Grit, Soft Skills, and Achievement Gaps in the United States

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ABSTRACT

Is a child's assessment of their grit—or perseverance in the face of adversity—the key to explaining achievement gaps in the United States? Despite the widespread popularity of policies that promote perseverance and related concepts in American schools, to date, there has been no formal assessment of grit using longitudinal, nationally-representative data. Using the ECLS-K 2011, we document the size of socioeconomic and racial/ethnic disparities in math and reading achievement in 5th grade and examine whether grit and soft skills meaningfully account for these gaps. We find that self-reported "grit" has modest links to academic performance and does not explain socioeconomic and racial/ethnic achievement gaps. By comparison, we find that soft skills—specifically *approaches to learning* and *attentional focus skills*—play a more important role.

Keywords: Cognitive Skills, Early Adolescence, Grit, Noncognitive Skills, Educational Inequality

Scholars have long argued that large-scale inequalities, whether they are economic, political, or social, often impact the everyday life of individuals in very personal ways (Collins 2014; Sewell et al. 1969). As such, concern about persistent achievement disparities among American youth often search for the social psychological[i] ramifications of more macro-level phenomena (see Farkas 2003, Lechner et al. 2019). Among education practitioners, this approach has translated into a focus on children's socio-emotional learning, and more specifically, growth mindset and noncognitive skills (see Gruijters, Raabe and Hubner 2021). Despite considerable academic attention on these more psychological factors among American students, one popularized line of inquiry has largely gone unexamined with nationally representative data—*grit*.

Grit is commonly referred to as perseverance in the face of adversity (Duckworth 2016). Although dismissed in some academic literature as not predictive of educational performance (see Steinmayr et al. 2018; Chang 2014, although see Alan et al. 2019; Myers et al. 2016; Bowman et al. 2015; Eskreis-Winkler et al. 2014; Yeager and Dweck 2020), grit (Duckworth 2016) and growth mindset (Dweck 2006) have been widely cited and advanced in educational psychology and in the public generally. For example, a google trend search reveals a persistent interest in "grit" and an increasing interest in "resilience". And the peak popularity for the term "resiliency" was September 2020, as schools moved to online learning in the first months of the COVID-19 pandemic (see Figure 1).

In the past decade, prominent public intellectuals have advocated for grit curriculum as a feature of educational reform efforts among disadvantaged communities (e.g. Tough 2011; 2013; 2016). Likewise, growth mindset and related socio-emotional learning approaches are popular concepts across primary and secondary education with a number of instruments developed to

access and increase a student's resiliency and perseverance (e.g. secondstep.org). As with many educational trends, confirmatory evidence often lags (Yeager and Dweck 2020) and concepts are often distorted (Gross-Loh 2016, e.g. "false" growth mindset). Our approach is to provide a focused examination of grit with the only known nationally representative data set of American students to determine its association with achievement outcomes and its potential role in addressing socioeconomic and racial/ethnic disparities in education.

Using the ECLS-K 2011, we examine measures of grit—a self-reported measure of academic perseverance—as specifically designed by Angela Duckworth for the ECLS-K.[ii] These measures ask 5th graders to rate how much they feel they are the kind of student that: (1) finishes whatever they begin, (2) tries hard even after making mistakes, (3) continues to work toward goals, (4) works hard even when they feel like quitting, (5) continues to work on what they set out to do, and (6) keeps trying to improve themselves. For comparison, we will also examine an array of noncognitive or soft skills—self-control, internalizing and externalizing problem behaviors, approaches to learning, interpersonal skills, and attentional focus. If, as some speculate (Tough 2016), these measures are a meaningful reason why achievement gaps are found in the elementary and middle school years, resiliency-focused efforts such as the *Knowledge Is Power Program* (www.kipp.org) and socioemotional programs such as Second Step (www.secondstep.org) may be widespread educational solutions to addressing persistent educational achievement gaps in the United States.

LITERATURE REVIEW

Achievement Gaps in America

The role of cognitive skill achievement for predicting later educational outcomes and socioeconomic success has been well-established (Kautz et al. 2014; Duncan and Magnuson 2013; Carbonaro 2007; Hout 2012; Hall and Farkas 2011; Kerckoff, Raudenbush, and Glennie 2001). Yet, despite historical progress, socioeconomic gaps in cognitive skills remain—emerging early in the life course and persisting into adolescence (NAEP NDE 2021[iii]; Halle et al. 2009; Isaacs 2012; Fletcher and Kim 2016; Reeves, Venator, and Howard 2014; Denton and West 2002; Lee and Burkam 2002; West, Denton, and Reaney 2001, Moffitt et al. 2011). Likewise, race-based gaps in math and reading skills have been persistent across all measured race/ethnic groups between 2009 and 2019, with even more pronounced stalling from 2000-2017 among 8th graders (NAEP 2019a). And despite years of educational reform intended to reduce such disparities (i.e. No Child Left Behind Act of 2001, Race to the Top Act of 2011), socioeconomic gaps on standardized tests have persisted for at least a quarter century (1995-2015) (Hanushek et al. 2020)—with estimates around one standard deviation difference in scores or more between low and high income students (Reardon 2011).[iv] And more recent estimates confirm the durability of both socioeconomic and race/ethnic disparities (see NAEP 2019b; NAEP 2019c).

Prevailing explanations for these enduring gaps are often centered on neighborhood factors (Reardon, Robinson-Cimpian, and Weathers 2014), growing income inequality (Reardon 2013), school funding (Condron and Roscigno 2003), parenting (Gibbs and Downey 2020), teacher bias (Downey and Pribesh 2004; Corcoran and Evans 2008) and related factors (Magnuson and Waldfogel 2008; Potter, Mashburn, and Grissmer 2013). By some estimates,

these measures account for nearly a half to 2/3^{rds} of the relationship in early childhood (Jencks and Phillips 1998; Grissmer and Eiseman 2008; but see Gibbs and Downey 2020).

One growing explanation for cognitive skills gaps has been in the realm of social-psychological skills—more specifically, soft or noncognitive skills (Farkas 2003). Soft skills are personality traits, goals, motivations, and preferences that are valued in the labor market, in school, and in other domains (Heckman and Kautz 2012). If soft skills are important features of academic success (Bowles and Gintis 1976; Jencks 1979; Kautz et al. 2014; Bowles, Gintis, and Osborne 2001; Tough 2011; Duckworth 2016; Dweck 2006; Heckman and Kautz 2012) and if disadvantaged groups have fewer of these attributes (Tough 2016; Farkas 2003; Garcia 2015; Urzua 2006), it seems reasonable that disparities in skills like these could be one critical explanation for persistent achievement gaps in the US.

Evidence for this premise appears supportive—there are clear links between social psychological related skills (i.e. relationship skills, self-control, motivation, perseverance, and tenacity) and positive math and reading outcomes (see Heckman 2006; Durlak et al. 2011; Farrington et al. 2012; Cameron et al. 2012; Cameron et al. 2016; Little 2017, Liu 2020, see also Grissmer and Eiseman 2008; Potter et al. 2013). There is also some evidence that noncognitive skills and related behaviors vary by class and race (Grissmer and Eiseman 2008; Morris and Perry 2016; Elder and Zhou 2021; Liu 2020). However, few studies have formally examined the mediating role of soft skills in explaining cognitive skill gaps (see Liu's 2020 study of ECLS-K 1998 data), and we know of no study that has explored the mediating or moderating role of the popularized concept of "grit" on academic outcomes with nationally representative, longitudinal data (Duckworth et al. 2007).

