

ARTICLE

The Development of Students' Engagement in School, Community and Democracy

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Abstract

This article explores the origins of youth engagement in school, community and democracy. Specifically, it considers the role of psychosocial or non-cognitive abilities, like grit or perseverance. Using a novel original large-scale longitudinal survey of students linked to school administrative records and a variety of modeling techniques – including sibling, twin and individual fixed effects – the study finds that psychosocial abilities are a strong predictor of youth civic engagement. Gritty students miss less class time and are more engaged in their schools, are more politically efficacious, are more likely to intend to vote when they become eligible, and volunteer more. Our work highlights the value of psychosocial attributes in the political socialization of young people.

Keywords political socialization; non-cognitive skills; education; political participation

Scholars have long documented that the time young citizens spend in school is strongly related to their levels of civic engagement later in life (Verba, Schlozman and Brady 1995; Wolfinger and Rosenstone 1980). Yet there is less research on the specific school-based factors that help students develop into active citizens. Most commonly, scholars attribute the development of early civic attitudes and behaviors to the cognitive skills that schooling enhances or reflects (Denny and Doyle 2008; Luskin 1990).¹ For instance, in their seminal work on voter turnout, Wolfinger and Rosenstone argue that education 'increases cognitive skills, which facilitate learning about politics' (Wolfinger and Rosenstone 1980, 35–6). Nie, Junn and Stehlik-Barry (1996) similarly assert that 'education influences the characteristics of democratic enlightenment *almost exclusively* through verbal cognitive proficiency' (emphasis added). In contrast, a growing body of research from education policy, psychology, economics, child development and other fields suggests that students' success in school and beyond is predicted by 'non-cognitive' or psychosocial attributes – a set of skills and aptitudes related to self-control, emotional regulation and sociability, which are distinct from the cognitive abilities captured by math and reading tests (Cunha and Heckman 2007; Heckman 2000; Heckman and Kautz 2013).² Recently, popular attention and scholarly work has been focused on the psychosocial attribute of grit – the 'exertion

¹Others conclude that schools impart democratic values (Campbell 2006), develop social connections (Nie, Junn and Stehlik-Barry 1996) or provide young people with vital political knowledge (Campbell and Niemi 2016; Hillygus 2005).

²That these skills are sometimes called 'non-cognitive' does not mean that they do not require cognition; they do. They have also been called socio-emotional skills, soft skills, character skills, emotional intelligence, social cognitive skills and meta-cognitive learning skills (Farrington et al. 2012; Shechtman et al. 2013).

of effort or will necessary to achieve goals' (Shechtman *et al.* 2013, 15). Across different fields, scholars have found that grit and closely related constructs can predict a variety of success outcomes (Reed, Pritschet and Cutton 2013; Salles, Cohen and Mueller 2014). In this article, we consider the possibility that psychosocial abilities captured by measures of grit might also predict engagement in school, community and democracy.

Our analysis links a unique large-scale longitudinal student survey with student-level school administrative records from the Wake County (North Carolina) Public School System (WCPSS).³ This data enables us to account for a wide variety of observable and unobservable confounders, first to extend previous analyses of student achievement and then to evaluate the relationship between grit and student engagement in school, community and democracy. In doing so, we use several identification strategies, including an especially compelling set of empirical models that leverage family, twin and individual-level fixed effects.

Building on previous research (Duckworth *et al.* 2007; Duckworth and Quinn 2009), our results show that grit is an important predictor of academic achievement: students who score one standard deviation higher on the grit scale score about 0.10-0.15 standard deviations higher on standardized tests of math and reading. Going beyond academic performance, we also show that grittier students are more engaged in their schools, have fewer absences and tardies, and are more likely to feel politically efficacious, volunteer in their community, and plan to vote when they are old enough to do so. Our results suggest that these relationships are not an artifact of observable confounders like race, age, gender, socio-economic status, political motivation, personality or other character traits, genetics or even cognitive ability – the marker of individual ability long thought to be pre-eminent in the development of an engaged citizenry (Denny and Doyle 2008; Luskin 1990; Verba, Schlozman and Brady 1995). These results are robust to models that account for a host of unobservable factors that remain constant within census tracts, schools, siblings, twin pairs or within individuals themselves over time, with a few exceptions.

Our analysis has implications that cut across disciplinary boundaries by speaking to our broader understanding of child development, political socialization and civic engagement. The findings suggest that general psychological attributes (like grit), not just domain-specific political attributes (like interest in politics), may shape the development of the attitudes and habits necessary to engage democratically. Indeed, our results suggest that the civic benefits often ascribed to cognitive ability may be at least partly attributable to an individual's non-cognitive or psychosocial abilities. Our findings also highlight the value of studying political socialization – a field that, according to many, has been overlooked in recent years as research studies tend to 'eschew [...] children' and instead focus on adulthood.⁴ Building on previous research in this area (Dawson and Prewitt 1968; Greenstein 1965; Jennings *et al.* 2005; Niemi and Hepburn 1995; Sapiro 2004; Searing, Schwartz and Lind 1973; Sears and Funk 1991), our results underscore the need to focus on the roots of political participation, especially given the rigidity of civic attitudes and behaviors in adulthood (Fox and Lawless 2014; Meredith 2009; Plutzer 2002; Prior 2010, Prior 2018). Late childhood and early adolescence appears to be a critical period in the development of the general – not explicitly political – psychological attributes needed to engage in the civic domain.

Our results also have implications for current policy debates. Education policy makers are currently weighing the costs and benefits of emphasizing psychosocial attributes, like grit, in education curricula. For example, a 2013 US Department of Education report concluded that 'there is an emerging and convergent recognition that [psychosocial] factors – and particularly grit, tenacity, and

³We are able to offer a more compelling analysis than previous research that has typically relied on small, idiosyncratic samples. For example, Duckworth's (2007, 2009, 2016) foundational work uses small convenience samples of college students and opt-in surveys.

⁴Niemi and Hepburn 1995, 7. Scholars once focused on childhood in hopes of identifying the roots of civic attitudes and behaviors (e.g., Dawson and Prewitt 1968; Niemi and Jennings 1991), but more recently there has been 'little current empirical research shedding light on [the] childhood antecedents to [...] civic engagement' (Astuto and Ruck 2010, 249).

perseverance – should play an essential role in evolving educational priorities’ (Shechtman et al. 2013, 75). However, others have been critical of this approach (Ris 2015; Erickson 2015). Although this debate has centered on the relationship between grit and academic achievement, our results highlight that the development of psychosocial attributes can contribute to other life outcomes that impact the quality of democracy and society more generally. These results should be of interest to a broad range of education stakeholders, given that one of the fundamental objectives of public education systems is the preparation of a citizenry (Ravitch and Viteritti 2003).

Background and Conceptual Framework

A growing literature from multiple disciplines examines a set of so-called non-cognitive or psychosocial skills as a means of improving life outcomes.⁵ These abilities appear to promote success in school and beyond, but are distinct from measures of cognitive ability. They are thought to initially develop in childhood and early adolescence (Eccles et al. 1993). Those who develop psychosocial skills early on are thought to be more likely to develop other skills later in life, as ‘skill begets skill’ (Heckman 2000, 3).

Media and scholarly attention has been especially focused on the psychosocial attributes of grit, tenacity and perseverance (Duckworth et al. 2007; Duckworth and Quinn 2009). Across several disciplines, scholars have found these attributes to be predictive of a variety of well-being measures. Grittier individuals tend to stay in school longer, perform better in school, be healthier and score higher on measures of subjective well-being (Meyers, Pignault and Houssemand 2013; Reed, Pritschet and Cutton 2013; Strayhorn 2014; Kleiman et al. 2013).

What is Grit?

Colloquially, grit is often described using closely related words, such as resolve, resilience, zeal, persistence, pluck, fortitude, determination or endurance. Psychologist Angela Duckworth loosely defines grit as ‘perseverance and passion towards long-term goals’ (Duckworth and Quinn 2009), and the ability to ‘work strenuously toward challenges [and to] maintain effort and interest over years despite failure, adversity, and plateaus in progress’ (Duckworth et al. 2007).⁶ More recent research has adopted a broader conceptualization of grit, defining it as a bundle of beliefs, attitudes and strategies that help in working through the difficult mental process of planning for and ultimately overcoming obstacles to achieving one’s goals.⁷

Conceptually, we follow the lead of Shechtman et al. (2013) and others, and consider grit a construct that captures a set of attributes that enable follow-through on a goal in the face of obstacles. Grit encapsulates one’s levels of *general self-efficacy* (the belief that one can do what they set out to do (Bandura 1977)), *systematic thinking* (the ability to plan to overcome the obstacles that stand in one’s way (Golwitzer 1999)) and *effortfulness* (the ability to work hard and follow through to overcome the barriers that get in the way of completing a given task (Blair and Razza 2007)). That is, in order to achieve a goal, one has to believe in (self-efficacy), put plans in place (systematic thinking) and work hard to stick to the plan (effortfulness).

