Noncognitive Factors Affecting Academic Achievement of Juvenile Delinquents

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Abstract

The present study provides a description and analysis of the plight of first-time detained juvenile delinquents in the United States and the impact of noncognitive attributes and academic achievement on grades. Juvenile delinquents have poor outcomes as adults in higher rates of drug abuse, poor high school graduation rates, and lowered employment well into adulthood. The research questions examined the correlation among the noncognitive attributes of grit, academic self-concept, mental health, and self-esteem, academic achievement, and English and Mathematics grades for first-time detained juvenile delinquents aged 10-18. A multiple regression analysis of archival records of students in a short-term juvenile detention center was conducted. Findings showed three predictor variables were statistically significant and influenced academic performance measured by grades: verbal ability, social self-esteem, and prosocial skills. For juvenile delinquents (n = 72; males = 58, females = 14) aged 10-18 (M =15.3; SD = 1.6; range 10-18), the three predictor variables predicted English grades (adjusted R^2 = .280) and Mathematics grades (adjusted R^2 = .225). There was a discussion and recommendations for policies and research. The results support the need to consider noncognitive factors and the consideration of communication skills in the education of juvenile delinquents.

Keywords: juvenile delinquency, noncognitive, alternative education, multiple regression

1.   Introduction

While juvenile delinquents typically have lower reading and math skills than nondelinquent peers, there has also been an interest in juvenile delinquency and noncognitive factors, such as self concept, for over 50 years (Brookover, Thomas, & Paterson, 1964; Lund & Salary, 1980; Zinkus & Gottlieb, 1978). Juvenile detention centers often provide substandard educational services to delinquents and fail to provide appropriate services for students with disabilities. (Leone & Meisel, 1997; Leone & Wruble, 2015; Twomey, 2008). Juvenile delinquents suffer from mental illness and substance abuse at a much higher rate than similarly situated peers, and most problems persist well into adulthood (Denzel, van Esch, Harte, & Scherder, 2016; Fazel, Doll, & Långström, 2008; Lea & Abrams, 2017; Quinn, Rutherford, Leone, Osher, & Poirier, 2005; Welty et al., 2016).

Involvement in the juvenile justice system has been found to better predict dropping out of high school than demographic factors, school attendance, and socioeconomic status (Robison, Jaggers, Rhodes, Blackmon, & Church, 2017). Education in juvenile detention lacks a strong foundation, with unprepared

teachers, poor leadership, absence of adequate resources, and few research-based intervention (Baetz et al., 2019; Flores & Barahona-Lopez, 2020; Gabel, 2016). In spite of the long history and research, direct research in correctional education lacks systematic, quality research existed among the participants in the juvenile justice system (Davis et al., 2014; Erofeeva et al., 2019; Mathur & Schoenfeld, 2010).

The gap is most acute among first-time detained juvenile delinquents. A review of the top three policy journals, *Educational Policy Analysis Archives*, *Educational Evaluation and Policy Analysis*, and *Journal of Education Policy*, as well as a search in Google Scholar, EBSCO, and ERIC, found no comparable research for policies concerning first-time detained juvenile delinquents. For example, the book *Making it Count: Strategies for Improving Mathematics Instruction for Students in Short-term Facilities* (Leone, Fink, Wilson, & Mulcahy, 2018) provided no direct research from short-term facilities in the book, as there was little research in short-term facilities because of availability and high transient rate (Babel et al., 2016; Sedlak & Bruce, 2016). Analyzing the National Longitudinal Survey of Youth 1997, juveniles involved in delinquency and incarceration had reduced high school and college graduation rates (Ward & Williams, 2015). Since first-time detained juvenile delinquents are at risk for future failure in school and life, understanding causes of educational failure could improve graduation rates and reintegration back into society.

Though juvenile delinquents face many challenges, research findings suggested two-thirds wanted to go to college, with positive expectations about future educational achievement and avoidance of criminal activity (Mahler, Fine, Frick, Steinberg, & Cauffman, 2017; Sedlak & Bruce, 2016). The problem is the correlation of noncognitive factors of grit, academic self-concept, mental health, and self-esteem and academic achievement on grades for first-time detained juvenile delinquents aged 10-18 was not known. The results could be used to improve instructional practices in juvenile correctional facilities and reduce recidivism. The following study provides a review of the literature. A description of the sample and methodology follows. There is an interpretation and discussion of results, with policy recommendations.

2.   Literature Review

Most juvenile delinquents have a long history of problem behavior entering the criminal justice system, and first-time juveniles incarcerated have a much higher prevalence of mental illness and aggression (Barrett & Katsiyannis, 2017). Juvenile correctional facilities have a poor track record in successfully educating juvenile delinquents, with Suitts (2014) having found "most juvenile justice schools have had little positive, enduring impact on the educational achievement of most children and youth in state custody" (p. 15). The literature review examines four components of juvenile delinquency: a theory of juvenile delinquency, academic characteristics, problems, and the gap in the literature.

Social learning theory described the intersection of learners directing one's own efforts toward outside goals, with students being proactive versus reactive to the educational experience (Rendell et al., 2011; Zimmerman, 2013). A review of research and found social learning theory explained crime and deviancy better than other theories because differential association and imitation produced conforming behavior (Jensen, 2017; Winfree, 2015). Associational preferences, a central aspect of social learning before and after incarceration, included juvenile delinquents having a referent group with much higher rates

of antisocial behavior and psychopathology (Lopes et al., 2012; Pratt et al., 2010; Tatar, Joseph, Cavanagh, & Cauffman, 2016). Applied to incarcerated juvenile delinquents' schooling, social learning theory supported the exploration of expected academic achievement and actual performance as viewed from the internal struggles juveniles faced (Engel, 2017; Herrman & Sexton, 2017).

