



Profiles of and Correlations Among Mindset, Grit, and Optimism in Adolescents with Learning Disabilities: A Pilot Study

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Abstract

Despite increased interest in the role of “noncognitive skills” in educational contexts, there has been little exploration of their implications for youth with disabilities. We explored several constructs under the “noncognitive skills” umbrella using a survey comprised of items from the Implicit Theories of Intelligence Scale: General (Dweck, 2000) and Self-Theory (De Castella & Byrne, 2015); the Short Grit Scale (Duckworth & Quinn, 2009); and the Life Orientation Test – Revised (Scheier, Carver, & Bridges, 1994). We found notable correlations among scale scores, and preliminarily explored scale reliabilities with this population. Although sample size was small, these data are of value because they represent the first explicit exploration of these variables and their interrelationships in adolescents with learning disabilities.

Keywords: learning disabilities, mindset, grit, optimism, secondary special education

Interest in the potential role of noncognitive skills in learning outcomes for K-12 students has intensified over the past decade, with calls to apply our understandings of noncognitive skills to inform education policy and practice (Garcia, 2014). Evidence from the fields of human development, psychology, and education, suggests that noncognitive skills are related to academic and lifelong success for children and adolescents (Farrington et al., 2012; Kautz, Heckman, Diris, Weel, & Borghans, 2014). Unfortunately, in spite of the encouraging current discourse and research on these noncognitive skills, we have noted a crucial omission in both the policy *and* education research landscape: the explicit investigation of these constructs for learners identified with disabilities. This is a concerning gap in the literature, because learners identified with disabilities and served through special education have consistently poorer post-high school outcomes than do their nondisabled peers (Newman et al., 2011). Given the

importance of noncognitive skills in supporting the success of general education students, there is a critical need to explore these skills in students with disabilities.

Noncognitive skills can be broadly conceived of as patterns of thoughts, feelings and behaviors that individuals cultivate, refine and develop over the lifespan (Garcia, 2014). Although the term “nonacademic skills” (e.g., not related to literacy, math, or written expression) may be a more precise descriptor (since all mental processes require cognition), we will use the term noncognitive skills to maintain consistency with the current literature. We also believe it is important to note that use of the word “skills” is potentially misleading. As evidenced by the Garcia definition above, many of the constructs captured under the umbrella of noncognitive skills include dispositions, psychological orientations, attitudes, characteristics, and traits, as well as domain specific skills (e.g., behavioral, emotional), and cognitive habits of mind requiring certain skills (to name a few). Thus, throughout the manuscript we use the words constructs, dispositions, orientations, and skills to capture the diversity of concepts embedded within this term “noncognitive skills.”

Although a review of the totality of potential noncognitive skills schools could address is beyond the scope of this paper, Garcia (2014) broadly states, “since noncognitive skills matter greatly and can be nurtured in schools, developing them should be an explicit goal of public education” (p. 4). Noncognitive skills such as critical thinking or problem-solving skills are intuitively related to academic learning and are often targeted for intervention (see Abrami et al., 2008; Garcia 2014). However, other noncognitive skills are equally important and include things like “personal relationships between students and teachers...self-regulation, persistence, academic confidence, teamwork...and communication skills” (Garcia, 2014, p. 3). We are particularly interested in noncognitive skills and dispositions regarding academic confidence and persistence. Our interest is driven by compelling findings from the field of psychology, in particular those of Dweck and colleagues on the construct of mindset (Blackwell, Trzesniewski & Dweck, 2007), those of Duckworth and colleagues on the construct of grit (Duckworth, Peterson, Matthews, & Kelly, 2007), and research by Seligman and colleagues on the construct of optimism (Seligman, 1998; Seligman, Reivich, Jaycox & Gillham, 2007). Evidence suggests that these three constructs – mindset, grit, and optimism – are related to outcomes associated with academic success (Dweck, 2006), adult achievement (Duckworth et al., 2007) and overall well-being (Scheier, Carver, & Bridges, 2001). However, throughout the scholarly literature, there are no explorations of how these psychological constructs function for students with disabilities, resulting in a critical gap in this literature.

Mindset

The term *mindset* refers to a person’s theory of intelligence; in this context, the word intelligence implies what some people might call “smarts,” “abilities,” or “talents” (and is not constrained to notions of intelligence quotients [IQ]). Dweck and colleagues (Blackwell et al., 2007; Dweck, 2000) have explored students’ notions of intelligence and found that their underlying beliefs about intelligence tend toward either a “fixed mindset,” the view that intelligence is a stable characteristic that cannot change much, or a “growth mindset,” the belief that it is possible to increase intelligence through effort and learning (Dweck, 2000). Researchers have been particularly interested in exploring the effects of helping students cultivate more

growth-oriented mindsets and understanding how those shifts in mindset influence students' approaches to learning and outcomes. Several studies have indicated that mindset is indeed malleable, especially in middle and high school students, and is associated with positive gains in student outcomes, including higher academic achievement, lower stress, and improved physical health (Blackwell et al., 2007; Paunesku et al., 2015; Yeager et al., 2014). For example, Paunesku et al. (2015) found that a short online mindset intervention had significant effects on satisfactory course completion (i.e., A, B, C, pass, or credit) in core academic classes and GPA for high school students, and the effects were most pronounced for the lowest achieving students. However, these studies did not explicitly include students identified with disabilities and receiving special education services.