Grit

Grit encompasses the soft skills of drive, focus, discipline, and persistence which are required for success in the economy and society at large. The concept of grit is linked to Farrington's work on academic perseverance and growth mindset—that school-aged children succeed in school when they possess qualities of grit, self-control and can delay gratification (Farrington et al. 2012). A student's academic perseverance, according to Farrington, is highly dependent on whether a student believes (1) "My ability and competence grow with my effort" and (2) "I can succeed at this" (Farrington et al. 2012; Tough 2016).

Perhaps the most influential work on grit has been popularized by Harvard psychologist Angela Duckworth. She defines grit as "passion and perseverance for long-term goals" (Duckworth, Peterson, Matthews, and Kelly 2007). Duckworth devised the popular *Grit Scale* developed to quantify character strengths and asks participants to numerically self-score statements like "I have overcome setbacks to conquer an important challenge" or "I finish whatever I begin" (Duckworth 2016).[v] Although the scale was developed for a study that could accurately predict which military cadets would last through training at the United States Military Academy at West Point, it has since been used to study successful spelling bee contestants, students, and teachers. Results suggest that "grittier" people are more successful, healthier, better off, and less likely to be convicted of a crime (Duckworth et al., 2007; Robertson-Kraft & Duckworth 2014).

The concept of grit has resonated strongly with the American public (see Diamond and Lee 2011; Wall et al. 2015; Pappano 2013; Hoerr 2013), with many educators adopting grit interventions to improve low performance (Perkins-Gough 2013) and socioeconomic/racial gaps in school (Tough 2013). In addition, an update to federal education law requires states to include

at least one nonacademic measure in judging school performance, such as soft skills (Every Student Succeeds Act 2015). Many school systems have begun to include grit measures in their school assessments (Belfali and Ikeda 2016; Kearns 2015). For example, Knowledge is Power Program (KIPP schools) have worked with Duckworth to promote grit in their students (Tuttle et al 2015). Notably, the Department of Education issued a report reviewing more than fifty grit-inspired programs and approaches with the call for more school programs and practices to promote grit in education (Shechtman et al 2013).

With increased focus on grit, is there evidence that grit matters for academic achievement? Some evidence suggests that grit has a relationship to educational outcomes (Al-Mutawah and Fateel 2018; Usher et al 2019; Khan 2018; Rojas, Usher, and Toland 2012; Barrington 2017, Brigman, Webb, and Campbell 2007), even when accounting for other related skills like conscientiousness and intelligence (Bowman et al. 2015; Gutman and Schoon 2013; West et al 2016; Crede et al 2017; Lucas et al 2015; Duckworth et al 2007). For example, grit is associated with cognitive skills (Alan et al. 2019), student learning motivation (Myers et al. 2016), persistence in academic programs (Bowman et al. 2015) and success in school and in the workplace (Eskreis-Winkler et al. 2014). Grit has also been linked to attitudinal measures, including higher levels of optimism (Lovering et al. 2015), psychological well-being (MacCann and Roberts 2010), lower levels of suicide ideation (Blalock, Young, and Kleiman 2015), overall life satisfaction (Samson et al. 2011), and general mental health (Kleiman et al. 2013) (see Lam and Zhou 2019).

Still, the significance of grit in relation to other noncognitive factors has been called into question (Steinmayr et al. 2018; Chang 2014). Two meta-analyses of grit literature report that grit is sometimes positively associated with academic achievement, but only modestly, and

individual facets of grit or other noncognitive abilities like motivation and engagement are more impactful. Additionally, interventions to enhance grit appear to have weak effects on performance (Crede et al. 2017; Lam and Zhou 2019; Steinmayr et al. 2018). And attempts to determine whether levels of grit vary by race or class have been inconclusive (Bowman et al. 2015).

In sum, many claims about grit have been unexamined or contradicted (see Crede 2018). As such, we argue for a more rigorous assessment of grit that uses nationally representative data, and accounts for other soft skills when modeling estimates. Thus, based on the literature, we have four expectations in this study. First, we expect to find sizable socioeconomic and race/ethnic gaps in math and reading scores in 5th grade. Second, we expect that both soft skills and to some extent grit will help explain socioeconomic and race/ethnic gaps in math and reading scores in 5th grade. Finally, based on the work of *name withheld* (2022), we anticipate differential returns to self-reported levels of grit by socioeconomic status.

METHODS

The Early Childhood Longitudinal Study, Kindergarten Class of 2010-11 (ECLS-K:2011) data are a nationally representative sample of 18,174 students who were enrolled in 968 schools in the United States for the school year 2010-11. Data were collected in kindergarten (2010-11), first grade (2011-12), second grade (2012-13), third grade (2013-14), fourth grade (2014-15), and fifth grade (2015-16). The sample used a clustered, multistage probability design. Children, parents, teachers, and administrators were interviewed in each wave of data. Children were given self-administered questionnaires beginning in third grade.

Measures

Math and reading scores. The assessment of *math* skills captures conceptual knowledge and problem solving. The assessment measured number sense, properties, and operations; measurement; geometry and spatial sense; data analysis, statistics, and probability; and patterns, algebra, and functions. The assessment for *reading* captures basic reading skills (e.g., word recognition), vocabulary knowledge, and reading comprehension. Questions asked the child to identify information specifically stated in text (e.g., definitions, facts, supporting details); to make complex inferences within texts; and to consider the text objectively and judge its appropriateness and quality. Both math and reading assessments use item-response methods (IRT) to gauge the level of difficulty, discriminating ability, and "guess-ability" of each item. (Najarian et al. 2019; Tourangeau et al. 2015)

Self-Reported Grit

For *grit*, we rely on measures developed by Duckworth for the ECLS-K. The prompt ask 5th graders to rate if they are a student that: finishes whatever they begin, tries hard even after making mistakes, continues to work toward goals, works hard even when they feel like quitting, continues to work on what they set out to do, and keeps trying to improve themselves. Students could select 1=not at all like me, 2=a little bit like me, 3=somewhat like me, 4=quite a bit like me, and 5=very much like me.[vi] We created a factor of these measures for a reliability coefficient of .83.

Soft Skills

Our measures of *soft skills* compile several social/behavioral measures rated by teachers in the following domains: interpersonal skills, self-control, internalizing and externalizing problem behaviors, approaches to learning, and attentional focus skills. The reliability coefficient of this factored measure was .89.

For *interpersonal skills*, teachers were asked to assess children's ability to (a) form and maintain friendships, (b) get along with people who are different, (c) comfort or help other children, (d) express feelings, ideas, and opinions in a positive way, and (e) show sensitivity to the feelings of others. Teachers could choose from 1=never to 4=very often. The reliability coefficient score was .86. Teacher rated the children's *self-control* with four questions about the child's ability to (1) respect the property rights of others, (2) control temper, (3) accept peer ideas for group activities, and (4) respond appropriately to pressure from peers. Reliability for self-control was 80.

