant to one grade level (9^{th} through 12^{th}) within each dataset. As most datasets contained longitudinal high school data, this ensured each student appeared only once at a randomly assigned grade level. Next, we imputed missing data for participants with complete information on race, ethnicity, gender, and grade level (See Tables S3-S5 for frequencies and missing data for each item in analytic and original sample). Using the joint modeling approach in multiple imputation (Schafer & Yucel, 2002), we generated 90 datasets in M*plus*. The imputation model also incorporated auxiliary variables, including mathematics competence-related beliefs, mathematics subjective task values, and above-mentioned background variables.

Within each dataset, we evaluated measurement invariance for individual subjective task value across the eight groups defined by race, ethnicity, and gender. Establishing invariance is necessary to ensure that the construct is comparable in meaning and structure across groups over time (Putnick & Bornstein, 2016). To do so, we created eight race- and ethnicity-by-gender subgroups (e.g., Asian boys, Asian girls, Black boys, Black girls) and tested configural, metric, and scalar invariance across two time points, treating subgroup as the grouping variable (Putnick & Bornstein, 2016). Changes greater than .010 in the CFI and greater than .015 in the RMSEA were considered evidence that measurement invariance was not achieved across groups and over time (Chen, 2007).

Next, we adopted a two-step approach and tested for overall racial and ethnic differences (Step 1) followed by racial and ethnic differences within each gender (Step 2), following prior research (Else-Quest et al., 2013; Rubach et al., 2022). To account for overall racial/ethnic differences in the dataset, cross-sectional analyses were conducted separately at each grade level from 9th through 12th grades in each of the two datasets. We ran ANCOVAs using the imputed data for each dataset to compare the means of each racial and ethnic group in the overall sample and within each gender. To descriptively compare findings across datasets that used different Likert scales, we calculated Percent of Maximum Possible (POMP) scores based on the mean scores (Cohen et al., 1999). POMP scores convert values to a 0–100% scale, enabling comparisons across scales with different ranges while preserving the original distribution and covariance structure. Additionally, we calculated Hedge's g (i.e., the weighted effect size) for the overall racial and ethnic differences and racial and ethnic differences within each gender using the obtained mean scores. We considered the effect sizes to be meaningful at $|g| \geq .20$ or close to .20, in line with previous research (Rubach et al., 2022; Starr et al., 2025). For the analyses using the HSLS, we estimated the models using sampling weights, strata, and primary sampling unit to account for the sampling design.

Finally, we compared the effect sizes across the datasets using Comprehensive Meta-Analysis version 3.3 (Bornstein et al., 2014). The significant differences between the effect sizes in each dataset were tested using the conventional heterogeneity tests (i.e., Q-statistics; Hedges & Schauer, 2019), and I^2 effects (i.e., percentage of the variance across studies; Higgins & Thompson, 2002). We interpreted significant Q-statistics at $p \leq .10$ (Hedges & Schauer, 2019) and a large I^2 effect (i.e., $I^2 \geq 70$; Higgins & Thompson, 2002) as indicative of differences in effect sizes across datasets. We reported combined random effects when there was heterogeneity of the effects across the two datasets and combined fixed effects when there was homogeneity of effects.

Results

Bivariate correlations among study variables in HSLS (Table 1) and CAMP (Table 2) provide support for our hypothesized relations. Descriptive statistics by race and ethnicity, grade level, and dataset are presented for boys (Table S7) and girls (Table S8).

Table 1

Bivariate correlations between study variables in HSLS

	1	2	3	4	5	6	7	8	9
1. Math Interest 9th	-								
2. Math Interest 11th	.23**	-							
3. Math Utility Value 9th	.49**	.20**	-						
4. Math Utility Value 11th	.22**	.43**	.33**	-					
5. Male	.01	.01	-.01	-.01	-				
6. White	-.03**	-.01*	-.07**	-.04**	.00	-			
7. Prior Math Achievement	.11**	.10**	.07**	.17**	.00	.09**	-		
8. Parent Education Level	.05**	.04**	.03**	.08**	.00	.13**	.37**	-	
9. Family Income	.04**	.02**	0.00	.03**	.00	.19**	.32**	.58**	-

Note. The White variable was coded as 1 = White individuals, 0 = all other racial and ethnic groups. ** $p < .01$.

Table 2

Bivariate correlations between study variables in CAMP

	1	2	3	4	5	6	7	8	9	10
1. Math Interest T1	-									
2. Math Interest T2	.71**	-								
3. Math Utility Value T1	.53**	.38**	-							
4. Math Utility Value T2	.52**	.66**	.64**	-						
5. Math Attainment Value T1	.68**	.51**	.72**	.56**	-					
6. Math Attainment Value T2	.52**	.68**	.50**	.75**	.67**	-				
7. Male	.03**	.08**	-.05**	-.02	.02	.05**	-			
8. White	-.06**	-.05**	-.11**	-.09**	-.08**	-.05**	0.00	-		
9. Prior Math Performance	.24**	.19**	.13**	.12**	.17**	.15**	0.01	0.01	-	
10. Parent Education Level	.01	0.01	-.06**	-0.02	-0.01	0.01	.02*	.30**	.12**	-
11. Free/Reduced Lunch	-.04**	-.03**	-.09**	-.07**	-.06**	-.04**	-0.02	.26**	-.04**	.25**

Note. Due to the cohort-based study design, correlations were calculated using participants from all grade levels in 2005 (T1) and 2006 (T2), rather than computed separately by grade level. The White variable was coded as 1 = White individuals, 0 = all other racial and ethnic groups.
* $p < .05$. ** $p < .01$.