With its recent ascent to the national discourse, grit is now the subject of considerable debate.⁸ Some contend – perhaps rightfully so – that the rhetoric about the influence of grit on

⁵For a recent overview of this literature, see Heckman and Kautz (2013).

⁶The most prominent and widespread measure of grit is the Duckworth Scale (Duckworth et al. 2007), which we describe in the data section below.

⁷Shechtman et al. (2013). See also work by Credé, Tynan and Harms (2017); Duckworth (2016); Tucker-Drob et al. (2016), which follows this broader framework.

⁸Popular critiques range from labels of grit as an empty buzzword to arguments that it is ‘a Social Darwinist explanation for why poor communities remain poor’ (Ris 2015, 2; see also Erickson 2015). Our view is that examining the relationship between grit and civic engagement does not diminish the importance of institutional barriers.

academic performance has outpaced the available empirical evidence (hence our efforts below to first explore whether grit predicts academic achievement, before turning to our primary focus of youth engagement) (Credé, Tynan and Harms 2017; Rimfeld *et al.* 2016). Moreover, many have raised concerns about the extent to which grit overlaps – conceptually and operationally – with other psychological constructs.⁹ For example, at first glance, grit seems similar to the notion of resilience previously explored by social psychologists (Ong *et al.* 2006). But while resilience refers narrowly to an ability to adapt to adversity (Masten *et al.* 2009), grit also encompasses self-efficacy, careful planning and effortful control towards achieving one's goals (Duckworth *et al.* 2007; Tough 2013; Von Culin, Tsukayama and Duckworth 2014).¹⁰ Some have also argued that grit is closely related to the personality dimension of conscientiousness (Rimfeld *et al.* 2016). However, formal empirical examinations have shown only a modest correlation between the two (for example, $r=0.44$) (Ivcevic and Brackett 2014). Grit is also weakly related to other psychological characteristics. For instance, Tucker-Drob *et al.* (2016, Table 2) and Credé, Tynan and Harms (2017, 27) show that grit is only modestly related to psychological constructs like a need for cognition ($r=0.36$), intellectual self-concept ($r=0.27$), mastery orientation ($r=0.32$), incremental mindset ($r=0.16$) and test motivation ($r=0.14$). Aligning with our broader conceptualization, they also show that grit appears to be more strongly related to measures of generalized self-efficacy ($r=0.43$), effortfulness ($r=0.72$) and planning processes ($r=0.46$), though none of these alone fully captures grit. While touching lightly on other psychosocial constructs – as is the case with virtually all (if not all) psychological factors – meta analyses suggest that grit is uniquely able to capture individuals' perseverance of effort, which explains variance in academic performance even after controlling for (other psychological factors like) conscientiousness. Our view is that the grit measure captures a family of psychosocial attributes that have yet to be thoroughly explored for their relevance to early civic engagement.

One key way that the concept of grit separates itself from other psychological constructs is its malleability. Recent research seems to suggest that grit – unlike stable personality traits – can be developed, promoted or reinforced. Two recent sets of experiments have explicitly looked at grit's responsiveness to targeted intervention. In the first, Alan, Boneva and Ertac (2016) show that school training programs have a lasting effect on students' grittiness (and also have downstream effects on student grades). In the second, the Behavioral Insights Team in the UK evaluated three randomized-control trials that shifted student learning towards a more reflective and interactive pedagogical approach. These programs increased students' levels of grit noticeably (and also increased their empathy and problem-solving skills) (Kirkman *et al.* 2016). These findings are consistent with research that shows, more generally, that psychosocial skills are malleable (Holbein 2017). While there is certainly more to learn about when and how grit can be changed, and at what point during the life course it is most malleable, it seems to be an individual characteristic that is not fixed at birth.

While empirical work has found grit to be predictive of academic success, conceptually and operationally distinct from other individual attributes (Duckworth *et al.* 2007; Eskreis-Winkler *et al.* 2014; Meyers, Pignault and Houssemand 2013; Tucker-Drob *et al.* 2016), and malleable to targeted intervention, we remain sympathetic to the view that the standard grit measure might capture a family of psychosocial attributes that tap into the broader ability to persevere in order to accomplish one's goals in the face of challenges and setbacks. Given the emerging research, it seems reasonable to conceptualize grit as comprising both individual mindsets – how people

⁹This classic issue is sometimes called the 'jingle-jangle fallacy' – the erroneous assumptions that two nearly identical things are different because they have different labels (jangle) or that two different things are the same simply because the same label is used (jingle) (Kelley 1927).

¹⁰Resiliency scales tend to ask individuals how well they respond to risk and stress (e.g., 'I quickly get over and recover from being startled.');

new experiences (e.g., 'I like to take different paths to familiar places.');

and how well they interact with others (e.g., 'Most of the people I meet are likable.')

(Windle, Bennett and Noyes 2011).

think about themselves, their environment and their relationships to their environment – and skills – the characteristics originating from one's knowledge, ability, practice and aptitude – that allow individuals to set aside short-term concerns, withstand challenges and setbacks, and anticipate obstacles in the future (Dweck, Walton and Cohen 2011; Shechtman et al. 2013). While more work remains to be done to understand the exact nature of grit, the key question motivating our analysis concerns the relevance of this psychological construct for the development of civic and social attitudes and behaviors.

Why Psychosocial Abilities and Youth Civic Engagement?

Our research situates itself in the literature on the psychological underpinnings of youth civic engagement and political socialization more generally (Dawson and Prewitt 1968; Eccles et al. 1993; Flanagan 2003; Greenstein 1965; Jennings et al. 2005; Niemi and Hepburn 1995; Sapiro 2004; Searing, Schwartz and Lind 1973; Sears and Funk 1991; Sears and Levy 2003; Watts and Flanagan 2007). These works clearly show that childhood experiences affect civic engagement later in life. Despite a growing body of research in this area, to our knowledge no work has explored the importance of the bundle of psychosocial attributes captured by grit for early life civic engagement. A few studies have come close by exploring the political relevance of other psychosocial attributes and civic participation. These include examinations of the relevance of self-efficacy, emotion regulation, locus of control, and patience or delayed gratification for adult participation (Condon and Holleque 2013; Denny and Doyle 2008; Dawes et al. 2014; Fowler and Kam 2006).

While children and early adolescents are not eligible to vote in the United States, there are a number of ways that they *can* be civically engaged. Young people can volunteer with civic and political organizations, be involved in their school communities, consume political information and have political discussions, to name a few. Even active participation and involvement in school activities can be thought of as an analog to forms of adult civic engagement. Understanding what helps young people develop the attitudes and behaviors of an active citizen early on – before they are eligible to vote – is vitally important given the habitual nature of civic participation (Plutzer 2002; Meredith 2009) and the remarkable stability of civic attitudes and behaviors in adulthood (Fox and Lawless 2014; Prior 2010, Prior 2018). Young people who start engaging early on are much more likely to do so in adulthood, while those who do not may be left behind (McFarland and Thomas 2006).

There are several reasons to suspect that psychosocial skills, like grit, could promote youth engagement in school, community and democracy. Consistent with grit's dual role in shaping mindsets and skills, these channels involve both the civic attitudes that grit might help develop and the civic behaviors it might promote. First, grit may help individuals follow through on a given desire to be engaged. Put differently, grittier students may be better focused, attentive and willing to exert effort in spite of the obstacles and distractions that they face in being actively engaged. This view starts with an acknowledgment that acts of civic engagement are costly.¹¹ Because of the costs, obstacles or distractions that young people face, many may fail to actually follow through and be civically engaged *even if* they have a desire or motivation to do so. In choosing whether or not to volunteer, for example, young people need to overcome a number of barriers. Volunteering requires time, planning and effort, and competes with a host of distractions and substitutes that limit one's available time. With grit involving – at its core – the ability to overcome obstacles, the direct relationship is relatively straightforward: grit may help young people overcome engagement costs and follow through on their intentions. Consistent with this notion, some scholars have speculated, but not tested, that it may take

¹¹Voting, citizens have to locate and travel to polling locations (Brady and McNulty 2011) and potentially navigate long lines (Pettigrew 2016).

'a great deal of initiative, energy, [and] *perseverance* [...] [for citizens] to be heard' (Neuman 1986, 2 (emphasis added)).¹²

Second, psychosocial skills like grit may promote the attitudes necessary to be actively engaged. As mentioned earlier, the notion of grit involves an individual's ability to believe in themselves across their various life domains. As a result, grit may promote internal political efficacy – the feeling 'that the individual citizen can play a part in bringing about [political] change' (Campbell, Gurin and Miller 1954, 187), which is a known precursor to civic engagement (Verba, Schlozman and Brady 1995). Having overcome obstacles and experienced success in a number of domains, grittier individuals may be more likely to believe they can understand and navigate complex civic and political environments. In the school setting, an enhanced level of self-efficacy may translate into higher levels of engagement with teachers, peers, schoolwork and various intra-school organizations (Bandura *et al.* 1996; Fast *et al.* 2010). Simply put, the ability to persevere may breed a general belief that individual efforts in the civic domain are achievable.

