



The impact of stress on later literacy achievement via grit and engagement among dual language elementary school students

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Abstract

The goal of this short-term longitudinal study was to identify how stress impacts later literacy achievement via the mediators of grit and emotional engagement. Study design included three time-points with students in 3rd through 5th grades who were low-income, dual language learners in the US ($N = 142$; 54% female; 75% Latina/o; $M = 9.47$ years old). The measures were Time 1 student-reported perceived stress, Time 2 teacher-reported student grit and emotional engagement, and a Time 3 student literacy achievement performance task. Stress had a negative impact on later literacy achievement via the mediator of engagement, but not via the mediator of grit. Implications of how stress and socioemotional processes impact achievement among dual language learners are discussed.

Keywords

dual language learners, engagement, grit, literacy, stress

An important process in the lives of low-income, culturally and linguistically diverse students may be how stress impacts achievement (Becker & Luthar, 2002). Although the relation of stress to achievement has been established among youth and adults (e.g., Cunningham, Hurley, Foney, & Hayes, 2002), the extant literature has two limitations: (a) a lack of diverse elementary school-aged samples; and (b) a need to identify mediation processes underlying the relation

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between stress and achievement. Indeed, socioemotional factors (e.g., grit) may be potential mediators of the relation between stress and achievement. For instance, for those in poverty, stress may make it difficult to motivate for and engage with anything other than survival which, in turn, may have a negative impact on academic performance (Ravitch, 2013). Two possible socioemotional mediators of the relation between stress and academic achievement are grit (i.e., ‘perseverance and passion for long-term goals’; Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087) and emotional engagement in school (i.e., interest in learning; Skinner, Kindermann, & Furrer, 2009), as explained more below. Socioemotional factors, such as grit and engagement, need to be examined in the context of mediation processes contributing to achievement and with diverse samples, rather than simply as static, general traits which occur in a vacuum (Turiel, 2016).

The current short-term longitudinal study is the first to test how stress impacts literacy achievement for dual language, largely Latina/o elementary school-aged children, via the mediators of grit and engagement. Socioemotional factors include beliefs, goals, attitudes, and skills used in managing emotions and behavior in a learning context (Domitrovich, Durlak, Staley, & Weissberg, 2017; Parke & Clarke-Stewart, 2010).

Ecological developmental model

The ecological developmental model is a useful framework for testing risk and resilience processes leading to achievement among low-income, dual language students. Indeed, the model emphasizes the identification of culture-specific, risk and protective factors among ethnic minority, dual language, immigrant students from the perspective of multiple ecological levels (Suárez-Orozco, Yoshikawa, Teranishi, & Suárez-Orozco, 2011). An example of a risk and resilience process model is the mechanism by which a stressor impacts later functioning, as explained by a mediator. The ecological developmental model incorporated Bronfenbrenner’s ecological model (Bronfenbrenner, 1979) and risk and resilience models (Masten, 2014). The macro-level factor of poverty, for instance, may impact micro-level perceived socioemotional processes and achievement for low-income, dual language students. Indeed, the macro-level factor of poverty, including the related poverty constellation of poor housing, etc., may increase a child’s stress with consequences for their socioemotional functioning, which may hold subsequent consequences for their achievement (Levy, Heissel, Richeson, & Adam, 2016). While this study only examined micro-level factors, the ecological developmental model provides a larger conceptual framework with which to test micro-level processes among low-income, ethnic minority samples. The ecological developmental approach relies on a risk and resilience model which requires identification of how, in the case of our study, socioemotional factors such as grit and engagement relate to

achievement in the face of risks, like stress (e.g., Luthar, Cicchetti, & Becker, 2000). The literature reviewed will address Latina/o children.