Furthermore, results from the measurement invariance tests supported the invariance models for all study variables in CAMP and HSLS (Table S9), except for mathematics interest in HSLS. The partial scalar model of mathematics interest showed good fit to the data and was used for analysis. Effect sizes for racial and ethnic differences in mathematics subjective task values are presented in the tables, with corresponding forest plot findings shown in the figures. We included three pieces of information in tables: (a) the effect sizes of the differences between racial and ethnic groups calculated for each dataset separately (i.e., Hedge's g), (b) the combined effect size calculated across the available datasets (i.e., $\bar{g}$ statistic), and (c) heterogeneity statistics that indicate if the effect sizes significantly varied across the datasets (i.e., Q-statistic and I^2 -statistic). Positive effect sizes indicate that the racial and ethnic group listed on the right side of the comparisons in the tables reported higher mathematics subjective task value than the group on the left side, whereas negative effect sizes indicate that the group on the left side of the comparisons reported higher mathematics value beliefs than the group on the right. Full-sample results are available in the supplementary material (Tables S10–S12 for effect sizes and heterogeneity statistics; Figures S1–S2 for forest plots).

Boys

We found significant racial and ethnic differences among boys. Asian, Black, and Latine boys generally reported higher interest than White boys at some grade levels between 9th and 11th grade (Table 3 and Figure 1), whereas Asian, Black, and Latine boys did not meaningfully differ in their mathematics interest (Table 3 and Figure 2). In both datasets, Asian boys ($-0.41 \leq g \leq -0.17$) and Latine boys ($-0.31 \leq g \leq -0.11$) reported higher interest than White boys from 9th through 11th grade. In HSLS, Black boys showed higher interest than White boys in 9th and 11th grade ($-0.17 \leq g \leq -0.14$). Among Asian, Black, and Latine boys, only one difference emerged in the CAMP dataset—Asian boys reported higher interest than Latine boys in 9th grade ($g = 0.20$).

Table 3

Racial and ethnic differences in mathematics interest among boys in 9th to 12th grade

	9th grade			10th grade			11th grade			12th grade		
	g	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI
Asian vs. White												
CAMP	-.18	.13	[-.44, .07]	-.24	.12	[-.47, -.01]	-.41	.12	[-.63, -.18]	-.14	.11	[-.36, .09]
HSLS	-.23	.07	[-.36, -.09]	-	-	-	-.17	.08	[-.31, -.02]	-	-	-
Combined effect	-.22	.06	[-.34, -.10]				-.24	.06	[-.36, -.12]			
Heterogeneity	Q = .08, df = 1, p = .775, I^2 = 0						Q = 3.03, df = 1, p = .082, I^2 = 67					
Black vs. Asian												
HSLS	.05	.08	[-.10, .20]	-	-	-	.01	.08	[-.16, .17]	-	-	-
Black vs. Latine												
HSLS	-.04	.05	[-.13, .05]	-	-	-	-.01	.05	[-.11, .09]	-	-	-
Black vs. White												
HSLS	-.17	.04	[-.25, -.09]	-	-	-	-.14	.04	[-.22, -.06]	-	-	-
Latine vs. Asian												
CAMP	.20	.10	[.01, .39]	.05	.09	[-.13, .23]	.10	.09	[-.08, .28]	.05	.08	[-.10, .20]
HSLS	.08	.07	[-.06, .23]	-	-	-	.03	.08	[-.13, .19]			
Combined effect	.12	.06	[.01, .24]				.06	.06	[-.06, .18]			
Heterogeneity	Q = .85, df = 1, p = .357, I^2 = 0						Q = .38, df = 1, p = .540, I^2 = 0					
Latine vs. White												
CAMP	.01	.10	[-.18, .20]	-.20	.09	[-.37, -.02]	-.31	.08	[-.47, -.14]	-.09	.10	[-.29, .10]
HSLS	-.11	.03	[-.17, -.04]	-	-	-	-.14	.04	[-.22, -.06]	-	-	-
Combined effect	-.09	.03	[-.16, -.03]				-.17	.04	[-.24, -.10]			
Heterogeneity	Q = 1.27, df = 1, p = .260, I^2 = 21						Q = 3.15, df = 1, p = .076, I^2 = 68					

Note. The significant effect sizes (*g*) and heterogeneity statistics (Q and I^2 statistics) are in bold. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Table 4

Racial and ethnic differences in mathematics utility value among boys in 9th to 12th grade

	9th grade			10th grade			11th grade			12th grade		
	g	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI
Asian vs. White												
CAMP	-.25	.13	[-.51, .00]	-.26	.12	[-.49, -.03]	-.38	.11	[-.61, -.16]	-.14	.11	[-.37, .08]
HSLS	-.22	.07	[-.36, -.09]	-	-	-	-.04	.08	[-.19, .10]	-	-	-
Combined effect	-.23	.06	[-.35, -.11]				-.20	.17	[-.53, .13]			
Heterogeneity	Q = .04, df = 1, p = .850, I^2 = 0						Q = 5.98, df = 1, p = .015, I^2 = 83					
Black vs. Asian												
HSLS	.05	.08	[-.01, .20]	-	-	-	.01	.08	[-.16, .17]	-	-	-
Black vs. Latine												
HSLS	-.04	.05	[-.13, .05]	-	-	-	-.01	.05	[-.11, .09]	-	-	-
Black vs. White												
HSLS	-.17	.04	[-.25, -.09]	-	-	-	-.14	.04	[-.22, -.06]	-	-	-
Latine vs. Asian												
CAMP	.20	.10	[.01, .39]	.05	.09	[-.13, .23]	.10	.09	[-.08, .28]	.05	.08	[-.10, .20]
HSLS	.08	.07	[-.06, .23]	-	-	-	.03	.08	[-.13, .19]	-	-	-
Combined effect	.12	.06	[.01, .24]				.06	.06	[-.06, .18]			
Heterogeneity	Q = .85, df = 1, p = .357, I^2 = 0						Q = .38, df = 1, p = .540, I^2 = 0					
Latine vs. White												
CAMP	.01	.10	[-.18, .20]	-.20	.09	[-.37, -.02]	-.31	.08	[-.47, -.14]	-.09	.10	[-.29, .10]
HSLS	-.11	.03	[-.17, -.04]	-	-	-	-.14	.04	[-.22, -.06]	-	-	-
Combined effect	-.09	.03	[-.16, -.03]				-.17	.04	[-.24, -.10]			
Heterogeneity	Q = 1.27, df = 1, p = .260, I^2 = 21						Q = 3.15, df = 1, p = .076, I^2 = 68					