Juvenile delinquents as a group possessed IQs in the low-average to below-average range, and a history of academic and school failure existed, with attention deficit commonly found (Falligant, Alexander, & Burkhart, 2017; Foley, 2001; Hoffmann, 2020). Incarcerated juveniles, scored, on average, a standard deviation below peers on standardized academic achievement, and a prevalence of disabilities and psychiatric illnesses defined the population (Krezmien, Mulcahy, & Leone, 2008; Vaughn, Salas-Wright, DeLisi, Maynard, & Boutwell, 2015). Juvenile detention center schools have a different population than regular school, with about one third diagnosed disabled, and behavioral and emotional diagnoses better predicted academic achievement than grades (Engstrom & Scott, 2020; Ennis, Evanovich, Losinski, Jolivette, & Kimball-Greb, 2018; Quinn, Rutherford, & Leone, 2001). Adolescents with rapid cognitive tempo, conduct disorders, substance abuse problems, poor inhibition, and high impulsivity were incarcerated at a higher rate (Beaudry, Yu, Långström, & Seena Fazel, 2020; Carroll et al., 2006; Ray, Thornton, Frick, Steinberg, & Cauffman, 2016).

Juvenile delinquents had a myriad of other problems beyond academic and behavioral issues in school. Developmental delays were common and caused problems with desistance after detention (Crosby, Algood, Sayles, & Cubbage, 2017). Self-views, important in determining academic and social outcomes for juvenile delinquents, were generally negative, and the appraisal of peers influenced one's self-view (Kõiv, 2016; Walters, 2016). Behavioral and emotional dysregulation were the norm in juvenile delinquents, and the youths in juvenile detention scored low on emotional intelligence in peer relations (Mohanty & Nanda, 2018). Juvenile delinquents with mental illness often do not get the therapy needed, with one study finding 95% of juvenile offenders with major mental illness diagnoses failed to receive evidence-based treatments (McCart & Sheidow, 2016). When students self-regulated behavior and developed accurate cognitive appraisals, juveniles displayed better mental and physical health (Gardner, Dishion, & Connell, 2008; Raftery-Helmer & Grolnick, 2018; Reynolds & Crea, 2015; Trzesniewski et al., 2006).

When socioeconomic status was factored into student achievement, intrinsic motivation, school engagement, and length of education suggested improved educational practices have been shown to improve academic achievement (Froiland & Oros, 2014; Losel & Bliesener, 1994; Ritchie & Bates, 2013). The research has not bridged the gap between theory and practice; juvenile delinquents after release continued to struggle in school after incarceration (Rice, Musil, Kretschmar, & Warner, 2018). After instituting a myriad of programs, interventions, and time spent trying to improve the lives of juvenile delinquents, the dropout rate remained dismal, and the chances for early death were much greater (Aalsma et al., 2016; Feinstein et al., 1998; Sampson & Laub, 2003). Approximately 100,000 juveniles were released from detention each year, but only 50% returned to school and about 16% dropping out within five months (Benner, Zeng, Armstrong, Anderson, & Carpenter, 2016). For most juvenile delinquents, placement in a juvenile detention center worsened the situation and increased deviancy, with peer-led interventions often harmful (Asencio & Burke, 2011; Cullen & Jonson, 2014; Dishion, McCord, & Poulin, 1999).

3.   Method

To conduct the present study, permission from a regional juvenile detention center for archival records was secured. Institutional Review Board granted permission as long as personal descriptors were removed. After receiving permission, within two weeks, the facility's registrar removed personal and confidential information and transmitted the data. All Excel files were checked for missing or erroneous values, and within a week or two, all information was converted to a CSV file for use in JASP (Jeffreys's Amazing Statistics Program). Using JASP, the data were analyzed.

A multiple regression analysis of the correlation of noncognitive factors and academic achievement on English and Mathematics grades for first-time detained juvenile delinquents aged 10-18 was conducted. This study's research questions were based on a theoretical framework where juvenile delinquents received learned behavior from others, and adaptive leadership by practitioners could improve outcomes. The research questions and hypothesis are outlined, the sample and setting described, instrumentation utilized, data analysis conducted, and results interpreted.

3.1   Research Questions and Hypotheses

Backward regression analysis and correlation showed the relationship of variables. For predictor variables, mental health (overall, emotional, conduct, hyperactivity, peers, and prosocial), academic self-concept (Math and English), academic achievement (math, verbal, math computation, math application, reading comprehension, vocabulary, and language mechanics), grit, and self-esteem were examined for correlation and, or regression to the criterion variables of grades in mathematics and language arts after three weeks. The purpose of the research was to see if cognitive and noncognitive variables impacted student learning and grades. The following research questions and hypotheses guided this study:

Research Question 1: What is the degree of correlation between noncognitive attributes and academic achievement on grades in English for students first detained in juvenile detention facilities?

$H1_0$: There is no statistically significant correlation between noncognitive attributes and academic achievement and English grades.

$H1_A$: There is a statistically significant correlation between noncognitive attributes and academic achievement and English grades.

Research Question 2: What is the degree of correlation between noncognitive attributes and academic achievement on grades in Mathematics for students first detained in juvenile detention facilities?

$H2_0$: There is no statistically significant correlation between noncognitive attributes and academic achievement and math grades.

$H2_A$: There is a statistically significant correlation between noncognitive attributes and academic achievement and math grades.

3.2   Data Analysis

This nonexperimental, ex post facto quantitative study sought to determine if the independent (predictor) variables of noncognitive attributes (academic self-concept, mental health, grit, and self-esteem) and academic achievement (standardized testing in math and verbal) related to the dependent (criterion)

variable of academic outcomes measured by students' grades in English and mathematics for first-time-incarcerated juveniles. Multiple regression analysis uses predictor variables to describe the variance or relationship with a criterion variable. Backward multiple regression was used after meeting all assumptions, which allowed the construction of a model for the best fit (Garson, 2014). The results may be useful to improve educational programming for juvenile delinquents. Correlation and multiple regression analysis were used to ascertain the relationship, if any, of many independent variables with a single dependent variable (Creswell, 2012).