Literacy achievement among low-income, dual language learners

Literacy achievement is especially relevant for Latina/o, dual language student achievement (Carlo et al., 2004), and this study operationalized literacy achievement as reading decoding, fluency, and comprehension (Cain, Oakhill, & Lemmon, 2004). Concerns have been raised about a literacy gap with 21% of Latina/o 4th graders reading at a proficient level, compared to 46% of White 4th graders (National Center for Education Statistics, 2015). In addition, immigrant Latina/o children tend to struggle with literacy, especially if their first language at home is a non-English language (Carlo et al., 2004). As children enter the upper elementary grades, the vocabulary demand of their texts is more academic and domain-specific, which makes the role of vocabulary, efficiency, and reading comprehension all the more essential (Cain et al., 2004).

Stress and achievement

Low-income, Latina/o children often face stressful experiences which can raise their perceived stress levels (e.g., Capps, Fix, & Zong, 2016). Perceived, general life stress is the focus of this study, and this study operationalized perceived stress as the internal experience of stress-related feelings including anger, anxiety, and sadness in reaction to distressing experiences, in general, not specific to academic stress (e.g., Suldo, Shaunessy, & Hardesty, 2008). The rationale for selecting a general life stress measure instead of an academic stress measure is that general life stress may better capture the overall stressful experience of a low-income, dual language learner's life compared to academic stress. In addition, theoretical support for the importance of examining stress, beyond academic stressors, in the development of achievement among students of color (Levy et al., 2016) also justifies the use of general life stress. In addition, research supports the link between general life stress and achievement among Latina/o students. For instance, the limited number of studies which have examined Latina/o youth stress and achievement have found that general life stress may contribute to lower standardized reading and math scores for Latina/os in middle childhood (Brabeck, Sibley, Taubin, & Murcia, 2016) and in high school (Alva & de los Reyes, 1999; Gillock & Reyes, 1999). Albeg and Castro-Olivo (2014) found negative consequences of acculturative stress on teacher-rated academic performance among Latina/o middle school students. Strikingly, little research has been done on the relation of any types of stress with achievement among diverse elementary school samples (Levy et al., 2016).

Stress and socioemotional factors. Although there are many socioemotional variables (e.g., academic resilience, perseverance, and growth mindset) which could mediate

the relation of stress with educational outcomes, we would argue that the socioemotional factors of grit and engagement are strong candidates as mediators of stress and achievement. The thinking underlying the rationale of grit and engagement as mediators is that stress can erode socioemotional factors such as motivation and engagement over time among Latina/o youth, with consequences for achievement (Ravitch, 2013; Roche & Kuperminc, 2012). The empirical support for the rationale of selecting grit and engagement as the mediators between stress and achievement is that stress is related to the socioemotional factors of motivation and engagement (e.g., Choudhuri, Santiago-Rivera, & Garrett, 2012), so grit and engagement may play a role in the process of how stress impacts achievement. Also, grit is conceptualized as a socioemotional factor which may be used to overcome stressful obstacles (O'Neal et al., 2016), and grit is related to the motivation construct of perseverance among ethnic minority youth (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Grit has two subscales – consistency of interests and perseverance of effort – which indicate a constant focus on a single goal (*consistency of interests*) and unwavering commitment to that goal (*perseverance of effort*) despite obstacles (Duckworth et al., 2007). No research has tested the impact of stress on grit, except one study which found a negative, concurrent relation between stress and grit among Latina/o college students (O'Neal et al., 2016). Assuming that grit is more of a malleable state than trait (Eskreis-Winkler et al., 2014), then it may serve as a mediator that is capable of changing in response to a predictor, like stress, and the same may be true for engagement. Motivation is closely connected to the construct of engagement (Wigfield & Guthrie, 1997), and stress has been linked to lower levels of engagement in the classroom (Choudhuri et al., 2012). In this study, we operationalized emotional engagement as how students react emotionally, in a positive manner, to school. Interest and enthusiasm in learning at school are examples of emotional engagement (Skinner, Furrer, Marchand, & Kindermann, 2008). Emotional engagement, in particular, may respond to stress given that stress is emotion-related; stress and emotional engagement have been found to relate to each other among Latina/o college students (O'Neal et al., 2016). Engagement, in addition to grit, may be a valuable variable explaining the relation between stress and achievement. In sum, stress is a risk factor which may affect socioemotional skills, like grit and engagement, with potential consequences for achievement, as reviewed below.