Grit

Grit is defined as passion and perseverance in pursuing a long-term goal (Duckworth et al., 2007). Research suggests that youth and young adults who display more grit spend more time deliberately practicing skills (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011) and demonstrate higher levels of academic achievement (Strayhorn, 2014) and high school graduation rates (Eskreis-Winkler, Shulman, Beal, & Duckworth, 2014). Youth with high levels of grit are more likely to persist at tasks that are tedious and difficult as they pursue an important long-term goal. Psychologists have explored the construct of grit in order to define it more clearly, but research on the efficacy of interventions to increase grit is still emerging. For example, in two different studies, researchers developed an intervention in which students were prompted to write about their larger goals and to identify strategies for overcoming obstacles in achieving those goals. This grit intervention was associated with improvements in GPA (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011) and increased studying for the Preliminary SATs (Yeager et al., 2015). This early evidence suggests that grit might be a target for meaningful intervention. However, again, students with disabilities are not included in this body of scholarly work. In fact, scholarly investigations of the grit construct often include participants who are considered "high-achieving" by societal standards, such as National Spelling Bee participants or West Point cadets (Duckworth et al., 2007), a sample population in which individuals with disabilities are often under-represented.

Optimism

An additional construct that is not well-represented in the Garcia (2014) policy paper targeting non-cognitive skills, and one that we suggest for consideration among noncognitive skills to be taught in school (particularly for students with disabilities) is optimism. Optimism, a construct that has been defined primarily by the field of psychology, refers to both *expectancy* and *explanatory* processes (Boman, Furlong, Shochet, Lilles, & Jones, 2009; Gillham, Shatte, Reivich, Seligman, 2001). Optimism is conceptualized as a dispositional orientation that shapes what people expect of their experiences, as well as how people explain the experiences they have had, and use those perceptions to promote particular coping responses (Boman et al., 2009). The degree to which one is optimistic, then, informs the individual's perceptions and explanations of struggles and adversity. Seligman (2006) describes optimism as including a perception of setbacks as both temporary and manageable. Researchers have also suggested that the construct also reflects elements of agency. For instance, Scheier and Carver (2014) state that optimism

“also relates to motivation: optimistic people exert effort, whereas pessimistic people disengage from effort” (p. 293). Thus, while optimism is a cognitive construct, it is closely linked to emotions and behaviors.

Considering the difficulties encountered by many students as they approach academic tasks, optimism may serve as an important nonacademic, educational target which has, to date, been overlooked. Especially for students with disabilities who often encounter significant difficulties in school, a focus on the cultivation of optimistic orientations to explain difficulties, and promote expectations that difficulties can be managed, may have an important role to play in special education programming. Seligman (1998) asserts that optimism is malleable and can be learned, and optimism maps to how individuals think, feel and act, especially in situations involving difficulty. In light of the complex interactions between the thoughts and emotions of students with disabilities and their approaches to learning, an exploration of the role of optimism in learning for students with disabilities is warranted.

Conceptual Framework for Current Study

Upon examination of the constructs of mindset and grit, we see optimism embedded in both constructs. Duckworth and Eskreis-Winkler (2013) have noted that the constructs are “conceptually related” and a handful of people have explored the relationship between grit and optimism quantitatively. For example, Shishim (2012) found a statistically significant correlation between optimism and grit in undergraduate students but the effect was small ($r = .12$). Watson (2013) also found a significant correlation between grit and optimism in undergraduates ($r = .385$). However, neither of these studies investigated the profiles of and relationships among these constructs for secondary students or for students with disabilities. Thus, the goal of the current research was twofold: 1) to explore the correlations among mindset, grit and optimism for high school students with learning disabilities (LD) and begin to understand how those constructs profile for adolescents with LD, and 2) to pilot an approach to basic research exploring these constructs in adolescents with LD. (For the sake of clarity, when we refer to adolescents with LD, we mean adolescents who, despite average or above average IQs, struggle to achieve as expected in academic domains including reading, math, and writing. These students often demonstrate academic achievement and grades well below what would be expected of them based on their intelligence scores).

It is important to note that the noncognitive skills on which we have chosen to focus are embedded in the relatively recent field of positive psychology. We have intentionally situated our work related to students with disabilities within a positive psychology framework for empirical as well as philosophical reasons. First, empirically, a review of the available research evidence suggests that a focus on adaptive positive function is a critical component of building strengths and improving general well-being (see Sin & Lyubomirsky, 2009), an outcome we feel should be a target of education as well. However, our intentional application of positive psychology frameworks for adolescents with LD is also a direct challenge to what has been historically, a predominantly deficit-focused approach in the field of special education. This focus on the ways in which students are *not* achieving has led to a host of special education interventions focused on remediation. While we agree that a focus on remediating and building academic skills is an important target to help students with disabilities benefit from the general

education curriculum, we feel this principal focus on academic skill remediation is incomplete. We hypothesize that outcomes for students with disabilities will be improved when students are engaged in an educational context that intentionally focuses on positive noncognitive skills and outcomes associated with overall psychological well-being (Tuckwiller & Dardick, 2015). We suggest that all students, and especially those at risk due to the stigmatization of disability in our culture and other challenges these students face, would benefit from an explicit focus on positive constructs. Thus, the current investigation was a first step in developing understandings about how these positive psychological variables profile for students with learning disabilities, a necessary step in our eventual goal to build an evidence-supported positive psychology framework for secondary special education.