Note. The significant effect sizes (g) and heterogeneity statistics (Q and I^2 statistics) are in bold. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Table 5

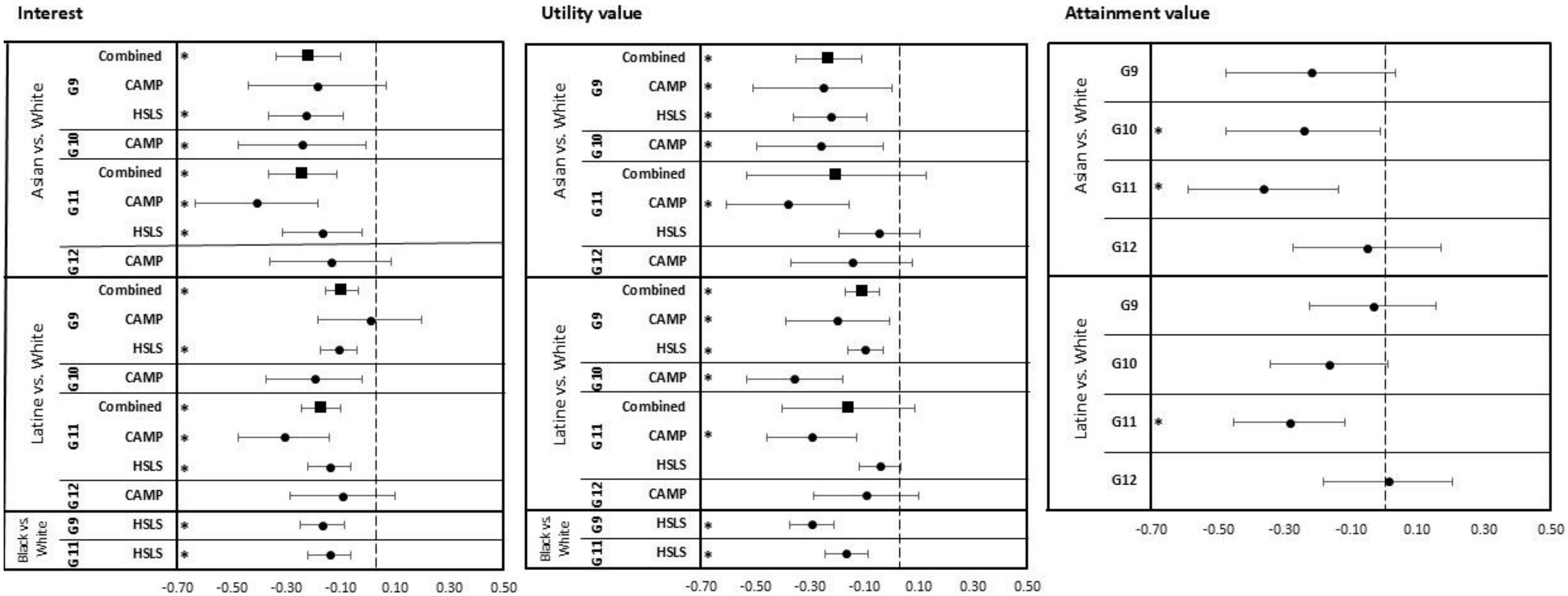
Racial and ethnic differences in mathematics attainment value among boys and girls in 9th to 12th grade

	9th grade			10th grade			11th grade			12th grade		
	g	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI
Boys												
Asian vs. White	-.22	.13	[-.48, .03]	-.24	.12	[-.48, -.01]	-.36	.11	[-.59, -.14]	-.05	.11	[-.28, .17]
Latine vs. Asian	.19	.10	[.00, .38]	.08	.09	[-.10, .26]	.08	.09	[-.10, .26]	.06	.08	[-.09, .21]
Latine vs. White	-.03	.10	[-.22, .16]	-.17	.09	[-.34, .01]	-.29	.08	[-.45, -.12]	.01	.10	[-.18, .21]
Girls												
Asian vs. White	-.33	.12	[-.57, -.10]	-.20	.13	[-.45, .05]	-.23	.12	[-.47, .01]	-.14	.12	[-.37, .09]
Latine vs. Asian	.12	.09	[-.06, .30]	.03	.10	[-.16, .23]	.00	.10	[-.19, .19]	.03	.08	[-.12, .19]
Latine vs. White	-.22	.09	[-.39, -.05]	-.17	.09	[-.35, .01]	-.24	.09	[-.41, -.06]	-.11	.10	[-.30, .09]

Note. The significant effect sizes (*g*) are in bold. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second. The analysis of attainment value was conducted using the CAMP dataset only, as this variable was not available in the HSLS dataset.

