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Grit: A Potential Protective Factor Against Substance Use and Other Risk Behaviors Among Latino Adolescents

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Abstract

Objective: Grit, defined as "working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in progress," is strongly associated with academic achievement and life success and may also be associated with health outcomes and behaviors. We examined predictors of grit, and the association between grit and health behaviors among at-risk Latino adolescents.

Methods: We analyzed baseline survey data collected in 2013–2014 from a sample of 1270 9th graders in low-income neighborhoods of Los Angeles. We examined factors associated with grit and whether grit is associated with substance use and delinquent behaviors, controlling for adolescent and parent sociodemographic factors.

Results: In a sample of mostly Latino adolescents (89.5%), compared to those with low grit, those with high grit had significantly lower odds of alcohol use in the last 30 days (odds ratio 0.30, $P < .001$), marijuana use (odds ratio 0.21, $P < .05$), and fighting (odds ratio 0.58, $P < .05$). Involvement in delinquent behavior was also lower ($\beta = -0.71$, $P < .001$). Factors associated with more grit included authoritative parenting style, parental employment, and high self-efficacy scores.

Conclusions: Grit may be an important candidate protective factor against substance use and other risk behaviors among Latino adolescents.

Keywords: adolescents; grit; Latinos; noncognitive skills; risk behaviors; substance use

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What's New

Although grit is increasingly being recognized as a predictor of academic and socioeconomic success, less is known about its link with health. We found that grit may be a protective factor against substance use and delinquent behaviors among adolescents.

EDUCATION AND HEALTH outcomes are closely linked, but some evidence suggests that simply increasing academic achievement may not reduce risky behaviors or improve health.[1,2] Prior research on human capacity building suggests that life success depends on much more than the acquisition of specific academic skills learned in school such as literacy and math.[3–5] It has been theorized that social-emotional and other noncognitive skills learned in childhood and adolescence are the key ingredients that lead to better educational and health trajectories over the life course, including long-term academic success, employment, marriage stability, health behaviors and outcomes, and incarceration rates.[3,5–8]

Noncognitive factors are a set of attitudes, behaviors and strategies including motivation, perseverance, self-control, and grit, which contribute to one's ability to recognize and manage emotions, forsake short-term for long-term gratification, overcome failures, and make more responsible decisions. The causal impact of noncognitive factors on life success is supported by research showing that social emotional learning programs can improve academic performance, promote positive adjustment, and reduce problem behaviors in school.[9,10] Although noncognitive factors are increasingly being recognized as strong predictors of academic and socioeconomic success, much less is known about their link with health and health behaviors.

Given the strong association between education and health, as well as the need to understand how to prevent substance use and delinquent behaviors among adolescents, we wanted to explore whether one particular noncognitive factor—grit, defined as "working strenuously toward challenges, maintaining effort and interest over years despite failure, adversity, and plateaus in

progress"[11]—might also be connected to health and risk behaviors. Grit has recently been identified as a strong and important predictor of academic and life success.[10,11] In studies by Duckworth and colleagues,[11] individual differences in grit accounted for variance in successful academic outcomes over what could be explained by traditional intelligence quotient (IQ) tests. They also found that grit mediated the final performance of spelling bee competitors, enabling them to engage in sustained activity of deliberate practice that increased their overall performance.[12] In general, grit has been associated with long-term academic success, employment, marriage stability, future exercise, good health behaviors, and lower incarceration rates.[3,5–8] However, the relationship between grit and adolescent risk behaviors has not been examined previously. We hypothesized that grit might be associated with lower levels of delinquent behaviors and substance use.

Analyzing data from a sample of mostly Latino adolescents living in low-income neighborhoods of Los Angeles, we examined potential factors associated with grit and the relationship between grit and risk behaviors, including alcohol use, marijuana use, fighting, and delinquent behaviors. We chose to study grit in this population, as previous studies on this noncognitive factor have not been tested among them.