After a thorough review of the special education and psychology literature, we could not find a study that examined the constructs of mindset, grit, and optimism explicitly within the context of special education and/or for adolescents with disabilities. We did find limited evidence that these students are at risk of developing less adaptive “fixed mindsets” (Baird, Scott, Dearing, & Hamill, 2009; Saracoglu, Minden, & Wilchesky, 1989), but we were not able to locate any studies addressing grit and optimism explicitly for students with learning disabilities. Given this research gap and the relationship of these noncognitive skills to the achievement and success of youth without disabilities, we believe it is important to gain an initial understanding of these constructs for students with disabilities. Therefore, we conducted a preliminary pilot investigation of the profiles and correlations of mindset, grit, and optimism in adolescents with LD. Data from this pilot study will help inform hypotheses and research protocols for a larger-scale study aiming to uncover noncognitive variables that can be addressed in secondary education settings to improve outcomes for students with disabilities.

Method

Procedure

After obtaining the appropriate IRB approvals, we recruited students in grades 9-12 from a private school in a moderately sized mid-Atlantic city. This private school specifically serves students who have learning disabilities (LD)/differences (ld) in grades kindergarten through 12th grade. (The school acknowledges a wide spectrum of learners and learning profiles and encourages students to view their learning differences as normal variations on a spectrum rather than as disabilities. We acknowledge and support this orientation, and only use the term “learning disability (LD)” throughout the paper to align with commonly-used language in the field of special education.) The first author attended a parent’s coffee meeting (held at the school on a regular basis) to provide information about the study directly to parents. She also attended a student assembly to inform students about the study and consent procedures. A research study coordinator – a counselor at the school – was identified as the main point of contact for research-related business, and she also disseminated informational flyers (via posting them in the school and emailing them to parents). We obtained consent from students over 18 years of age, and parent consent and student assent for students under 18 years of age. With the help of the school-based study coordinator, we scheduled several sessions in which students were provided access to the online survey (administered through Qualtrics). Because it was possible that among our sample of students with LD, there might be students with significant reading difficulties, we provided on-site support from a university-based research assistant and the school-based study

coordinator during the completion of the survey. However, in this pilot with our selected instruments, no students required assistance during the survey administration.

Sample

We recruited high school students (grades 9-12) who attend a private school serving students with learning disabilities and differences. Students at the school have a range of learning disability diagnoses including dyslexia, dyscalculia, learning disorder – not otherwise specified, and language processing disorders. We invited 128 students to participate in the survey research, and we had a response rate of 13% ($n = 17$). See Table 1 for sample demographic information.

Table 1
Demographic Characteristics of Participants

Demographic Characteristics	Number (Percentage)
Gender	
Female	11 (65%)
Male	6 (35%)
Grade	
9 th grade	5 (29%)
10 th grade	6 (35%)
11 th grade	4 (24%)
12 th grade	2 (12%)
Race/Ethnicity	
European/Caucasian	12 (71%)
African American	2 (12%)
Latino	1 (6%)
Multiethnic	2 (12%)

Note. Percentages may equal more than 100% due to rounding.

Measures

Our survey instrument consisted of 5 scales (mindset: general, mindset: self-theory, optimism, grit, and self-determination). However, here, we report on the four scales of interest for this study: 1) mindset: general, 2) mindset: self-theory, 3) optimism, and 4) grit. Our survey instrument was comprised of items from the Implicit Theories of Intelligence (ITI) Scale: General (Dweck, 2000) and Self-Theory (De Castella & Byrne, 2015); the Life Orientation Test – Revised (LOT-R; Scheier, Carver, & Bridges, 1994); and the Short Grit Scale (Grit-S; Duckworth & Quinn, 2009).

Mindset. The ITI General Scale (Dweck, 2000) contains eight items in total: four items measuring the entity or “fixed” mindset factor and four measuring the incremental or “growth” mindset factor. The scale is designed to measure an individual’s attitudes about intelligence and its malleability relative to “people in general.” In developing the ITI Self-Scale, De Castella and

Byrne (2015) reported that it was developed from the original ITI General Scale (Dweck, 2000), with “all eight items reworded so that each statement reflected a first person claim... Efforts were made to ensure the items stayed closely aligned to the originals” (p. 250). The scale is designed to measure an individual’s beliefs about their abilities to change their own intelligence (De Castella & Byrne, 2015). De Castella and Byrne reported good internal consistency for both scales ($\alpha = .87$ for ITI-General and $\alpha = .90$ for ITI-Self-Theory). See Table 2 for mindset survey items.