Finally, grittier citizens may also be able to better exert effort towards future civic acts like voting. As Duckworth and her coauthors mention, grit often involves goals that have long time horizons (Duckworth *et al.* 2007; Duckworth and Quinn 2009; Duckworth 2016). As such, grit may help individuals better consider their actions in the future. This ability may prove useful in the civic and political realm. Those who develop grit may be able to see themselves as taking part in costly future civic activities. Put differently, in addition to promoting following through on civic activities that are immediately available (such as volunteering and showing up to school), grit may help students anticipate, plan for and identify as participants in activities in the future (such as voting). Thus it is our expectation that grittier students will have higher vote intentions, despite the fact that they are not yet eligible to vote.¹³

Data

To examine the relationship between grit and our outcomes of interest among a sample of young, not yet eligible citizens, we partnered with the WCPSS – the largest school district in North Carolina and the 15th largest in the United States in terms of student enrollment. WCPSS has a mix of urban, suburban and rural areas, and enrolls students of multiple races and ethnicities.¹⁴ The system currently has more than 180 schools serving roughly 160,000 students across an 800 mi² area.

During the spring semesters of 2015 and 2016, WCPSS implemented an in-school student survey of all students in grades 5, 8 and 9.¹⁵ All survey respondents in both waves were linked to school administrative records, resulting in a dataset that is exceptional not only in its size, but also in its scope and richness.¹⁶ More information on the survey design and summary statistics of our measures can be found in the online appendix.

In both waves, grit was measured using the standard 8-item Duckworth Grit Scale for children (Duckworth *et al.* 2007). This battery of questions asks students to identify how well the following statements describe them: 'New ideas and projects sometimes distract me from

¹²Regarding voting, some have speculated that, 'perseverance could conceivably account for why some [...] overcome [voting's] start-up costs' (Plutzer and Wiefek 2006, 674).

¹³Research suggests that vote intentions are strong predictors of vote self-reports and validated voter turnout (Achen and Blais 2010).

¹⁴Currently, WCPSS students are 53 per cent non-white, 32 per cent receive free or reduced price lunch, and 7 per cent are English-language learners. The corresponding figures for public school students across the United States are 50 per cent, 52 per cent and 10 per cent, respectively.

¹⁵The student response rate in 2015 was 72.9 per cent, excluding 18 schools for non-participation. The 2016 response rate was 82.5 per cent excluding two schools for non-participation. See the online appendix for more information about the survey implementation.

¹⁶The de-identified data were shared with us through a secure connection pursuant to a data use agreement, a confidentiality agreement and Institutional Review Board protocol approval.

previous ones', 'Setbacks don't discourage me', 'I have been obsessed with a certain idea or project for a short time but later lost interest', 'I am a hard worker', 'I often set a goal but later choose to pursue a different one', 'I have difficulty maintaining my focus on projects that take more than a few months to complete', 'I finish whatever I begin' and 'I am diligent'. Together these individual items form a scale that has been previously evaluated for validity and reliability (Duckworth and Quinn 2009). For our analyses below, we create a mean grit scale that is standardized by grade: ranging from -4 to 2.8 and having a mean of 0 and standard deviation of 1.¹⁷ The scale is reliable ($\alpha = 0.7$) and loads on a common factor (Eigenvalue 1: 2.13, Eigenvalue 2: 0.76).¹⁸

Our data also contain a variety of questions and administrative data measuring students' engagement in school, community and democracy. In the survey, we were able to include three items directly related to community and democratic engagement. Following the example of previous research on civic engagement among pre-voting aged youth (Flanagan, Syvertsen and Stout 2007), we include measures of civic attitudes (for example, political efficacy and future voter turnout intentions) and civic behaviors (volunteerism).¹⁹ Working within the survey length and response option constraints (4-point scales, agree/disagree) of the instrument, these measures were adapted from existing batteries of civic engagement for young people (Flanagan, Syvertsen and Stout 2007). Our models consider these items individually. We also combined them into a scale using principal component factor analysis; the items are strongly related and all load highly on a common factor (Factor 1 Eigenvalue: 1.86; Factor 2 Eigenvalue: 0.82).

We measure school engagement using a combination of survey and administrative data. Although a somewhat nebulous concept, school engagement has long been considered a critical component of student success and has been broadly defined to include the behaviors, attitudes, and values that promote behavioral and emotional participation in a school's academic, social and extracurricular activities (Appleton et al. 2006; Fredricks, Blumenfeld and Paris 2004). School engagement can be conceptualized as being closely related to other forms of civic engagement, such as engaging in the community and in democracy – indeed, previous studies have shown that measures of school engagement taken in adolescence are predictive of more traditional forms of civic engagement, such as voting, volunteering and belonging in adulthood (McFarland and Thomas 2006; Metz and Youniss 2005; Marzana et al. 2015).²⁰ Included on the student engagement survey were a number of items previously identified and validated by others that are designed to tap into students' involvement in learning activities, enjoyment or interest in school, and the recognition of the importance of school for future goals (Appleton et al. 2006). Specific items include 'After finishing my schoolwork I check it over to see if it's correct', 'When I do schoolwork I check to see whether I understand what I'm doing', 'I work hard to meet my teachers' expectations', 'I enjoy talking to the teachers here', 'I enjoy talking to the students here', 'Learning is fun because I get better at something', 'What I'm learning in my classes will be important in my future', 'School is important for achieving my future goals' and 'My education

¹⁷This resulting scale differs from Duckworth et al. (2007) in two very minor ways. First, we standardize within grades due to observed variation across school years. Secondly, instead of using an additive scale, which would presumably employ list-wise deletion, we use a mean scale that averages across all answered items. Our conclusions are not sensitive to these decisions.

¹⁸Some have advocated splitting the Duckworth scale into two subscales – one of these capturing perseverance and the other capturing passion (Duckworth 2016). We do not find support for two distinct sub-constructs in our sample.

¹⁹The specific items ask about agreement or disagreement with the following statements: 'I believe I can make a difference in my community', 'I participate in projects in my community' and 'When I'm old enough, I plan to vote in most elections.' Admittedly, the measurement of civic engagement is imperfect given concerns about social desirability and the hypothetical nature of some of the questions. We try multiple approaches with a similar observed pattern.

²⁰We find the same in our survey. In a bivariate model, a 1 σ increase in our school engagement scale predicts that students are 0.52 units higher on our civic engagement scale ($p < 0.01$), 8.0 percentage points higher in intending to vote ($p < 0.01$), 15.2 percentage points higher in the likelihood of volunteering ($p < 0.01$) and 0.32 units higher in political efficacy ($p < 0.01$).

will create many future opportunities for me'.²¹ In addition, we have two proxies for school engagement from administrative data records: student absenteeism and tardies. If students do not show up to school or to class on time they are, almost by definition, not engaged in the school. Empirical evidence supports this notion: our survey-based school engagement scale is strongly related to our administrative measures of student absenteeism and tardies.²²

Other key variables in our combined data file include student administrative records of cognitive ability, as measured by North Carolina's standardized math and reading end-of-grade/end-of-course exams.²³ In addition to allowing us to examine the previously explored relationship between grit and academic achievement, lagged test score measures add value as a control when we examine civic engagement, as they guard against the possibility that any relationship between grit and engagement is an artifact of cognitive skills, which have long been considered a key predictor of engagement in the political science literature (Luskin 1990; Nie, Junn, Stehlik-Barry and 1996; Verba, Schlozman and Brady 1995).

Additionally, from the school administrative records we have measures of students' race/ethnicity, gender, grade, age, academically gifted status and limited English proficiency status. We also know which school students are currently attending and which census tract they live in. Administrative records also identify siblings, twin pairs and individual students across waves (a fact that we leverage in our identification strategies outlined in the next section).

We also have two survey-based measures of political interest or motivation. Our two specific questions ask students to indicate their level of agreement with the statements, 'I care a great deal about who is elected to be our next president' and 'I think politics and government are boring' (reverse coded). Given political motivation's foundational relationship with other civic attitudes and behaviors (Verba, Schlozman and Brady 1995), in all of our models we control for measures of this characteristic. We have argued that grit may promote engagement by strengthening individuals' beliefs about their capacity to engage, their ability to follow through on a given orientation towards engaging, and their ability to anticipate and plan for future forms of engagement. However, this framework does not diminish the need to have some degree of political motivation with our forms of political engagement. While grit might help citizens achieve their goals, their level of political motivation may also matter. Hence, exploring the relationship between grit and civic engagement requires that we partial out the role of political motivation by including it as a control in the model.