Internalizing and externalizing problem behaviors were developed from the original *Social Skills Rating System*. For *internalizing problem behavior*, we use the teacher-rated assessments of the child's anxiety, loneliness, low self-esteem, and sadness with a reliability coefficient of .79. *Externalizing problem behavior* assesses acting out behaviors including the frequency the child argues, fights, gets angry, acts impulsively, and disturbs ongoing activities. The reliability coefficient was .88. We reverse coded items so positive values represent fewer problem behaviors.

Approaches to learning captures a child's citizenship in the classroom by asking the teacher if the child keeps belongings organized, shows eagerness to learn new things, works

independently, easily adapts to changes in routine, persists in completing tasks, pays attention well, and follows classroom rules. Each item was factored for a reliability coefficient of .92.

Finally, *attentional skills* measures the capacity of a child to focus on task-related behaviors. For example, "When picking up toys or other jobs, [the child] usually keeps at the task until it's done'" (Rothbart et al. 2001, p. 1406, see Najarian et al. 2020). Teachers were presented with statements about how the children might react to a number of scenarios. Higher scores suggest a child's ability to focus attention on cues in the environment that are relevant to the task. The reliability coefficient for this measure was .85.

Socioeconomic Status

Socioeconomic status was computed at the household level using data from parents in fall 2010 or spring 2011. The measure is a composite measure of the following: the father's and mother's (or guardians) highest education level, the father's and mother's (or guardians) occupational prestige scores, and household income. We transformed the continuous measure of SES into a percentile measure for ease of comparison between the highest and lowest SES quintiles.

Race Ethnicity

For *race/ethnicity*, parents were asked whether or not their child was Hispanic or Latino and to indicate to which of five race categories their child belonged (White, Black or African American, Asian, Native Hawaiian or other Pacific Islander, American Indian or Alaska Native). Parents could also select if their child belonged to more than one race category.

Parental Involvement

Because grit may be a proxy of family advantages, we account for *parental involvement* using an additive measure of parental involvement at home and school, and the frequency of extracurricular activities and trips across all waves of data (from kindergarten the fifth grade).

For the measure of *home involvement*, parents (guardians) were asked the following; "In a typical week, how often the parent or any other family members did the following things with child? Tell stories, help with arts and crafts, play games or do puzzles, and talk about nature or do science projects." Response categories for each item were; 1=not at all, 2=once or twice a week, 3=3 to 6 times a week, and 4=every day. *Extracurricular activities* measures whether the child participated in music lessons, art classes or lessons, organized clubs or recreational programs, organized athletic activities, drama classes, and organized performing arts programs. For each response, 1=yes, 0=no.

Trips is based on the following question, "In the past month, has anyone in the family done the following with the child: visited a library or bookstore, visited an art gallery, museum, or historical site, visited a zoo, aquarium, or petting farm, gone to a play, concert, or other live show, or attended an athletic or sporting event?" For each response, 1=yes 0=no. Finally *school involvement* measures whether the parent or the other adults in the household attended an open house or back-to-school night, attended a meeting of a PTA or PTO, attended a school or class event, served as a volunteer in the classroom or elsewhere in the school, and gone to a regularly-scheduled parent-teacher conference. For each response, 1=yes 0=no.

Controls

We consider an array of controls. *Child Disability* is measured by asking parents (guardians) about their child's ability to be independent and take care of himself or herself, ability to pay attention and learn, overall activity level, overall behavior and ability to relate to adults and children, emotional or psychological difficulties, ability to communicate, difficulty in hearing and understanding speech, and eyesight. If parents (guardians) indicated that their child had any issues or difficulties in response to these questions, they were asked to indicate if a diagnosis was obtained by a professional. If so, 1=yes and 0=no. *Child BMI* was calculated by multiplying the child's weight by 703 and dividing by the square of the child's composite height. *Child poor health* was measured by asking parents (guardians) about their child's health; 1=excellent, 2=very good, 3=good, and 4=fair or poor. *Birthweight* is a continuous variable, measured in pounds.

We account for several other factors. For *female*, information was collected from schools and confirmed by parents in subsequent waves. If inconsistent, the most recent parent reporting of sex was used, 0=male, 1=female. For the measure of *family structure*, we use a measure for the number of *siblings in the household* (1=1, 2=2, 3=3, 4=4 plus), a measure of the parents/guardians relationship status, 1=two biological/adoptive parents and 0=one biological/adoptive parent, one other parent/partner, one biological/adoptive parent only or other guardians, the average age of the parents/caregivers. We also account for the *child's age* of assessment in kindergarten. In supplementary analyses, we also accounted for teacher-rated grades for writing and reading, child homework effort, parent help with homework and related factors. These analyses did not yield different patterns and were therefore excluded from our final models.

Analyses

All analyses were performed in Stata 17.0. Because dependent variables are continuous, we used Ordinary Least Squares (OLS) regression. We employed wave-specific weights to produce estimates of population parameters. Using recommended NCES procedures (NCES 2022), data weighting adjustments for attrition and complex sampling resulted in 5,790 cases. Missing data ranged from 0-30% across measures. We used multiple imputation procedures (20 data files, 150 burn-ins) to account for missingness using the MI command (StataCorp 2021).

RESULTS

We report descriptive statistics of our measures in Table 1.[vii] First, socioeconomic status was transformed into quintiles, therefore there is an even 20% distribution across socioeconomic categories. For the kindergarten year, 52% of students were white, 10% black, 28% Hispanic, 5% Asian American, under 1% Pacific Islander, 1% Native American and 4% biracial.[viii] Our sample is 48% female. The average number of siblings in the household is about 1.5 on average. Parent age averages at about 34 years. Twenty percent of the sample of children are reported as having a disability. The average child BMI score is about 17. Few children have poor health. Average birth weight was just over seven pounds. Finally, the average child age in kindergarten was about 5 ½ years old (68 months).

We should note that the measure of self-reported grit and teacher-reported soft skills are remarkably distinct, even given that teacher-rated approaches to learning has several parallel questions to grit. The highest correlation between grit and soft skills is the composite measure of grit and approaches to learning at .26 (see Appendix A).

Gaps in Achievement, Grit, and Soft Skills

The gauge the size of math and reading scores in fifth grade, we report scores by socioeconomic status and race/ethnicity in Figures 2 and 3. With both scores standardized, the size of the socioeconomic gap for the 1st to 5th quintile is approximately 1.23 for math and 1.17 for reading. The black/white gaps are the largest. The math gap is about .94 standard deviations and .64 for reading.

In Table 2, we report the gaps in self-report grit and teacher-reported soft skills. For grit, gaps are surprisingly small between socioeconomic quintiles, with students in the lowest quintile scoring nearly the same as the average student reporting. The largest gaps in self-reported grit are between 2nd and 4th quintile students at about .20 standard deviations. Also surprising, black students have the highest self-reported grit scores and pacific islanders the lowest. Asian American students have the second highest scores. We report both scores with the aggregate grit measure and the submeasures of grit. Conversely, teacher-reported soft skills show a very different pattern. Virtually all groups receive high scores with black students as the clear outliers, nearly .42 standard deviations below the average student. In addition, gaps in submesasures are pronounced by socioeconomic status. Thus, teacher-rated soft-skills show both socioeconomic and race/ethnicity differences (especially comparing black students with others). We now turn to multivariate analyses to gauge the extent to which these grit and soft skills disparities might mediate math and reading score gaps.