3.3   Sample Selection and Setting

The sampling strategy used was convenience sampling, which was affordable, easy, and used subjects readily available. Convenience sampling operates under the assumption the population would not be different from the sample (Etikan, Musa, & Alkassim, 2016). The participants were from a regional juvenile detention center in a small town in central Illinois which housed up to 26 juveniles, and the sample's demographic data by age, sex, race, school status, grade, and special education status were collected. All records were archival, so there was no direct participation, and all students left by the time data were collected. Most students had short-term detainments in juvenile detention center. To be included, students were first-time-detained juvenile delinquents, enrolled long enough to earn grades, and completed all survey instruments within five school days upon entering school (generally all noncognitive tests and the Test of Silent Contextual Reading Fluency–2 (TOSCRF–2) were given on the second school day, and the Basic Achievement Skills Inventory-Survey (BASI–S) was given on the fourth school day). Initial intake by juvenile officers screened juveniles to determine if enrollment was the first time in secure detainment.

The setting was a short-term regional juvenile detention center in a small midwestern town in central Illinois. The school had two full-time teachers and two substitutes. School was in session 257 days per year and operated off a modified block schedule (four core subjects, physical education, two electives by computer-guided instruction, response to intervention as needed, and remediation on tablets). The average stay at the juvenile detention center was 30.5 days, with a range of one to 250 days. Up to 26 students can be housed at once, though sometimes the facility was at overcapacity. The students were required to attend school, though many were only enrolled for a short time before either going home, state correctional facilities, or residential treatment. Though the detention center was in an urbanized area, the population came from an 11-county area and ranged from rural to urban. In a given year, approximately 160–250 students passed through the juvenile detention center, and recidivism was high (approximately 25% or more of the population were repeat offenders). Many of the students stayed less than a week or got released the next day.

3.4   Instrumentation

The instruments were all standardized across many ages and provided insight into a student's academic, social, and emotional status. Intake procedures required juveniles complete all instruments within five school days of entering school. Teachers administered all tests. Predictor variables were measured by State Self-Esteem Scale (SSES) included a total score and subscales of performance, social,

and appearance, Marsh's Math and English Academic Self-concept, BASI–Survey (including subscores of math computation, math application, vocabulary, language mechanics, and reading comprehension), TOSCRF–2, Grit–Short Scale, and the Strengths and Difficulties Scale SDQ (included a total and subscales of emotional, conduct, hyperactivity, peer, and prosocial). Concerning the criterion variables, grades obtained after three weeks in English and math were used to be as close to the noncognitive assessments administration and because the facility studied was a short-term facility.

Correlational data analysis and multiple regression analysis require selection of variables of appropriate controls (e.g., age, gender, race), and selection was guided by controls used in published research (Creswell, 2012; Dattalo, 2013). All instruments had adequate validity and reliability. The following instruments were used to measure noncognitive and cognitive variables:

State Self-Esteem Scale. The work of Heatherton and Polivy (1991) developed the 20-question SSES to measure three correlated factors (performance, social, and appearance), and the SSES provided a global score of self-esteem. In use with adolescents, the SSES demonstrated adequate validity and reliability (Linton & Richard, 1996). High scores mean high self-esteem.

Academic Self-Concept. Following the Marsh/Shavelson model, subject-specific models for language arts and mathematics were developed and analyzed, suggesting each scale measured single subjects versus broad generalities. The Language Arts and Mathematics Academic Self-Concept (ASC) Scales both have adequate internal reliability (Marsh, 1990). Each survey is four questions and measures academic self-concept in language arts or mathematics. High scores mean a high academic self-concept.

Grit–Short Scale. The eight questions Grit–Short Scale was found to possess adequate predictive power, and the instrument was shown to be psychometrically sound (Duckworth & Quinn, 2009). The survey assesses grittiness of a student, with the higher the average, the higher one's grit. Scores are averaged, and a higher score means higher grittiness.

Strengths and Difficulties Questionnaire. The 20-question SDQ was developed as a brief screener for ages 4–18 to identify mental health problems in students concerning adjustment and psychopathology (Arman, Amel, & Maracy, 2013). The SDQ was shown to be psychometrically sound (Bourdon, Goodman, Rae, Simpson, & Koretz, 2005; Goodman, 2001). The survey has the subscales of emotional, conduct, hyperactivity, peer, and prosocial. The prosocial scale is a separate component and does not contribute to the omnibus score of the SDQ. Other advantages were the SDQ listed strengths as well as difficulties and gave coverage to peer relations and prosocial behavior (Goodman, 1997). A higher score means there either borderline or abnormal.

Test of Silent Contextual Reading Fluency–2. The TOSCRF–2 has adequate reliability and correlated to the Woodcock-Johnson (Dumont, Willis, Veizel, & Zibulsky, 2013). The TOSCRF–2 gives raw scores, standard scores, percentiles, and age and grade equivalents.

Basic Achievement Skills Inventory–Survey (BASI–S). The BASI-S provides math and verbal scores, and all sections and questions had adequate psychometric properties (Broxterman, Mok, & Beukema, 2017). The BASI-S has two major tests, math and reading (verbal), and five subscores (math computation, math applicability, vocabulary, language mechanics, and reading comprehension). Each test generates a number of scores: standardized scores, age range, grade range, subscores, percentiles, confidence intervals, and descriptors.

3.5 Data Analysis

A variety of non-cognitive and cognitive variables were used, as shown in Table 1. The noncognitive instruments measured self-esteem, grit, academic self-concept, and mental health. Academic ability was measured with two instruments: BASI-S and TOSCRF-2. While the TOSCRF-2 measured reading fluency, the BASI-S measured reading and mathematics ability, and the instrument provided a variety of subscores.