METHODS

We analyzed the baseline data from the RISE UP study, which is a natural experimental study designed to understand the impact of high-performing school environments on adolescent health and health behaviors. RISE UP is a follow-up study from RISE (Reducing health Inequities through Social and Educational change Study),[1] which surveyed applicants to 3 high-performing public charter high schools in low-income neighborhoods of Los Angeles to test the hypothesis that exposure to such schools reduces risky behaviors. For the RISE UP study, in 2013 we identified 35 public charter high schools in Los Angeles that were in the top tertile of performance based on the 2012 Growth Academic Performance Index[13] among all 507 Los Angeles public high schools. Of these schools, we selected 5 charter schools that had a student population at least 75% underserved as measured by free/reduced-price lunch eligibility. We also selected for participation in this study schools that had an admissions lottery with at least twice the number of applicants as seats available.

We sought to recruit students who had applied to attend 9th grade for fall 2013 or fall 2014 at 1 or more of the 5 high-performing charter public high schools. We randomly selected students from the applicant list with the goal of obtaining equal numbers of students who were and were not offered admission to create our experimental and control groups. We excluded students who could not be contacted or who had moved out of the Los Angeles area before matriculating to the 9th grade. We also excluded those who received preferential admission as a result of having a sibling who was already accepted into the school.

After being clearly informed that participation in the study would have no bearing on their admission to the schools, obtaining written informed consent from the parent, and obtaining an assent form from the participating students, we performed 90-minute face-to-face baseline interviews with the students between March of 8th grade through November of 9th grade. Individual students participated in a face-to-face interview with a researcher at a location convenient to them—usually in their home, at school, or in a public place (like a library or coffee shop). The interview consisted of the researcher asking them questions and providing response options. Student responses were recorded by the researcher on a laptop or iPad. When the survey asked sensitive questions, including substance use and other risk behaviors, the students responded by entering answers themselves using an audio-enhanced, computer-assisted self-interview (audio CASI) on a laptop or iPad. This study is based on the baseline data collected.

The survey includes measures of 30-day alcohol and substance use, fighting, and delinquent behaviors taken from national studies of adolescent risk behaviors including the Youth Risk Behavior Survey, Monitoring the Future Survey, and the National Longitudinal Study of Adolescent to Adult Health.[14–16]

We measured grit using the previously validated Short Grit Scale.[11,17] This scale consists of 8 statements like "I finish whatever I begin," "I am diligent," and "New ideas and projects sometimes distract me from previous ones," and are asked with response options ranging from "very much like me" to "not like me at all." With some questions requiring reverse scoring, all items are averaged to get an overall grit score ranging from 1 (not at all gritty) to 5 (extremely gritty). For our study, we examined the correlation between the grit items and found that one of the statement items ("setbacks don't discourage me") correlated with the other 7 items in a direction opposite from what would be expected. We suspect that respondents were confused by this item because it asks them to affirm a negative statement. The Cronbach's alpha for the scale including all 8 items was 0.63 and was 0.67 for the 7-item scale without this statement. Given this, we chose to drop this item from the final grit scale score for this analysis.

We also measured general self-efficacy using the previously validated New General Self-Efficacy Scale with a Cronbach alpha of 0.90 in this sample,[18] and hopelessness using the previously validated Brief Hopelessness Scale with a Cronbach alpha of 0.87.[19] Students self-reported their grade point average (GPA) and completed the Index of Parenting Style,[20] which assesses adolescents perceptions regarding their parents' acceptance/involvement (Cronbach $\alpha = 0.62$) and strictness/supervision (Cronbach $\alpha = .63$).

First we performed multivariable linear regression analyses to examine factors that might contribute to grit, using a staged model approach. For this analysis, grit scores were standardized, which allows for easier interpretation of the β coefficients, such that a 1-unit change in the β coefficient

(ie, the magnitude of the association between the predictor and grit) corresponds to a 1 standard deviation change in grit. Model 1 included demographic variables (gender, ethnicity, place of birth, English-language status) and parental variables (parents' place of birth, education, employment level, parenting style). Model 2 included additional variables that may be predictors of grit but that might also have a bidirectional causal relationship with grit. These variables were GPA and self-efficacy.