Optimism. The Life Orientation Test – Revised (LOT-R; Scheier, Carver, & Bridges, 1994) is a 10-item instrument designed to measure optimism. Three items measure optimism, three items measure pessimism, and four items are designed to detect faking positive, which are not scored. A psychometric evaluation of the instrument ($n = 2,055$), yielded an $\alpha = .78$ (Scheier et al., 1994). See Table 2 for optimism survey items.

Grit. The Short Grit Scale (Grit-S; Duckworth & Quinn, 2009) has 8 items which have been shown to be psychometrically superior to the longer 12-item Grit Scale (Duckworth et al., 2007). The Grit-S is designed to measure two factors of grit: consistency of interest and perseverance of effort. In eight separate samples across two studies, Cronbach’s α ranged from .77 to .85 (Duckworth et al., 2007; Eskreis-Winkler et al., 2014). See Table 2 for grit survey items.

Quantifying and scoring the scales. Because we were developing a survey to be piloted with high school students with LD, we thought it was important to maintain consistency and ease of use throughout the survey instrument. Thus, we standardized the scales on our survey across the ITI: General, ITI: Self-Theory, LOT-R, and Grit-S to maintain consistency for participants. Both ITI scales originally had a 6-point, Likert-like scale (1 = strongly agree, 6 = strongly disagree without the option for a neutral response). The Grit-S was originally based on a 5-point scale ranging from “very much like me” to “not like me at all.” Similarly, the original LOT-R instrument originally used a 5-point, Likert-like scale (A = I agree a lot, E = I disagree a lot). In developing the pilot survey instrument, we sought the input and feedback of stakeholders at our research partnership school who suggested that the responses of our participants might be more reliable if scales remained consistent. Therefore, for the purposes of this pilot study, we modified the scale on all instruments to a 6-point, Likert-like scale ranging from “1 = strongly agree” to “6 = strongly disagree” as was used on the original mindset scales.

On the survey instrument, participants rated their agreement with each item on the 6-point scale (1=Strongly Agree; 6 = Strongly Disagree with no option for a neutral response). To create general and self-theory mindset scale scores, we reverse coded the four items for the fixed mindset factor and then averaged the responses for individual items. To create an optimism scale score, we reverse coded the pessimism items and then averaged the responses for individual items. To create a grit scale score, we reverse coded items capturing “low” grit and then averaged the responses for individual items. Thus, lower scores indicate endorsement of a growth mindset, high grit, and an optimistic disposition, while higher scores indicate endorsement of a fixed mindset, lower grit, and a pessimistic disposition. Each scale score was calculated to give an average response on each scale item across our participants. See Table 2 for reverse coding information and descriptive statistics for each survey item.

Table 2
Descriptive Statistics for Survey Items

Item	Mean	SD	Range
ITI Questionnaire: General Theory Scale			
You have a certain amount of intelligence, and you can't really do much to change it. ^a	2.65	1.54	1-5
Your intelligence is something about you that you can't change very much. ^a	2.53	1.55	1-6
No matter who you are, you can significantly change your intelligence level.	2.06	1.35	1-6
To be honest, you can't really change how intelligent you are. ^a	2.53	1.66	1-6
You can always substantially change how intelligent you are.	2.35	.86	1-4
You can learn new things, but you can't really change your basic intelligence. ^a	3.82	1.59	1-6
No matter how much intelligence you have, you can always change it quite a bit.	2.24	.90	1-4
You can change even your basic intelligence level considerably.	2.71	1.26	1-5
ITI Questionnaire: Self-Theory Scale			
I don't think I personally can do much to increase my intelligence. ^a	2.12	1.45	1-6
My intelligence is something about me that I personally can't change very much. ^a	2.41	1.33	1-5
With enough time and effort I think I could significantly improve my intelligence level.	1.41	.71	1-3
I can learn new things, but I don't have the ability to change my basic intelligence. ^a	3.24	1.75	1-6
To be honest, I don't think I can really change how intelligent I am. ^a	2.71	1.96	1-6
I believe I can always substantially improve my intelligence.	1.88	1.17	1-5

Item	Mean	SD	Range
Regardless of my current intelligence level, I think I have the capacity to change it quite a bit.	1.47	.62	1-3
I believe I have the ability to change my basic intelligence level considerably over time.	1.82	.88	1-4
Life Orientation Test – Revised			
In uncertain times, I usually expect the best.	2.94	1.09	1-5
If something can go wrong for me, it will. ^a	3.29	1.05	1-5
I'm always optimistic about my future.	1.82	.95	1-4
I hardly ever expect things to go my way. ^a	3.06	1.64	1-6
I rarely count on good things happening to me. ^a	2.65	1.32	1-6
Overall, I expect more good things to happen to me than bad.	2.18	.88	1-4
Short Grit Scale			
New ideas and projects sometimes distract me from previous ones. ^a	4.00	1.00	1-5
Setbacks don't discourage me.	2.82	1.19	1-5
I have been obsessed with a certain idea or project for a short time but later lost interest. ^a	3.65	1.37	1-6
I am a hard worker.	1.35	.79	1-4
I often set a goal but later choose to pursue a different one. ^a	3.18	1.55	1-6
I have difficulty maintaining my focus on projects that take more than a few months to complete. ^a	4.18	1.63	1-6
I finish whatever I begin.	2.47	1.38	1-6
I am diligent.	2.06	1.09	1-5

Note. SD = standard deviation; ITI = Implicit Theory of Intelligence; 1 = strongly agree, 2 = agree, 3 = mostly agree, 4 = mostly disagree, 5 = disagree, 6 = strongly disagree. *n* = 17 for all items.

