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Supportive classrooms for Latino English language learners: Grit, ELL status, and the classroom context

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ABSTRACT

Students' academic achievement is the result of the interplay between person-level and contextual factors (R. R: Greene, 2014; D. E. Hunt, 1975). Students perform better when classroom characteristics support their characteristics. The authors examine whether student perceptions of two classroom characteristics (care and control) fit with two Latino student characteristics (English language learner status and grit) in relation to their academic achievement. Using a sample of fourth- and fifth-grade Latino students from the Measures of Effective Teaching dataset ($n = 3{,}272$), the authors conducted a series of nested regression models with two- and three-way interactions between student characteristics and student perceptions of classroom characteristics. Findings revealed that grit is most strongly associated with Latino English language learners' English/language arts achievement when students perceived that teachers used high levels of care and control. We conclude with implications for practitioners.

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Schools are increasingly considering the importance of explicitly teaching and measuring aspects of students' character, in their aim to promote achievement overall and reduce achievement gaps (Cohen, 2015; Strauss, 2015; Zernike, 2016). One popular student characteristic is grit, which is defined as passion and persistence in the pursuit of long-term goals (Duckworth & Quinn, 2009). Grit is controversial: many advocates have argued that grit places undue burden on individuals to rise above their circumstances (e.g., Osgood, 2012) whereas others have emphasized the positive role grit plays in success and achievement (e.g., Duckworth, Peterson, Matthews, & Kelly, 2007). Regardless of one's stance, grit has permeated schools. For example, the 2017 National Assessment of Educational Progress will include data collection on students' self-reported grit levels, although grit research is in nascent stages (Strauss, 2015).

At the same time that schools are increasingly attending to characteristics such as grit, schools are also facing shifts in student populations. Currently, the U.S. student population is undergoing rapid linguistic, ethnic, and cultural changes. In particular, the Latino student population is growing and concurrently the number of Latino English language learners (ELLs) is expanding (Kena et al., 2016). In this period of student demographic changes and educational reform, it is critical to investigate how the classroom context supports Latino students' personal characteristics with regard to their academic achievement.

In this study, we use person-environment fit theory to examine this interplay with in relation to the academic achievement of Latino fourth- and fifth-grade students. We use a sample of Latino upper elementary students to take a strengths-based, within-group approach and avoid deficit-oriented comparisons with other student groups (Chase-Lansdale, D'Angelo, & Palacios, 2007; García Coll & Szalacha, 2004). We examine student perceptions of two classroom characteristics that may reflect supportive environments for Latino students: teacher warmth and sensitivity (care) and teacher classroom management (control). Given the importance of person/environment fit, we examine whether warm, well-managed classrooms appear to fit well with two Latino student characteristics: grit and ELL status.

Person-environment fit theory

A key idea of person-environment fit theory is that the interplay between environmental characteristics and personal traits produces behaviors (Hunt, 1975). An individual's success within an environment depends on the goodness of fit between the individual and the environment: when environmental characteristics and personal characteristics match well, then the individual's outcomes will be optimal (Greene, 2014). As Eccles et al. (1993) noted, the concept of good fit extends to classrooms: if students perceive that classroom characteristics fit with their characteristics, then they perform well. In the present study, we focus specifically on student perceptions of two classroom characteristics—classroom management and teacher warmth—as well as two student personal characteristics, namely grit and ELL status. It may be that teachers who foster highly warm and well-managed environments for Latino ELLs are also creating environments that specifically support ELLs'

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efforts to use their character resources, such as their grit, and thrive academically. Thus, it may be that because of the specific needs of Latino ELLs, factors such as teacher warmth and a well-managed classroom are of greater import to ELLs' achievement than they are for all students' achievement. In the following section, we review the literature on teacher warmth and classroom management in the classroom context, attending to why these classroom characteristics may be particularly meaningful for Latino ELLs.

Classroom characteristics

Both teacher warmth and classroom management are generally beneficial in upper elementary classrooms. Each is associated with positive student outcomes, including achievement. Having a positive relationship with a warm, caring teacher is associated with higher levels of student engagement and achievement in upper elementary school (Klem & Connell, 2004; Rimm-Kaufman, Baroody, Larsen, Curby, & Abry, 2015; Wu, Hughes, & Kwok, 2010). Similarly, fourth- and fifth-grade teachers who spend time early in the school year implementing strong classroom management routines may witness student gains such as improved reading and mathematics abilities at the end of the year (Freiberg, Huzinec, & Templeton, 2009). For the purposes of this study, we refer to quality of teacher warmth and caring as care and we refer to the quality of classroom management as control (Ferguson, 2012). Hence, a highly controlled classroom signals a well-managed and organized classroom.

Teacher care and control are important across all students. However, the impact of these characteristics on students may vary depending on students' ethnic, cultural, and linguistic backgrounds. Many educators and researchers advocate for teachers to look to students' home cultures when planning how to cultivate supportive classroom contexts for students from diverse backgrounds (DaSilva Iddings & Katz, 2007; Gay, 2002; Ladson-Billings, 1995). Although our focus is on Latino students' perceptions of classroom characteristics, we briefly examine research on common parenting trends in Latino families, to identify aspects of home environments that may be salient for Latino students' classrooms. We note that it is not appropriate to approach this literature as definitively universal practices across Latino families. Latino families represent a range of national and ethnic backgrounds and there will be variability in their parenting practices. Our discussion of these practices should be read as general, empirically supported parenting trends within the Latino community.

Cultural alignment of classroom characteristics

In general, empirical literature on behavioral expectations and discipline in Latino homes emphasizes the implementation of high and clear expectations, as well as the importance of consistent discipline within Latino families (Cardona, Nicholson, & Fox, 2000; Calzada & Eyberg, 2002; Dixon, Graber, & Brooks-Gunn, 2008; Domenech Rodriguez, Donovick, & Crowley, 2009). As previously noted, these practices are also beneficial in fourth- and fifth-grade classrooms (Freiberg et al., 2009; Rimm-Kaufman et al., 2015). Taken together, fourth- and fifth-grade Latino students may benefit from well-organized classrooms with clear behavioral expectations and consistent follow-through. For example, with regard to classroom management, using practices such as clear and consistent expectations aligned with Latino students' homes has helped teachers establish smoothly functioning classrooms (Brown, 2004).