We then conducted regression analyses looking at grit and its relationship with use of alcohol and marijuana in the last 30 days, involvement in a fight in the last year, and engagement in delinquent behaviors. Alcohol and marijuana use and fighting are binary outcomes; we thus used logistic regression models for these outcomes. The delinquency variable is a continuous variable that is positively skewed, with a large proportion of the sample with zero values. Given this distribution for the delinquency scale, we used a negative binomial model.[21,22] We categorized the primary independent variable, grit, into tertiles, on the basis of the distribution of grit scores to better understand if the outcome variables levels were affected by levels of grit and identify a dose–response relationship with the outcomes. We controlled for demographic variables (gender, ethnicity, place of birth, English-language status), parental variables (parents' place of birth, education, employment level, parenting style), and GPA. Because it is possible that the effect of grit on risk behaviors may differ among different groups of adolescents (eg, male and female adolescents), we tested for the following interaction terms with grit: gender, Latino ethnicity, being US born, and being a native English speaker. We imputed missing data for all variables in our model using multiple imputations with chained equations, using 20 replicates.[23]

Although we controlled for a number of sociodemographic characteristics of the adolescents and parents when examining the relationship between grit and adolescent risk behaviors, we may not have controlled for all potential confounders. To adjust for potential omitted variables, we conducted a sensitivity analysis using doubly robust methods.[24] Because this method requires a dichotomous independent variable, we performed regression models with grit dichotomized at the median. We then examined the relationship between grit and the outcomes using both standard regression techniques and doubly robust methods. We used Stata 14 statistical software for all analyses.[25]

RESULTS

A total of 1996 students were identified from the applicant list for the 5 charter schools to participate in our study. One hundred forty (7.0%) were excluded for sibling admission preference, 27 (1.4%) for moving out of the Los Angeles area, and 320 (16.0%) because they could not be located or contacted. Of the remaining 1509 students eligible for the study, 239 (15.8%) refused participation. The final sample consisted of 1270 students.

The baseline sample of 9th grade students was mostly Latino (89.5%) and US born (87.6%), yet less than half (41.2%) reported being native English speakers (Table 1). More than half (55.3%) reported having at least 1 parent who graduated from high school, and most reported having at least 1 parent who was working full time (87.2%). Seventeen percent of students categorized their parents' parenting styles as neglectful, compared with authoritative

Table 1. Student Participant Characteristics (n = 1270)

Characteristic	Value*
Individual student variables	
Male	47.40
Latino ethnicity†	89.53
US born	87.64
Native English speaker	41.18
Grade point average (self-reported)	
>3.5	27.87
3.1–3.5	30.55
2.6–3.0	24.57
2.0–2.5	12.68
<2.0	3.86
Grit‡	3.42 (0.56)
Self-efficacy§	33.67 (4.25)
Hopelessness‖	1.67 (0.64)
Parental variables	
At least 1 parent is US born	26.54
At least 1 parent is a high school graduate	55.28
At least 1 parent is employed full time	87.24
Parenting style¶	
Average	49.92
Neglectful	20.79
Indulgent	9.21
Authoritarian	8.90
Authoritative	11.18
Behavioral outcomes	
Stated using alcohol in the last 30 d	6.93
Stated using marijuana in the last 30 d	3.86
Were in a fight in the last 12 mo	16.69
Were involved in delinquent behavior in the last 12 mo#	
Lied to parents or guardians	40.79
Damaged property that didn't belong to them	11.57
Took something from a store without paying for it	9.06
Deliberately painted graffiti or signs	6.22
Ran away from home	4.09
Sold marijuana or other drugs	1.73
Drove a car without owner's permission	1.57
Threatened to use a weapon to get something from someone	1.50
Went into a house or building to steal something	0.94
Delinquency scale score	1.23 (2.11)