Table 1

Predictor Variables

Predictor variable	Instrument	Scale
Self-esteem; performance self-esteem; social self-esteem; appearance self-esteem	State Self-Esteem Scale (SSES) with three subscores and a total and Single-Item Self-Esteem Scale (SISE).	SSES has a 100-point scale, with Performance, Social, and Appearance are the subscores. SISE is a 7-point Likert scale
Grit	Grit–Short Scale	Students answer 8 questions on a 5-point scale.
Academic self-concept: math and English	Marsh's Academic Self-Concept for Mathematics and English.	Students answer 4 questions on a 6-point scale for each question.
Mental health: emotional, conduct, hyperactivity, peer, prosocial, and total	Strengths and Difficulties Questionnaire.	Students answer 20 questions on a 3-point scale: not true, somewhat true, or certainly true.
Verbal	Basic Achievement Skills Inventory–Survey (BASI): Verbal	Standardized scores, age equivalency, and grade equivalency.
Verbal—Language mechanics	BASI: A subscore of Verbal measured with a standard score.	Scores range from 1 to 10
Verbal—Vocabulary	BASI: A subscore of Verbal measured with a standard score.	Scores range from 1 to 10
Verbal—Reading comprehension	BASI: A subscore of Verbal measured with a standard score.	Scores range from 1 to 10
Mathematics	BASI: Mathematics	Standardized scores, confidence intervals, age equivalency, and grade equivalency.

Mathematics—Computation	BASI: A subscore of Mathematics measured with a standard score for computation.	Scores range from 1 to 10
Mathematics—Application	BASI: A subscore of Mathematics measured with a standard score for application.	Scores range from 1 to 10
Reading fluency	Test of Silent Contextual Reading Fluency–2:	Standardized scores, confidence intervals, and grade equivalency.

The demographic variables and noncognitive and academic variables from were regressed on the criterion variables of students' grades for language arts and mathematics after three weeks to develop a model. The grade scale was 6 = A, 5 = B, 4 = C, 3 = D, and <2.5 = F. Grades were assigned holistically; rather than percentages, as students received grades based on mastery of the activity assigned. The cutoff was three weeks, as the facility was a short-term facility, and students arrived and exited frequently.

Multiple regression analyzes correlation between two or more variables, and requires the following assumptions: reliability of measurement, normality, homoscedasticity, linearity, independence of errors, and multicollinearity (W. E. Martin & Bridgmon, 2012; Osborne & Waters, 2002). Plots can be used to find strong and weak correlations, and the largest sample possible was procured to obtain a valid effect size and for power considerations (Abbott & McKinney, 2013). Multiple regression analyses checked for relationships between noncognitive attributes, academic achievement, and grades in English and math at three weeks for first-time-detained juvenile delinquents. An ANOVA table provided information if the model was significant at the .05 level. A regression equation was developed. Soper's calculator for power analysis and G*Power conducted post hoc tests. JASP tested all assumptions by plotting residual plots, Q-Q plots, and running tests for outliers, variance inflation factors (VIFs), and tolerance (Goss-Sampson, 2018). After checking for all assumptions, a power test checked for adequate sample size and possibility of a Type II error. Using regression and beta coefficients, as well as the coefficient of determination, the relationships were identified.

3.6　　Results of Demographics

There were 72 students in the sample. The average age was 15.3 ($SD = 1.6$; range 10–18), but 73.6% were between the ages of 15–17. Most students were male (male = 58; female = 14), as the facility was a coeducational juvenile detention center. Students were incarcerated for offenses which as adults would be a felony or misdemeanor. All students included in the study experienced problems in traditional school. Very few students were at either extremes of middle school or 18 and over. Younger students were relatively rare, with only 5.6% of students aged 10-12. Few students were in middle school compared to the overall population. Older high school students, at the ages 16 and older, predominated. Most students

had not earned enough credits to be counted as juniors or seniors, placing most students at risk of dropping out of high school.

A further breakdown of demographics was examined. Of the 72 students, 39 (54%) were Black, 2 (2.7%) were Hispanic, and 31 (46%) were White. Students self-reported race upon intake. There were slightly more Black students than White. The Hispanic population was very low. Though 50% of students were 16 years of age and over, the students as a collective were behind academically and at risk of school failure. There were 22 (30%) students 17 years of age, yet only 21% were in 11th and 12th grade. Students were over age compared to the students' grade level and lacked sufficient credits to be on track to graduate.

Special education was overrepresented, with 32% of students receiving services (seriously emotionally disturbed was most prevalent, comprising 18% of the total population). Special education was overrepresented, with 32% of students receiving services (seriously emotionally disturbed was most prevalent, comprising 18% of the total population). Students with special needs made up approximately one third of the facility, and most students were behind academically regardless of disability. Descriptive statistics revealed students, compared by grade level ($M = 9.333$; $SD = 1.703$), were more than one standard deviation behind in reading (BASI verbal GE $M = 6.065$; $SD = 2.446$) and math (BASI math GE $M = 5.525$; $SD = 2.404$).

3.7   Results of Instrumentation

Self-esteem was measured by the SSES. For the SSES, subscores of performance ($M = 71.9$, $SD = 15.849$), social ($M = 71.5$, $SD = 14.992$), and appearance ($M = 71.6$, $SD = 16.742$). All subscores of the SSES, performance, social, and appearance, were similar.

Mental health was screened by the SDQ ($M = 14.4$, $SD = 5.296$), with five subscores, which suggested over 42% of all juveniles needed further evaluation for psychiatric problems. The SDQ-E and SDQ-H suggested many students had difficulties with emotional regulation and hyperactivity. On the SDQ-PRO, the average and standard deviation suggested a quarter of the population were statistically different in a negative way.

Students' self-perceptions, concerning abilities and work ethic were measured with the Grit–Survey Scale, Math Academic Self-Concept, and English Academic Self-Concept. Grit–Survey revealed an average of 3.3 ($SD = 0.68$). Percentiles suggested students had average to high average grit. Though students were delinquent and had long histories of school failure, students in juvenile detention reported resiliency in schoolwork On the Math ASC students had an average of 14.1 ($SD = 4.2$), and the Language Arts ASC had an average of 16.3 ($SD = 5.0$). Students, on average, felt more confident in ability and aptitude in English than math. Percentiles suggested students viewed academic self-concept by subject differently.