Similarly, research on Latino children's home environments indicates that warmth and nurturance are common parenting practices within Latino family culture (Calzada & Eyberg, 2002; De Von Figueroa-Moseley, Ramey, Keltner, & Lanzi, 2006; Domenech Rodriguez et al., 2009). Demonstrating warmth also is important for students' engagement and achievement within upper elementary contexts (Klem & Connell, 2004; Wu et al., 2010; Rimm-Kaufman et al., 2015). Given the prominence of parental warmth in Latino families, the practice of teacher warmth may be a key support for fourth- and fifth-grade Latino students. This possibility is further supported by research: for example, Crosnoe, Johnson, and Elder (2004) found that for middle school Latina girls, bonding with their teachers was associated with higher achievement, when compared with students from other ethnic groups.

Student perceptions of care and control

Classroom characteristics are only as impactful as Latino students perceive them to be, particularly if minority populations perceive warmth and classroom management practices differently than teachers or researchers. Research involving student perceptions of classroom characteristics has focused on student perceptions of care. Generally, positive student perceptions of teacher care are predictive of positive student outcomes. For example, upper elementary students who report caring relationships with teachers also report higher levels of engagement, school belonging, academic competence, and mathematics achievement (Hughes, 2011; Klem & Connell, 2004; Rimm-Kaufman et al., 2015). With regard to care and control, ninth-grade students who reported higher levels of teacher care and control also reported higher levels of school engagement, as well as less misbehavior and more school satisfaction (Nie & Lau, 2009).

Little research has examined whether Latino students differ from students of other backgrounds in their perceptions of teacher care and control. Garza (2009) suggested that Latino high school students vary from white students in how they perceive teacher care, preferring teachers to show care by explicitly scaffolding their learning instead of using broadly caring actions, such as greeting students in the morning. Given the paucity of research on Latino student perceptions of classroom characteristics, a conservative approach requires measuring teacher care and control using student report. Without student report, it is impossible to know if teachers are using care and control in meaningful ways that respond to the needs of Latino students.

Understanding student perspectives on classroom characteristics that are thought to be culturally relevant, such as teacher care and control, may be particularly important for ELL students (DaSilva Iddings & Katz, 2007; de Jong & Harper, 2005). In general, Latino ELLs often face challenges such as poverty (Fry & Gonzalez, 2008). Within the classroom, ELLs also

confront instructional challenges, such as learning content and language in English-speaking classrooms, and consequently require teachers to adapt instruction accordingly (e.g., Buysse, Castro, West, & Skinner, 2005; Echevarria, Powers, & Short, 2006). Moreover, ELLs experience noninstructional classroom challenges as well, such as such as anxiety learning in English-speaking classrooms, stigma, and deficit perspectives from teachers and peers (Orosco & Klingner, 2010; Pappamihiel, 2001). Teachers who do not integrate elements of students' home culture with their classrooms can ultimately constrain opportunities for ELLs to participate and can lead to ELLs feeling powerless in their classrooms and uninvolved during instruction (DaSilva Iddings & Katz, 2007; Yoon, 2008). Using Latino ELLs' home environments as templates for constructing a classroom environment thus may help Latino ELLs feel included, supported, and empowered. For instance, (Lucas, Villegas, & Freedson-Gonzalez, 2008) posit a framework to help teachers successfully support their ELL students. As part of that framework, they suggest that when ELLs perceive their teachers have cultivated highly caring, safe classrooms they will feel less anxiety or stigma due to their ELL status. In other words, when Latino ELLs perceive that their teachers have cultivated highly caring or very well-managed classrooms, then they may also perceive that their classroom provides particularly good fit for their personal characteristics. Whereas care and support is important for all students, these factors may be of greater salience for the success of ELL students.

Student perceptions of their classroom are important. However, these perceptions do not take into consideration other personal characteristics that may also relate to student achievement. As indicated previously, one such characteristic is grit, which has garnered attention as schools increasingly focus on character education (Strauss, 2015; Tough, 2011).

Grit

Grit is defined as passion and persistence in the pursuit of long-term goals (Duckworth & Quinn, 2009). A gritty individual identifies a goal and works hard toward that goal over an extended period of time, despite setbacks. Grit is conceptually related to other processes, such as self-control or motivation, although it stands alone as a construct (Duckworth & Gross, 2014; Myers, Wang, Black, Bugescu, & Hoeft, 2016). Grit is similar to self-control, in that both grit and self-control involve denying impulses to accomplish a goal of "greater enduring value" (Duckworth & Gross, 2014, p. 321). However, grit differs from self-control in that it focuses on a longer-term goal than self-control, despite possible setbacks and failures. In Grade 4, for example, this is the difference between 9-year-olds successfully reading complex chapter book of their choosing over the course of a month (grit) versus taking time to sit quietly and read for 20 min (self-control). The former is a long-term goal requiring extended effort and motivation; the latter is a short-term effort requiring in-the-moment impulse control. Similarly, grit and motivation are correlated but distinct constructs (Myers et al., 2016). With regard to Latino students, evidence suggests that grit is positively and moderately correlated with academic motivation for Mexican American adolescent students (Piña-Watson, López, Ojeda, & Rodriguez, 2015)."

Grit is important for students' academic achievement. College undergraduates with higher grit also had higher grade point averages after controlling for SAT scores (Duckworth et al., 2007). Grit was also associated with higher grade point averages for West Point Cadets, along scores assessing candidates' overall potential (Duckworth et al., 2007). Recent evidence indicates that grit predicts fourth- and fifth-grade students' English/language arts (ELA) and mathematics standardized test outcomes (omitted). Although the research on the relation between grit and academic achievement in the late elementary period is limited, a theme emerges from the existing literature about the importance of grit for academic achievement from late middle-childhood through adolescence. The present study is among the first to link grit to upper elementary academic outcomes.