^a Item was reverse scored.

Results

The goals of this study were: 1) to examine the noncognitive, positive psychology constructs of mindset, grit and optimism in a sample of high school students with learning disabilities/differences, and 2) to pilot a research protocol to explore these constructs for this population of students. Seventeen students (13% of the population) responded fully to the instrument, leaving no missing data. Data were descriptively explored within each scale and the results are presented individually by construct below.

Mindset

We surveyed participants on their implicit theories of intelligence or “mindsets,” both about 1) people in general, measured by participants’ responses on the ITI: General Scale, as well as 2) their own selves, as measured by participants’ responses on the ITI: Self-Theory scale.

Table 3
Cronbach’s Alpha for Survey Instruments

Instrument	α
ITI Questionnaire: General Theory Scale	.792
ITI Questionnaire: Self-Theory Scale	.447
Life Orientation Test – Revised	.672
Short Grit Scale	.717

Note. ITI = Implicit Theory of Intelligence

Mindset – General. Cronbach’s alpha for the ITI: General scale demonstrated a moderately high internal consistency ($\alpha = .792$) for the eight items. (See Table 3 for Cronbach’s α for each scale.) The average scale score on the ITI: General scale was $M=2.61$ ($SD = .87$). (See Table 4 for mean scale scores and standard deviations.) In our scale, this mean score of 2.61 indicates that, on average, participants’ responses fell between “agree” and “mostly agree” with the endorsement of a growth mindset in relation to the intelligence of people in general.

Mindset – Self-Theory. The ITI: Self-Theory scale demonstrated poor internal consistency ($\alpha = .447$) for the eight items. Items 1 and 6 on the ITI: Self-Theory scale were particularly bad performers for our small sample, and we suspect this is due, at least in part, to the language used to write the items. We explore this finding further in the Discussion section of this article. The average scale score on the ITI: Self-Theory scale was $M=2.13$ ($SD = .60$). In our scale, this mean score of 2.13 indicates that participants’ responses, on average, fell almost directly at “agree” with the endorsement of a growth mindset in relation to their beliefs about their own intelligence. In particular, there were several items with a small response range, suggesting all students shared similar beliefs about their ability to change their intelligence. For instance, on the item, “With enough time and effort, I think I could significantly improve my intelligence level,” all 17 participants indicated they strongly agreed, agreed, or mostly agreed with the statement ($M_{\text{item score}} = 1.41$ ($SD = .71$)). (See Table 2 for individual item means, standard deviations, and ranges.) There was a very similar response pattern on the item, “Regardless of my current intelligence level, I think I have the capacity to change it quite a bit,” $M_{\text{item score}} = 1.47$

($SD = .62$). However, there was inconsistency across responses on this scale. For example, on the item, “I don’t think I personally can do much to increase my intelligence, $M = 2.12$ ($SD = 1.45$), indicating an average response very close to “agree” with this statement. However, the standard deviation indicates a large range of responses to this item, and this item was one of two that performed particularly poorly in reliability analysis. We discuss this further in the Discussion section of this article.

Optimism

The Life Orientation Test – Revised (LOT-R) scale demonstrated reasonably strong internal consistency ($\alpha = .672$) for the six scored items. The average scale score on the LOT-R was $M = 2.96$ ($SD = .74$), indicating that, on average, our participants “mostly agreed” with items suggesting they held an optimistic disposition. Overall, our participants endorsed items related to optimistic expectancies for the future. For example, on the item, “I am always optimistic about my future,” the mean item score was $M_{\text{item score}} = 1.82$ ($SD = .95$) and on the item, “Overall, I expect more good things to happen to me than bad,” the mean item score was $M_{\text{item score}} = 2.18$ ($SD = .88$) indicating average responses for these two items converging right around “agree.” However, there were some seemingly inconsistent responses on this scale as well. For example, on the item “I rarely count on good things happening to me,” the mean item score (after reverse coding) was $M_{\text{item score}} = 2.65$ ($SD = 1.32$) indicating that on average, participants fell between “agree” and “mostly agree” for this statement, which captures a pessimistic orientation. Similarly, on the item, “I hardly ever expect things to go my way,” the mean item score (after reverse coding) was $M_{\text{item score}} = 3.06$ ($SD = 1.64$) indicating that on average participants “mostly agreed” with this statement, also a pessimistic item on the scale. We discuss this finding more in the Discussion section of this article.