*Data presented as % or mean (SD).
†A total of 5.4% were black and 5.2% white/mixed/other.
‡Grit scale ranges from 1 to 5.
§Self-efficacy scale ranges from 8–40 with higher scores indicating more self-efficacy.
‖Hopelessness scale ranges from 1 to 5, with higher scores indicating higher levels of hopelessness.
¶Parenting style index allows for the classification of families into theoretically meaningful categories.
#Consists of 9 behaviors, with response options ranging from never to 6 or more times.

(20.8%), authoritarian (8.9%), and indulgent (9.2%). The remaining categorized their parents as having a mixed parenting style (49.9%).

The mean grit score for the sample was 3.4 (on a scale of 1 to 5). Self-efficacy mean score was 33.7 (on a scale from 8 to 40). Hopelessness mean score was 1.7 (on a scale of 1 to 5). None of these sets of scores showed statistically significant differences between male and female adolescents.

We analyzed substance use and delinquency behaviors as our outcomes. In our sample, 6.9% reported using alcohol in the last 30 days, and 3.9% reported using marijuana in the last 30 days. Seventeen percent (16.7%) reported being in a fight in the last year. In terms of delinquent behaviors, lying to parents or guardians about where they had been or who they were with was the most common behavior (40.8%), followed by damaging property that didn't belong to them (11.6%), taking something from a store without paying for it (9.1%), and deliberately painting graffiti or signs on someone else's property or in a public place (6.2%). Less than 5% of the sample stated having run away from home (4.1%), driving a car without permission (1.6%), going into a house or building to steal something (0.94%), using or threatening to use a weapon to get something from someone (1.5%), and selling marijuana or other drugs (1.7%).

Table 2 shows the results of linear regression models identifying factors associated with grit. Because self-reported GPA, hopelessness, and self-efficacy may have had a bidirectional causal relationship with grit, we added these variables in a second-stage model. In model 1, which looked only at student demographics and parental characteristics, parenting style was the strongest factor associated with grit. Compared to mixed parenting style, neglectful parenting style was associated with lower grit scores ($\beta = -0.32$, $P < .001$), and authoritative parenting style was associated with higher grit scores ($\beta = 0.40$, $P < .001$). Grit scores were also slightly lower among boys ($\beta = -0.12$, $P = .036$) and higher among those with at least 1 full-time-employed parent ($\beta = 0.26$, $P = .002$). Our results were slightly different in model 2, which also included GPA and self-efficacy. In this model, neglectful parenting style was still associated with lower grit scores ($\beta = -0.19$, $P = .005$), and authoritative parenting style was still associated with higher grit scores ($\beta = 0.18$, $P = .043$), but the associations were not as strong. Having high levels of self-efficacy ($\beta = 0.59$, $P < .001$) was the factor associated most strongly with grit. Lower GPAs were associated with lower grit scores in a dose–response fashion.

Table 3 shows the relationship between grit and adolescent behavioral outcomes, adjusting for student demographics, parental characteristics, and student self-reported GPA. We found no significant interaction terms between grit and gender, Latino ethnicity, being US born, or being a native English speaker. Thus, we report results of the regression model without these interaction terms. Compared to those with low grit, we found that students with high grit had lower odds of alcohol use in the last 30 days (odds ratio 0.30, $P = .002$), lower marijuana use in the last 30 days (odds ratio 0.21, $P = 0.012$), less fighting in the last 12 months (odds ratio 0.58, $P = .014$), and lower engagement in delinquent behaviors ($\beta = -0.71$, $P < .001$). There also appears to be a dose–response factor to grit, with increasing levels of grit associated with