Figure 1

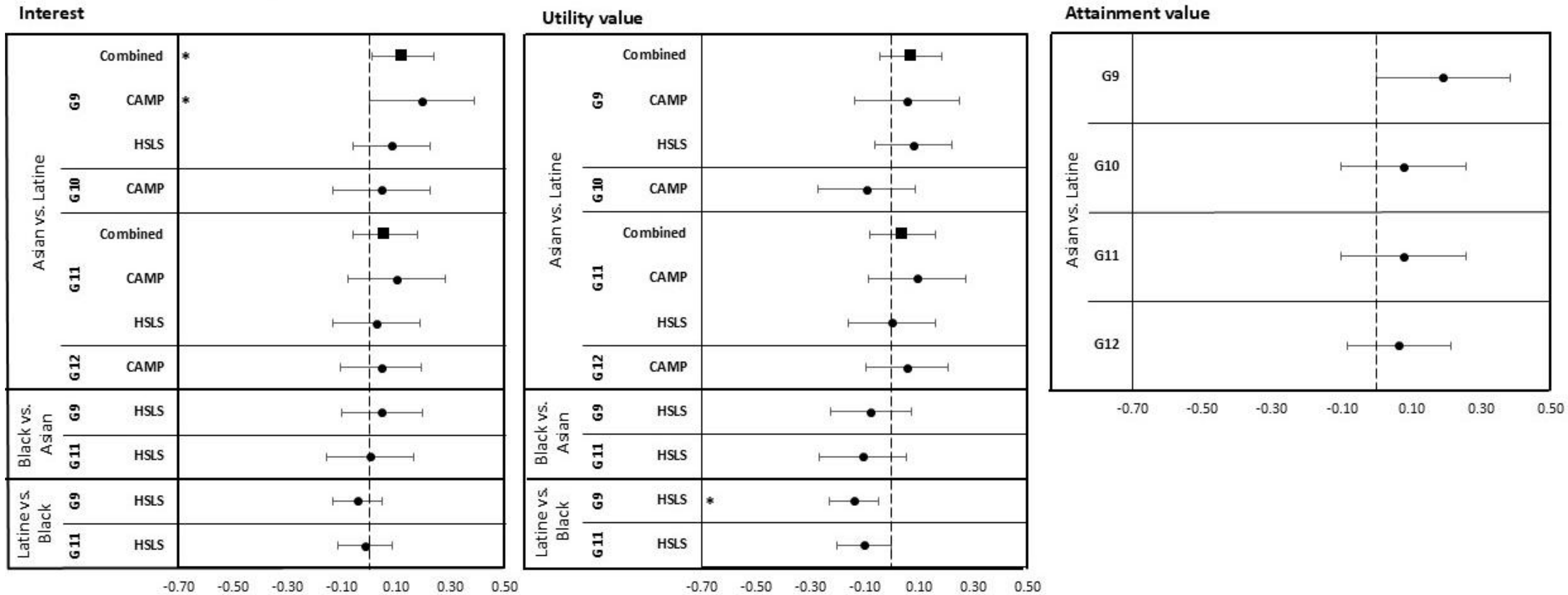
Effect sizes of mean-level differences in mathematics subjective task values between boys of color and White boys by grade level and datasets



Note. The significant effect sizes (*g*) are marked with an asterisk. Attainment value was examined using the CAMP dataset only. G9=9th grade; G10=10th grade; G11=11th grade; G12=12th grade. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Figure 2

Effect sizes of mean-level differences in mathematics subjective task values among boys of color by grade level and datasets



Note. The significant effect sizes (*g*) are marked with an asterisk. Attainment value was examined using the CAMP dataset only. G9=9th grade; G10=10th grade; G11=11th grade; G12=12th grade. Positive effect sizes mean that the racial/ethnic group on the right reported higher mathematics values than the group on the left, while negative effect sizes mean the group on the left reported higher values than the group on the right.

All six heterogeneity statistics were not significant, indicating that similar patterns emerged across the two datasets.

Again, we found a similar pattern of racial and ethnic differences in mathematics utility value—the pattern favored Asian ($-0.38 \leq g \leq -0.04$), Black ($-0.17 \leq g \leq -0.14$), and Latine boys ($-0.31 \leq g \leq -0.11$) over White boys across 9th and 11th grade (Table 4 and Figure 1) with minimal differences among Asian, Black, and Latine boys (Table 4 and Figure 2). Among Asian, Black, and Latine boys, only one difference emerged in the CAMP dataset—Asian boys reported higher utility value than Latine boys in 9th grade ($g = 0.20$). One out of six heterogeneity statistics indicated that the significant effect size favoring Asian over White boys in 11th grade was significantly larger in the CAMP dataset than in the HSLS dataset ($Q(1) = 5.98$, $p = 0.015$). The remaining five heterogeneity statistics were not statistically significant, indicating that the effect sizes were similar across the datasets.

The pattern for mathematics attainment value was less pronounced than those for other subjective task values, with some variation (Table 5 and Figures 1-2). We found significant differences favoring Asian boys over White boys in 10th ($g = -0.24$) and 11th grade ($g = -0.36$), differences favoring Latine boys over White boys in 11th grade ($g = -0.29$), and differences favoring Asian boys over Latine boys in 9th grade ($g = 0.19$).

Girls

We found significant racial and ethnic differences among girls. Black girls showed higher interest than White girls in 9th and 11th grade in HSLS ($-0.20 \leq g \leq -0.16$) (Table 6 and Figure 3). Latine girls also reported higher interest than White girls in 10th and 11th grade in both datasets ($-0.22 \leq g \leq -0.16$). Asian and White girls did not differ in mathematics interest across grade levels in either dataset. Further, differences among Asian, Black, and Latine girls were

Table 6

Racial and ethnic differences in mathematics interest among girls in 9th to 12th grade

	9th grade			10th grade			11th grade			12th grade		
	g	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI
Asian vs. White												
CAMP	-.17	.12	[-.4, .06]	-.01	.13	[-.26, .24]	-.13	.12	[-.37, .12]	-.12	.12	[-.35, .11]
HSLS	-.14	.07	[-.28, .00]	-	-	-	-.14	.08	[-.29, .01]	-	-	-
Combined effect	-.15	.06	[-.27, -.03]				-.14	.07	[-.27, -.01]			
Heterogeneity	$Q = .05$, $df = 1$, $p = .830$, $I^2 = 0$						$Q = .02$, $df = 1$, $p = .902$, $I^2 = 0$					
Black vs. Asian												
HSLS	-.03	.08	[-.18, .12]	-	-	-	-.06	.08	[-.22, .10]	-	-	-
Black vs. Latine												
HSLS	-.13	.04	[-.21, -.04]	-	-	-	-.08	.05	[-.17, .01]	-	-	-
Black vs. White												
HSLS	-.16	.04	[-.23, -.08]	-	-	-	-.20	.04	[-.28, -.12]	-	-	-
Latine vs. Asian												
CAMP	.03	.09	[-.16, .21]	-.18	.10	[-.38, .01]	-.10	.10	[-.29, .10]	.04	.08	[-.11, .20]
HSLS	.10	.07	[-.04, .25]	-	-	-	.03	.08	[-.13, .18]	-	-	-
Combined effect	.07	.06	[-.04, .19]				-.02	.06	[-.14, .10]			
Heterogeneity	$Q = .38$, $df = 1$, $p = .538$, $I^2 = 0$						$Q = 1.00$, $df = 1$, $p = .318$, $I^2 = 0$					
Latine vs. White												
CAMP	-.15	.09	[-.31, .02]	-.19	.09	[-.37, -.01]	-.22	.09	[-.4, -.05]	-.08	.10	[-.27, .12]
HSLS	.02	.03	[-.04, .09]	-	-	-	-.10	.03	[-.16, -.03]	-	-	-
Combined effect	.00	.03	[-.06, .06]				-.11	.03	[-.18, -.05]			
Heterogeneity	$Q = 3.44$, $df = 1$, $p = .064$, $I^2 = 71$						$Q = 1.84$, $df = 1$, $p = .175$, $I^2 = 46$					