Grit

The Short Grit Scale (Grit-S) demonstrated reasonably strong internal consistency ($\alpha = .717$) for the eight items. The average scale score for the Grit-S was $M = 2.66$ ($SD = .73$), indicating that, on average, our participants’ responses fell between “agree” and “mostly agree” with items endorsing a grit orientation. In particular, our participants endorsed the statement, “I am a hard worker” ($M_{\text{item score}} = 1.35$ ($SD = .79$), and “I am diligent” ($M_{\text{item score}} = 2.06$ ($SD = 1.09$), indicating responses falling, on average, between “agree” and “strongly agree.” On items meant to measure lower degrees of grit, our participants provided somewhat inconsistent responses. For example, on the item, “New ideas and projects sometimes distract me from previous ones,” participants, on average, “mostly disagreed” $M = 4.00$ ($SD = 1.00$) indicating a “high grit” response. Similarly, on the item, “I have difficulty maintaining my focus on projects that take more than a few months to complete,” participants “mostly disagreed” $M = 4.18$ ($SD = 1.63$). However, on other items indicating lower grit, our participants, on average, “mostly agreed”; for example, the mean item score on the item, “I often set a goal but later choose to pursue a different one,” was $M_{\text{item score}} = 3.18$ ($SD = 1.55$).

Table 4
Scale Score for Survey Instruments

Instrument	Mean	Standard Deviation
ITI Questionnaire: General Theory Scale	2.61	.87
ITI Questionnaire: Self-Theory Scale	2.13	.60
Life Orientation Test – Revised	2.96	.74
Short Grit Scale	2.66	.73

Note. ITI = Implicit Theory of Intelligence

Correlations Among the Constructs

We also descriptively explored relationships observed among the four scales. (See Table 5 for the correlation matrix for all four scales.) The bivariate correlation coefficient (r) is a measure of the strength and direction of a relationship between two variables and can be interpreted as an effect size. Among the six correlations explored in our analysis, four of them represent medium to large effect sizes. As expected, even with a small sample, we found a statistically significant correlation between the average scale score on the ITI: General Mindset scale and the average scale score on the ITI: Self-Theory Scale ($r = .533$; $p < .05$). Three other correlations among scale scores were also notable (although not statistically significant) and can be considered medium to large effects as well: 1) LOT-R and Mindset: General ($r = .416$), LOT-R and Mindset: Self-Theory ($r = .454$), and LOT-R and Grit-S ($r = .413$). Additionally, there was a small correlation between Grit-S and Mindset: General ($r = .220$), but no correlation between Grit-S and Mindset: Self-Theory ($r = -.039$).

Table 5
Correlations Between Survey Instruments

Instrument	2	3	4
1. ITI Questionnaire: General Theory Scale	.533*	.416	.220
2. ITI Questionnaire: Self-Theory Scale		.454	-.039
3. Life Orientation Test – Revised			.413
4. Short Grit Scale			

Note. * $p < .05$

Discussion

Research Purpose 1

In this small pilot study, we had two purposes, the first of which was to explore the profiles of and relationships among the constructs of mindset (general and self-theory), grit, and optimism in high school adolescents with LD. We initiated this study of noncognitive variables, profiles and relationships because they have not been explored explicitly for students with

disabilities. Although our pilot investigation sample size was small, we believe these data are of great value because they represent the first explicit exploration of these variables and their interrelationships in adolescents with LD. Furthermore, the method of data collection was precise; there were no missing data, and the data can be considered a high value, clean data set.

Because of the lack of prior investigation of profiles of grit and optimism for students with learning disabilities, we formulated no *a priori* hypotheses about the profiles of these two variables. However, we did anticipate certain patterns in the mindset data. Prior investigations of constructs related to (but not synonymous with) mindset (e.g., self-efficacy) have suggested that college students with LD may endorse more fixed mindsets than their nondisabled peers. For example, Saracoglu et al. (1989) found that a small sample of college students with learning disabilities ($n = 34$) demonstrated lower self-efficacy and lower self-esteem than a comparison group of college students without disabilities ($n = 31$). More recently, Baird et al. (2009) found that middle and high school students with LD were more likely to endorse a fixed mindset and have lower academic self-efficacy than their peers without disabilities. Thus, we expected that our participants would, on average, demonstrate scores toward the fixed mindset end of the ITI – General scale. However, this was not the case. In this sample of adolescents with LD, we observed a mean scale score of $M = 2.61$ ($SD = .87$) indicating that our participants' average scale scores fell between "mostly agree" and "agree" with items endorsing a general *growth* mindset. This finding needs to be explored further. Do students with LD, on average, tend toward fixed or growth mindsets? Are there certain features of schools, curricula or programming in secondary school settings that buffer students with LD from fixed mindsets?