Measures of academic achievement were conducted using BASI–S and TOSCRF–2. The standardized scores average was 85.7 ($SD = 12.8$), which showed most students were between low average to average. The BASI age equivalency suggested students were average age of 11 ($SD = 2.7$). All subscores were similar and toward the low average end of the scale. Salient factors were the BASI verbal scores ($M = 85.6$; $SD = 12.8$) matched closely with the TOSCRF–2 ($M = 85.4$; $SD = 11.7$). Students in math were further behind on the BASI math assessment, with a standardized score of 79.1 ($SD = 11.7$) and age

equivalency of 10.7. Overall, students' skills were similar to upper elementary and lower middle school, though most students were in high school. Math computation and application were low average.

Academic achievement in showed students lacked many of the skills necessary to be successful in middle and high school. Grades were assigned as holistic scores on a mastery learning scale of 0 = F, signifying little to no effort, higher F's of 1–2, minimal passing of 2.5, and letters assigned by 3 = D, 4 = C, 5 = B, and 6 = A. Traditional averages were not assigned, as the grade scale worked on the principle of mastery learning. Initial grade averages for both groups revealed the average grade was a D for math and language arts (standard deviation for both was from an F to a B). BASI-S scores showed students, on average, were far behind academically, and grades were mostly poor.

3.8   Multiple Regression

Before developing a regression model, assumptions for the parametric test of multiple regression had to be met. Two regression models were developed: math grades and English grades. The dependent variables were grades, and backward multiple regression analyses were run for each subject matter. Math grades are explored first and then English grades. For each dependent variable, the following assumptions were checked: multicollinearity, linearity, absence of outliers, homoscedasticity, normality, and independence (O'Brien & Scott, 2012).

Assumptions. Assumptions were checked for both the math and language arts multiple regression models. The criterion variable was math grades after three weeks. A backward regression model was run to explore relationships, and a model was selected. All assumptions were tested.

Multicollinearity was tested by checking the VIFs for independent, continuous variables. Since the values for VIF were under 4–10, the variables were not considered collinear. Tolerance was also found to be adequate. The condition index revealed no predictor variable had correlation greater than .90 (Hair, Black, Babin, & Anderson, 2009). One concludes the independent variables did not predict each other.

Linearity of continuous variables was tested using partial plots. Scatterplots revealed if the residuals were normally distributed by visual inspection. Because there were three independent variables, three scatterplots were examined. There were no curvilinear patterns. Also, since there were no problems with normality or homoscedasticity, the model was considered linear. Outliers were tested with casewise diagnostics. There were no outliers, and residuals did not reveal any values had high influence or leverage. The conclusion was there were no outliers.

Homoscedasticity was tested to see if the data were evenly distributed. Scatterplots were used and were found to be normal to satisfy homoscedasticity, as most residuals were within -2 or +2 standard deviations. White's test can help check for violation of homoscedasticity, as visual inspection can be difficult (Berenson, 2013). Using Microsoft Excel, the abridged White's test was conducted to test for heteroscedasticity in math ($F[2,69] = 2.892, p = .062$) and language arts ($F[2,69] = 1.894, p = .158$), failing to reject the null hypothesis the data were homoscedastic.

All predictor variables were examined for homoscedasticity. Residuals within +/- 3.3 standard deviations, for samples under 1000, was used as the standard to confirm absence of heteroscedasticity (Tabachnick, Fidell, & Ullman, 2007). No problems with homoscedasticity were found.

Normality was tested by examining the Q-Q plot. The Q-Q plot compares theoretical to actual residuals to determine if both samples were derived from the same sample. The residuals were close to the best-fit line, suggesting the predicted values and actual values were within a normal range. Since the study was cross-sectional as opposed to longitudinal, all values were gathered independently from each other. There were no concerns. A further inference was because normality and homoscedasticity were met, linearity can be assumed for the model for language arts. Overall, the model showed good fit. All assumptions were met.

Math multiple regression analysis. Since all assumptions for multiple regression were met, a backward approach was used to construct a model for multiple regression analysis of academic achievement and noncognitive factors on Mathematics grades after three weeks. ANOVA results (Table 2) indicated the model was a significant predictor of math grades, $F(3,68) = 7.879$, $p = <.001$, meaning one can conclude the results were not by chance.

Table 2

ANOVA: Math Grades After Three Weeks Linear Regression

Model		Sum of squares	*df*	Mean square	*F*	*p*
1	Regression	68.730	3	22.910	7.879	<.001
	Residual	197.714	68	2.908		
	Total	266.444	71			

Multiple regression analysis was used to test if noncognitive and academic factors significantly predicted students' grades after three weeks in math. All assumptions were met. The results of the regression indicated the three predictors explained 22.5% of the variance ($R = 0.508$, adjusted $R^2 = .225$, $F[3,68] = < .001$).

When math grades after three weeks were predicted, BASI verbal standardized score ($\beta = 0.047$, $b = 0.314$, $p = .004$), social self-esteem ($\beta = 0.050$, $b = 0.386$, $p = <.001$) and prosocial ($\beta = 0.259$, $b = 0.255$, $p = .022$) were significant predictors (Table 3). The partial correlations revealed each variable provided a unique value for the model: BASI verbal ($r = 0.309$, $p = .004$), social self-esteem ($r = 0.372$, $p = <.001$), and prosocial ($r = 0.245$, $p = .022$). Unstandardized coefficients can be used to build a predictive model. The final predictive model, derived from Table 3, was

Math Grade—3 wks = -7.366 + (0.047*BASI SS R) + (0.050*Soc. SE) + (0.259*Pro.).

After including all predictor variables, three variables produced the strongest model, as shown in Table 3. One predictor, BASI SS math, confounded other variables and was removed. Standardized test scores for verbal as measured by BASI (BASI SS R), social self-esteem (SSE), and Strengths and Difficulties Questionnaire–Prosocial (SDQ–PRO) were significant. Standardized coefficients showed all three variables had significance from 0.255 to 0.386. Grit, math academic self-concept, state self-esteem, and math ability were not statistically significant. Other variables which did not show significance were BASI Math Computation and BASI Math Application.