Multivariate Patterns

The size of the socioeconomic and race/ethnic gaps in math and reading are reported in Model 1 of Tables 3 and 4. The gaps between a student in the highest socioeconomic quintile

from that of a student in the lowest socioeconomic quintile is 1.03 standard deviations for math and 1.02 standard deviations for reading. The black/white gaps (the most pronounced of the racial/ethnic gaps) is -.74 for math and -.42 standard deviations for reading. Model 2 in Tables 3 and 4 show the modified socioeconomic and racial/ethnic gaps conditioned by parental involvement and other factors in the model. For the highest and lowest socioeconomic gaps, controls account for 28% of the gap for math, and 30% of the gap for reading. For the black/white disparities, these factors account for 8%.

Models 3 and 4 are the central analyses of this study. We find that socioeconomic and most racial/ethnic gaps in math and reading are virtually unchanged with child self-reported grit included in the models (compare Models 2 and 3 in Tables 3 and 4). For comparison, soft skills explain an additional 12% and 9% of the socioeconomic and black/white gap in math respectively, an additional 11% and 15% of the socioeconomic and black/white gap in reading, respectively. These suggest the possibility that soft skills might play a modest impact in closing achievement gaps. In supplementary analysis, the submeasures of approaches to learning and attentional skills had the most impact on reducing socioeoconmic and racial/ethnic disparities.

Another way to access importance is mediation analyses (see Appendix B). Using the *medeff* function in Stata, we find that grit accounts for 3% of the gap across racial/ethnic groups for both math and reading. Conversely, soft skills account for 14% and 16% of socioeconomic gaps in math and reading, respectively, and 22% and 32% of the black/white gap in math and reading, respectively.

It is important to note that child self-reported grit measures, although unimportant for socioeconomic and racial/ethnic disparities in math and reading, are still modest predictors of math and reading achievement at the individual level (see Tables 3 and 4, Models 3 and 5).

When we model grit as an interaction variable with socioeconomic status, we find that a one unit increase in self-report grit is associated with a .15 standard deviation increase in student math scores and a .13 standard deviation increase in reading scores. Yet, the impact of self-reported grit is virtually erased for students in the highest socioeconomic quintile (-.15-.15=.00 and -.14-.13=.01). This suggests that this self-assessment of grit is not a factor in math and reading achievement for advantaged children but a more critical outlook for disadvantaged children. In supplementary analyses, we found no evidence of racial/ethnic interactions with grit.

CONCLUSION

We document sizable math and reading gaps by socioeconomic status and race/ethnicity. Children in the highest socioeconomic quintile are a full standard deviations higher in math and reading that students from the lowest socioeconomic quintile. Likewise, black students are about .74 and .42 behind white students in math and reading, respectively, controlling for socioeconomic differences. Although we find modest evidence that self-reported grit is associated with improvement in math and reading scores (.10 SD, .07 SD respectively), there is no evidence that grit explains any social class and racial disparities in math and reading. Yet, the modest association between grit and math/reading scores is greater for students from the lowest socioeconomic quintile and virtually unlinked for students from the highest socioeconomic background.

Finally, we document that soft skills explain 14%-16% of socioeconomic gaps in math and reading, respectively, and about 22% and 32% for black/white math and reading disparities. Thus, although a focus on self-reported grit may not be critical for addressing achievement gaps, we find strong evidence that soft skills (and in supplementary analyses, we specifically identify

approaches to learning and attentional skills) may be a meaningful ways to reduce socioeconomic gaps and even more so for black/white achievement gaps.

Given large scale adjustments to educational practices due to COVID-19 we think a rigorous assessment of grit is warranted. Today, educational practitioners, parents and caregivers are confronted with helping motivate students to learn despite months and year long setbacks in learning. And as socioeconomic achievement gaps in American schools may grow by up to 30% due to the global pandemic (Haeck 2020; Hammerstein, Konig, and Frey 2021), educational practitioners will likely be eager to inculcate grit and resilience among their students. Yet, despite popular expectations (Tough 2016), we document here that self-rated grit, as developed by Duckworth, is not a meaningful way to understand achievement gaps in the United States, at least at the end of elementary school. Instead, our findings suggest that the development of soft skills may be a more effective, albeit modest, path for educational reform.

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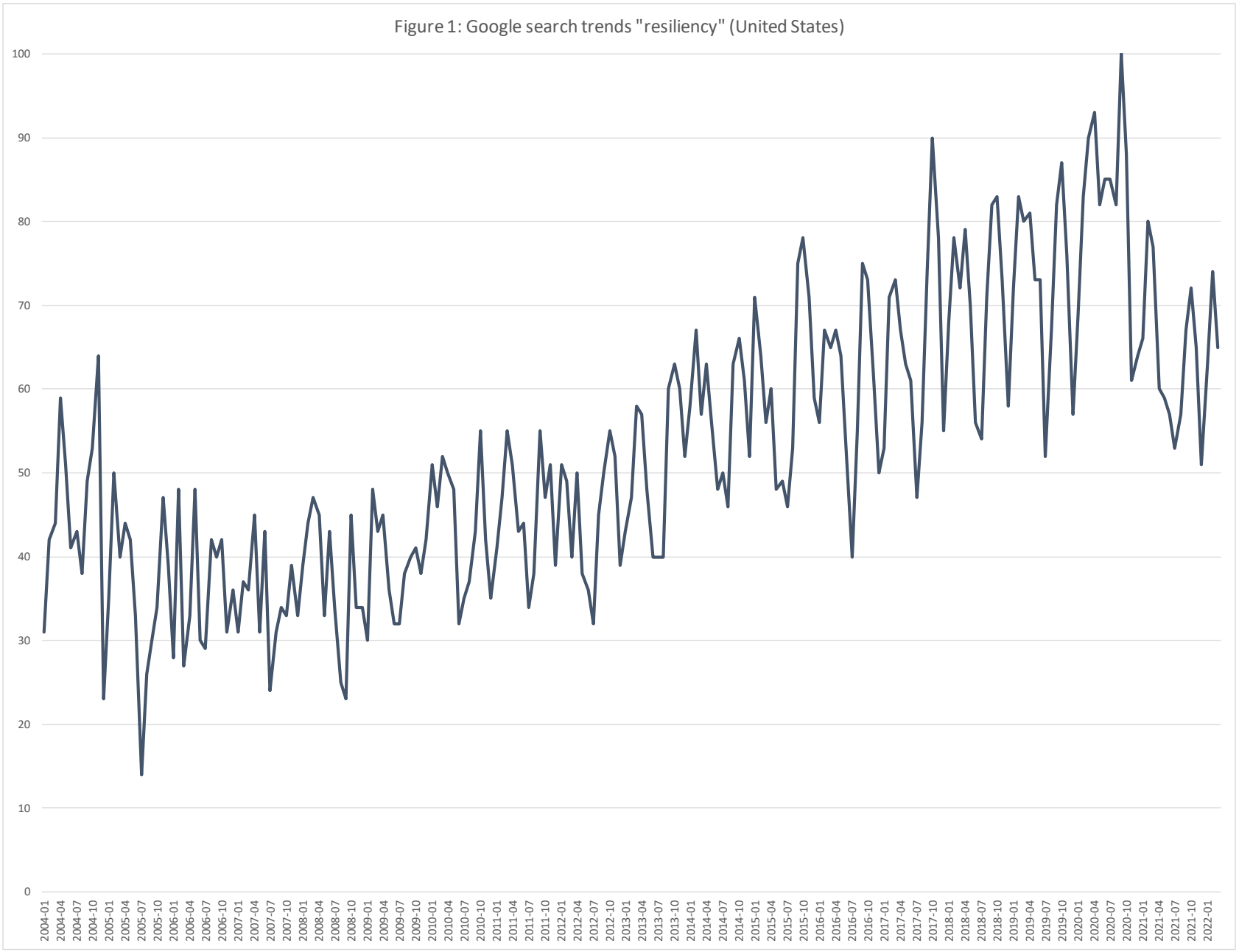
Figure 1: Google search trends "resiliency" (United States)
100
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80
70
60
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30
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2004-04
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2022-01