The study of grit has been controversial. Some fear that a focus on grit–particularly in schools– leads to a pull-yourself-up-by-your-bootstraps mentality that ignores larger structural problems, such as poverty. Angela Duckworth (2016), the foremost researcher on grit, has disavowed the practice of grading grit in schools, as doing so focuses only on students' character while ignoring the context in which these evaluations are made. As posited in our theoretical framework, successful learning results from a well-matched interplay between student and classroom characteristics (Hunt, 1975; Lau & Nie, 2008). Given the importance of this interplay, it is necessary to examine grit within the framework of person-environment fit for two reasons. First, grit is gaining rapid attention in districts across the country. Schools are implementing character report cards in which students are graded on their grit and the National Assessment of Educational Progress will begin grit data collection soon (Straus, 2015; Tough, 2011). Given this reality, researchers have an obligation to investigate how this construct operates in a classroom. Second, grit is thought to be an important trait for individuals in challenging circumstances, including elementary-aged children (Duckworth, Quinn, & Seligmann, 2009; Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011). Thus, grit may be relevant for Latino ELLs who frequently both live in poverty and must achieve English language proficiency, typically in English-only contexts (Fry & Gonzales, 2008; Hemphill & Vanneman, 2011). Understanding how grit operates for Latino students may better help researchers and educators support this student group in the future. For example, given the many challenges Latino ELLs, face, perhaps their grit operates best in supportive contexts and conversely, may be constrained or limited in unsupportive contexts.

Person-environment fit: Grit, ELL status, and classroom characteristics

How teachers use practices such as care and control may be interconnected with the degree to which students exhibit characteristics similar to grit (i.e., characteristics analogous to passion and persistence). Classroom characteristics overall and student perceptions of classroom characteristics specifically set a context that may allow gritty students to thrive. For example, high levels of classroom organization may help students engage in more independent, on-task behaviors by the conclusion of the academic year (Cameron, Connor and Morrison, 2005). Students who can manage themselves independently in the short term may also have higher levels of persistence in the

long term, as grit and self-control are correlated (Duckworth & Gross, 2014). Moreover, a strong, positive relationship between student perceptions of teacher care and student characteristics similar to grit may lead to better academic outcomes. For instance, student perceptions of strong teacher-student relationships can be indicative of higher levels of student engagement (Klem & Connell, 2004). Higher levels of students' engagement may indicate students' developing passion for the subject and may also lead to improved academic achievement (Wu et al., 2010). It is therefore important to consider students' perceptions of grit in the context of these two classroom characteristics.

Additionally, previous research has indicated the importance of grit or qualities similar to grit for ELL students. Baker (2014) noted the importance of persistence for ELLs be academically successful. Grit also appears to account for differences in mathematics and ELA achievement between ELLs and non-ELLs (omitted). Perhaps grit becomes most relevant for ELLs when considering that the development of English academic language proficiency is a prolonged process (Thomas & Collier, 2002) and that generally, learning a second language requires persistence and interest through multiple stages of learning (Sparks, Patton, Ganschow, & Humbach, 2009).

While grit may be important for Latino ELL students, it is insufficient to reduce ELLs as being either high or low in grit. Rather, grit should be examined in light of other student and classroom characteristics. Exploring contexts in which grit is beneficial for Latino ELLs may provide insight into useful environmental features for their academic pursuits. Our theoretical framework, which rests on person-environment fit, indicates that Latino student characteristics (ELL status and grit) will interact with student perceptions of the classroom environment (such how teachers use care and control) to produce outcomes (academic achievement).

Present study

In this work we investigate the interplay among grit, ELL status, and student perceptions of care and control. We consider each of the following pairings: (a) care or control and grit, (b) ELL status and grit, and (c) ELL status and care or control. We also quantitatively test the hypothesis that person-environment fit is critical for Latino students by examining the three-way interaction between Latino students' ELL status, their grit, and care or control. Simultaneously examining grit and ELL status in relation to each of these classroom characteristics is the most comprehensive manner of investigating how these personal and classroom characteristics interact for Latino students in classrooms. We use a fourth- and fifth-grade sample for two reasons. First, although grit is discussed, measured, or taught in school contexts, there are few studies linking grit to school outcomes. Second, because current research attention focuses more on early childhood and lower elementary ELLs and less on upper elementary ELLs (e.g., Castro, 2014). The present study addresses both gaps. Our research questions are as follows:

Research Question 1. Are the interplays among (a) student grit and care or control, (b) student grit and ELL status, and (c) ELL status and care or control important with regard to ELA and mathematics outcomes?

Research Question 2. Is the interplay between ELL status, grit, and care or control important with regard to ELA and mathematics outcomes?

Method

Participants

We used the publicly available Measures of Effective Teaching (MET) dataset for our analyses. To access these data, we agreed to data policies in place to protect the identities of districts and their members. We provide all the information we can while upholding these agreements. More information on this dataset can be found in MET-released reports (e.g., Kane & Staiger, 2012).

This study focuses on Latino students (n = 3,272). Table 1 provides descriptive statistics of our sample. The sample includes fourth- and fifth-grade students from Year 2 (2010–2011) of MET data collection. A total of 434 fourth- and fifth-grade classrooms are represented. On average, each classroom had about 7.4 ELLs (SD = 5.32) and approximately 11.7 Latino students (SD = 6.75). Of the 434 classrooms, 39014;had more than one Latino student and 26614;had more than one ELL student. Students were 7–12 years old, with an average age of 9.24 years old. Approximately 44% of students in our sample were classified as ELLs (n = 1,433), 61% received free or reduced/price lunch (n = 2,008), and 50% were male (n = 1,648). Data from Year 2 were used because this was the only year in which data were collected on student personal characteristics, including grit. Students in our sample come from Memphis City Schools, Denver Public Schools, New York City Public Schools, Hillsborough County Public Schools, and Charlotte-Mecklenburg Schools.

Measures and procedures

ELL status

The ELL status variable was provided by the district from the child's school record and reflects the whether the student

Table 1. Sample descriptive statistics (N = 3,272).

Variable	n	%	M	SD
Outcomes				
ELA			−0.09	0.89
Mathematics			−0.05	0.90
Key independent variables				
ELL	1,433	44		
Grit			3.75	0.63
Care			4.27	0.69
Control			3.55	0.70
Other independent variables				
Free/reduced lunch	2,008	61%		
Male	1,648	50%		
Age			9.02	0.70
Prior math			−0.05	0.90
Prior ELA			−0.11	0.90
Classroom organization			5.36	0.32
Emotional support			3.45	0.26
Instructional support			3.66	0.35

Note. Means and standard deviations are provided for age, grit, care, control, English/language arts (ELA), and mathematics, which are continuous variables. Age ranged from 6.96 to 12.48 years old, unstandardized grit ranged from 1.13 to 5, and unstandardized control and care from 1 to 5. ELL = English language learner.

received school-based language services. This is a dummy variable, with 1 indicating that the district was providing ELL services to the student.