Furthermore, in consideration of De Castella's and Byrne's (2015) suggestion that mindset about the intelligence of others (general mindset) is distinctly different from beliefs about one's own ability to shape one's own intelligence (self-theory mindset), we utilized the ITI: Self-Theory Scale with adolescents with LD (to our knowledge for the first time). Our goal was to explore the convergence or divergence of the mean scale scores on the self-theory mindset scale with those on the general mindset scale. We observed two interesting findings related to the self-theory mindset profile and scale in our small sample of high school students with LD. First, we observed a mean scale score on the ITI: Self-Theory of $M = 2.13$ ($SD = .60$), indicating that, on average, our participants "agreed" with items endorsing a growth mindset about their own intelligence. This mean scale score fell more definitively on the growth mindset end of the scale than did the mean scale score for the general mindset scale for this sample, indicating that our participants reported even more endorsement of a growth mindset when thinking about their own intelligence than they did when thinking about intelligence in general. This was a surprising finding to us. We had hypothesized that students with LD may endorse an even more fixed mindset when they considered the malleability of their own intelligence as compared to that of the general population perhaps due to disability identity development and/or negative academic experiences. However, that was not the case with our small sample. Our findings mirrored those of De Castella and Byrne (2015) who found that individuals tend to believe their own intelligence is more changeable than is the intelligence of general others. Further exploration of this pattern is warranted.

Another surprising finding was the low reliability of the ITI: Self-Theory scale observed for our sample. Although De Castella & Byrne (2015) piloted the instrument with over 600

students and observed a reliability of $\alpha = .90$, in the current sample, the Cronbach's $\alpha = .447$, indicating poor reliability. Upon close examination of the items, we have preliminarily speculated that the way in which the items were written (e.g., word choice, qualifiers) may have impacted reliability for our particular sample of students with LD. With such a small sample size, we will need to collect and examine additional data, but further exploration is needed to establish the reliability of this scale for adolescents with LD. Further, we intend to pursue the development of an alternative self-theory mindset scale that more closely mirrors the language in the original ITI: General Scale (Dweck, 2000) and preserves the certainty of statements about mindset. We intend to pilot the instrument for students with disabilities as well as those without in the near future.

Another finding of interest in the current study was the medium to strong effect of optimism on general mindset, self-theory mindset, and grit. To our knowledge, this is the first group of data to explore optimism and its relationship to these other variables of interest for adolescents with learning disabilities. Although we strongly acknowledge the small sample size in our current study, when we examine this finding from an effect size perspective, we see effects in the $r = .4$ to $.5$ range. Effects of this magnitude in this small sample are not by themselves unusual, but when taken as a whole, four out of six relationships have moderate to large effect sizes, which is certainly an indicator for future research. For our small sample, effects of this size suggest that approximately 16 – 20% of the variation in general mindset, self-theory mindset, and grit can be accounted for by the linear relationship between optimism and these respective variables. (e.g., $r^2 =$ proportion of variance accounted for; thus, in our data, for example, optimism and self-theory mindset: $r = .454$, $r^2 = 20.6\%$ variance accounted for). If even one of these findings replicates in future larger samples, this is an important understanding for us to have regarding the optimism of students with LD, *especially* in light of the fact that optimism can be learned. We calculated sample size needed for a correlation of $.4$ to achieve statistical significance ($\alpha = .05$; power = $.8$) and the required sample is $n = 34$. We expect to achieve a sample of this size in a currently underway replication and expansion of this pilot study, and we expect to replicate at least one, if not all, of the meaningful correlations among those constructs. It is highly unlikely that on replication with larger samples none of those relationships among mindset, grit and optimism will be meaningful. This will be a critical contribution to the field of learning disabilities and foundational knowledge on which to build future positive psychology (and specifically, perhaps, optimism) interventions.

Research Purpose 2

Again, in this small pilot study, we had two purposes, the second of which was to pilot an approach to basic research on these constructs for adolescents with LD. We learned several important lessons throughout the pilot that have informed our approach to the study of these constructs and allowed us to refine and improve the design of a second, expanded study currently underway. First, we confirmed that cultivating positive and mutually respectful research partnerships in which K-12 school personnel contribute directly to the development of research questions and approaches to data collection is an important feature of school-based research. We also confirmed that making the scales consistent, using measures with a readability index of $\sim 6^{\text{th}}$ grade, and providing on-site support for reading are important to the research process when

gathering survey data from adolescents with LD. Our data collection approach resulted in a high quality data set with no missing values.

We also encountered several challenges that provide guidance for improving future versions of this exploratory work. First, the response rate to the survey was low (13%) resulting in a small sample size. We had no participation incentive, and in hindsight, we speculate that an incentive may have increased participation. Thus, we have implemented a participation incentive in the second wave of this study currently underway. We also found that on some scales, there was significant variance in responses, sometimes at the item level and other times across the whole scale. We speculate that some of that variance is due to survey item characteristics such as confusing wording. However, it is also possible that the variance observed is indicating an authentic research finding. For example, responses on the LOT-R indicated that some respondents strongly endorsed items measuring both optimism and pessimism. Is this an artifact of wording that was confusing to adolescents with LD, or an indicator that adolescents with LD feel both very optimistic and very pessimistic at the same time about their lives? Because we did not have an interview component in this pilot study, we were not able to query respondents who demonstrated a wide variety of responses, nor gain insight into their endorsement of particular items. Thus, we have implemented an interview component in the second iteration of this study to provide us with insight into certain patterns of responses and richer data to contextualize response patterns. Finally, we were surprised at the relationship optimism demonstrated with every other construct of interest. This was unanticipated but deserves further attention. To further understand the role of optimism for adolescents with LD in relation to the constructs of mindset and grit, as well as a stand alone construct, we have added an additional construct of interest for future investigations: life satisfaction. Optimism is distinctly tied to life satisfaction in the psychology literature, and because optimism emerged as a construct of strong interest in our data for adolescents with LD, the addition of life satisfaction allows us to begin to examine these subjective well-being components more fully for this population.