Table 3

Coefficients: Math Grades After Three Weeks Linear Regression

							95% CI		Collinearity statistics	
Model	Unstand.	*SE*	Stand.	*T*	*p*	Lower	Upper	Tolerance	VIF
1 (Intercept)	-7.366	1.994		-3.695	<.001	-11.344	-3.388		
SDQ–PRO	0.259	0.111	0.255	2.344	0.022	0.038	0.479	0.923	1.083
SSE	0.050	0.014	0.386	3.562	<.001	0.022	0.078	0.930	1.075
B SS R	0.047	0.016	0.314	2.962	0.004	0.015	0.079	0.972	1.029

Note. Unstand. = unstandardized; *SE* = standard error; Stand. = standardized; CI = confidence interval; SDQ-PRO = Strengths & Difficulties Prosocial; SSE = social self-esteem; B SS R = BASI standardized score for verbal.

The best predictors for grades in math were standardized scores in verbal, social self-esteem, and prosocial skills. For the model, the results were statistically significant (<0.001) and each predictor variable showed adequate alpha levels as well. The model explained 22.5% of variation in students' grades in mathematics for first-time detained juvenile delinquents (adjusted $R^2 = 0.225$).

Power analysis examined if effect size and sample size were adequate. Using Soper's (2019) calculator, the multiple regression analysis was found to be adequate ($R^2 = 0.258$, $f^2 = 0.348$, power = 0.8, 3 dependent variables, $p = .05$, sample size needed = 35). The effect size of Cohen's $f^2 = 0.348$ suggested a moderate to high effect and sufficient size. G*Power 3 was used for post hoc testing of power (Faul, Erdfelder, Buchner, & Lang, 2009). Power was computed to be 0.9904, which was high (noncentrality parameter $\lambda = 25.9273$; *F*-crit = 2.7395; numerator $df = 3$; denominator $df = 68$). The conclusion was power was high, and the results can be considered robust.

English multiple regression analysis. Similar to the math multiple regression model, all assumptions were met, and using a backward approach, a multiple regression model was constructed. The predictor variables were academic achievement and noncognitive factors regressed on English grades at the three-week mark. ANOVA results, shown in Table 4, indicated the model was a significant predictor of English grades, $F(3,68) = 10.225$, $p = <.001$, meaning one can conclude the results were not by chance.

Table 4

ANOVA: Language Arts Grades After Three Weeks Linear Regression

Model		Sum of squares	*df*	Mean square	*F*	*p*
1	Regression	87.402	3	29.134	10.225	<.001
	Residual	193.761	68	2.849		
	Total	281.163	71			

Multiple regression analysis was used to test if noncognitive and academic factors significantly predicted students' grades after three weeks in English. All assumptions were met. The results of the regression analysis indicated the three predictors explained 28.0% of the variance ($R = .558$, adjusted $R^2 = .280$, $F[3,68] = 10.225$, $p = < .001$).

When English grades after three weeks were predicted, he BASI verbal standardized score ($\beta = 0.056$, $b = .360$, $p = < .001$), social self-esteem ($\beta = 0.041$, $b = .312$, $p = .004$) and prosocial ($\beta = 0.375$, $b = .359$, $p = .001$) were found to be significant predictors. The partial correlations revealed each variable provided a unique value for the model: BASI verbal ($r = 0.355$, $p = <.001$), social self-esteem ($r = 0.301$, $p = .004$), and prosocial ($r = 0.345$, $p = <.001$). The overall model fit was adjusted $R^2 = 0.280$. Unstandardized coefficients can be used to build a predictive model. The final predictive model, developed from Table 5, was

LA Grade—3 wks = -8.046 + (0.056*BASI SS R) + (0.041*Soc. SE) + (0.375*Pro.).

With English grades at three weeks as the criterion variable, standardized test scores for verbal as measured by BASI (BASI SS R), social self-esteem (SSE), and Strengths and Difficulties Questionnaire–Prosocial (SDQ–PRO) were statistically significant as predictor variables. Prosocial and reading accounted for most of the standardized correlation. As with math grades, grit, math academic self-concept, state self-esteem, and math ability were not shown to be statistically significant. The values are shown in Table 5.

Table 5

Coefficients: Language Arts Grades After Three Weeks Linear Regression

Model		Unstand.	*SE*	Stand.	*t*	*P*	95% CI Lower	Upper	Collinearity statistics Tolerance	VIF
1	(Intercept)	-8.046	1.973		-4.077	<.001	-11.985	-4.108		
	SDQ–PRO	0.375	0.109	0.359	3.427	0.001	0.157	0.593	0.923	1.083
	SSE	0.041	0.014	0.312	2.990	0.004	0.014	0.069	0.930	1.075

| B SS R | 0.056 | 0.016 | 0.360 | 3.523 | <.001 | 0.024 | 0.088 | 0.972 | 1.029 |

Note. Unstand. = unstandardized; *SE* = standard error; Stand. = standardized; CI = confidence interval; SDQ–PRO = Strengths and Difficulties Questionnaire–Prosocial; SSE = social self-esteem; B SS R = BASI standardized scores for verbal.

As in math, the best predictors for grades in English were standardized scores in verbal, social self-esteem, and prosocial skills. Each independent variable had statistical significance, as well as the entire model. The model explained 28.0% of variation in students' grades in English for first-time-detained juvenile delinquents (adjusted $R^2 = 0.280$).

Soper's (2019) calculator was used to conduct power analysis. The model was found to have adequate power ($R^2 = 0.311$, $f^2 = 0.451$, power = 0.8, 3 dependent variables, $p = .05$, sample size needed = 28). The effect size of Cohen's $f^2 = 0.451$ suggested the findings have a high effect and sufficient size. G*Power 3 was also used for post hoc testing of power (Faul et al., 2009). Power was computed to be 0.9986, which was high (noncentrality parameter $\lambda = 33.4172$; *F*-crit = 2.7395; numerator $df = 3$; denominator $df = 68$). The conclusion was power was high, and the results can be considered robust.