Grit

Eight items measuring elementary students' grit were included in the Student Perceptions Survey offered in the second year of MET data collection (Duckworth & Quinn, 2009). Students responded on a 5-point Likert-type scale ranging from 1 (*not like me at all*) to 5 (*very much like me*). Items 1–4 were reverse coded. Examples of items include the following: "I have been obsessed with a certain idea or project for a short time but later lost interest"; "It's hard for me to finish projects that take a long time to complete"; "I finish whatever I begin." These items were taken from the Short Grit Scale and item language was simplified for fourth- and fifth-grade students ($\alpha_{overall}$= .67, α_{ELL}= .62, $\alpha_{non\text{-}ELL}$= .69 in the present study). While these reliabilities are low, we note that low reliabilities can occur in self-report data with young children (Mellor, 2004). Given that grit may be a culturally specific construct and language proficiency might interfere with students' ability to report grit, we tested measurement invariance for ELLs and non-ELLs. Tests of measurement invariance confirmed scalar invariance for ELLs and non-ELLs ($\Delta\chi^2$= 5.55; Δdf= 8). Scalar invariance indicates that, although ELL responses were measured with greater error, responses can be interpreted similarly across ELLs and non-ELLs (Van de Schoot, Lugtig, & Hox, 2012; Steimetz, Schmidt, Tina-Booh, Wieczorek, & Schwartz, 2009). We calculated a standardized grit composite of the responses averaged across all eight items. Finally, owing the presence of outliers, we winsorized the standardized perceived grit variable at the first percentile, to ensure normality.

Student perceptions of classroom characteristics

The three classroom characteristics were also included in the Student Perceptions Survey, using items from the Tripod Survey (Ferguson, 2008). Teacher warmth and supportiveness was measured using the care construct, whereas classroom management was measured using control. Examples of items include "If I am sad or angry, my teacher helps me feel better" (care; 7 items; $\alpha_{overall}$= .83, α_{ELL}= .81, $\alpha_{non\text{-}ELL}$= .84 in the present study) or "Everybody knows what they should be doing and learning in this class" (control; 4 items; $\alpha_{overall}$= .61, α_{ELL}= .55, $\alpha_{non\text{-}ELL}$= .66). Students responded using a 5-point Likert-type scale, with options ranging from 1 (*no, never at all*) to 5 (*yes, always*).An advantage of using student-report data to measure classroom characteristics is the opportunity for information richness: Participants in a specific context possess the deepest understanding of their experiences within that context (Paulhus & Vazire, 2007). It was therefore critical to gather specifically Latino students' impressions of these classroom characteristics, rather than relying on observers who may not have the same cultural perspectives as Latino students in these classrooms. We again calculated standardized composites of the averaged items for each practice. Descriptive statistics revealed that 1,096 Latino students in the sample perceived teachers as having care scores at least one standard deviation above the mean, whereas 898 Latino students perceived that their teachers had control scores at least one standard deviation above the mean.

Academic achievement

Academic achievement (both prior achievement and current achievement) was measured using state standardized test outcomes for both mathematics and ELA. Prior achievement was assessed in the spring of 2010 and current achievement was assessed in the spring of 2011. Raw state standardized assessment scores were not provided in the MET datasets, as test scores could identify districts. Instead, rank-based *z*-scores (Van der Waerden scores) were provided which standardize scores by state and by grade, allowing us to include all districts in our analyses despite the fact that each district offered its own assessments (Conover, 1999; Kane & Staiger, 2012).

Covariates

Districts were included as fixed effects (1 = the student belonged to that school district), with one district excluded as a reference group. As we cannot identify districts, we are not permitted to report district coefficients. We do discuss how districts were included in our analyses below. Other student-level covariates were free and reduced-price lunch status, age, and gender. All of these student-level variables were obtained from local district administrative data (Kane & Staiger, 2012). Free and reduced-price lunch (FRPL) status was included as a proxy for socio-economic status and was dummy coded as 1 if the student received those services. We also included a dummy variable for gender, in which 1 indicates that the student is male. Student age was the only continuous student-level control variable, measured in years (M= 9.02, SD= 0.70).

Finally, we also included average scores from the Classroom Assessment Scoring System (CLASS) as covariates (Pianta, La Paro, & Hamre, 2008). The CLASS is an observational measure of three empirically validated domains of instructional practices: emotional support (α = .80), classroom organization (α = .78), and instructional support (α = .83). Each domain is comprised of three to four dimensions, which include items rated by an observer on a 7-item Likert-type scale (Kane & Staiger, 2012).

Analytic plan

Preliminary analyses were conducted in Stata version 14 (StataCorp, College Station, TX) and SPSS 20.0, including checks for missingness, skewness, kurtosis, multicollinearity, correlations (Table 2), and multivariate or univariate outliers. As previously mentioned, the grit variable was winsorized at the first percentile to correct for outliers and ensure normality. For all of the research questions, a series of regression models were run using Mplus software (Muthén & Muthén, 1998–2011). All variables were entered at the student level and thus these are not multilevel models. However, we recognized that the error terms of students within the same class are likely not independent of one another. We therefore accounted for the nested structure of our data (students nested in classrooms) by using TYPE = COMPLEX, a function which uses a sandwich estimator to compute robust standard errors (Muthén & Muthén, 2007). We note that all continuous variables in these analyses have been standardized, so coefficients can be read as effect sizes.

We ran analyses separately for ELA and mathematics outcomes, each model controlling for ELL status, district, age,

Table 2. Correlations between continuous variables.

	Age	Grit	Care	Control	ELA10	ELA11	Mathematics10	Mathematics11	ES	IS
Age										
Grit	−.06*									
Care	−.09**	.31**								
Control	−.06*	.29**	.44**							
ELA10	−.17**	.28**	.01	.05						
ELA11	−.20**	.33**	.04	.07	.76**					
Mathematics10	−.15**	.28**	.01	.08	.68**	.64**				
Mathematics11	−.16**	.29**	.06*	.10**	.61**	.68**	.79**			
ES	.06**	.00	.06*	.02	.00	.00	−.01	.01		
IS	.04	.03	.07**	.08**	.03	.06**	−.03	.08**	.76**	
CM	−.04	.03	.18**	.18**	.09**	.06**	.08**	.14**	.44**	.54**

*Note.*CM = classroom management; ES = emotional support; IS = instructional support.
*$p < .05$; **$p < .01$.

gender, FRPL, and prior achievement. As one of the districts did not provide FRPL data, FRPL status was included as an auxiliary variable to correct for systematic missingness in all models. For each outcome, we ran multiple models to answer our first research question (Are there two-way interactions among [a] student grit and care or control, [b] student grit and ELL status, and [c] student grit and care or control?).