Note. The significant effect sizes (*g*) and heterogeneity statistics (*Q* and I^2 statistics) are in bold. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Table 7

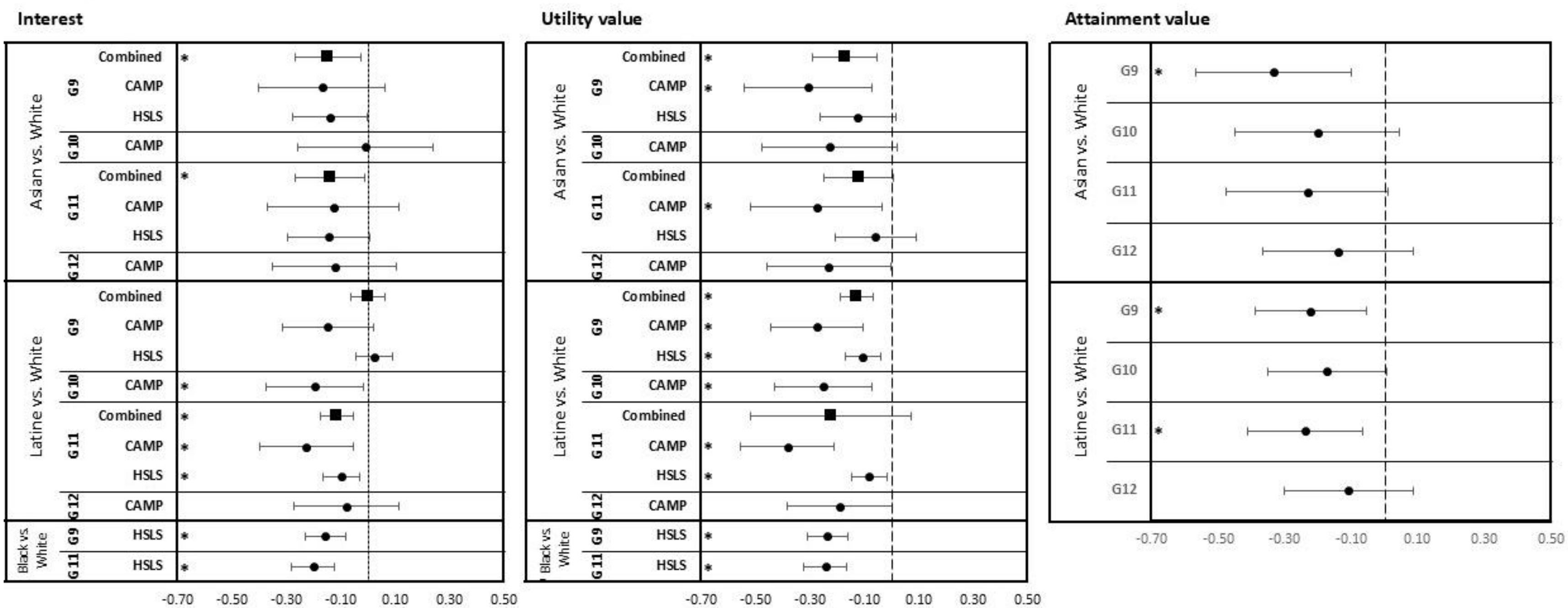
Racial and ethnic differences in mathematics utility value among girls in 9th to 12th grade

	9th grade			10th grade			11th grade			12th grade		
	g	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI	*g*	SE	95% CI
Asian vs. White												
CAMP	-.31	.12	[-.54, -.07]	-.23	.13	[-.48, .02]	-.28	.12	[-.52, -.03]	-.23	.12	[-.46, .00]
HSLS	-.12	.07	[-.26, .02]	-	-	-	-.06	.08	[-.21, .09]	-	-	-
Combined effect	-.17	.06	[-.29, -.05]				-.12	.07	[-.25, .01]			
Heterogeneity	Q = 1.75, df = 1, p = .185, I^2 = 43						Q = 2.23, df = 1, p = .136, I^2 = 55					
Black vs. Asian												
HSLS	-.03	.08	[-.18, .12]	-	-	-	-.06	.08	[-.22, .10]	-	-	-
Black vs. Latine												
HSLS	-.13	.04	[-.21, -.04]	-	-	-	-.08	.05	[-.17, .01]	-	-	-
Black vs. White												
HSLS	-.16	.04	[-.23, -.08]	-	-	-	-.20	.04	[-.28, -.12]	-	-	-
Latine vs. Asian												
CAMP	.03	.09	[-.16, .21]	-.18	.10	[-.38, .01]	-.10	.10	[-.29, .10]	.04	.08	[-.11, .20]
HSLS	.10	.07	[-.04, .25]	-	-	-	.03	.08	[-.13, .18]	-	-	-
Combined effect	.07	.06	[-.04, .19]				-.02	.06	[-.14, .10]			
Heterogeneity	Q = .38, df = 1, p = .538, I^2 = 0						Q = 1.00, df = 1, p = .318, I^2 = 0					
Latine vs. White												
CAMP	-.15	.09	[-.31, .02]	-.19	.09	[-.37, -.01]	-.22	.09	[-.40, -.05]	-.08	.10	[-.27, .12]
HSLS	.02	.03	[-.04, .09]	-	-	-	-.10	.03	[-.16, -.03]	-	-	-
Combined effect	.00	.03	[-.06, .06]				-.11	.03	[-.18, -.05]			
Heterogeneity	Q = 3.44, df = 1, p = .064, I^2 = 71						Q = 1.84, df = 1, p = .175, I^2 = 46					