The results of the research questions for correlation with students' grades found similar predictor variables. Reading skills, social self-esteem, and prosocial skills predicted math and English grades. In the results for the first question for language arts grades, the proposed model was statistically significant using ANOVA ($F[3,68] = 10.225$, $p = <.001$), the adjusted $R^2 = 0.280$ ($p = <.001$), and a high effect size ($f^2 = 0.451$). For the second research question for mathematics grades, the proposed model was statistically significant using ANOVA ($F[3,68] = 7.879$, $p = <.001$), adjusted $R^2 = 0.225$ ($p = <.001$), and a moderate to high effect size ($f^2 = 0.348$). Power was adequate for both studies. In the present study, reading comprehension mattered as much as being socially mature and demonstrating prosocial skills. Essentially, student success depended on being able to listen, read, and comprehend, and the youths refrained from behavioral problems and attempted to be pleasing to others.

4. Discussion

"The high recidivism and low school re-engagement data serve as an urgent call to action. It is clear that greater investments in JDC [juvenile detention center] staffing, professional development, instruction and transition planning are needed" (Benner et al., 2016, p. 43). Juvenile delinquents have a lengthy history of failure. Demographic results in the study were comparable to previous research findings conducted nationally, finding juvenile delinquents had the following characteristics: (a) well behind similarly situated peers, (b) present with high rates of mental illness, and (c) self-perceptions of acceptable academic progress which do not align with school grades, behavior, and graduation. The recommendations start by briefly outlining prior work to improve outcomes for juvenile delinquents and end with recommendations of how current findings and theory should be used to improve educational programs for juvenile delinquents.

For low-achieving students with behavioral issues, self-appraisal did not match normal expectations (Walters, 2020). Some questioned if grit was a construct, as one large-scale study suggested grit was conscientiousness, and improving grit had low effect versus a focus on perseverance (Credé, Tynan, &

Harms, 2017). Correlation and regression did not show significance with grit. While some factors correlated to grit, one would hypothesize because of the low academic achievement, lack of success in school, and pervasive behavioral problems, students would show either low grit or negative correlation. One study found grit was a protective factor against delinquency (Guerrero, Dudovitz, Chung, Dosanjh, & Wong, 2016). Unlike the Duckworth and Quinn (2009) studies which correlated grit with high academic achievement, in the present study, students in juvenile detention had similar grit to high-achieving students but pervasive failure. Possible causes were in the face of persistent failure, students distorted causes of failure and appraised ability disassociated from results to protect the self.

Many found academic self-concept predicted academic achievement, with a low to moderate effect size (Ghazvini, 2011; Stankov & Lee, 2014; Susperreguy, Davis-Kean, Duckworth, & Chen, 2018). Noncognitive factors, such as psychosocial and behavior, influenced grades as much as prior grades and standardized achievement (Casillas et al., 2012). Yet, in the current study, academic self-concept did not correlate with academic achievement as found in previous studies). Juvenile delinquents had comparable academic self-concept as students in the general population, and grades were not impacted by this factor. Like grit, there was a disassociation between effort and results.

Prosocial, social self-esteem, and reading ability were shown to be connected by language and expressive communication. Low intelligence and psychopathic behavior negatively impacted decision making and cooperation, and juvenile delinquents demonstrated low empathy by practicing self-serving cognitive distortions (Baetz et al., 2019; Barriga, Sullivan-Cosetti, & Gibbs, 2009; Stams et al., 2006). Students able to play the game, where the youths listen, read adequately, and understand social situations, excelled. In addition, students with empathy and people-pleasing behavior, the hallmarks of prosocial behavior, found ways to be successful in juvenile detention centers in the face of poor math skills and other psychosocial problems.

The present research supports current findings communication problems and antisocial behavior were prevalent and detrimental to academic achievement, but there was an important divergence. Possibly 90% of students in juvenile detention have impaired receptive vocabulary skills, and being agreeable and conscientious were found at odds with antisocial behavior (Jones, Miller, & Lynam, 2011; Lansing et al., 2013). Juvenile who persisted across the lifespan had a history of aggressive behavior and drug and alcohol abuse (Assink et al., 2015). Well into midlife, juvenile delinquents had 41% odds of being unemployed and 141% increased odds of having a mental illness (Drury, DeLisi, & Elbert, 2019).

Long theorized was reading was a factor causing juvenile delinquency, but the findings of this study problematize those conclusions. Communication and language disorders have been found to start in childhood and were much higher in adult prisons, and such disorders related to psychological, emotional, and behavioral problems (LaVigne & Van Rybroek, 2011; Søndenaa, Wangsholm, & Roos, 2016). For example, psychopathy related to poor reading outcomes (Vaughn et al., 2011). The Texas Tiered Instructional Model offered four evidence-based steps to teach reading in juvenile detention (Williams, Wexler, Roberts, & Carpenter, 2011). The missing fifth step in the Texas model and others was an inability to read was more than lack of instruction. Students had severe social and emotional problems, exacerbated by communication disorders which largely goes undiagnosed and untreated (Moncrieff, Miller, & Hill,

2018). Results of the current study suggested juvenile delinquents have severe reading problems, but other factors, such as prosociality and social self-esteem, should be considered.

The findings offered a mediation about the root causes of juvenile delinquents, calling for further analysis. Numerous studies documented poor reading skills of juvenile delinquents, which led some to suggest failing to teach students to read led to juvenile delinquency (Baker & Ireland, 2007; Malmgren & Leone, 2000; Warnick & Caldarella, 2015; Wheldall & Watkins, 2004). Christle and Yell (2008) called for preventing reading problems as a way to prevent or reduce juvenile delinquency. Instead of presupposing poor or little reading instruction causes delinquency, problems with communication coexist with learning reading over the course of elementary school. Combined, students likely did not get along socially with others, struggled with empathy and teacher pleasing behavior, and experienced difficulty in reading (and in social and prosocial interactions) connected with an inability to communicate effectively. The conclusion juvenile delinquents experienced persistently poor schools and teachers seemed less likely than the interaction of social self-esteem, prosocial skills, and verbal abilities were all mediated by communicative abilities. The ideas of instilling helpability and coachability in juvenile delinquents were suggested by the regression analysis.