Socioemotional factors and achievement. The relation of socioemotional factors to achievement may also play a role in how stress impacts achievement. In studies with primarily middle-income, high-achieving, Caucasian adults and college students, grit has demonstrated weak positive relations with GPA (Duckworth et al., 2007; Duckworth & Quinn, 2009), with similar relations in one study with African American and Latina/o high school students (Eskreis-Winkler et al., 2014). In high school and college-aged samples, grit is linked to other related constructs like academic self-efficacy, career exploration self-efficacy, and talent development self-efficacy (Datu, Yuen, & Chen, 2017), academic

engagement (Datu, Valdez, & King, 2016), sense of coherence and authenticity (Vainio & Daukantaitė (2015), and indicators of well-being (Datu et al., 2016). It is critical to further examine grit in elementary student populations, since, to our knowledge, there are only four studies of students' grit in childhood – one with 4th through 8th graders (Rojas & Usher, 2012), one with the present sample (O'Neal, 2017), and two with high-achieving 10- to 15-year-olds (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011; Duckworth & Quinn, 2009); these have found positive associations between grit and academic outcomes. These studies were done with students who overlapped in age with the current study – the current study has 3rd through 5th graders and a few of these studies have 4th grade or older students. Given that these studies were largely with high achieving students and did not adjust for previous achievement, a longitudinal study of grit with a lower income, culturally and linguistically diverse sample and a more narrow achievement outcome such as literacy is needed.

Engagement has consistently been found to have positive relations with academic achievement (e.g., Wigfield & Guthrie, 1997), including among Latina/o youth (Roche & Kuperminc, 2012). Most relevant to this study, emotional engagement has a positive relation with literacy achievement (e.g., Taboada, Tonks, Wigfield, & Guthrie, 2009). In sum, grit and emotional engagement may have an impact on literacy achievement.

Hypotheses

This study predicted that stress would have a negative effect on literacy achievement four months later among dual language learners, with grit and engagement mediating the effect (see Figure 1).

Methods

The current study is a short-term longitudinal study which assessed Time 1 latent student-reported stress as a predictor of Time 3 performance-based literacy achievement via the observed teacher-reported mediators of Time 2 grit and engagement. The rationale for a longitudinal design over three time-points was that identification of a mediation process requires both longitudinal assessment and temporal precedence (Preacher, 2015).

Sample

This sample included 142, largely Latina/o 3rd, 4th, and 5th graders at a Title 1 suburban elementary school serving low-income students in the US. The sample for this study was 54% female, an average age of 9.47 years old, and 75% Latina/o (Table 1). School-level statistics indicated that 95% of the students received free or reduced lunch. Using student and parent-report, we coded students as dual language learners if they spoke a non-English language with at least one parent.