Note. The significant effect sizes (*g*) and heterogeneity statistics (Q and I^2 statistics) are in bold. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Figure 3

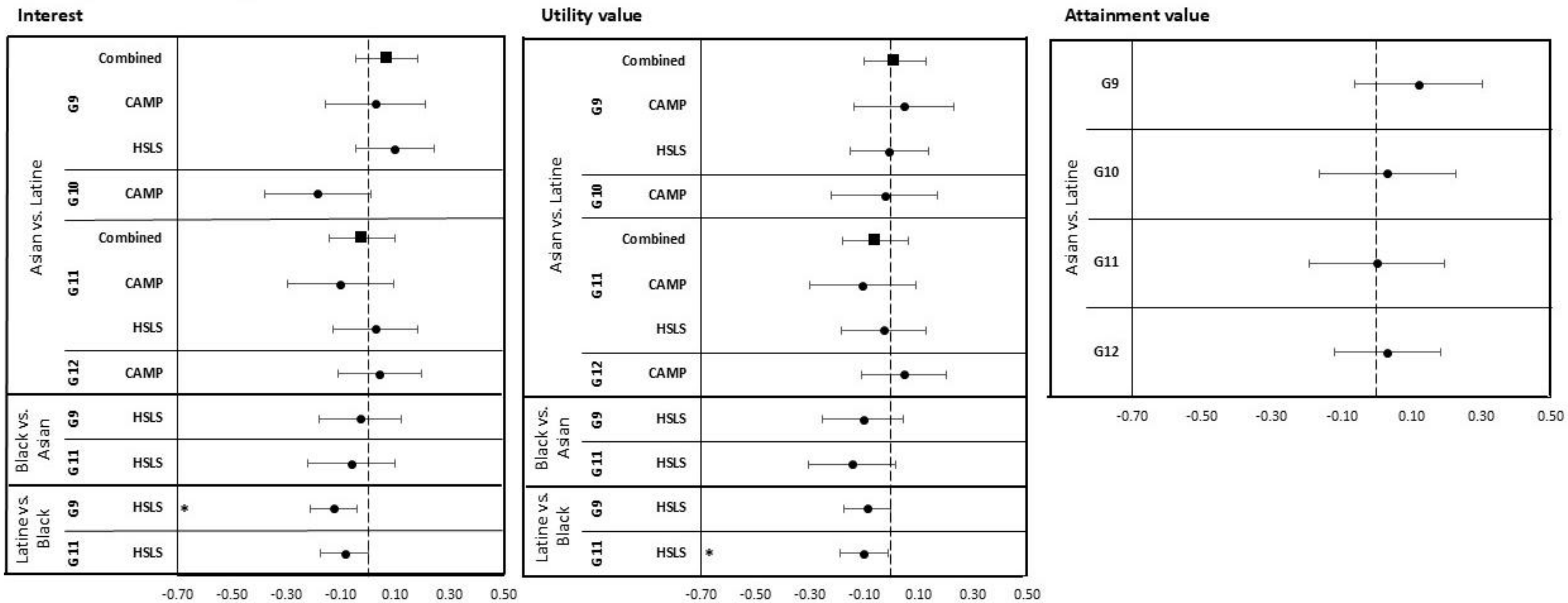
Effect sizes of mean-level differences in mathematics subjective task values between girls of color and White girls by grade level and datasets



Note. The significant effect sizes (*g*) are marked with an asterisk. Attainment value was examined using the CAMP dataset only. G9=9th grade; G10=10th grade; G11=11th grade; G12=12th grade. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

Figure 4

Effect sizes of mean-level differences in mathematics subjective task values among girls of color by grade level and datasets



Note. The significant effect sizes (*g*) are marked with an asterisk. Attainment value was examined using the CAMP dataset only. G9=9th grade; G10=10th grade; G11=11th grade; G12=12th grade. Positive effect sizes mean that the racial/ethnic group listed second reported higher mathematics values than the group listed first, while negative effect sizes mean the group listed first reported higher values than the group listed second.

minimal (Table 6 and Figure 4). Asian girls did not differ from either Black or Latine girls ($-0.29 \leq g \leq 0.25$) in either dataset, whereas Black girls reported higher interest than Latine girls in 9th grade in HSLS ($g = 0.20$). All six heterogeneity statistics were not significant, suggesting consistent patterns across the two datasets. A similar pattern emerged for mathematics utility value. Asian, Black, and Latine girls generally reported higher utility value than White girls at some grade levels between 9th and 11th grade (Table 7 and Figure 3), whereas utility values among Asian, Black, and Latine girls were largely similar (Table 7 and Figure 4). Specifically, Asian girls showed higher utility value than White girls in 9th and 11th grade in CAMP ($g = –0.31$, $–0.28$); Black girls also showed higher utility value than White girls in 9th and 11th grade in HSLS ($g = –0.16$, $–0.20$); and Latine girls showed higher utility value than White girls in 10th and 11th grade in both datasets ($–0.20 \leq g \leq –0.16$). No significant differences were found among Asian, Black, and Latine girls, except for Black girls reporting higher utility than Latine girls in 9th grade in HSLS ($g = –0.13$). None of the six heterogeneity statistics were significant, suggesting consistent effects across the two datasets. Regarding mathematics attainment value (Table 5 and Figures 3–4), compared to White girls, Asian girls showed higher attainment value in 9th grade ($g = –0.33$), and Latine girls showed higher attainment value in 9th ($g = –0.22$) and 11th grade ($g = –0.24$). There were no significant differences between Asian and Latine girls at any grade level ($0.00 \leq g \leq 0.12$).