Positive prosociality correlated with reduced aggression and delinquent behavior (Padilla-Walker, Memmott-Elison, & Coyne, 2017). Teaching and promoting prosocial behavior have been shown to reduce aggressive conduct and improve academic achievement (Caprara et al., 2014; Gerbino et al., 2018). Pull out and counseling sessions probably do not provide enough intensity in juvenile detention centers. Without development of social skills and prosocial ability, a strict focus on academic achievement had shown little chance of success. Students in short-term juvenile detention centers with higher engagement and commitment perform better behaviorally and academically (Walden, Stancil, & Verona, 2019).

Juvenile detention centers should embrace the alternative model and develop cross-disciplinary subjects focused on improved communication in reading, prosociality, and social interaction centered around teaching helpability and coachability. Antisocial behavior and impulsivity significantly predict criminal behavior (Bobbio, Arbach, & Illescas, 2020; Geerlings, Asscher, Stams, & Assink, 2020). The present research results suggested communication problems remediation should be at the center of many juvenile's learning problems. Unfortunately, schools in juvenile detention centers might have smaller classes and counseling after school, but most operate closer to traditional schools than focusing on the diverse needs of incarcerated juvenile delinquents.

Prior research findings, plus the current study, suggested schools should shift focus from solely academic or cognitive factors to one which also includes social and emotional factors of prosociality and social regulation from first contact to postrelease (Copp, Giordano, Longmore, & Manning, 2020). Preparing students to reenter society starts with understanding the complex interplay of academic skills, prosocial deficits, and social self-esteem issues to develop and implement programs which produce successful outcomes (Jäggi, Kliewer, & Serpell, 2020). Future research should operationalize current findings to maximize student growth based on shifting from the collective to a focus on individual-level traits (Gearhart & Tucker, 2020). Future research should look at making prosociality and social skills as key performance indicators for juvenile delinquents, and each student should have an individual case study to develop a personal plan.

5. Limitations

The present study used instruments with adequate reliability and validity. Testing conditions were followed to standardize results. The R^2 and adjusted R^2 were close in value to each other in the mathematics and language arts multiple regression analyses, suggesting the models were valid and reliable (Hair et al., 2009).   The instruments used were considered reliable and credible for the purposes. The same variables predicted both regression models, and when connected with students' demographics (e.g., persistent failure, behavioral problems, poor academic achievement), the results related to previous findings for the student population. Furthermore, White's test, though useful for testing homoscedasticity, can be used for model specification (Berenson, 2013; Meuleman, Loosveldt, & Emonds, 2015). In the current models, White's test suggests both models were not misspecified. The current findings were consistent with other studies which found poor academic achievement and prevalence of mental illness in juvenile delinquents (Krezmien et al., 2008; Wood, Wood, & Mullins, 2008). Though the population was sampled by convenience, the sample size and power were adequate. Furthermore, the sample was from a large geographical area with an urban and rural population.

Despite the findings, caution should be exercised in interpreting the results. External validity should be considered by numerous factors. First, the sample size was comparatively small, and the sample was drawn from one juvenile detention center in a small urban area. Secondly, correlation analysis did not reveal grit or academic self-concept directly impacted students' grades, and there would need to be further investigation on how students developed normal grit and academic self-concept which did not match achievement. Thirdly, the instruments used were screeners, brief, and could be better developed with follow-up investigations. Lastly, regression analysis only correlated grades for a small period; longer periods of incarceration change students, and examining variables before, during, and after would offer more insight. Using larger random samples and mixed-methods research could strengthen findings and add credibility.

6. Conclusion

Leaders in the education in juvenile detention should be freed from many state mandates, as complex cases and needs should dictate programming, not a one-size-fits-all program. Rather than seeing problems as technical, adaptive leaders work on continuous improvement by collaboration and improved dissemination of information (Baltaci & Balci, 2017). A framework for analyzing and tackling problems can be taught, and leaders can support and enable faculty members to use adaptive leadership skills by changing goals, beliefs, and habits in everyday practices (Boylan, 2018; Heifetz, Grashow, & Linsky, 2009). Juvenile delinquents, as a group, have difficulty appraising one's self, but how self-appraisals manifest in each juvenile varies to the degree where each facility should continuously update and shift programming to meet the needs of a highly transient population.

Within the confines of existing research, there should be a shift in theory and a new framework individualized to each juvenile (Coker, 2020). Preventive measures and improved resiliency do not teach communication skills connected with reading, social self-esteem, and prosocial skills. Many settings have been found to teach academic buoyancy and resiliency to juveniles to cope with anxiety and failure (A. J.

Martin, 2013). Though the characteristics of psychopathy and antisocial personality disorders were related to recidivism, there was not one instrument or finding which predicts poor outcomes (Pechorro, Seto, Ray, Alberto, & Simões, 2019). Students in juvenile detention need more intensive services than a second-tier intervention or 20 minutes extra per day for response to intervention. New instruments and programs which move beyond observed behavior are necessary to cause long-term change. Redefining schools around programs which explicitly focus on reading ability, improved prosociality, and positive social self-esteem hold promise to improve outcomes of juvenile delinquents.

The results of this quantitative, correlation study suggested reading ability, prosociality, and social self-esteem positively impacted academic outcomes for first-time detained juvenile delinquents. Findings from special education can be extrapolated to juvenile detention: Depressed academic achievement and behavioral problems have shown a connection, and prevention through positive supports has shown promise in juvenile correctional facilities (Algozzine, Wang, & Violette, 2011; Jolivette, 2016). Juvenile detention centers need to redefine what education means for newly incarcerated students, with a focus on improved engagement (Pytash & Kosko, 2020). Schooling for students has to move beyond pure academic concerns, as developing positive peer relationships and inculcating prosocial skills show great promise. Leaders will have to challenge the current approaches which maintain the status quo and move schooling for juvenile delinquents to be redefined differently than the classic models of schooling. Without change, the current trajectory of failure and recidivism will continue.

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