Table 1. Descriptive Statistics with Estimated Means and Standard Errors, ECLSK-11. (n=5,750)

Kindergarten Measures	Mean	S.E.
Socioeconomic Status		
1st Quintile	0.20	0.01
2nd Quintile	0.20	0.01
3rd Quintile	0.20	0.01
4th Quintile	0.20	0.01
5th Quintile	0.20	0.01
Race		
White	0.52	0.02
Black	0.10	0.01
Hispanic	0.28	0.02
Asian American	0.05	0.01
Pacific Islander	0.00	0.00
Native American	0.01	0.01
Biracial	0.04	0.00
Female	0.48	0.01
Sibling Size	1.46	0.02
Parent Age	34.40	0.15
Lives with Biological Parents	0.61	0.01
Disability	0.20	0.01
Child's BMI	16.64	0.04
Poor Child Health	1.62	0.02
Birth Weight	7.29	0.02
Child's Age	67.53	0.11

Fifth Grade Measures	Mean	S.E.
Parental Involvement		
Home	52.23	0.21
Extracurriculars	6.66	0.17
Trips	5.23	0.08
School	13.23	0.13
Soft Skills (aggregate measure)	0.00	0.02
Interpersonal Skills	3.14	0.01
Self-Control	3.30	0.01
Few Internalizing Problem Behaviors	3.44	0.01
Few Externalizing Problem Behaviors	3.37	0.01
Approaches to Learning	3.13	0.01
Attentional Skills	3.62	0.02
Grit (aggregate measure)	0.03	0.02
Finish What I Begin	4.04	0.02
Try After Mistakes	4.32	0.02
Work Towards Goals	4.32	0.02
Work Even When Wanting to Quit	4.04	0.02
Work on What I Set Out to Do	4.14	0.02
Keeps Trying to Improve	4.30	0.02
Cognitive Assessments		
Math Score	120.63	0.67
Reading Score	137.35	0.50

Note: Kindergarten weights include W1_2P0PSU, W1_2P0STR and W1_2P0. Fifth grade weights include W9C29P_9T29PSU, W9C29P_9T29STR, and W9C19P_9T29B0.

Figure 2: Math and Reading Score across Socioeconomic Status, ECLS-K 2011.

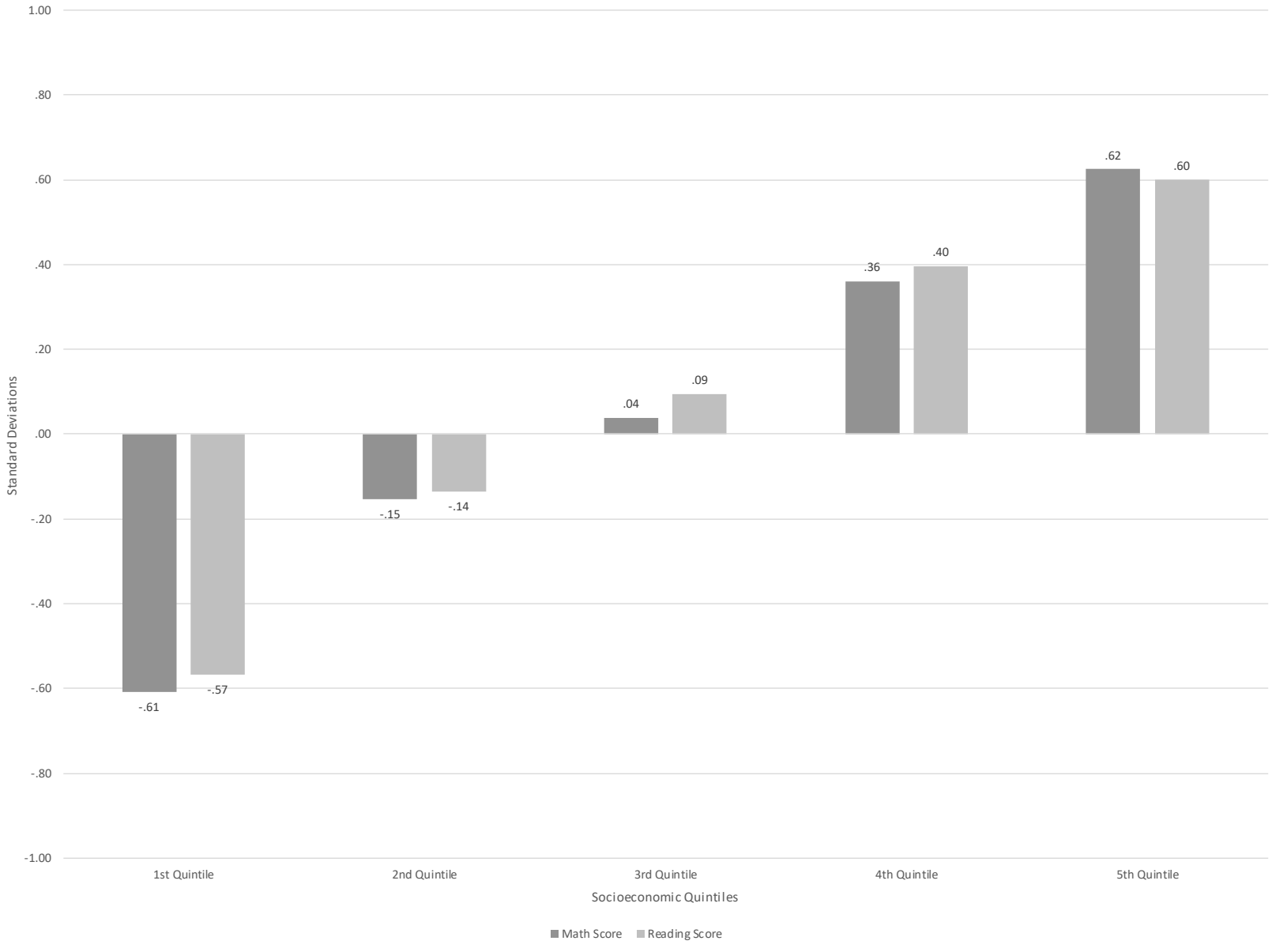

Figure 3: Math and Reading Scores across Racial/Ehtnic Categories, ECLS-K 2011.