Discussion

Our findings on racial and ethnic differences (i.e., Asian, Black, Latine, and White) in U.S. adolescents' mathematics intrinsic, utility, and attainment values within each gender support SEVT's view that individuals' values and beliefs are shaped by the specific social and cultural experiences associated with their social groups. Furthermore, our conceptual replication that tests the extent to which these patterns replicated across grade levels and across two datasets strengthens the reliability and generalizability of the current findings. Overall, we found significant racial and ethnic differences, though the specific patterns varied somewhat by type of value belief and grade level. Furthermore, across all subjective task values, adolescents of color in the U.S. generally reported higher mathematics subjective task values than their White peers, irrespective of gender. However, certain patterns slightly differed by gender, with racial gaps appearing more pronounced among boys than among girls—underscoring the situated nature of U.S. mathematics education. These patterns remained consistent from 9th through 11th grade but were no longer statistically significant by 12th grade. Below, we discuss each of these findings.

Higher Mathematics Values for Adolescents of Color than White Adolescents

Our findings showed that, in the U.S., Asian, Black, and Latine adolescents, regardless of gender, typically viewed mathematics as more interesting, important to their identity, and useful than White adolescents. This pattern replicated across both datasets, though the specific racial and ethnic differences varied depending on the value and grade level. Even though this trend contradicts earlier evidence suggesting that White adolescents report higher mathematics values (e.g., Anderson & Ward, 2014), our findings align with more recent studies showing that Black and Latine adolescents demonstrate adaptive mathematics beliefs that are comparable to those of White adolescents (McKellar et al., 2024; Seo et al., 2019).

There are several reasons explaining why Black and Latine adolescents in the U.S. may have higher mathematics subjective task values than their White peers. It is possible that, despite structural inequities in mathematics education (and the U.S. educational system more broadly), Black and Latine adolescents may recognize that STEM careers can help individuals' social mobility, which is particularly significant for these groups as they strive to overcome decades of societal barriers and discrimination in the U.S., and enhance their socio-economic position (Archer et al., 2015). In the U.S., furthermore, cultural resources within Black and Latine communities that emphasize resilience and cultural pride (Huguley et al., 2019) may help adolescents place greater value on learning mathematics (Del Toro et al., 2024). Another possibility is that Black and Latine adolescents increase their mathematics values as a strategy to resist social stigma and prove their intellectual competence in mathematics (e.g., stereotype management; McGee & Martin, 2011). Yet, individuals' mathematics outcomes are not just the result of their beliefs, as individuals are situated within a particular context and may have limited access to enriching mathematics education and/or may experience several barriers. The continued underrepresentation and lower mathematics achievement of Black and Latine individuals in mathematics-related fields underscore the need to examine underlying contextual mechanisms—such as experiences of discrimination (Del Toro et al., 2024) and unequal opportunities in U.S. mathematics education (Butler-Barnes et al., 2021)—that limit the extent to which these students can fully benefit from their high mathematics values to achieve strong math performance and pursue math-intensive pathways.

Higher Mathematics Values for Asian than White, and for Black than Latine Adolescents

Our findings show that, even among groups with similar advantages or disadvantages in U.S. mathematics education (e.g., Asian vs. White, Black vs. Latine), there are meaningful differences in how much they value mathematics. In general, Asian boys had higher mathematics values than White boys across all three values, and Asian girls had higher utility and attainment values than White girls. This trend may reflect the strong cultural emphasis on academic achievement in many Asian communities, where parents often communicate values related to mathematics success through academic support (Chang & Shih, 2023). However, the lack of a significant difference in mathematics interest between Asian and White girls across grade levels suggests that gender stereotypes about male superiority in mathematics may play a stronger role for these groups (Shapiro & Williams, 2012), as both White and Asian communities in the U.S. often uphold traditional math stereotypes (Rowley et al., 2007).

Additionally, we found that Black girls exhibited higher mathematics interest and utility value than Latine girls, whereas Black and Latine boys held similar beliefs. Though both cultures emphasize that boys and girls are equally capable in mathematics (Rowley et al., 2007), this message may be more strongly reinforced within Black communities, benefiting Black girls (cf., Rubach et al., 2022). In contrast, traditional gender roles may still influence Latine adolescents, despite growing egalitarian views on academic ability (Gutierrez & Leaper, 2025). Latine culture has long emphasized family loyalty and responsibility, as reflected in the concept of *familismo* (Gutierrez & Leaper, 2025), which includes traditional gender roles—women as caregivers and men as providers. In the U.S., these roles may continue to affect Latine girls' mathematics subjective task values, preventing them from perceiving mathematics as interesting or useful as Black girls did. On the flip side, Latine boys' mathematics values may have been supported by traditional gender role beliefs within their communities.

Similar Racialized Patterns within Each Gender, Slightly More Pronounced among Boys

Though racial and ethnic differences emerged for both genders, the differences among Asian, Latine, and White adolescents were more consistent for boys than for girls. That is, Asian boys consistently reported higher levels of all three mathematics subjective task values than White boys across 9th through 11th grade in both datasets, whereas Asian girls showed higher attainment and utility values than White girls only in 9th and 11th grade in CAMP, with no differences in mathematics interest across datasets. Asian boys had higher mathematics interest and utility value than Latine boys in 9th grade in CAMP, whereas Asian girls and Latine girls had similar values in both datasets. Moreover, Latine boys consistently exhibited higher levels across all three values than White boys from 9th through 11th grade, whereas Latine girls showed higher values than White girls only in 10th and 11th grade.

These patterns may suggest that prevailing gender-based norms that undervalue girls' mathematics ability in the U.S. (Else-Quest et al., 2013) may influence girls across all racial and ethnic backgrounds, potentially contributing to the smaller variability observed among girls compared to boys. One notable difference among girls is that Black girls reported higher mathematics interest and utility values than Latine girls in 9th grade, which was not observed between Black and Latine boys. These findings suggest that racial and ethnic differences in the U.S. do not consistently favor one group across gender, reflecting how cultural experiences can differently shape boys' and girls' mathematics values within specific learning contexts (Eccles & Wigfield, 2020). Therefore, our findings emphasize the need for a nuanced examination of how structural inequities at the intersections of race, ethnicity, and gender shape adolescents' development of mathematics values in the U.S.