Table 2. Linear Regression of Factors Associated With Grit†

Predictor (Reference)	β Coefficients From Linear Regression Model (95% Confidence Interval)		
	Unadjusted	Model 1	Model 2
Parenting (mixed)			
Neglect	−0.33 (−0.48, −0.19)***	−0.32 (−0.46, −0.17)***	−0.19 (−0.33, −0.06)**
Indulgent	0.10 (−0.10, 0.30)	0.12 (−0.08, 0.32)	0.00 (−0.18, 0.19)
Authoritarian	−0.10 (−0.30, 0.10)	−0.11 (−0.31, 0.09)	−0.09 (−0.27, 0.10)
Authoritative	0.42 (0.24, 0.60)***	0.40 (0.22, 0.58)***	0.18 (0.01, 0.35)*
Male	−0.14 (−0.25, −0.03)*	−0.12 (−0.23, −0.01)*	−0.03 (−0.13, 0.08)
Latino ethnicity	−0.06 (−0.24, 0.12)	−0.02 (−0.21, 0.17)	0.06 (−0.11, 0.24)
US born	0.10 (−0.08, 0.27)	0.07 (−0.10, 0.25)	0.08 (−0.09, 0.24)
Native English speaker	0.06 (−0.06, 0.17)	0.06 (−0.07, 0.19)	0.06 (−0.06, 0.18)
Parent graduated from high school	0.06 (−0.05, 0.18)	0.01 (−0.11, 0.13)	0.00 (−0.12, 0.11)
Parent employed full time	0.28 (0.11, 0.44)***	0.26 (0.10, 0.43)**	0.22 (0.06, 0.37)**
Parent born in United States	0.02 (−0.11, 0.15)	−0.06 (−0.20, 0.09)	−0.03 (−0.16, 0.11)
Grade point average (>3.5)			
3.1–3.5	−0.31 (−0.45, −0.16)***		−0.19 (−0.33, −0.06)**
2.6–3.0	−0.49 (−0.64, −0.33)***		−0.30 (−0.45, −0.15)***
2.0–2.5	−0.67 (−0.86, −0.48)***		−0.43 (−0.61, −0.24)***
<2.0	−0.88 (−1.21, −0.56)***		−0.56 (−0.87, −0.25)***
Grades not used/missing	0.24 (−0.58, 1.06)		0.32 (−0.43, 1.07)
Self-efficacy (low)			
Medium	0.41 (0.28, 0.55)***		0.26 (0.12, 0.40)***
High	0.83 (0.71, 0.95)***		0.59 (0.45, 0.72)***

*$P < .05$.
**$P < .01$.
***$P < .001$.
†Grit scale is standardized scores of grit (SD = 1).