Finally, from the student survey we are also able to construct a number of data quality controls, which include an indicator for straight-lining on the grit scale items (1.5 per cent of the sample), a continuous variable measuring the percent of survey questions answered (to help account for non-response bias), a continuous variable measuring the percent of responses that the respondent answered 'strongly agree' (to help account for acquiescence bias), an indicator for taking the survey very quickly (marking individuals in the quickest 5 per cent or respondents – equivalent to taking the 50-item survey in about 4 minutes), and an indicator marking individuals who responded in an inconsistent pattern to our two reverse-coded political interest items (as an attention check). These data quality controls help us rule out the possibility that the results are an artifact of systematic survey response patterns or satisficing. They also serve to account for psychosocial factors that are related to, but ultimately distinct from, grit. Recent research has shown that survey-taking patterns offer a powerful behavioral measure of individuals' levels of conscientiousness or character traits (Hitt, Trivitt and Cheng 2016). As a result, including our

²¹The WCPSS survey includes 33 school engagement items, covering five dimensions, from Appleton *et al.* (2006) along with two additional questions about academic rigor developed within the district. We include only the subset of student behavioral and attitudinal items (rather than perceptions of others; e.g., family support). The results are unchanged if we use the full set of individual items in our survey-based scale.

²²A 1 σ increase in our school engagement scale predicts 0.5 fewer absences ($p < 0.01$) and 0.98 fewer tardies ($p < 0.01$).

²³5th, 8th and 9th graders take math exams; 5th and 8th graders take reading exams.

survey-taking measures allows us to account for other aspects of psychosocial ability unrelated to the Duckworth grit scale.²⁴ This approach, combined with our sibling, twin and individual fixed effects models (which we outline in the next section), allows us to isolate grit's relationship with test scores, school engagement and democratic engagement net of the other potentially important individual student traits and abilities.

Methods

To evaluate the relationship between grit and our outcomes of interest, we use several identification strategies. Our first approach controls for the observed characteristics and data quality measures that we just outlined. This approach most closely resembles previous work studying grit's relationship with academic performance (Duckworth et al. 2007; Kleiman et al. 2013; Reed, Pritschet and Cutton 2013).

Improving on previous work (Duckworth et al. 2007; Duckworth and Quinn 2009), we are also able to control for census tract/school fixed effects. These account for both observable (community socio-economic conditions, levels of grit, etc.) and unobservable (school quality, school culture, school leadership, social connectivity, community levels of civic involvement, etc.) differences that remain constant within these fairly fine-grained geographic units.²⁵ All in all, these geographic fixed effects account for the possibility that any relationship with our outcomes of interest is a byproduct of the time-invariant components of social context.

Additionally, we are able to leverage the fact that we can identify twins and siblings in our sample.^{26,27} Among non-experimental studies of psychological characteristics, twin and sibling fixed effects models are one of the strongest robustness checks that can be run, as they controls for a host of observable (for example, socio-economic status, family members' levels of political motivation, family members' levels of engagement, parents' grittiness, etc.) and unobservable (for example, parenting style, personality, shared heritable traits, etc.) factors that are shared within families and twin pairs.²⁸ As such, this modeling approach is commonly used to eliminate many sources of potential bias, but this technique has not often been used in studies of the roots of civic engagement, with some notable exceptions (Burden et al. 2017; Charney and English 2012; Dinesen et al. 2016; Fowler, Baker and Dawes 2008; Oskarsson et al. 2017).²⁹

As a final robustness check, we leverage the fact that we have panel data from Waves I and II of the student survey, and estimate individual fixed effects models that approach causality even more so than the sibling and twin pair models. These models take advantage of variation in individuals' level of grit over time, comparing students when they are gritty to themselves when they are less gritty. In a way, this modeling approach is similar to an especially powerful difference-in-difference specification, where the first difference is between individuals whose

²⁴Inasmuch as these behavioral proxies overlap with our grit measure, our results will be attenuated towards zero. Hence, our results may be a conservative estimate of grit's relationship with our outcomes of interest. Indeed, omitting these behavioral proxies increases the grit coefficient, although the results remain substantively the same.

²⁵The inclusion of census and school fixed effects also accounts for possible reference bias if students were to benchmark their level of grit relative to their social surroundings (West et al. 2016).

²⁶The WCPSS survey sample includes just over 30,000 family members with siblings and 1,737 twins (1.82 per cent of students in grades 5, 8, and 9). This prevalence of twins is roughly equivalent to the US population, which is 2–3 per cent depending on the year (National Vital Statistics). In the WCPSS sample, grit's intra-cluster correlation (ICC) among siblings is 0.32 ($p < 0.01$) and among twins it is 0.27 ($p < 0.01$).

²⁷Unfortunately, we cannot distinguish between MZ/DZ twins, given that this information comes from school administrative records that do not contain genetic profiles. This means we cannot use quite as powerful of a discordant twin design as we would like (Dinesen et al. 2016; Oskarsson et al. 2017). This limitation is muted by the fact that we can estimate individual fixed effects models, which implicitly hold all of the genetic factors constant that would be held constant in a discordant twin design.

²⁸Freedman, Collier and Sekhon 2010, ch. 15; Medland and Hatemi 2009; Hart et al. 2009.

²⁹Twin studies do come with assumptions and limitations (see Bouchard and McGue 2003).

level of grit changes over time (the ‘treatment’ group) and the second difference is between those whose level does not change (the ‘control’ group).³⁰ Given the grades present in the survey (5th, 8th and 9th), the sample for this estimation procedure comes from individuals who were in 8th grade in the first wave and 9th grade in the second (with some additional students who repeated grades also included).³¹ This modeling approach controls for *all* observable and unobservable individual-level heterogeneity that remains constant within individuals over time (individual-level propensity to engage, family-level propensity to engage, genetics, childhood experiences, stable personality traits, etc.). This provides a very stringent robustness check in exploring the relationship between grit and engagement in school, community and democracy. While this approach is commonly used in education studies with panel data (Hanushek, Kain and Rivkin 2004; Ladd, Clotfelter and Holbein 2015), to our knowledge this strict specification has rarely been used in observational studies of engagement outcomes. While this modeling approach is especially powerful, it does not absorb heterogeneity that varies within individuals over time. That said, this approach goes a long way towards accounting for factors that may bias our estimates. With this final robustness check, we are able to make our estimates as observationally robust as possible given our research question of interest.

These rigorous robustness checks allow us to account for the possibility that our results (shown in the next section) are picking up some other personality trait beyond grit. Many of these traits, like conscientiousness, have been shown to be stable within families and over time (Cobb-Clark and Schuer 2012; Mondak 2010; Soldz and Vaillant 1999). Given stability along these dimensions, our sibling, twin and individual fixed effects models will absorb all of these other stable character traits. In short, given our robustness checks – and our survey quality controls mentioned earlier – it is highly unlikely that any relationship between grit and test scores and engagement in school, community and democracy is an artifact of conscientiousness or other stable psychological characteristics.

Results

In each of the results reported here, we provide the predicted change in our outcomes associated with a one-standard-deviation change in the Duckworth grit scale. In some instances, as a reference we also report the associated change moving from the 10th to the 90th percentile of the grit scale.³²

Before turning to our primary results for student engagement in school, community and democracy, we first briefly replicate and extend previous work exploring the relationship between grit and academic performance. Figure 1 plots the coefficient estimates for our models relating grit and student achievement in math and reading. Our first two modeling approaches suggest that students who score one standard deviation higher on the Duckworth grit scale score roughly 0.119σ higher ($p < 0.01$) in math and 0.104σ ($p < 0.01$) in reading. If we compare individuals at the 10th percentile of the grit scale to those at the 90th percentile, the estimates are 0.31σ ($p < 0.01$) for math and 0.27σ ($p < 0.01$) for reading.³³ This conclusion holds if we look among siblings (math: $\beta = 0.093$, $p < 0.01$; reading: $\beta = 0.081$, $p < 0.01$) or twin pairs (math: $\beta = 0.130$, $p < 0.01$; reading: $\beta = 0.103$, $p < 0.01$). In short, regardless of the modeling approach, we find that grittier students perform noticeably better on standardized tests than those who have less grit. This finding, while not our primary focus, is meaningful in that it validates and extends previous research exploring the relationship between grit and student performance (Duckworth *et al.* 2007; Eskreis-Winkler *et al.* 2014). It suggests that grit is vital for student achievement.

³⁰For reference, the ICC of grit within individuals between Waves I and II is 0.6.

³¹Of the 8,777 students who took the survey in 8th grade, 6,185 (70.5 per cent) took the survey again in Wave 2.

³²If the reader wishes to have a different comparison point – such as the corresponding predicted change moving from the minimum to the maximum value on the grit scale – we reiterate that the full distribution of the grit scale is about 6.8 standard deviations.

³³These results hold if we include lagged achievement.