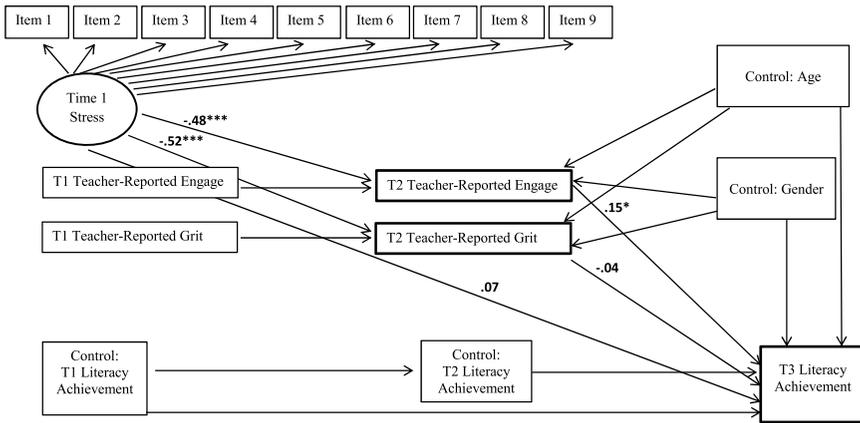


Figure 1. Impact of T1 latent stress on T3 literacy achievement via the mediators of teacher-reported grit and engagement, controlling for previous engagement, grit, literacy achievement, age, and gender.

Table 1. Demographics.

	N	%
Child sex: Female	77	54
Age		
8 years	24	17
9 years	51	36
10 years	42	30
11 years	24	16
12 years	1	1
Grade Level		
3rd	50	35
4th	43	30
5th	49	35
Ethnicity		
Latina/o	106	75
Black	20	14
Asian	12	8
Other Ethnic Minority	4	3
White	0	0
Non-English Language spoken with at least one parent		
Spanish	89	63
French/Haitian Creole	11	8
Other (e.g., Vietnamese)	42	29

From the original sample of 149, we removed seven students who were non-dual language learners. Spanish was the non-English language reported by the majority of students as spoken with at least one parent. In this sample, 18% reported English as the primary language spoken at home, in addition to speaking a non-English language with at least one parent at home.

Nine teachers completed grit and engagement questionnaires for each of their participating students at each time point. Four 4th grade, four 5th grade, and one 3rd grade art teacher participated (1 male; 4 African American; 5 Caucasian). Third grade teachers as a group declined to attend our recruitment meeting due to new third grade work requirements, so the art teacher completed questionnaires on all 3rd grade participants. Given that only the 3rd grade art teacher completed 3rd grade teacher-reported data, preliminary analyses were conducted to rule out teacher cluster effects.

Procedures

Time 1 (T1) was collected from January to February, Time 2 (T2) from March to April, and Time 3 (T3) from May to June, 2014. Stress was measured via student-report, grit and engagement via teacher-report, and literacy achievement via a reading performance task. The data for this study came from a larger study which included these and other socioemotional variables which were collected at all three time-points. The time between T1 and 3 was nonequivalent among individual students. The mean number of days between T1 and T3 across students was 120 days ($SD = 16$), which is about four months.

All procedures were conducted with Institutional Review Board approval from the school district and university, including student assent and parent and teacher consents. The study sample represented a 55% recruitment rate. Comparisons of students who participated versus did not participate could not be conducted since non-participation was caused by failure to return consent forms, which included demographic information.

Graduate research assistants read the stress questionnaire items out loud to each student, one-on-one. Each student also completed a three-minute English reading performance task after receiving one-on-one instructions. Students with limited or no English language skills ($N = 6$) were interviewed by Spanish- and French-speaking researchers. Teacher-reported data were collected immediately after student-reported data.

Measures

Grit. T1 and T2 teacher-reported grit was employed in this study. The adapted grit measure was modified from the eight-item Short Grit Scale (Grit-S) which demonstrated strong psychometrics as a youth and adult self-report measure (Duckworth & Quinn, 2009). The Grit-S scale item vocabulary and phrasing were adapted to simplify wording and make it more relevant to the school context. For instance,

we translated the original phrasing of the Grit-S item, 'I am a hard worker' into 'I am a hard worker in school'. We then adapted the student-reported grit items into teacher-reported grit items. Teachers rated how much four statements about the student's consistency of interests (e.g., 'This student often sets a goal but later chooses to pursue a different one') and four statements about perseverance of effort (e.g., 'The student finishes whatever s/he begins') described the student, on a five-point scale (1 = Not at all, 5 = Very much). A total score was created using an average of the eight items. Grit data were collected at two time-points in this study, T1 and T2, and T1 grit was used to control for the mediator of T2 grit in mediation model testing. The teacher-reported grit α was 0.92 at both T1 and T2.