Table 3. Predictors of Substance Use, Fighting and Delinquency

Predictor (Reference)	Relative Odds (95% CI) of: Alcohol Use in Last 30 Days	Marijuana Use in Last 30 Days	Being Involved in Fight in Last 12 Months	β Coefficient (95% CI) of Model Predicting Delinquent Behavior in Last 12 Months†
Grit level (low)‡				
Average	0.71 (0.43, 1.20)	0.73 (0.37, 1.45)	0.79 (0.54, 1.16)	−0.29 (−0.50, −0.08)**
High	0.30 (0.14, 0.65)**	0.21 (0.06, 0.71)*	0.58 (0.38, 0.90)*	−0.71 (−0.94, −0.48)***
Self-efficacy (low)§				
Medium	0.67 (0.35, 1.26)	0.65 (0.27, 1.55)	1.10 (0.72, 1.67)	−0.27 (−0.50, −0.05)*
High	0.71 (0.37, 1.38)	0.78 (0.32, 1.95)	1.18 (0.77, 1.80)	−0.36 (−0.59, −0.14)**
Hopelessness (low)				
High	2.56 (1.48, 4.43)***	3.16 (1.45, 6.89)**	1.40 (0.98, 1.99)	0.04 (−0.15, 0.24)
Individual student variables				
Male	0.56 (0.35, 0.90)	0.68 (0.36, 1.27)	1.78 (1.28, 2.48)***	−0.10 (−0.27, 0.08)
Latino ethnicity	0.85 (0.39, 1.85)	0.72 (0.25, 2.05)	0.82 (0.49, 1.38)	0.22 (−0.08, 0.53)
US born	0.88 (0.43, 1.82)	0.64 (0.28, 1.48)	0.49 (0.31, 0.78)**	−0.08 (−0.34, 0.18)
Native English speaker	1.14 (0.68, 1.94)	0.86 (0.42, 1.75)	1.25 (0.86, 1.81)	−0.07 (−0.27, 0.13)
Parental variables				
At least 1 parent is US born	1.17 (0.65, 2.10)	0.97 (0.42, 2.20)	1.41 (0.94, 2.13)	0 (−0.23, 0.23)
At least 1 parent graduated high school	1.10 (0.65, 1.84)	1.29 (0.66, 2.51)	1.06 (0.74, 1.51)	0.17 (−0.03, 0.36)
At least 1 parent employed full time	1.35 (0.68, 2.68)	1.16 (0.49, 2.77)	0.69 (0.45, 1.07)	0.07 (−0.19, 0.32)
Parenting style (mixed)				
Neglectful	1.74 (1.04, 2.92)*	2.22 (1.12, 4.41)*	0.97 (0.65, 1.45)	0.76 (0.55, 0.97)***
Indulgent	1.81 (0.82, 4.00)	2.77 (1.00, 7.64)*	1.07 (0.62, 1.84)	0.16 (−0.15, 0.47)
Authoritarian	0.54 (0.18, 1.61)	0.60 (0.13, 2.73)	0.88 (0.48, 1.62)	−0.05 (−0.37, 0.27)
Authoritative	0.70 (0.24, 2.05)	0.99 (0.21, 4.55)	0.53 (0.27, 1.06)	−0.35 (−0.67, −0.02)*
Grade point average (>3.5)				
3.1–3.5	1.02 (0.51, 2.05)	1.59 (0.47, 5.33)	1.53 (0.87, 2.70)	0.13 (−0.11, 0.37)
2.6–3.0	1.13 (0.56, 2.28)	2.70 (0.85, 8.58)	2.44 (1.44, 4.15)***	0.19 (−0.06, 0.44)
2.0–2.5	1.39 (0.64, 3.05)	3.48 (1.00, 12.05)*	3.33 (1.88, 5.89)***	0.30 (−0.01, 0.61)
<2.0	1.52 (0.50, 4.57)	3.65 (0.82, 16.28)	3.66 (1.69, 7.94)***	0.54 (0.11, 0.97)*

CI indicates confidence interval.

*$P < .05$.

**$P < .01$.

***$P < .001$.

†Given the skewed distribution of the delinquency scale, we used negative binomial regression for this analysis. Delinquency scale scores ranged from 0 to 22.

‡Scale divided by tertiles.

§Scale divided at median.

decreasing odds of engaging in risky behaviors. Although we controlled for several potential confounding factors, such as parenting, self-efficacy, and hopelessness, there may have been additional unobserved confounders that we did not adjust for. To address the potential for omitted variables bias, we used doubly robust methods in a sensitivity analysis and found similar results (results not shown).

DISCUSSION

Although education and health outcomes are closely linked, it has been theorized that social-emotional and other noncognitive skills learned in childhood and adolescence are the key ingredients that lead to both better educational and health trajectories over the life course. Educational researchers have found that social-emotional skills can lead to improved scholastic performance, including more positive social behaviors, fewer conduct problems, and better grades.[9,26] Yet much less is known about how noncognitive skills are linked to health and health behaviors. For some social-emotional factors, such as motivation, self-esteem, and self-concept, there is evidence of associations with lower rates of substance use and teen pregnancy,[3,5,7,27] but much less is known about the health associations of other newly identified social-emotional factors such as grit. Recent research has shown that those with more grit are less likely to drop out of their life commitments, like work, school, and marriage, and that grit, more than conscientiousness, was predictive of stage of change for exercise participation.[6,8] However, to our knowledge, the relationship between grit and health risk behaviors has not been examined previously.