For each question, we also ran separate models for care and control. We made this choice for two reasons. First, we wanted to understand the separate importance of these variables. Care and control are distinct underlying processes, which would lead to different points of intervention and development for teachers. While some literature would suggest the importance of including these variables in the same model (e.g., Ware, 2006), we could not find theoretical or empirical evidence to support this choice specifically for Latino students. Second, three-way interaction models by their nature are already full models (inclusion of partial main effects, two-way interactions, and three-way interactions). We were concerned that the including three-way interactions for both care and control in the same model would lead to an overly fitted model.

Grit and care or control

We first examined the interplay between grit and student perceptions of care or control. We included in each model either care or control, grit, and all student-level covariates. We also included an interaction term for either student-perceived care or control and grit. For example, the care model included care as the focal classroom characteristic, grit, all student-level covariates and an interaction term for Care × Grit. We alternated mathematics and ELA scores as outcomes.

ELL status and care or control

To examine the interaction between ELL status and student-perceived care or control, we ran an additional series of regression models. We included in each model either perceived care or control, ELL status, grit, and all student-level covariates. We also generated an interaction term for ELL status and care or control. For example, in the care model we included care, ELL status, student-level covariates, and a Care × ELL Status interaction term. The same process was conducted for control.

ELL status and grit

To examine the interaction between ELL status and grit, the model contained ELL status, grit, and the student covariates. We also created an interaction term for ELL status and grit.

ELL status, care or control, and grit

For our second research question, which examined the three-way interaction between perceived care or control, ELL status, and grit, we ran separate models for care and control. To test a three-way interaction, all possible two-way interaction terms among the three variables must be included. For example, the care three-way model included care, ELL status, grit, FRPL status, age, gender, ELL Status × Grit, ELL Status × Care, Care × Grit, and Care × Grit × ELL Status.

Finally, we checked to see if our findings held when we included observational measures of instructional practices as covariates. Specifically, in the three-way interaction control model, we included classroom organization and instructional support scores. In the three-way care model, we included emotional support and instructional support scores. We added these practices as covariates for two reasons. First, if grit is an important predictor of student outcomes, then we hypothesized that adding instructional support would not change the significance of either three-way interaction. Second, if Latino student perceptions of classroom characteristics are important to take into account, then adding either emotional support or classroom organization to the model would also not change the significance of either three-way interaction. In other words, the unique interactions across student report of grit, care, or control would hold even after controlling for observational measures of similar classroom level processes.

To probe the source of significant three-way interactions, we then conducted an exploratory post hoc analyses in which we calculated and graphed the simple slopes of the three-way interactions. To graph the simple slopes, we divided our sample into thirds based on how students rated their teachers' use of these various practices. For example, a high-care classroom is a teacher rated by Latino students as at least 1 *SD*above the mean, whereas a mid-care classroom was rated around the mean, and a low-care classroom was rated at least 1 *SD*below the mean. Within each of these thirds, we then graphed the relationship between students' perceived grit and achievement. For all of these post hoc analyses,

we applied a Bonferroni correction ($\alpha/3$) to account for multiple tests and so only slopes with *p*values below the $\alpha = .01$ level were considered significant.

Missing data

As we assume that data are missing at random conditional on our covariates, full-information maximum likelihood (FIML) was used to account for missing data. FIML is an estimation procedure that uses all available data to estimate parameters, increasing available statistical power (Enders & Bandalos, 2001). Approximately 20% of data were missing across the Student Perceptions Survey items (i.e., items pertaining to student-reported grit, care, and control). Students missing grit, care, and control data had lower mathematics and ELA test scores, indicating that missing data within these variables are not missing at random. Researchers suggest that even if data are not missing at random, FIML still can produce valid estimates
(Collins, Schaffer, & Kam, 2001; Schaffer & Graham, 2002).

Results

A few general results bear mentioning before discussing results specific to research questions. Across all research questions, students' perceived grit was related to both their mathematics and ELA achievement (b_{math}= .06 and b_{ELA}= .10); all associations were positive but modest in size. Because both measures of grit and test scores are standardized, these values can be read as effect sizes. Similarly, ELL status had an effect size of –.10 for Latino students' ELA achievement. Table 3includes a summary of all results.

Two-way interactions

None of the two-way interactions between student perceptions of care or control and grit proved to be significant in the models for research question one with regard to either ELA or mathematics outcomes. Similarly, there were no significant two-way interactions between student perceptions of care or control and ELL status or between ELL status and grit for either ELA or mathematics achievement.

Three-way interactions

Care

The three-way interaction among care and ELL status and grit was modestly related to students' ELA achievement (b= .06, SE= .03, p= .03), but not to students' mathematics achievement. Calculating and graphing the simple slopes revealed that when Latino students perceived their teachers as high care, the relation between grit and ELA achievement was twice as strong for ELLs as compared with non-ELLs (b_{ELLs}= .16, SE_{ELLs}= .05, p< .01; $b_{non\text{-}ELLs}$= .08, $SE_{non\text{-}ELLs}$= .04, p< .05; see Figure 1).