Emotional engagement. T1 and T2 emotional engagement were assessed using the five-item emotional engagement subscale of the engagement versus disaffection with learning scale (EvsD; Skinner et al., 2008); the items address student interest and enthusiasm in school (sample item: 'Class is fun'). Teachers rated the statements on a five-point scale (1 = Not at all, 5 = Very much), and a mean score was calculated for the five items. The EvsD has shown adequate internal consistency in elementary-aged samples (Skinner et al., 2008). Engagement data were collected at two time-points in this study, T1 and T2, and T1 engagement was used to control for the mediator of T2 engagement in mediation model testing. In this study, the teacher-reported engagement α was 0.94 at T1 and 0.95 at T2.

Stress. Stress was assessed using the perceived stress scale (PSS-10; Cohen, Kamarck, & Mermelstein, 1983). Students rated how often their lives felt emotionally upsetting, uncontrollable, and overwhelming in the past week on a five-point scale (1 = Never, 5 = Very often; sample item: 'How often were you upset by all the things you had to do?'). The PSS-10 was developed for youth and adults, so we made minor adaptations in item vocabulary and phrasing. In this study, the T1 internal consistency was 0.43. Given the weak internal reliability and its importance as a predictor, we used Confirmatory Factor Analysis (CFA) to create a latent T1 stress variable from the items, which best accounts for measurement error.

Literacy achievement. Literacy achievement was assessed via an index score from the test of silent reading efficiency and comprehension (TOSREC; Kim, Wagner, & Foster, 2011) which assesses students' silent reading fluency, decoding, and comprehension. Students have three minutes to read as many sentences as possible and decide if each is true or false. The TOSREC has excellent reliability and validity with similar measures (Kim et al., 2011).

Analyses. This study employed Mplus version 7.4 (Muthén & Muthén, 1998–2011) structural equation modeling (SEM) to test the mediation model (Figure 1). Path a was the relation between T1 latent stress and T2 teacher grit and engagement. Path b was the relation of T2 teacher grit and engagement with T3 literacy achievement.

Path c was the direct relation of T1 latent stress on T3 literacy. T3 literacy adjusted for both T1 and T2 literacy. The model used a conservative test of mediation by controlling for previous time points of both the mediator and outcome in the mediation model (Selig & Little, 2012). Mediation was tested using the Mplus INDIRECT command with bootstrapping testing significance with 10,000 sample replicates (Preacher, 2015). Age and gender were controls for prediction of outcomes in paths a and b. Only two cases were missing the TOSREC literacy achievement outcome by T3. A maximum likelihood standard error estimation approach was used (i.e., ML).

The reason for turning T1 stress into a latent variable was because (a) it is a stronger SEM choice to have a latent than observed predictor; and (b) the alpha for T1 stress was weak – while observed variables typically have measurement error associated with them, latent variables, on the other hand, do not have measurement error associated with them (Hancock & Mueller, 2013). Before model testing, a CFA was conducted of the T1 stress latent variable, with its ten items as observed indicators. Twenty-one correlations were added between CFA items, in addition to prediction of four CFA items by four other CFA items to improve model fit based on modification indices.

Teacher-reported, not student-reported, grit and engagement were selected because the teacher-reported grit and engagement alphas, test–retest (O'Neal et al., in press), and correlations with the outcomes of T3 literacy were stronger for the teacher-reported variables, than for the student-reported variables. Perhaps more importantly, it is a stronger multimethod design to have a student-reported predictor, a teacher-reported mediator, and a student performance task outcome in the model, compared to having both a student-reported predictor and student-reported mediator in the model.