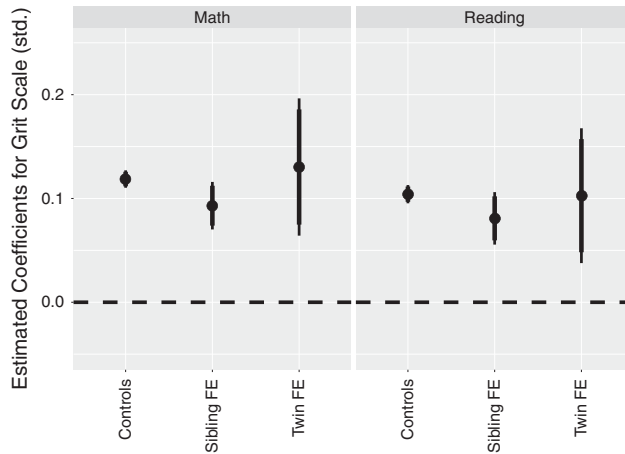


Figure 1. Grit and student achievement (waves 1 and 2).

Note: coefficient plot for grit's estimated relationship with test scores. Bars represent the 90 per cent and 95 per cent confidence intervals. Grit is measured with the Duckworth 8-item Grit Scale (standardized by grade). Achievement standardized by grade to have a mean of 0 and a standard deviation of 1. Models with controls (math, $N = 33,889$; reading, $N = 32,369$) include survey wave, race, gender, academically gifted, limited English proficiency, attendance, and school and census tract fixed effects. Sibling models (math, $N = 16,455$; reading, $N = 15,867$) include gender, age, attendance, data quality controls and survey wave. Twin models (math, $N = 1,092$; reading, $N = 1,060$) include controls for gender, data quality controls and survey wave.

We next go beyond student test scores to explore the relationship between grit and our measures of students' school, community and democratic engagement. We start with students' levels of engagement in school. Table 1 documents the relationship between grit and three proxies of students' engagement in their schools – a survey scale measuring various aspects of school engagement, validated unexcused absences and validated unexcused tardies from school administrative records. Column 1 shows that students who are observationally similar, but grittier than their counterparts score about 0.145 standard deviations ($p < 0.01$) higher on the survey-based school engagement scale.³⁴ In addition, Table 1 shows that gritty students appear to have fewer absences. Column 2 shows that a one-standard-deviation increase in grit predicts 0.23 fewer absences ($p < 0.01$) and 0.27 fewer tardies ($p < 0.01$), on average.³⁵ These effect sizes are modest; however, given the harm that student tardiness and absenteeism has on student learning (Goodman 2014), this predicted reduction in absences is meaningful.

Table 1 also shows that grit predicts our measures of students' engagement with community and democracy. Column 4 provides the estimates for political efficacy. As we have hypothesized, grittier students appear to have a stronger belief that they have the capacity to engage in civic and political processes. Students who score one standard deviation higher on the grit scale score 0.096 units higher on the 4-point political efficacy scale ($p < 0.01$) – a sizeable estimate that benchmarks well with the coefficient size for political interest (0.06 units, $p < 0.01$). If we compare individuals at the 10th percentile to those at the 90th percentile, we have an estimate of 0.25 units higher on the political efficacy scale. If we recode political efficacy to a dichotomous variable by splitting observations at the median, the models suggest that a one-standard-deviation shift in grit predicts a 5.3-percentage-point increase in the likelihood of a student feeling politically efficacious ($p < 0.01$). These results suggest that grit contributes to the early development of one the most foundational political attitudes – political efficacy.

³⁴The 10th–90th percentile estimate is 0.38σ .

³⁵If we compare individuals at the 10th percentile to those at the 90th percentile, the estimates are 0.6 fewer absences and 0.7 fewer tardies.

Table 1. Grit and student engagement in school, community and democracy

	School engagement			Community and democratic engagement			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	School engage (std.)	# Absences	# Tardies	Political efficacy (1–4)	Volunteer (0/1)	Vote older (0/1)	Civic Engagement Scale (1–6)
Grit (std.)	0.145* (0.004)	-0.232* (0.025)	-0.265* (0.042)	0.096* (0.004)	0.064* (0.003)	0.017* (0.002)	0.122* (0.005)
Political Interest (std.)	0.031* (0.004)	0.065* (0.024)	0.032 (0.043)	0.060* (0.004)	0.035* (0.003)	0.103* (0.002)	0.308* (0.005)
Math Score (std.)	0.009 + (0.005)	-0.731* (0.038)	-0.879* (0.071)	-0.007 (0.006)	0.001 (0.004)	0.017* (0.003)	-0.005 (0.007)
Read Score (std.)	-0.041* (0.005)	-0.119* (0.039)	-0.185* (0.070)	-0.005 (0.005)	-0.043* (0.004)	0.002 (0.003)	-0.023* (0.007)
Black	-0.040* (0.010)	-0.231* (0.071)	1.984* (0.135)	0.023* (0.011)	-0.105* (0.008)	-0.002 (0.006)	-0.083* (0.013)
Hispanic	0.060* (0.010)	0.159* (0.078)	0.428* (0.136)	-0.023* (0.011)	-0.097* (0.008)	-0.038* (0.007)	-0.139* (0.014)
Asian	0.143* (0.013)	-0.666* (0.071)	-0.139 (0.112)	-0.037* (0.014)	-0.039* (0.010)	-0.060* (0.008)	-0.116* (0.017)
Other Race	-0.037* (0.016)	0.225* (0.106)	0.822* (0.169)	-0.018 (0.016)	-0.046* (0.012)	-0.030* (0.009)	-0.070* (0.020)
Female	0.080* (0.006)	-0.065 (0.044)	-0.293* (0.079)	0.036* (0.007)	0.071* (0.005)	0.041* (0.004)	0.112* (0.008)
Age	0.023* (0.006)	0.470* (0.049)	0.471* (0.095)	0.003 (0.006)	-0.007 (0.005)	0.003 (0.004)	0.018* (0.008)
Acad. Gifted	-0.002 (0.010)	0.122* (0.055)	-0.002 (0.090)	0.016 (0.010)	0.049* (0.007)	0.020* (0.005)	0.077* (0.012)
Limited English	0.082* (0.019)	-0.121 (0.175)	-0.333 (0.331)	0.034 + (0.020)	0.056* (0.014)	0.023 + (0.013)	0.090* (0.026)
Prop. Days Attend	1.116* (0.096)	. (0.096)	. (0.096)	-0.025 (0.103)	0.445* (0.071)	0.325* (0.058)	0.511* (0.131)
N	38,189	38,189	38,866	37,692	37,727	37,751	36,567
Census Tract FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Quality Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R ²	0.643	0.143	0.148	0.255	0.138	0.143	0.421

Note: robust standard errors in parentheses. Each of the model controls for data quality items include an indicator for those straight-lining on the grit scale items, a continuous variable measuring the percent of survey questions answered (to help account for non-response bias), a wave fixed effect, a continuous variable measuring the percent of responses to which the respondent answered 'strongly agree' (to help account for acquiescence bias), an indicator for taking the survey very quickly, and an indicator marking individuals who responded in an illogical pattern to our two reverse-coded political interest items. + $p < 0.10$, * $p < 0.05$

Column 5 likewise shows that grittier students are more likely to volunteer in their community. Students who score one standard deviation higher on the grit scale are 6.4 percentage points more likely to volunteer than observationally similar, but less gritty students ($p < 0.01$). Column 6 shows that grittier students are also more likely to report an intention to vote when they are old enough to do so.³⁶ Controlling for observables and census and school fixed effects, a one-standard-deviation change in grit predicts a 1.7-percentage-point increase ($p < 0.01$) in the probability of intending to vote. If we compare individuals at the 10th percentile to those at the 90th

³⁶These conclusions are not sensitive to the coding of volunteering or voting as categorical rather than dichotomous.

percentile, the estimate indicates a 4.4-percentage-point increase in the probability of intending to vote. This estimate is not only statistically significant; it is also substantively large. Considering that 84 per cent of students indicated an intention to vote, it is meaningful that we are still able to see substantive variation along the dimension of student grittiness given the presence of ceiling effects.³⁷ (This result with vote intentions as the outcome holds even when we shift our models slightly to also control for political efficacy, suggesting that while grit is related to political efficacy, its relationship with other metrics of engagement is not fully explained by this foundational political attitude.) That grit is predictive of vote intentions suggests that not only does grit help young citizens follow through and overcome obstacles to forms of civic behavior that are currently available (that is, volunteering), it also helps them believe that they will be able to do so with forms of engagement that are possible in the future (that is, when they become eligible to vote). Finally, Column 7 shows the relationship between grit and a scale of our civic engagement outcomes combined together. This multi-item scale reduces measurement error in our civic engagement outcomes. These models show that grittier students are 0.122 units ($p < 0.01$) higher on this 6-point weighted scale. If we compare individuals at the 10th percentile to those at the 90th percentile, we find a predicted increase of 0.32 units.