Racial and Ethnic Differences Across 9th to 12th Grade

We found evidence of racial and ethnic differences in mathematics values from 9th through 11th grade, but no such differences were observed in 12th grade. This aligns with prior research indicating that racial and ethnic differences in subjective task values tend to diminish as adolescents advance through high school (Seo et al., 2019). One possible explanation is that Black and Latine adolescents may experience a decline in their mathematics values over time due to the cumulative exposure to racial discrimination or bias (Del Toro et al., 2024). In contrast, Asian and White adolescents may maintain or even increase their mathematics values during high school (Lee-Poon & Simpkins, 2024). In 12th grade, it is possible that Asian and White adolescents may become more focused on college and career plans and see mathematics as important for getting into competitive STEM programs and careers (Edwin et al., 2019), which could help explain the smaller racial and ethnic differences in mathematics values at this stage. This trend replicated across the two datasets, suggesting that further examination of the social and individual factors influencing this reduced racial gap in motivational experiences is necessary.

Practical Implications

Although it is promising that Black and Latine adolescents in our study reported higher mathematics values than their peers regardless of gender, their lower math performance and underrepresentation in U.S. math-intensive fields draw attention to the need for mathematics teachers to adopt instructional strategies tailored to help these adolescents capitalize on their motivational strengths and achieve their academic and career goals in mathematics fields. In light of this, we offer several recommendations.

First, research on culturally responsive teaching practices highlights the promise of using students' cultural backgrounds (e.g., communalism within Black and Latine communities) and life experiences as assets to make learning mathematics engaging and personally relevant for students from diverse backgrounds (Turner et al., 2024). Guided by this work, mathematics teachers can incorporate collaborative learning activities (e.g., pair work, group work) that emphasize shared goals, mutual responsibility, and the funds of knowledge students bring to mathematics learning (Wright, 2021). They can also implement social justice– and real-world–oriented lessons that engage students in examining community issues and open-ended problems that reflect their lived experiences (e.g., wage disparities; Turner et al., 2024; Wiehe et al., 2025).

Second, to counter brilliance-oriented beliefs about mathematics that are pervasive in the U.S. (Shapiro & Williams, 2012), teachers can emphasize the time and effort involved in developing mathematical competence (Lee et al., 2025), communicate high expectations for minoritized students (Butler-Barnes et al., 2021), and use mastery-oriented practices that reduce harmful social comparison (Lee et al., 2021). Finally, increasing students' exposure to role models who are demographically similar (e.g., Black female scientists) or whose values and experiences align with those of students (e.g., scientists emphasizing collaboration or resilience) can also foster mathematics values among girls of color (Lee et al., 2023).

Limitations and Future Directions

The current study makes several notable contributions to understanding racial and ethnic differences in mathematics subjective task values within the same gender as well as overall. However, there are also several limitations to consider, which inform the directions for future research. First, the data available to us had limitations that impacted our ability to test for replication. For example, we were unable to test for conceptual replication among Black adolescents because this population was only present in one dataset (i.e., HSLS). This limitation warrants caution in generalizing our findings related to Black adolescents in the U.S. Future research should build on the trends identified in the current study by replicating the analysis with more diverse samples that include Black adolescents as well as multiracial/ethnic adolescents.

We were also constrained by the types of subjective task values examined. Replication was not possible for attainment value, as it was only measured in one dataset (i.e., CAMP). Particularly, because Black adolescents were absent from the CAMP dataset, where attainment value was measured, our ability to examine racial and ethnic differences in attainment value for Black adolescents was limited in this study. Previous research has highlighted the complex roles of risk factors (e.g., parents' stereotype beliefs) and protective factors (e.g., parents' support) in shaping identity-based attainment value among Black adolescents (Starr et al., 2022), emphasizing the need for further research to address the gaps left by this study.

Additionally, cost was not measured in either dataset. Cost is an important aspect of value beliefs that is often overlooked in empirical research (Eccles & Wigfield, 2020). Although it has been studied less comprehensively than other value beliefs, research on cost indicates its relevance to outcomes such as intentions to leave STEM majors (Eccles & Wigfield, 2020). Therefore, examining cost should be an important focus for future research on race and ethnicity and motivational beliefs. Finally, it should be noted that the datasets used in this study reflect mathematics subjective task values from the mid-2000s and early 2010s. Although our findings provide a historical benchmark for racial patterns in math motivational beliefs, it remains an important question whether and how these patterns have shifted amid recent changes in U.S. and global mathematics learning environments (e.g., advances in digital technologies; Weigand et al., 2024) to inform ongoing efforts to promote equity in contemporary mathematics education.

The current study's contributions and limitations highlight several research strands that future directions may address. First, although our focus on mathematics is aligned with the domain-specificity of motivational beliefs outlined by SEVT, our research may not generalize to other STEM subjects. Thus, future research should test racial and ethnic differences within boys and girls in other subjects, such as science and engineering, to confirm the domain generalizability of our findings. Second, our current study found that Black and Latine adolescents exhibited differences in their interest and utility value, despite sharing a minoritized status in U.S mathematics education. This finding highlights the need for future research to explore the distinct cultural and individual factors that may shape the motivational experiences of Black and

Latine adolescents in unique ways. A deeper understanding of these factors can inform targeted interventions that support Black and Latine adolescents in developing positive mathematics values and success in U.S.

Conclusion

The current study demonstrates racial and ethnic variability in mathematics subjective task values within boys and girls. Overall, adolescents of color reported higher levels of mathematics subjective task values compared to their White peers in the U.S., with particularly notable differences favoring Asian over White adolescents and Black over Latine adolescents. These trends were consistent across gender—though slightly more pronounced among boys, high school years, and datasets. Our findings highlight the importance of taking an intersectional approach to better understand mathematics motivational beliefs among adolescents of different gender, racial, and ethnic backgrounds.

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