Given that a one-way ANOVA with three levels (for three grades) indicated that the 3rd grade rater (who rated all of the 3rd grade students) reporting higher engagement, $F(2, 139) = 14.6, p < 0.001$, and grit, $F(2, 139) = 15.5, p < 0.001$, than 4th and 5th grade raters, and there was a significant difference by grade for T3 literacy, $F(2, 136) = 3.60, p < 0.05$, with 3rd grade literacy higher than 5th grade literacy, $p < 0.05$, it was important that this paper rule out teacher cluster effects before model testing for the paths using teacher-reported predictors. It is important to first test for clustering effects of differences among teacher raters on predictive paths prior to model testing (Asparouhov & Muthen, 2016). Indeed, we did rule out construct-irrelevant variance due to potential differences in the way some teachers may have awarded scores (Kelcey, McGinn, & Hill, 2014). We relied on Hayes' (2013) approach to two-level cluster effects testing with random effects to determine whether paths in our model differed by teachers who completed the teacher-report. There was no evidence of between-teacher variation in any of the model paths given that the between-teacher variance for each path was non-significant [e.g., teacher-reported engagement predicting T3 literacy, path b variance: Estimate = 0.75(15.25), $p = 0.96$; teacher-reported grit predicting T3 literacy, path b variance: Estimate = 1.51(31.01), $p = 0.96$].

Results

Descriptives

T1 average perceived stress was high at 24.71, higher than an adult sample that had a mean of 14.2 (Cohen & Williamson, 1988). Average teacher-reported grit and engagement were at similar levels as previous self-reported grit and engagement research with youth and adults (Table 2). T3 literacy achievement was low, at an average of 19th percentile.

Correlations

Table 2 depicts bivariate correlations among all of the observed variables. As expected, T1 average stress had a significant negative relation with concurrent and later literacy achievement. Also, the mediation paths were significant with a negative relation between T1 average stress and T2 teacher-reported grit and engagement in addition to positive relations of T2 teacher-reported grit and engagement with T3 literacy.

T1 latent stress CFA

One item was removed from the stress CFA given that it did not have a significant loading, so there were nine item indicators of the CFA. The CFA measurement model fit for the nine observed stress item indicators onto latent stress was adequate based on the fit indices of RMSEA = 0.05, CFI = 0.98, and SRMR = 0.04. The recommended RMSEA cutoff is less than 0.06, CFI cutoff is more than 0.95, and SRMR cutoff is less than 0.08 (Hu & Bentler, 1999). All of the loadings were significant, ranged from 0.26 to 0.74, and were an average of 0.40.

Table 2. Descriptives and correlations among stress, grit, engagement, and literacy.

	1	2	3	4	5	Mean (SD)
1. T1 Literacy	–	–	–	–	–	84.65 (13.00)
2. T1 SR Stress	–0.19*	–	–	–	–	24.71 (5.79)
3. T2 TR Engagement	0.15	–0.29***	–	–	–	4.06 (0.89)
4. T2 TR Grit	0.19*	–0.34***	0.50***	–	–	3.93 (0.98)
5. T2 Literacy	0.71***	–0.24**	0.14	0.19*	–	87.45 (14.63)
6. T3 Literacy	0.76***	–0.23**	0.18*	0.23*	0.77***	86.14 (14.05)

Note: SR = student-reported; TR = teacher-reported.

N = 142.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Mediation model

As predicted (see Figure 1), we found that the relation between T1 latent stress and T3 literacy achievement was mediated by T2 engagement, indirect effect estimate: $\beta = -0.07(.05)$, $p < 0.05$, standardized CI $(-0.201, -0.002)$ (Table 3), and not by T2 grit. Note that T1 grit and engagement were used to control for the mediators of T2 grit and engagement, and T1 and T2 literacy were used as controls for effects on T3 literacy in mediation model testing (Figure 1). As expected, the direct effect was non-significant in the context of the mediation model (Table 3). Mediation model fit was adequate: RMSEA = 0.038, CFI = 0.971, and SRMR = 0.079. See Table 3

Table 3. Mediation model estimates.