How large are these estimates? One way to benchmark our results is to compare them to one of the most common predictors of political participation: political motivation. If we compare the coefficients for our grit and political interest variables, rescaled in order to compare the lowest and highest levels of these variables (net of the other), we see that grit is a stronger predictor of childhood and early adolescent political efficacy (grit = 0.61 units; political interest = 0.24 units) and volunteering (grit = 41.2 percentage points; political interest = 14.2 percentage points), whereas political interest is a stronger predictor of early vote intentions (grit = 10.8 percentage points; political interest = 41.5 percentage points) and our combined civic engagement scale (grit = 0.78 points; political interest = 1.24 points). This suggests that while political-psychological orientations (like political interest) are important, so too are general psychological orientations (like grit) in the socialization of early civic attitudes and behaviors.

Our results suggest that grittier students have a stronger belief that they have the capacity to be involved in the political process (political efficacy), a greater ability to follow through on their desire to actively engage in activities that are available to them (volunteering, attending school), and a greater capacity to see themselves as being able to overcome future obstacles to their engagement (intending to vote). Moreover, as we show in the online appendix in our heterogeneity analyses (see Figure A.2), in some cases grit serves to narrow stubborn participatory gaps.

While these models do not fully account for bias from potential unobservables (which we discuss in the next section), they are meaningful in their own right. Our grit estimates are robust to controlling for political motivation and cognitive ability – two of the most foundational predictors of civic behaviors, and the factors previously thought to be the key drivers behind educational attainment's relationship with civic participation. Indeed, as we show in the online appendix, some of the supposed contribution of cognitive ability to civic engagement may be more accurately attributed to psychosocial ability (see Figure A.3). Not only does psychosocial ability remain statistically significant when we include these foundational controls, it also remains a substantively meaningful predictor of the formation of early civic attitudes and behaviors. This suggests that previous political socialization studies have missed the non-cognitive or psychosocial attributes that appear to contribute to the development of early civic attitudes and behaviors.

³⁷We note that our voting intention estimates are similar across grades. The grit estimates [95 per cent CI] for 5th, 8th and 9th graders are: 0.011 [0.004, 0.017], 0.018 [0.012, 0.025], and 0.026 [0.018, 0.035], respectively. The results suggest, perhaps as we would expect, that grit becomes more relevant as adolescents get closer to the voting age.

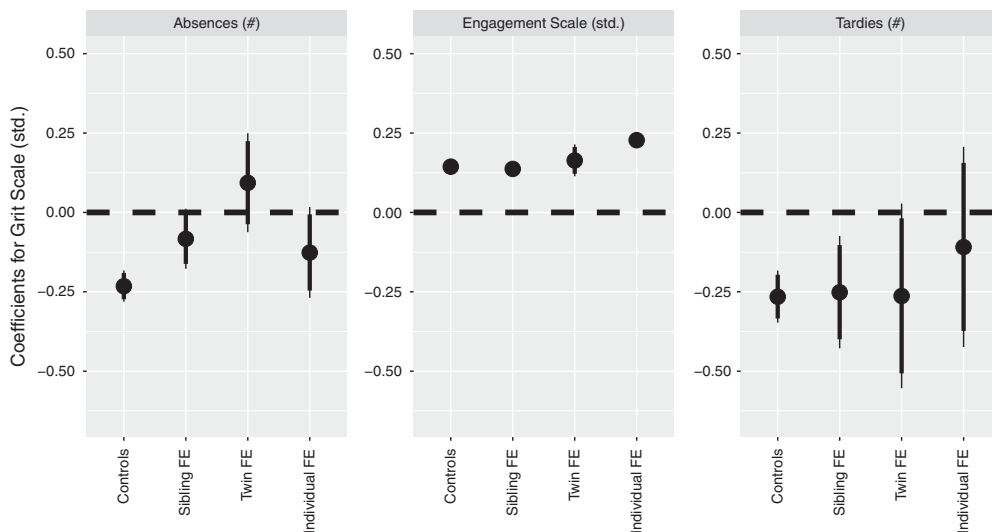


Figure 2. Grit and school engagement, robustness checks
 Note: coefficient plots of our grit estimates across four model specifications – those with all controls, sibling fixed effects, twin fixed effects, and individual fixed effects. Grit is measured using the Duckworth 8-item Grit Scale. Our measures of tardies and absences are raw counts from validated administrative school records in the WCPSS. The school engagement scale is created from select WCPSS survey items from the Appleton *et al.* (2006) school engagement scale. The school engagement scale and grit are standardized by grade.

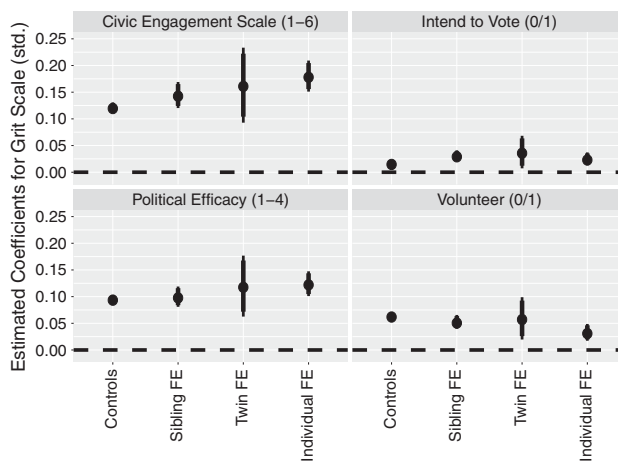


Figure 3. Grit and civic engagement, robustness checks
 Note: coefficient plots of our grit estimates across four model specifications – those with all controls, sibling fixed effects, twin fixed effects, and individual fixed effects. Grit is measured using the Duckworth 8-item scale (standardized by grade). Vote intention and volunteer are indicator variables for those who ‘agreed’ or ‘strongly agreed’. Our civic engagement scale is a composite of the other three civic items.

Robustness Checks

We next check the robustness of our results shown in Table 1 using a number of methods to account for bias from potential unobservables. These leverage family, twin pair and individual fixed effects. The relationship between grit and our survey-based measures of school engagement holds and remains substantively large among siblings ($\beta = 0.137\sigma$, $p < 0.01$), twin pairs ($\beta = 0.164\sigma$, $p < 0.01$) and individual fixed effects specifications ($\beta = 0.228\sigma$, $p < 0.01$). Figure 2 shows this visually by providing coefficient plots of these estimates. The figure confirms that gritty students appear to report being more engaged in their schools.

The next two panels of Figure 2 show the relationship between grit and student absenteeism and tardies. While our estimate for absences holds with controls, sibling and our strongest model specification – that with individual fixed effects – it does not hold among twins. The estimate itself is small, positive and not statistically distinct from zero, perhaps reflecting the homogeneity in attendance patterns among twins. That said, the absence estimates remain significant at the 90 per cent level in the individual fixed effects specification. Likewise, there is some evidence that our estimate for tardies is not a product of unobservables captured by our sibling and twin pair models. The estimate for tardies is not statistically distinguishable across model specifications, and remains statistically significant in the sibling estimate ($p < 0.01$); it is marginally insignificant in the twin pair sample ($p < 0.077$), but is not close to being significant in the individual fixed effects specification ($p < 0.50$).

Figure 3 shows that our results for the civic engagement outcomes are quite robust to model specification. With volunteering, we find that grit's effect clearly holds among siblings ($\beta = 5.3$ percentage points, $p < 0.01$), twin pairs ($\beta = 5.9$ percentage points, $p < 0.01$) and individual fixed effects specifications ($\beta = 3.3$ percentage points, $p < 0.01$). This suggests that grit help encourage young people to follow through to overcome obstacles that get in the way of their civic engagement. A similar pattern holds for political efficacy. We find that grit noticeably increases political efficacy in the sibling ($\beta = 0.10$ units, $p < 0.01$), twin pair ($\beta = 0.120$ units, $p < 0.01$) and individual fixed effects specifications ($\beta = 0.124$ units, $p < 0.01$). This suggests that the relationship outlined in the last section between grit and political efficacy is not the product of observed or unobserved factors that remain constant within families, twins or individuals themselves. Likewise, with vote intentions we can see that grit matters, perhaps even more than suggested in our models with controls alone, among our sibling ($\beta = 3.1$ percentage points, $p < 0.01$), twin ($\beta = 3.8$ percentage points, $p < 0.02$) and individual fixed effects specifications ($\beta = 2.5$ percentage points, $p < 0.001$). Finally, the same pattern holds in the combined civic engagement scale: the sibling ($\beta = 0.15$ units, $p < 0.01$), twin pair ($\beta = 0.16$ units, $p < 0.01$) and individual fixed effects specification ($\beta = 0.18$ units, $p < 0.01$) all remain statistically significant and substantively meaningful.

Taken together, these results suggest that grittier students not only perform at a higher level in school, but are more likely to be actively involved in their schools, communities and democracy. This pattern cannot be explained by political motivation, cognitive ability, other character traits, socio-economic status or other factors that remain constant within our fairly restrictive sibling, twin and individual fixed effects specifications.