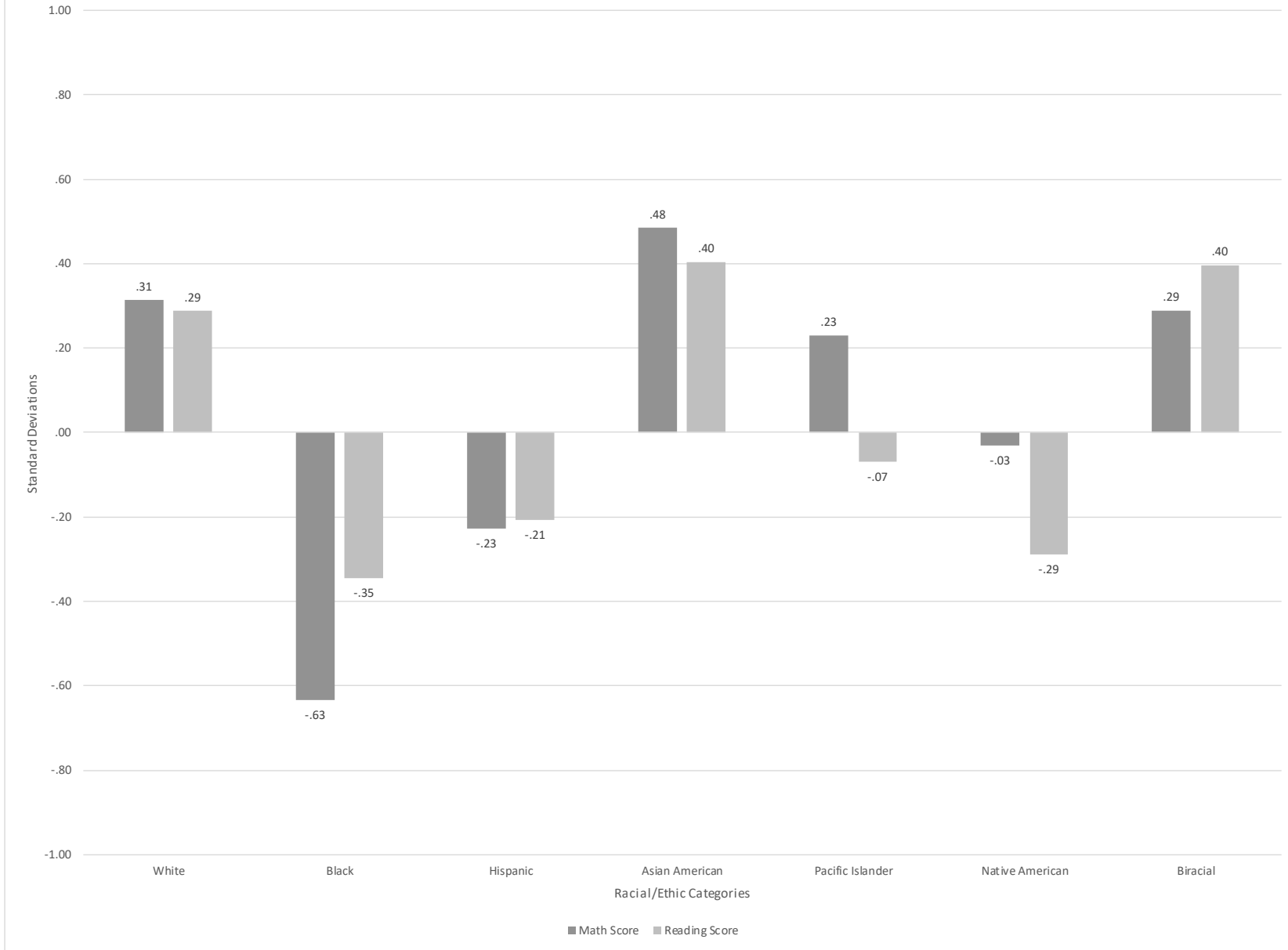

Table 2: Soft Skills and Grit Standard Deviation Scores across Socioeconomic Quintiles and Race/Ethnicity. ECLS-K 2011.

	Soft Skills (aggregate measure)	Interpersonal Skills	Self-Control	Few Internalizing Problem Behaviors	Few Externalizing Problem Behaviors	Approaches to Learning	Attentional Skills	Grit (aggregate measure)	Finish What I Begin	Try After Mistakes	Work Towards Goals	Work Even When Wanting to Quit	Work on What I Set Out to Do	Keeps Trying to Improve
Socioeconomic Status														
1st Quintile	-.27	-.21	-.24	-.10	-.13	-.28	-.29	.02	-.07	.06	.06	-.02	.04	.01
2nd Quintile	-.13	-.09	-.11	-.09	-.10	-.12	-.15	-.10	-.05	-.08	-.09	-.07	-.07	-.12
3rd Quintile	-.09	-.08	-.10	.00	-.12	-.06	-.07	.02	.02	.02	.01	.01	.03	.04
4th Quintile	.19	.15	.14	.10	.12	.20	.20	.12	.14	.11	.10	.08	.09	.10
5th Quintile	.32	.27	.25	.20	.18	.36	.34	.09	.12	.09	.05	.05	.09	.05
Race/Ethnicty														
White	.07	.07	.06	-.02	.01	.10	.06	.04	.07	.04	.03	.03	.05	.01
Black	-.42	-.35	-.46	.12	-.44	-.38	-.34	.15	.04	.17	.15	.14	.09	.12
Hispanic	.00	.00	.00	.02	.09	-.02	-.03	-.06	-.06	-.02	-.06	-.09	-.04	-.03
Asian American	.27	.08	.20	.10	.22	.34	.35	.09	.12	.15	.03	.06	.00	.10
Pacific Islander	.26	.17	.34	.22	.13	.34	.08	-.19	-.31	-.05	-.09	-.07	-.22	-.26
Native American	.13	.30	.14	.06	.09	-.04	.18	.04	.05	-.18	-.09	-.02	.37	-.01
Biracial	.11	.09	.07	-.04	.05	.14	.11	-.11	.02	-.22	-.02	-.16	-.07	-.08

Note: Data imputed for missing. Sample weights for PSU, Stratum, and Pweights included.