Paths	Standardized Estimates(Standard Error), Confidence Intervals (CI)
Prediction of mediators	
Predictor T1 Stress→Mediator T2 Grit	-0.52(0.14)***, CI(-1.06, -0.34)
Predictor T1 Stress→Mediator T2 Engagement	-0.48(0.13)***, CI(-0.65, -0.18)
Control T1 Grit→Mediator T2 Grit	0.67(0.06)***, CI(0.54, 0.79)
Control T1 Engagement →Mediator T2 Engagement	0.68(0.05)***, CI(0.58, 0.78)
Control T1 Age→Mediator T2 Grit	-0.10(0.05)*, CI(-0.21, -0.01)
Control T1 Age→Mediator T2 Engagement	-0.12(0.06)*, CI(-0.23, -0.01)
Control T1 Gender→Mediator T2 Grit	0.08(0.06), CI(-0.03, 0.20)
Control T1 Gender→Mediator T2 Engagement	0.13(0.06)*, CI(0.01, 0.24)
Prediction of outcome	
Predictor T1 Stress →Outcome T3 Literacy	0.07(0.11), CI(-0.16, 0.30)
Mediator T2 Grit →Outcome T3 Literacy	-0.04(0.10), CI(-0.21, 0.18)
Mediator T2 Engagement→Outcome T3 Literacy	0.15(0.08)*, CI(0.02, 0.32)
Control T1 Age→Outcome T3 Literacy	-0.02(0.06), CI(-0.14, 0.10)
Control T1 Gender→Outcome T3 Literacy	-0.02(0.06), CI(-0.13, 0.09)
Control T1 Literacy→Control T2 Literacy	0.72(0.04)***, CI(0.62, 0.79)
Control T2 Literacy→Outcome T3 Literacy	0.46(0.07)***, CI(0.32, 0.59)
Control T1 Literacy→Outcome T3 Literacy	0.40(0.08)***, CI(0.26, 0.56)
Direct, Indirect, and Total Mediation Effects	
Indirect effect with T2 grit as mediator	0.02(0.06), CI(-0.11, 0.11)
Indirect effect with T2 engagement as mediator	-0.07(0.05)*, CI(-0.20, -0.002)
Direct effect	0.07(0.11), CI(-0.16, 0.30)
Total effect	0.02(0.09), CI(-0.15, 0.20)

N = 140.

* $p < 0.05$; *** $p < 0.001$.

for estimates of each path. Stress had a negative impact on the mediator of engagement, and engagement had a positive impact on achievement.

Discussion

This study advanced our knowledge of the indirect mediation process of stress on literacy achievement among dual language learners. Results indicated that latent stress impacted the socioemotional factor of engagement which, in turn, impacted later literacy achievement; however, grit was not a significant mediator. Results underscored the importance of how engagement does not occur in a vacuum for ethnic minority, dual language learners, and holds consequences for literacy achievement.

This paper was guided by the ecological developmental model in which individual-level factors, such as engagement, are assumed to be a part of a complex, multilevel system governed by risk and resilience processes, especially for low-income, ethnic minority immigrant students (Suárez-Orozco, Yoshikawa, Teranishi, & Suárez-Orozco, 2011). The ecological developmental model would frame this study's results as the risk factor of stress and its impact on the socioemotional factor of engagement hold consequences for dual language learners' achievement. These dual language learners' combined low-income, ethnic minority, and dual language status may make them particularly vulnerable to the risk factor of stress. The significant negative prediction of literacy achievement by the risk factor of stress is consistent with negative relations reported in two studies with Latina/o middle and high school students (Albeg et al., 2014; Alva et al., 1999); however, unlike the present study, these previous studies did not test stress-achievement relations while adjusting for previous achievement, which sets a higher bar for prediction.