Conclusion

We have shown that psychosocial abilities, like grit, constitute an important, yet heretofore unexplored, predictor of early civic attitudes and behaviors. Beyond the better-established relationship with student performance on standardized tests, our results show that grittier students are also more engaged in schools, communities and democracy. These results have implications for our broader understanding of the early roots of civic attitudes and behaviors, and for public policy.

Our results suggest that stubbornly low civic engagement may have its roots in the general psychosocial attributes that children develop (or fail to develop) early in life. This finding refocuses attention on development that occurs during late childhood and early adolescence – which appear to be critical periods in the development of the psychosocial skills needed to be active citizens (Holbein 2017). While political scientists have long focused on the material resources, cognitive abilities and political motivations that citizens need to engage in their community and in various political processes, our results suggest that childhood and adolescent psychosocial attributes, like grit, may also play a critical role. Our results shed light on the socialization of civic attitudes and behaviors – a field that has strong roots, but that has seen surprisingly little research in recent years (Niemi and Hepburn 1995; Sapiro 2004). We also build on existing work in this area by reopening a promising line of research that explores how various psychological attributes influence a number of political attitudes and behaviors. These results

suggest that general non-political individual psychosocial attributes predict whether young people become actively engaged in politics or fail to do so.

From a policy perspective, there is disagreement about how much attention schools should give to teaching children psychosocial or non-cognitive skills (Farrington *et al.* 2012; Shechtman *et al.* 2013). Our findings indicate that in addition to predicting academic achievement, psychosocial skills – like grit – might also benefit societal well-being by helping to develop more engaged citizens. This information should be central to policy debates, since a fundamental objective of the education system is to prepare an engaged student body – one that will be active in the civic and political realm in adulthood. Future work should explore whether these findings generalize to other contexts, and investigate their curricular implications. Scholars and policy makers have considerable work ahead to identify specific policies and practices that may help to develop and reinforce psychosocial skills, like grit. As mentioned earlier, some early studies have shown that interactive curricula, such as those that emphasize service learning, have been shown to enhance psychosocial abilities. These offer particular promise given their connection to civic participation (Metz and Youniss 2005; Marzana *et al.* 2015). In short, our work implies that experiments studying the downstream effects of non-cognitive skill programs on civic outcomes are worthwhile. Further studies in this domain have the potential to shed light on ways that schools can better achieve their mission to promote a more active and engaged citizenry.

Supplementary Material. The WCPSS data used in this article is proprietary, and confidentiality agreements prohibit disclosure, as the data contains sensitive individual-level school records. However, interested scholars can apply for access through the WCPSS. For eligibility rules, restrictions, data security provisions and how to apply to access the data, please contact the WCPSS Data, Research & Accountability Department. To view supplementary material for this article, please visit <https://doi.org/10.1017/S000712341800025X>

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References

- Achen C and Blais A** (2010) Intention to vote, reported vote, and validated vote. Presented at the American Political Science Association Meeting, Washington, DC, 2–5 September.
- Alan S, Boneva T and Ertac S** (2016) Ever failed, try again, succeed better: results from a randomized educational intervention on grit. Working Paper, University of Essex.
- Appleton JJ *et al.*** (2006) Measuring cognitive and psychological engagement: validation of the student engagement instrument. *Journal of School Psychology* **44** (5):427–445.
- Astuto J and Ruck M** (2010) Early childhood as a foundation for civic engagement. In Sherrod LR *et al.* (eds) *Handbook of Research on Civic Engagement in Youth*. Hoboken, NJ: Wiley & Sons, pp. 249–276.
- Bandura A** (1977) Self-Efficacy: Toward a unifying theory of behavioral change. *Psychological Review* **84** (2):191–215.
- Bandura A *et al.*** 1996) Multifaceted Impact of Self-Efficacy Beliefs on Academic Functioning. *Child Development* **67** (3):1206–1222.
- Blair C and Razza RP** (2007) Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child Development* **78** (2):647–663.
- Bouchard TJ and McGue M** (2003) Genetic and environmental influences on human psychological differences. *Journal of Neurobiology* **54** (1):4–45.
- Burden BJ *et al.*** 2017) How different forms of health matter to political participation: the role of cognitive, physical, and general health functioning. *Journal of Politics* **79** (1):166–178.

- Brady HE and McNulty JE** (2011) Turning out to vote: the costs of finding and getting to the polling place. *American Political Science Review* **105** (1):115–134.
- Campbell A, Gurin G and Miller WE** (1954) *The Voter Decides*. Evanston, IL: Row, Peterson.
- Campbell DE** (2006) *Why we Vote: How Schools and Communities Shape our Civic Life*. Princeton, NJ: Princeton University Press.
- Campbell DE and Niemi RG** (2016) Testing civics: state-level civic education requirements and political knowledge. *American Political Science Review* **110** (3):495–511.
- Charney E and English W** (2012) Candidate genes and political behavior. *American Political Science Review* **106** (1):1–34.
- Cobb-Clark AD and Schurer S** (2012) The stability of big-five personality traits. *Economics Letters* **115** (1):11–15.
- Condon M and Holleque M** (2013) Entering politics: general self-efficacy and voting behavior among young people. *Political Psychology* **34** (2):167–181.
- Credé M, Tynan MC and Harms PD** (2017) Much ado about grit: a meta-analytic synthesis of the grit literature. *Journal of Personality and Social Psychology* **113** (3):492–511.
- Cunha F and Heckman J** (2007) The economics of human development: the technology of skill formation. *American Economic Review* **97** (2):31–47.
- Dawes CD et al.** (2014) The relationship between genes, psychological traits, and political participation. *American Journal of Political Science* **58** (4):888–903.
- Dawson RE and Prewitt K** (1968) *Political Socialization: An Analytic Study*. London: Little, Brown.
- Denny K and Doyle O** (2008) Political interest, cognitive ability and personality: determinants of voter turnout in Britain. *British Journal of Political Science* **38** (2):291–310.
- Dinesen PT et al.** (2016) Estimating the impact of education on political participation: evidence from monozygotic twins in the United States, Denmark and Sweden. *Political Behavior* **38** (3):579–601.
- Duckworth A** (2016) *Grit: The Power of Passion and Perseverance*. New York: Scribner.
- Duckworth A et al.** (2007) Grit: perseverance and passion for long-term goals. *Journal of Personality and Social Psychology* **92** (6):1087–1101.
- Duckworth AL and Quinn PD** (2009) Development and validation of the Short Grit Scale (GRIT-S). *Journal of Personality Assessment* **91** (2):166–174.
- Dweck C, Walton GM and Cohen GL** (2011) *Academic Tenacity: Mindsets and Skills that Promote Long-Term Learning*. Seattle, WA: Bill & Melinda Gates Foundation.
- Eccles JS et al.** (1993) Development during adolescence: the impact of stage-environment fit on young adolescents' experiences in schools and in families. *American Psychologist* **48** (2):90–101.
- Ericksen LH** (2015) The thorny politics of mobility. In Reeves R, (ed.) *Does Character Matter? Essays on Opportunity and the American Dream*. Washington, DC: Brookings Institution Press, pp. 64–67.
- Eskeis-Winkler L et al.** (2014) The grit effect: predicting retention in the military, the workplace, school and marriage. *Frontiers in Psychology* **12** (5):1–12.
- Farrington CA et al.** (2012) *Teaching Adolescents to Become Learners: The Role of Noncognitive Factors in Shaping School Performance – A Critical Literature Review*. Chicago, IL: University of Chicago Report CCSR.
- Fast LA et al.** (2010) Does math self-efficacy mediate the effect of the perceived classroom environment on standardized math test performance? *Journal of Educational Psychology* **102** (3):729–740.
- Flanagan CA, Syvertsen AK and Stout MD** (2007) Civic measurement models: tapping adolescents' civic engagement. CIRCLE Working Paper No. 55, Tufts University.
- Flanagan C** (2003) Developmental roots of political engagement. *PS: Political Science and Politics* **36** (2):257–261.
- Fowler JH, Baker LA and Dawes CT** (2008) Genetic variation in political participation. *American Political Science Review* **102** (2):233–248.
- Fowler JH and Kam CD** (2006) Patience as a political virtue: delayed gratification and turnout. *Political Behavior* **28** (2):113–128.
- Fox RL and Lawless JL** (2014) Uncovering the origins of the gender gap in political ambition. *American Political Science Review* **108** (3):499–519.
- Fredricks JA, Blumenfeld PC and Paris AH** (2004) School engagement: potential of the concept, state of the evidence. *Review of Educational Research* **74** (1):59–109.
- Freedman DA, Collier D and Sekhon JS** (2010) *Statistical Models and Causal Inference: A Dialogue with the Social Sciences*. Cambridge: Cambridge University Press.
- Gollwitzer PM** (1999) Implementation intentions: strong effects of simple plans. *American Psychologist* **54** (7):493–503.
- Goodman J** (2014) *Flaking Out: Student Absences and Snow Days as Disruptions of Instructional Time*. Cambridge, MA: National Bureau of Economic Research.
- Greenstein F** (1965) Children and politics. In Greenburg E, (ed.) *Political Socialization*. New Haven, CT: Yale University Press, pp. 56–63.
- Hanushek EA, Kain JF and Rivkin SG** (2004) Disruption versus tiebout improvement: the costs and benefits of switching schools. *Journal of Public Economics* **88** (9):1721–1746.