These findings are notable in comparison to ELLs' ELA performance in mid-care and low-care classrooms. In classrooms that students perceived as mid-care, the relation between grit and ELA achievement was comparable for ELLs and non-

Table 3. Two-way and three-way interactions examining grit, classroom characteristics, and ELL status for ELA outcomes

	Two-way A	Two-way B	Two-way C	Three way
Care				
ELL	−.09 (.03)***	−.10 (.03)**	−.10 (.03)**	−.10 (.03)**
Grit	.09 (.01)***	.10 (.01)***	.10 (.01)***	.09 (.02)***
Care	—	.002 (.01)	.005 (.02)	.01 (.01)
Grit × ELL Status (A)	.02 (.03)	—	—	.02 (.03)
Grit × Care (B)	—	.01 (.01)	—	−.01 (.02)
ELL Status × Care (C)	—	—	−.02 (.03)	.00(.03)
Grit × ELL Status × Care	—	—	—	.06 (.03)*
Emotional support	—	—	—	−.18 (.08)*
Instructional support	—	—	—	.18 (.06)**
R^2	.60	.60	.60	.61
Control				
ELL	−.09 (.03)***	−.10 (.03)***	−.10 (.03)***	−.10 (.03)***
Grit	.09 (.01)***	.11 (.01)***	.11 (.01)***	.09 (.02)***
Control	—	−.02 (.01)	−.001 (.01)	.00 (.02)
Grit × ELL Status (A)	.02 (.03)	—	—	.04 (.03)
Grit × Control (B)	—	−.004 (.01)	—	−.03 (.02)*
ELL Status × Control (C)	—	—	−.04 (.03)	−.04 (.03)
Grit × ELL Status × Control	—	—	—	.07 (.03)**
Classroom organization	—	—	—	.14 (.06)*
Instructional support	—	—	—	.02 (.05)
Covariates				
Age	−.05 (.02)**	−.05 (.02)**	−.05 (.02)**	−.06 (.02)**
Prior ELA	.68 (.02)***	.68 (.02)***	.68 (.02)***	.68 (.02)***
Male	−.03 (.02)	−.03 (.02)	−.03 (.02)	−.03 (.02)
R^2	.60	.60	.60	.61

Note. A refers to the Grit × ELL Status interaction; B refers to the Grit × Teaching Practice interaction; C refers to the ELL × Teaching Practice interaction. We note that we ran two separate models, one with care and one with control, and covariates were the same across both models. All continuous measures are standardized and can be read as effect sizes. ELA =English/language arts; ELL = English language learner.
*p < .05; **p < .01; ***p < .001.
Standard errors values are indicated in parentheses.

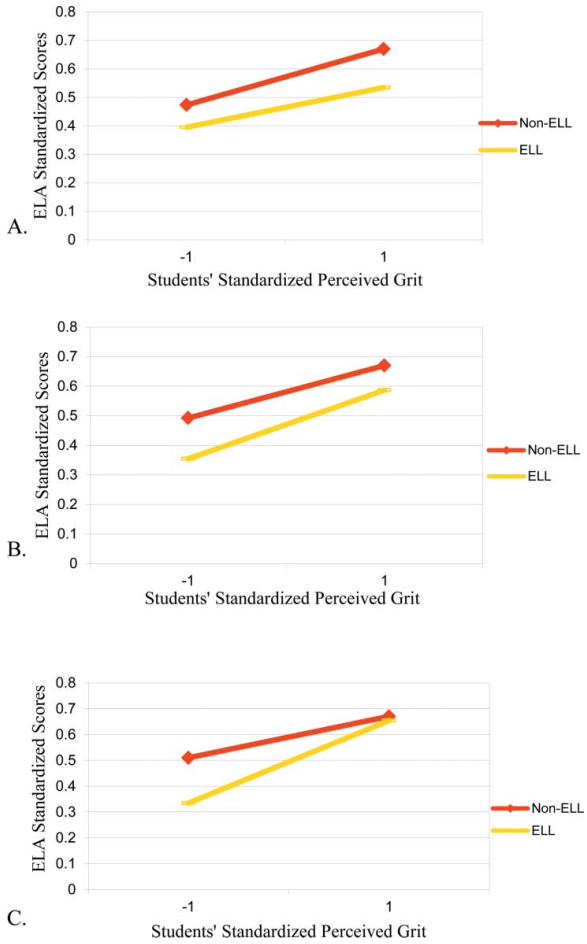

Figure 1. Simple slopes for the three-way interaction between English language learner (ELL) status, perceived grit, and perceived care with English/language arts (ELA) as the outcome. (A) Students in classrooms with low-care (care is 1 *SD* below the mean and lower). (B) Students in classrooms with mid-care (care is between one *SD* below and 1 *SD* above the mean). (C) Students in classrooms with high-care (care is 1 *SD* above the mean).

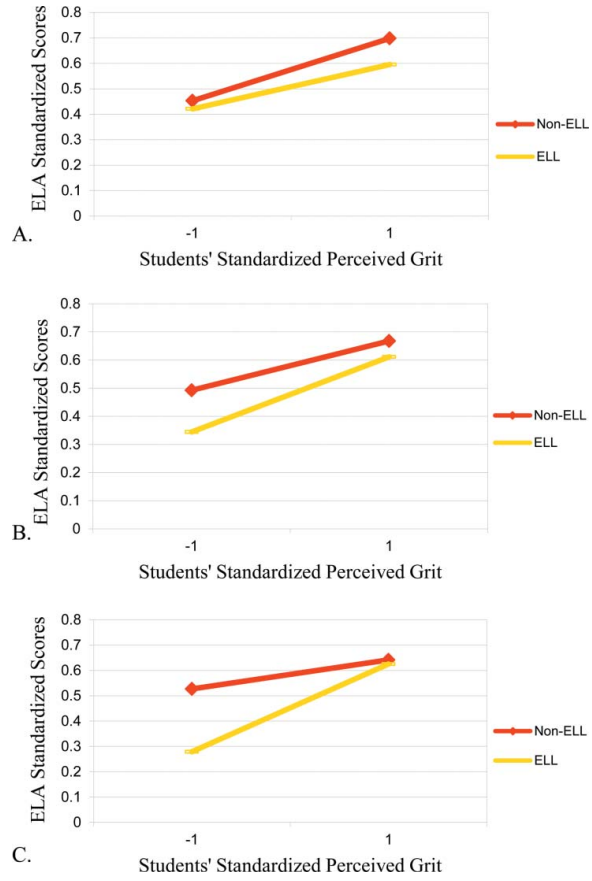

Figure 2. Simple slopes for the three-way interaction between perceived ELL status, grit, and perceived control A. Students in classrooms with low-control (control is one *SD* below the mean and lower). B. Students in classrooms with mid-control (control is between one *SD* below and one *SD* above the mean). C. Students in classrooms with high-control (control is one *SD* above the mean).