Results indicated that latent stress impacted later literacy achievement via the mediator of engagement. The findings may be interpreted as explaining how stress impacts achievement – stress impacts achievement by affecting the socioemotional process of engagement. Socioemotional processes involving emotional engagement may, indeed, be vulnerable to the effects of a risk factor such as stress, and engagement may, in turn, affect elementary school students' literacy achievement (Von Culin, Tsukayama, & Duckworth, 2014). The result of grit not being a significant mediator is striking, and it speaks to some recent results questioning both the predictive strength of grit on achievement (e.g., Credé, Tynan, & Harms, 2016; O'Neal, Boyars, Riley, & Wigfield, in press) and whether or not grit adds explanatory power of achievement above and beyond more well-established socioemotional constructs such as engagement (Credé et al., 2016; Muenks, Wigfield, Yang & O'Neal, 2016; O'Neal et al., in press). On the other hand, it might be possible that grit would be a significant mediator in a White, non-DLL sample, given that most of the grit research finding grit's relations with achievement were with White, high-achieving youth and adults (e.g., Duckworth, 2016). It is worth testing if these results are unique to dual language learners or applicable across mono-lingual and other ethnic groups.

In the face of stress, one can imagine how difficult it is to be emotionally engaged in school (e.g., Choudhuri et al., 2012; Ravitch, 2013; Turiel, 2016). In some ways, students in this sample provided a window into a private, internal process by which the negative emotions (e.g., frustration) associated with perceived stress spill over into dual language learners' engagement and academic performance.

The results from this study underscore the need for more integration of socio-emotional with academic learning (Domitrovich et al., 2017), stress management, and for more culturally relevant classroom engagement (Gay, 2010) to improve literacy education of low-income, dual language learners. On the other hand, targeting stress may be like targeting the tip of the iceberg. Future studies need to determine the systemic causes of stress (e.g., discrimination) which may have an impact on socioemotional factors and achievement. In addition, researchers may want to consider if these results are applicable to dual language learners in other countries, such as recent immigrants and refugees. Future studies should also consider the novel contribution of using multi-informant measures in a model testing engagement's effects (e.g., student-reported predictor, teacher-reported grit and engagement mediators, student performance task outcome) which may increase validity of the model testing (e.g., Fredricks & McColskey, 2012).

Limitations

A potential weakness was the adaptation of the teacher-reported grit measure for this study; however, the measure had adequate psychometrics and this paper has argued that the benefits of adapting the grit measure to school and teacher-reported contexts outweigh the potential minuses. This study was able to rule out possible influence of construct-irrelevant variance caused by the 3rd grade art teacher being the sole rater of 3rd grade students, but there may be some construct-irrelevant variance that was not accounted for by these analyses. It is also possible that the recruited sample may be students from families in which there is more academic press, if the parents were willing to give consent for their children to participate in the study. In addition, a short-term longitudinal design may not best capture the processes in this model, and future research should test how much time is necessary to detect effects of socioemotional factors on achievement. Finally, the stress measure had a low alpha, but this problem was addressed by using latent modeling for stress. This stress measure remains a potential limitation of this study because some of the loadings onto latent stress were below 0.40 which may have been due to some of the stress items being too challenging for these particular young DLL students to fully comprehend.

Implications

The implications of these results are that researchers and schools need to consider the internal, often very private, stressful experiences with which many low-income, culturally and linguistically diverse students cope, and how it affects their

engagement, in particular, with potential consequences for literacy achievement (Ravitch, 2013). Indeed, a call has been made for improvements to substandard socioemotional supports and literacy instruction for dual language learners (Mitchell, 2017). Further, this model may be relevant for immigrants and refugees who have resettled in other countries. These results, however, are too preliminary to immediately translate into psychoeducational services for dual language learners either in the US or other countries. US educators, and those in the international community, need to consider not only how we can promote marginalized students' education, in a culture-specific, engaging manner, but also how we can change the systemic structural factors which may lead to such stress (Levy et al., 2016), with potential negative consequences for both children's socioemotional well-being and literacy achievement.

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