As we hypothesized, we found that a higher grit score was associated with lower levels of risk behaviors among our sample of students from low-income neighborhoods in Los Angeles. Specifically, grit was associated with a substantially lower likelihood of alcohol use, marijuana use, and involvement in delinquent behavior. Although we could not determine the mechanism or directionality of how grit and delinquent behaviors are linked, we suspect that grit measures perseverance and working hard despite failure and adversity, which may lead to more life successes and contribute to adolescents' self-confidence, self-efficacy, and desire to invest in their future by making responsible decisions. In addition, there is also the possibility that grit is closely linked with self-control,[28] which is also associated with delay of gratification and lower-risk behaviors.[29] Thus, we analyzed the relationship between grit and self-efficacy to better understand their relationship with other aspects of adolescents' social-emotional processes. We hypothesized that grit might be associated with self-efficacy scores. Our findings revealed that higher self-efficacy scores were indeed associated with higher grit scores. Thus, further analysis is needed to determine the interplay and potential causal relationships among grit, self-efficacy, and other social-emotional development processes in adolescents.[30]

Our findings are relevant given the influence of schools on children and the growing interest among educators to promote health and social outcomes.[2,31] They are also relevant to those interested in looking at assets and protective factors in communities and individuals that can be tapped to reduce substance use and risk behaviors. Moreover, our findings underscore the potential importance of parenting on the development of grit, as we found that authoritative parenting style (higher involvement and strictness) was associated with higher grit scores and neglectful parenting style (low involvement and strictness) was associated with substantially lower grit scores. These findings are similar to those of Carneiro and Heckman,[32] which found that noncognitive skills are strongest among children who have more engaged parents.

LIMITATIONS

Given the cross-sectional design of our study, we cannot determine whether grit is causally associated with adolescent substance use or delinquent behaviors or whether changes in grit over time are related to engagement in risky behaviors. It is possible that the health behaviors and other outcomes examined actually lead adolescents to develop less grit, or that all simply covary in response to an unmeasured driver. Although we used doubly robust methods to adjust for potential omitted variables bias, this method may not fully account for unmeasured confounders. In addition, our study relied on results from a face-to-face interview and self-reports of grades, grit, parenting styles, and risk behaviors; thus, our results may be subject to social desirability and self-reported bias.[33,34] Our study is also limited to a sample of early adolescents who were mostly Latino from low-income neighborhoods. Thus, our results may not generalize to other populations of adolescents. Last, our study findings may not generalize to adolescents whose parents do not apply to charter schools on their behalf or to other school environments, including successful noncharter public or private schools.

CONCLUSION

Although grit is widely accepted as an important noncognitive skill for success in life, its impact on risk behaviors had not been explored previously. Our findings suggest that grit may be a potential protective factor against substance use and delinquent behaviors among low-income Latino adolescents. This is an important finding, as risk behaviors in adolescence can have an impact on adult health and there is a need to design early prevention efforts.[35,36] Yet the exploratory nature of this study in the overlapping arenas of noncognitive skills, adolescent risk behaviors, and educational environments leads to additional potential research questions: How do grit levels and health behaviors change over time and during the transition to adulthood? How do varying cultural, social, and educational environments influence grit? How does grit relate to the ability to resist peer pressure and risk behaviors during adolescence? What comes first, having established long-term goals or grit? How might these influence risk behaviors? Hence, there is a clear

need to better understand the relationships between noncognitive factors, health, and risk behaviors of adolescents to learn when and how these factors are established and to determine whether improving grit, as well as other noncognitive factors, leads to better health outcomes in the long run.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.acap.2015.12.016.

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