ELLs (b_{ELLs}= .11, SE_{ELLs}= .04, p< .01; $b_{non\text{-ELLs}}$= .09, $SE_{non\text{-ELLs}}$= .03, p< .001). And in classrooms that were perceived as low-care, the relation between grit and ELA achievement was stronger for non-ELLs than for ELLs (b_{ELLs}= .06, SE_{ELLs}= .04, p= .26; $b_{non\text{-ELLs}}$= .10, $SE_{non\text{-ELLs}}$= .04, p < .01).

Control

The three-way interaction among control and ELL status and grit was modestly related to students' ELA achievement (b= .07, SE= .03, p= 01). Closer inspection of the simple slopes revealed that in high-control classrooms, the relation between grit and ELA achievement was stronger for ELLs compared with non-ELLs (b_{ELLs}= .17, SE_{ELLs}= .05, p < .01; $b_{\text{non-ELLs}}$= .06, $SE_{\text{non-ELLs}}$= .03, p= .10; see Figure 2).

In contrast, in mid-control classrooms the relation between grit and ELA achievement was comparable for ELLs and non-ELLs (b_{ELLs}= .13, SE_{ELLs}= .04, p< .001; $b_{\text{non-ELLs}}$= .09, $SE_{\text{non-ELLs}}$= .03, $p\leq$ .001). Moreover, in low-control classrooms the relation between grit and ELA achievement was stronger for non-ELLs than for ELLs (b_{ELLs}= .09, SE_{ELLs}= .06, p= .15; $b_{\text{non-ELLs}}$= .12, $SE_{non\text{-}ELLs}$= .04, p= .01). The three-way interaction also appeared to be modestly related to ELLs' mathematics achievement (b= .05, SE= .03, p< .05); however, probing simple slopes did not reveal significance once the Bonferroni correction was applied. Consequently, we do not consider the three-way interaction between control, grit, and ELL status in relation to mathematics achievement to be significant.

Model comparisons

Both significant three-way interaction models accounted for a fairly high percentage of variance (R^2= .61 for the care model and R^2= .61 for the control model). However, the majority of variance is accounted for by students' prior achievement. We entered terms into the model in a stepwise fashion, beginning with a baseline model containing students' prior achievement and school districts as fixed effect (R^2= .58). We gradually added terms over a series of models. Adding in ELL status in the second model accounted for an additional 1% of variance (R^2= .59). Adding grit in the third model accounted for another 1% of variance (R^2= .60). Adding either care or control in Model 4 accounted for no additional variance; moreover, gradually adding two-way interactions (grit and ELL status followed by ELL status and care or control, followed by grit and control or care) and three-way interactions (grit and ELL status and care or control) did not account for additional variance. Adding instructional support and emotional support as teaching practice covariates to the care model as well as adding instructional support and classroom organization to the control model added

another 1% of variance (R^2= .61). We discuss our findings in the Discussion.

Discussion

In the present study, we use a person-environment framework to examine how two student characteristics (ELL status and grit) interact with student perceptions of two classroom characteristics (care and control) that shape the classroom environment of Latino students. A series of nested regression models examining the two-way interactions between student characteristics and classroom characteristics did not reveal significant results. Additionally, three-way interactions related to mathematics achievement were not significant. However, two three-way interactions proved to be significant with regard to students' ELA achievement: (a) Grit × ELL Status × Care and (b) Grit × ELL Status × Control. Our findings indicate that in classrooms that Latino students perceived as highly caring or highly controlled, the relation between ELLs' grit and ELA achievement was nearly twice as strong as the relation between non-ELLs' grit and ELA achievement. That is, strong student perceptions of care and control were particularly salient for ELLs' grit and by extension, their ELA achievement, as compared with Latino non-ELLs' grit and ELA achievement.

We note that these effect sizes are small and future work should replicate our analyses. We also caution that the lower levels of reliability, particularly for control, indicate that our results should be interpreted carefully. Still, these findings add preliminary, quantitative evidence to the argument regarding the importance of aligning students' home and classroom contexts (e.g., Benson, Leffert, Scales, & Blyth, 2012; Gay, 2002). They also provide preliminary evidence regarding the importance of considering how students' grit interacts with other personal and classroom characteristics. Moreover, grit was consistently and positively related to Latino students' mathematics and ELA achievement. This finding indicates that grit does have predictive validity for Latino fourth- and fifth-grade students' standardized test scores.

Student characteristics and classroom characteristics: Two-way interactions

The consistent pattern of null two-way interactions speaks to the intricacy of successful person/environment fit. When we examined only ELL status and student perceptions of care or control as an interaction, we did not take into account the importance of grit for ELLs' academic achievement (Baker, 2014). Similarly, when we investigated the interaction solely between grit and student perceptions of care or control, we ignored the importance of linguistic variability as a key characteristic of the Latino student population (Fry & Gonzalez, 2008). Finally, when we examined the interaction between ELLs and grit, we placed the onus of "being gritty" on students and ignored how students' perceptions of classroom characteristics may interact with their grit (Klem & Connell, 2004). To observe all important aspects of a student's classroom experience, we had to investigate three-way interactions that considered both student and classroom characteristics.

Person-environment fit: Care, control, ELL status, and grit

We concentrate our discussion on our findings related to high-care and high-control classrooms to maintain a strengths-based perspective on Latino ELLs. However, it is worth noting that in classrooms perceived as low care or low control, ELLs performed at nonsignificantly lower rates than did their non-ELL counterparts as students' grit increased. The contrast in findings from high-care and high-control classrooms compared with low-care and low-control classrooms underscores the importance of high levels of care and control for Latino ELLs.

We found that in high-care classrooms, the relation between grit and ELA achievement was stronger for ELLs as compared with non-ELLs. Similarly, in classrooms perceived as highly controlled, the relation between grit and ELA achievement was stronger for ELLs than for non-ELLs. These findings suggest that classrooms that are perceived as highly caring or very well-managed are especially important for fourth- and fifth-grade Latino ELLs' grit in relation to their ELA achievement. In general, grittier students may have better academic outcomes (Duckworth et al., 2007; omitted). However, Latino ELLs may face multiple challenges, including learning a second language, poverty, anxiety, stigma, and deficit perspectives from teachers and peers, all of which may tax their grit (Fry & Gonzales, 2008; Orosco & Klingner, 2010; Pappamihiel, 2001; Russakoff, 2011). Thus, a highly caring or well-organized classroom may provide a context that specifically bolsters ELLs' assets—such as their grit—and by extension, their ELA achievement. For example, a highly caring teacher may encourage her ELL students to leverage their grit during ELA assessments, resulting in higher performances. Similarly, a teacher with a well-controlled classroom may provide students with the time and space they need to learn ELA content deeply, creating a context in which gritty ELL students can put their grit to good use and thrive.