Table 3: OLS Regression with Social Class, Race/Ethnicty, Noncognitive Skills, Concerted Cultivation and Grit Predicting 5th Grade Standardized Math Scores. ECLS-K 2010 n=5,750.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Socioeconomic Status (ref= 1st Quintile)					
2nd Quintile	.38 (.06) ***	.34 (.06) ***	.35 (.06) ***	.32 (.06) ***	.33 (.06) ***
3rd Quintile	.55 (.05) ***	.39 (.06) ***	.40 (.06) ***	.37 (.06) ***	.37 (.06) ***
4th Quintile	.78 (.06) ***	.58 (.06) ***	.57 (.06) ***	.51 (.06) ***	.51 (.06) ***
5th Quintile	1.03 (.06) ***	.74 (.06) ***	.74 (.06) ***	.65 (.06) ***	.66 (.06) ***
Race/Ethnicity (ref= white)					
Black	-.74 (.07) ***	-.69 (.07) ***	-.70 (.07) ***	-.62 (.07) ***	-.63 (.07) ***
Hispanic	-.24 (.05) ***	-.20 (.05) ***	-.20 (.05) ***	-.23 (.05) ***	-.22 (.05) ***
Asian American	.09 (.07)	.17 (.07) *	.17 (.07) *	.14 (.06) *	.14 (.06) *
Pacific Islander	.04 (.14)	.02 (.13)	.05 (.13)	-.05 (.12)	-.03 (.13)
Native American	-.21 (.16)	-.12 (.15)	-.12 (.14)	-.16 (.13)	-.16 (.13)
Biracial	-.08 (.09)	-.06 (.08)	-.04 (.08)	-.07 (.07)	-.06 (.07)
Concerted Cultivation					
Home		.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Extracurriculars		.03 (.00) ***	.03 (.00) ***	.03 (.00) ***	.03 (.00) ***
Trips		.00 (.01)	-.01 (.01)	-.01 (.01)	-.01 (.01)
School		.02 (.00) **	.01 (.00) **	.01 (.01) *	.01 (.01) *
Controls					
Female		-.22 (.03) ***	-.24 (.03) ***	-.35 (.03) ***	-.35 (.03) ***
Sibling Size		.00 (.01)	.00 (.01)	.00 (.01)	.00 (.01)
Parent Age		.00 (.00) *	.00 (.00) *	.00 (.00)	.00 (.00)
Lives with Biological Parents		.09 (.04) *	.09 (.04) *	.02 (.04)	.02 (.04)
Disability		-.29 (.04) ***	-.28 (.04) ***	-.25 (.04) ***	-.24 (.04) ***
Child's BMI		.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)
Poor Child Health		-.06 (.02) **	-.06 (.02) **	-.06 (.02) **	-.06 (.02) **
Body Weight		.04 (.01) **	.04 (.01) **	.03 (.01) **	.03 (.01) **
Child's Age		.00 (.01)	.00 (.01)	.00 (.01)	.00 (.01)
Grit (aggregate measure)			.10 (.02) ***		.06 (.02) **
Noncognitive Skills (aggregate measure)				.24 (.02) ***	.23 (.02) ***
Constant	-.34 (.07) ***	-.57 (.43)	-.59 (.43)	-.30 (.43)	-.33 (.42)

Note: Standard errors reported in parentheses. Data imputed for missing. Sample weights for PSU, Stratum, and Pweights included.
*p<.10; **p<.01; ***p<.001 (two-tailed test)

Table 4: OLS Regression with Social Class, Race/Ethnicty, Noncognitive Skills, Concerted Cultivation and Grit Predicting 5th Grade Standardized Reading Scores. ECLS-K 2010 n=5,750.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5
Socioeconomic Status (ref= 1st Quintile)					
2nd Quintile	.39 (.06) ***	.32 (.06) ***	.33 (.06) ***	.30 (.06) ***	.31 (.06) ***
3rd Quintile	.59 (.05) ***	.43 (.06) ***	.44 (.06) ***	.41 (.06) ***	.41 (.06) ***
4th Quintile	.84 (.05) ***	.62 (.06) ***	.62 (.06) ***	.56 (.06) ***	.56 (.06) ***
5th Quintile	1.02 (.05) ***	.72 (.06) ***	.72 (.06) ***	.64 (.05) ***	.64 (.05) ***
Race/Ethnicity (ref= white)					
Black	-.42 (.07) ***	-.39 (.07) ***	-.40 (.07) ***	-.33 (.07) ***	-.33 (.07) ***
Hispanic	-.18 (.05) **	-.15 (.05) **	-.14 (.04) **	-.17 (.05) ***	-.17 (.05) ***
Asian American	.04 (.07)	.07 (.06)	.07 (.06)	.04 (.06)	.04 (.06)
Pacific Islander	-.23 (.25)	-.23 (.26)	-.22 (.28)	-.30 (.28)	-.29 (.29)
Native American	-.44 (.08) ***	-.36 (.07) ***	-.36 (.08) ***	-.40 (.09) ***	-.40 (.09) ***
Biracial	.06 (.07)	.07 (.06)	.08 (.06)	.06 (.06)	.06 (.06)
Concerted Cultivation					
Home		-.01 (.00) **	-.01 (.00) **	.00 (.00) **	.00 (.00) **
Extracurriculars		.02 (.00) ***	.02 (.00) ***	.02 (.00) ***	.02 (.00) ***
Trips		.01 (.01)	.00 (.01)	.01 (.01)	.01 (.01)
School		.01 (.00) *	.01 (.00) *	.01 (.00)	.01 (.00)
Controls					
Female		.00 (.03)	.00 (.03)	-.12 (.03) **	-.12 (.03) **
Sibling Size		-.04 (.01) *	-.04 (.01) *	-.04 (.01) **	-.04 (.01) **
Parent Age		.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Lives with Biological Parents		.08 (.04) *	.08 (.04) *	.02 (.03)	.02 (.03)
Disability		-.30 (.04) ***	-.29 (.04) ***	-.26 (.04) ***	-.26 (.04) ***
Child's BMI		.01 (.01)	.01 (.01)	.01 (.01)	.01 (.01)
Poor Child Health		-.08 (.02) **	-.08 (.02) **	-.07 (.02) **	-.07 (.02) **
Body Weight		.02 (.01)	.02 (.01)	.02 (.01)	.02 (.01)
Child's Age		.00 (.00)	.00 (.00)	.00 (.00)	.00 (.00)
Grit (aggregate measure)			.07 (.02) ***		.03 (.02)
Noncognitive Skills (aggregate measure)				.22 (.02) ***	.22 (.02) ***
Constant	-.39 (.05) ***	-.67 (.32) *	-.68 (.32) *	-.42 (.31)	-.43 (.31)

Note: Standard errors reported in parentheses. Data imputed for missing. Sample weights for PSU, Stratum, and Pweights included.
*p<.10; **p<.01; ***p<.001 (two-tailed test)

Table 5: OLS Regression with Social Class, Grit, Race/Ethnicty, Noncognitive Skills, Concerted Cultivation and Social Class & Grit Interaction Term Predicting 5th Grade Standardized Math Scores. ECLS-K 2010 n=5,750.