- Hart SA et al.** (2009) The ABCs of math: A genetic analysis of mathematics and its links with reading ability and general cognitive ability. *Journal of Educational Psychology* **101** (2):388–402.
- Heckman JJ** (2000) Policies to foster human capital. *Research in Economics* **54** (1):3–56.
- Heckman J and Kautz T** (2013) *Fostering and Measuring Skills: Interventions That Improve Character and Cognition*. Cambridge, MA: National Bureau of Economic Research.
- Hillygus DS** (2005) The Missing Link: Exploring the Relationship Between Higher Education and Political Engagement. *Political Behavior* **27** (1):25–47.
- Hitt C, Trivitt J and Cheng A** (2016) When you say nothing at all: the predictive power of student effort on surveys. *Economics of Education Review* **52**, 105–109.
- Holbein JB** (2017) Childhood skill development and adult political participation. *American Political Science Review* **111** (3):572–583.
- Ivcevic Z and Brackett M** (2014) Predicting school success: Comparing conscientiousness, grit, and emotion regulation ability. *Journal of Research in Personality* **52** (1):29–36.
- Jennings MK et al.** (2005) *Youth-Parent Socialization Panel Study, 1965-1997: Four Waves Combined*, ICPSR04037-v1. Ann Arbor, MI: Inter-university Consortium for Political and Social Research.
- Kelley TL** (1927) *Interpretation of educational measurements*. Yonkers, NY: World Book.
- Kirkman EM et al.** (2016) Does Participating in Social Action Boost the Skills Young People Need to Succeed in Adult Life? Behavioural Insights Team.
- Kleiman EM et al.** (2013) Gratitude and grit indirectly reduce risk of suicidal ideations by enhancing meaning in life: evidence for a mediated moderation model. *Journal of Research in Personality* **47** (5):539–546.
- Ladd HF, Clotfelter CT and Holbein JB** (2015) *The Growing Segmentation of the Charter School Sector in North Carolina*. Cambridge, MA: National Bureau of Economic Research.
- Luskin RC** (1990) Explaining political sophistication. *Political Behavior* **12** (4):331–361.
- Marzana D et al.** (2015) Memory of the quality of group experiences during childhood and adolescence in predicting volunteerism in young adults. *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations* **26** (5):2044–2060.
- Masten AS et al.** (2009) *Resilience in Development*, In Lopez SJ and Snyder CR, (eds) *Oxford Handbook of Positive Psychology*. Oxford: Oxford University Press, pp. 117–131.
- McFarland DA and Thomas RJ** (2006) Bowling young: how youth voluntary associations influence adult political participation. *American Sociological Review* **71** (3):401–425.
- Medland SE and Hatemi PK** (2009) Political science, biometric theory, and twin studies: a methodological introduction. *Political Analysis* **17**, 191–214.
- Meredith M** (2009) Persistence in political participation. *Quarterly Journal of Political Science* **4** (3):187–209.
- Metz EC and Youniss J** (2005) Longitudinal gains in civic development through school-based required service. *Political Psychology* **26** (3):413–437.
- Meyers R, Pignault A and Houssemand C** (2013) The role of motivation and self-regulation in dropping out of school. *Procedia-Social and Behavioral Sciences* **89**, 270–275.
- Mondak JJ** (2010) *Personality and the Foundations of Political Behavior*. Cambridge: Cambridge University Press.
- Neuman WR** (1986) *The Paradox of Mass Politics*. Cambridge, MA: Harvard University Press.
- Nie NH, Junn J and Stehlik-Barry K** (1996) *Education and Democratic Citizenship in America*. Chicago, IL: University of Chicago Press.
- Niemi RG and Hepburn MA** (1995) The rebirth of political socialization. *Perspectives on Political Science* **24** (1):7–16.
- Niemi RG and Jennings MK** (1991) Issues and inheritance in the formation of party identification. *American Journal of Political Science* **35** (4):970–988.
- Ong AD et al.** (2006) Psychological resilience, positive emotions, and successful adaptation to stress in later life. *Journal of Personality and Social Psychology* **91** (4):730–749.
- Oskarsson S et al.** (2017) Education and social trust: testing a causal hypothesis using the discordant twin design. *Political Psychology* **38** (3):515–531.
- Pettigrew S** (2016) The downstream effects of long lines: how long waits at the precinct depress future turnout. Paper presented at the 2016 Annual Meeting of the Midwest Political Science Association, Chicago IL, 7–10 April.
- Plutzer E** (2002) Becoming a habitual voter: inertia, resources, and growth in young adulthood. *American Political Science Review* **96** (1):41–56.
- Plutzer E and Wiefek N** (2006) Family transitions, economic status, and voter turnout among African-American inner-city women. *Social Science Quarterly* **87** (3):658–678.
- Prior M** (2010) You've either got it or you don't? The stability of political interest over the life cycle. *The Journal of Politics* **72** (3):747–766.
- Prior M** (2018) *Hooked: How Political Interest Fuels Our Democracy*.
- Ravitch D and Viteritti JP** (2003) *Making Good Citizens: Education and Civil Society*. New Haven, CT: Yale University Press.

- Reed J, Pritschet B and Cutton D** (2013) Grit, conscientiousness, and the transtheoretical model of change for exercise behavior. *Journal of Health Psychology* **18** (5):612–619.
- Rimfeld K et al.** (2016) True grit and genetics: predicting academic achievement from personality. *Journal of Personality & Social Psychology* **111** (5):780–789.
- Ris EW** (2015) Grit: a short history of a useful concept. *Journal of Educational Controversy* **10** (1):1–18.
- Salles A, Cohen GL and Mueller CM** (2014) The relationship between grit and resident well-being. *The American Journal of Surgery* **207** (2):251–254.
- Sapiro V** (2004) Not your parents' political socialization: introduction for a new generation. *Annual Review of Political Science* **7**, 1–23.
- Searing DD, Schwartz JJ and Lind AE** (1973) The structuring principle: political socialization and belief systems. *American Political Science Review* **67** (2):415–432.
- Sears DO and Funk CL** (1991) The role of self-interest in social and political attitudes. *Advances in Experimental Social Psychology* **24**, 1–91.
- Sears DO and Levy S** (2003) Childhood and adult political development. In Sears DO, Huddy L and Jervis R, (eds) *Oxford Handbook of Political Psychology*. Oxford: Oxford University Press, pp. 60–109.
- Shechtman N et al.** (2013) *Promoting Grit, Tenacity, and Perseverance: Critical Factors for Success in the 21st Century*. Washington, DC: US Department of Education Office of Educational Technology.
- Soldz S and Vaillant GE** (1999) The Big Five personality traits and the life course: A 45-year longitudinal study. *Journal of Research in Personality* **33** (2):208–232.
- Strayhorn TL** (2014) What role does grit play in the academic success of black male collegians at predominantly white institutions? *Journal of African American Studies* **18** (1):1–10.
- Tough P** (2013) *How Children Succeed*. New York, NY: Random House.
- Tucker-Drob EM et al.** (2016) Genetically-mediated associations between measures of childhood character and academic achievement. *Journal of Personality and Social Psychology* **111** (5):790–815.
- Verba S et al.** (1995) *Voice and Equality: Civic Voluntarism in American Politics (Vol. 4)*. Cambridge, MA: Harvard University Press.
- Von Culin KR, Tsukayama E and Duckworth AL** (2014) Unpacking grit: motivational correlates of perseverance and passion for long-term goals. *The Journal of Positive Psychology* **9** (4):306–312.
- Watts RJ and Flanagan C** (2007) Pushing the envelope on youth civic engagement: a developmental and liberation psychology perspective. *Journal of Community Psychology* **35** (6):779–792.
- West MR et al.** (2016) Promise and paradox measuring students' noncognitive skills and the impact of schooling. *Educational Evaluation and Policy Analysis* **38** (1):148–170.
- West M, Sherer E and Dow A** (2016) Measuring Social-Emotional Skills at Scale: Evidence from California's CORE Districts. Presented at the 2016 Annual Association for Education Finance and Policy Meetings, Denver, CO, 17–19 March.
- Windle G, Bennett KM and Noyes J** (2011) A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes* **9** (1):1–18.
- Wolfinger RE and Rosenstone SJ** (1980) *Who votes?* New Haven, CT: Yale University Press.

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