Limitations and Future Research

The current study has a very small sample size of $n = 17$. We had only a 13% response rate at our partner school during Wave 1 data collection. We believe this low response rate was due to several factors. We collected data in the last weeks of the school year. It is possible that students were concerned with final projects, graduation, SATs, and generally “burned out” from the school year. Furthermore, during our survey administration window, the school was experiencing a move into a brand new facility, and there were distractions related to the move for the students. Finally, we had no participation incentive. In Wave 2 of data collection currently underway, we have implemented a participant incentive and are also managing data collection at a less distracting time of the academic year.

Nonetheless, we cannot be certain that this small sample is representative of the larger population of students with LD. The 17 who responded may indeed be different from the 111 who did not. We intend to continue our investigation with additional waves of data to determine if the current findings replicate in the future. If we discover that is the case in future waves of data collection, it will be important for us to try to understand those differences. We did solicit information from our school partners about the participants who did respond and asked if they

noted any general characteristics of the group that would explain their response rates, or if they were a notable group for any other reason. Our school partners did not note anything about the group that stood out from the general population of students at the school and described them anecdotally as representative of the population of students who attend our research partnership school. Additionally, although we had a small sample, the stable, clean data we gathered is quality data, with no missing values. However, it bears repeating that these results should be interpreted with extreme caution due to small sample size.

In future research we intend to incorporate a comparison group of students without disabilities so we are able to compare mean scale scores among types of students. It will also be important to understand which items are correlated across scales, and future research will include factor models that permit such examination at a deeper level of investigation. It is also important to note that we conducted this initial pilot study with a group of adolescents who attend a specialized school that serves students with LD. We cannot be certain if their relatively higher levels of growth mindset and the relationships among the constructs are characteristic of adolescents with LD in general or if they resulted from specific curricular and programmatic aspects of that school. Additional research with adolescents with LD in public schools will yield important comparison data for future consideration.

Furthermore, we would like to examine item-level data from the LOT-R for adolescents with LD. As previously noted, this sample of adolescents with LD endorsed items indicating both optimistic and pessimistic orientations. On questions examining their expectancies for the future, responses, on average, indicated endorsement of an optimistic disposition (e.g., “I am always optimistic about my future”). However, on average, participants also endorsed items capturing pessimism (e.g., “I hardly ever expect things to go my way”, and “I rarely count on good things happening to me”). Is this finding related to scale reliability particularly for adolescents with LD? Is it measuring something unique about the dispositions adolescents with LD hold, perhaps as a result of their experiences as an individual with a learning disability? We do not believe this finding is simply capturing the emotional intensity/variability of adolescence in general, nor an adolescent propensity to identify with both dispositions, as prior research has suggested that the LOT-R is a valid and reliable instrument to assess optimism in adolescents (Monzani, Steca, & Greco, 2014). Thus, further investigation of this finding is warranted to develop depth of understanding regarding optimism (and pessimism) in adolescents with LD.

Conclusion

Although we will be the first to say that these findings should be considered with a good deal of caution considering the sample size, we have shared these findings as small weighted effects so that we and others can be aware of and consider them in future projects. There are no published effects for this group of variables for adolescents with LD in the current professional literature. This pilot study provides us with initial findings that will inform our work on a larger-scale investigation of noncognitive variables for adolescents with learning and other disabilities. Future studies will investigate these variables in a larger sample of participants, with different disability diagnoses, over the course of several years. We hope this small pilot study also informs others with similar research interests as a starting point for things to consider. We also hope that sharing our pilot process and reflections for improvement will inform other researchers’ designs as they explore these important ideas.

Finally, we agree with researchers and policy experts that the role of noncognitive skills in positive and healthy outcomes for U.S. K-12 students has been too long overlooked and under-targeted, and we believe this is true especially for students with disabilities. We subscribe to an intentionally interdisciplinary positive model of education that goes beyond a “cognitive” or nearly purely academic focus and takes into account child and adolescent psychology and positive psychology to inform best practices for K-12 education. There has been a void in the field of positive psychology regarding children and adolescents with disabilities. These youth would benefit greatly from an expanded educational research focus that includes consideration of positive psychology orientations, well-being outcomes, reliable measurement, and holistic development. Future studies of these important foci will serve as essential first steps in ensuring students with disabilities have opportunities to acquire critical noncognitive skills and related constructs that support their holistic development and success.

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