Variables	Model 1	Model 2	Model 3	Model 4
	Math Scores		Reading Scores	
Socioeconomic Status (ref= 1st Quintile)				
2nd Quintile	.47 (.06) ***	.34 (.06) ***	.45 (.06) ***	.31 (.06) ***
3rd Quintile	.65 (.06) ***	.38 (.06) ***	.67 (.05) ***	.42 (.06) ***
4th Quintile	.97 (.06) ***	.52 (.06) ***	.96 (.05) ***	.57 (.06) ***
5th Quintile	1.23 (.06) ***	.67 (.06) ***	1.17 (.05) ***	.65 (.05) ***
Grit (aggregate measure)	.20 (.05) ***	.15 (.05) **	.19 (.05) ***	.13 (.05) **
SES X Grit (ref= 1st Quintile)				
2nd Quntile	-.04 (.06)	-.04 (.06)	-.07 (.06)	-.07 (.06)
3rd Quintile	-.16 (.07) *	-.15 (.07) *	-.18 (.07) *	-.16 (.07) *
4th Quintile	-.16 (.06) *	-.16 (.06) **	-.14 (.06) *	-.13 (.06) *
5th Quintile	-.16 (.07) *	-.15 (.07) *	-.17 (.06) **	-.14 (.06) *
Race/Ethnicity (ref= white)				
Black		-.63 (.07) ***		-.33 (.07) ***
Hispanic		-.22 (.04) ***		-.16 (.04) ***
Asian American		.14 (.06) *		.04 (.06)
Pacific Islander		-.04 (.13)		-.29 (.29)
Native American		-.16 (.13)		-.40 (.09) ***
Biracial		-.06 (.07)		.06 (.06)
Soft Skills		.23 (.02) ***		.22 (.02) ***
Concerted Cultivation				
Home		.00 (.00)		.00 (.00) **
Extracurriculars		.03 (.00) ***		.02 (.00) ***
Trips		-.01 (.01)		.01 (.01)
School		.01 (.01) *		.01 (.00)
Controls		Yes		Yes
Female		-.36 (.03) ***		-.12 (.03) ***
Sibling Size		.00 (.01)		-.04 (.01) **
Parent Age		.00 (.00)		.00 (.00)
Lives with biological parents		.02 (.04)		.02 (.03)
Disability		-.24 (.04) ***		-.25 (.04) ***
Child's BMI		.01 (.01)		.01 (.01)
Poor Child Health		-.06 (.02) **		-.07 (.02) **
Body Weight		.03 (.01) **		.02 (.01)
Child's Age		.00 (.01)		.00 (.00)
Constant	-.61 (.06) ***	-.31 (.42)	-.57 (.04) ***	-.42 (.31)

Note. Standard errors reported in parentheses. Data imputed for missing. Sample weights for PSU, Stratum, and Pweights included.
*p<.10; **p<.01; ***p<.001 (two-tailed test)

APPENDIX

Appendix A: Correlation Matrix of Soft Skills and Grit, ECLS-K 2011.

Soft Skills (aggregate measure)	1	1.00													
Interpersonal Skills	2	.86	1.00												
Self-Control	3	.89	.80	1.00											
Few Internalizing Problem Behaviors	4	.45	.37	.33	1.00										
Few Externalizing Problem Behaviors	5	.79	.61	.73	.30	1.00									
Approaches to Learning	6	.92	.72	.71	.40	.62	1.00								
Attentional Skills	7	.85	.58	.60	.38	.64	.83	1.00							
Grit (aggregate measure)	8	.26	.21	.18	.18	.17	.26	.25	1.00						
Finish What I Begin	9	.21	.17	.14	.16	.13	.23	.21	.63	1.00					
Try After Mistakes	10	.24	.21	.19	.15	.18	.24	.22	.74	.40	1.00				
Work Towards Goals	11	.17	.14	.12	.12	.11	.18	.17	.75	.38	.46	1.00			
Work Even When Wanting to Quit	12	.17	.14	.13	.11	.11	.18	.16	.75	.38	.47	.46	1.00		
Work on What I Set Out to Do	13	.18	.14	.13	.12	.12	.18	.17	.80	.42	.47	.53	.52	1.00	
Keeps Trying to Improve	14	.17	.14	.11	.13	.11	.17	.17	.71	.36	.46	.45	.44	.46	1.00
		1	2	3	4	5	6	7	8	9	10	11	12	13	14

Appendix B: Mediation on 5th Grade Math Test Scores. ECLS-K

	Math Scores				Reading Scores			
	Grit		Soft Skills		Grit		Soft Skills	
	Simple	Full	Simple	Full	Simple	Full	Simple	Full
Socioeconomic Status	0.02	0.03	0.12	0.16	0.02	0.02	0.12	0.14
Race (ref=White)								
Black	0.00	0.00	0.18	0.22	0.00	0.00	0.24	0.32
Hispanic	0.02	0.04	0.06	0.11	0.02	0.05	0.06	0.13
Asian	-0.07	-0.04	0.25	0.19	-0.12	-0.05	0.50	0.30
Pacific Islander	0.11	0.07	0.07	0.08	0.12	-0.08	0.09	-0.08
Native American	0.06	0.12	0.06	0.11	0.06	0.09	0.06	0.11
Biracial	0.05	0.06	-0.03	-0.04	0.10	-0.07	-0.07	0.07

Note: Data imputed for missing. Sample weights for PSU, Stratum, and Pweights included. OLS = ordinary

[i] Although sometimes defined as social/behavioral skills, we prefer to emphasize the psychological orientation of the student as a likely critical pathway through which larger inequities ultimately influence the individual student.

[ii] We should note the Duckworth herself has more recently retracted the idea that grit is predictive of short-term educational gains or might address educational disparities (Barshay 2019). Yet, we are aware of no nationally representative study that has yet to confirm this conclusion nor is there evidence that such an approach is losing popularity among educators.

[iii] See https://www.nationsreportcard.gov/ndecore/xplore/NDE

[iv] While there is disagreement on whether class gaps are either persistent or growing, there is no evidence of convergence (see https://hechingerreport.org/inside-the-reardon-hanushek-clash-over-50-years-of-achievement-gaps/).

[v] It is important to note that critics see grit as a re-emergence of the deficit ideology which claims that the impoverished student struggles because of character flaws – individuals simply fail to apply themselves (Gorski 2016). Grit ideology does recognize structural barriers but emphasizes cultivating grit in marginalized students as the solution rather than eradicating barriers (Gorski 2016). While underprivileged students already demonstrate considerable grit in order to navigate a deprived world, poor results from an educators' standpoint reinforce their disadvantage (Herold 2015). If teachers promote that impoverished underachieving students are inherently deficient, some scholars warn, no interventions can successfully deal with the underlying conditions of inequality (Berliner 2013; Tewell 2020).

[vi] Relying on student self-reports to access grit has limitation. But we think there are several reasons why this measure is an appropriate assessment of girt. First, internalization of beliefs is an important part of self-efficacy (Bandura 1993) and child-reports have been shown to reliably capture other important socio-emotional struggle of children, including depression and anxiety (Wenz-Gross etal. 1997; Turney and McLanahan 2015; Reiss 2013). Also, we find modest associations between self-reported grit and math/reading outcomes among 5th graders, suggesting that these sets of questions measuring grit have some value for skill development. Taken together, we find no reason to discount a student's perception of grit and resilience when they are modestly predictive and are in line with other socioemotional measures

[vii] Because the data are imputed, we report the mean estimates of the data across 20 imputed data files.

[viii] This compares with 53% White, 13% Black, 24% Hispanic, 4% Asian American, 1% Native American, and 4% biracial (see https://www.childstats.gov/pdf/ac2013/ac_13KindergartenYear.pdf). The discrepancy is likely due to attrition, for which sample weights are applied.