Why are these interactions important for ELA outcomes but not mathematics? This discrepancy may be due to the content of the test. An ELA standardized test is a more explicit test of English language comprehension than a mathematics standardized test and can be more challenging for ELLs than non-ELLs (Abedi, 2002). ELLs' performance on both mathematics and ELA assessments tends to decrease as the linguistic complexity of test items increases (Abedi, 2004; Martiniello, 2008). Relatedly, in past years Latino ELLs have performed lower in ELA assessments than mathematics assessments and the achievement gap between Latino ELLs and Latino non-ELLs has often been larger in ELA than in mathematics assessments (Chudowsky & Chudowsky, 2010; Hemphill & Vanneman, 2011). It is possible that ELA tests require more grit for ELLs to complete. Thus, a highly caring or well-managed classroom may provide a key supportive context during challenging ELA instruction and assessments, so that Latino ELLs can draw on their assets, such as grit, and perform well.

Implications for educators

Two clear implications for practice stem from these findings. The first relates to classroom environments. Many researchers and educators have advocated for teachers to draw

on students' cultures to address the needs of an increasingly diverse student population (Gay, 2002, 2013; Ladson-Billings, 1995). Doing so goes beyond learning about common foods in various cultures or counting in students' native languages. These kinds of cultural exercises can serve as a starting point for incorporating a variety of cultural viewpoints in the classroom. However, they are not sufficient on their own. Teachers in ethnically and linguistically diverse classrooms may find other, more meaningful ways to embed students' home cultures in their classrooms. As previously discussed, high levels of parental care and control are often found in Latino homes (e.g., Calzada & Eyberg, 2002). Consequently, when Latino students perceive that their teachers are creating highly caring and well-managed classrooms, they may perceive cultural alignment between their homes and classrooms. Teachers can accomplish this aim by forging relationships with students and their families to understand how to cultivate a classroom environment which is both safe and supportive for their Latino and Latino ELL students (e.g., Ladson-Billings, 1995).

The second implication relates to how grit is used in schools. Our findings provide preliminary evidence about the importance of considering the contexts in which students are enacting their grit. It is critical that educators, researchers, and policymakers alike shift from a reductionistic perspective of students' grit, with which we view students as either gritty or not gritty, to considering whether classroom contexts support all students' grit. This is particularly true for students who face substantial amounts of challenge in their daily lives and consequently may have overly taxed grit. If grit is to be used in schools, then educators and policymakers need to find sensitive methods of evaluating and supporting students' grittiness. In particular, researchers have an obligation to further investigate grit not only with regard to student outcomes, but also in terms of students' broader contexts.

Limitations and future directions

Many of our limitations stem from tradeoffs inherent to the use of secondary data. The MET dataset provided a large sample of Latino students with many useful variables. However, as we did not guide the data collection process, some of our focal variables lack nuance. In particular, the ELL variable does not provide additional valuable information, such as students' specific English proficiency levels. Future researchers must examine the relation between ELL status, grit, and classroom characteristics with a more nuanced lens on students' English language proficiency. For example, researchers could use assessments such as the WIDA (formerly known as the World-Class Instructional Design and Assessment) to measure ELLs' proficiency and determine if the interplay between grit and classroom characteristics changes when students are less proficient or more proficient in English. Additionally, Latino ELLs' experience may vary depending on broader contextual factors, such as the level of diversity in their surrounding community or state policies. Future analyses could take these factors into account by using within-state or within-district samples.

With regard to cultural validity, the construct of grit may seem more suitable for students from an individualistic culture and thus may seem less relevant for Latino students. More work is required to understand the role of grit in Latino families and the psychometric soundness of these surveys for Latino students. Given that grit does have cultural importance within American classrooms and that teachers currently are expected to cultivate students' grittiness (Shechtman, DeBarger, Dornsife, Rosier, & Yarnall, 2013; Tough, 2011), further research is necessary to understand the cultural validity of this construct. Additionally, although researchers of grit have indicated that grit is distinct from similar psychological constructs, such as self-regulation (Duckworth & Gross, 2014), more research is needed to understand the degree to which these constructs differ for upper elementary school students.

Conclusions

Within a single classroom, a variety of student and classroom characteristics come together to affect learning. We have considered two important student characteristics as well as two classroom characteristics and examined their relation to Latino students' achievement. Our findings reveal classroom characteristics—high levels of care and control—that support grittier Latino ELLs' ELA achievement. These findings provide two types of preliminary evidence. First, students' grit should be considered, evaluated, and supported in context. Moreover, teachers of linguistically and culturally diverse classrooms must tailor the classroom environment to fit students' characteristics, so that all students perceive that their classroom is supportive.

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Appendix A.

The grit scale included in the MET data included the eight items listed below. The response options ranged from 1-*not like me at all*to 5-*very much like me*.

1. I often set a goal but later choose to pursue a different one.
2. Sometimes, when I'm working, I get distracted by a new goal or project.
3. I have been obsessed with a certain idea or project for a short time but later lost interest.
4. It's hard for me to finish projects that take a long time to complete.
5. I finish whatever I begin.
6. If something is hard to do and I begin to fail at it, I keep trying anyways.
7. I am a hard worker.
8. I try to do a good job on everything I do.

The Tripod Survey included the following constructs listed below and their corresponding items. Response options ranged from 1-*No, never*to 5-*Yes, always*.

Care (7 Items)

1. My teacher in this class makes me feel that she/he really cares about me.
2. The teacher in this class encourages me to do my best.
3. My teacher gives us time to explain our ideas.
4. My teacher seems to know if something is bothering me.
5. If I am sad or angry, my teacher helps me feel better.
6. My teacher is nice to me when I ask questions.
7. I like the way my teacher treats me when I need help.

Control (4 Items)

1. Our class stays busy and does not waste time.
2. Students behave so badly in this class it slows down our learning.
3. Everybody knows what they should be doing and learning in this class.
4. My classmates behave the way my teacher wants them to.