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The role of delay of gratification, substance abuse, and violent behavior on academic achievement of disciplinary alternative middle school students

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ABSTRACT

Disciplinary alternative education programs are academic environments where students are detained for 45 days by the county or court for delinquent and/or deviant behavior in their traditional schools. This study examined individual differences in academic performance, violence, willingness to delay gratification, and substance abuse of 391 students enrolled in a disciplinary alternative middle school program. Results revealed that students who reported a high propensity to delay gratification and low tendencies towards violent behavior and substance abuse obtained high math scores on the state standardized test. In addition, the negative association between violent behavior on math scores was attenuated by race/ethnicity status. Socio-economic status was not significantly associated with math test scores. Implications for further studies and educational implications are discussed.

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1. Introduction

Adolescence is a critical period in human development. It represents a transition from childhood to adulthood involving considerable physical, social, cognitive, and emotional changes. A key component in adolescents' successful negotiation during this period is their ability to acquire self-regulatory skills, most notably their proclivity to delay gratification (Bembenutty, Cleary, & Kitsantas, 2013). In academic contexts, *academic delay of gratification* refers to learners' willingness to self-regulate in terms of postponing immediate, available rewards for the sake of pursuing temporarily distant and valuable goals, such as obtaining a college degree in order to get the dream job after graduation rather than quitting school and ending with a less desirable job (Bembenutty & Karabenick, 1998). The desire to delay gratification is one of the self-regulatory skills known to alleviate challenging life stressors such as aggression, negative peer interactions, academic expectations, and pressure to take part in deviant behavior such as substance abuse and violent behavior (Ayduk et al., 2000; Herndon & Bembenutty, 2014; Mendoza-Denton, Freitas, & Downey, 1997). Often, students who are not able to engage successfully in delay of gratification end up having conflict with the law, in the school, and at home (Herndon & Bembenutty, 2014). As a consequence, through court order or by family decision, they find themselves assigned to disciplinary alternative education programs (DAEPs). During their detainment at these alternative schools, some adolescents succeed in enhancing their abilities to self-regulate and delay gratification while others do not (Herndon & Bembenutty, 2014). The present study examined academic delay of gratification as a central variable that accounts for such individual differences among students enrolled in these alternative disciplinary schools.

Furthermore, this study analyzed whether academic delay of gratification is associated with the performance of middle school students enrolled in a disciplinary alternative school on a state required math standardized test. We considered the association between academic delay of gratification, substance abuse, and violent behavior on academic achievement among at-risk adolescents. We also explored gender, racial/ethnic, and socioeconomic differences after controlling for the effects of academic delay of gratification, violent behavior and substance abuse while assessing the direct and indirect relationships between these variables and academic performance.

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1.1. Theoretical framework

Adolescence has been construed as a period of tumult and rapid changes associated with mood disruptions, conflict with parents, and risky behavior (Lerner & Steinberg, 2009). Improving a child's capacity to self-regulate as it pertains to delay of gratification can aid in buffering the challenges that child will face during their adolescence, particularly at school (Herndon & Bembenutty, 2014). Substance use and violent behavior are problems that interfere with learning and academic achievement. Adolescents that engage in continued substance abuse and/or violent behavior tend to have more disciplinary issues at school and confrontations with the law, ultimately leading to placement in DAEPs, juvenile justice facilities, and/or dropping out of the educational system entirely.

The classic work of Mischel on the *marshmallow test* construed delay of gratification as a competency or aptitude that could be strengthened through use of academic strategies specific to gratification delay (Mischel, 1996). Mischel's contributions facilitated the integration of delay of gratification into the large constellation of self-regulation. Recent research on self-regulation (Zimmerman, 2008, 2013) asserted that helping individuals to acquire self-regulatory skills promotes successful adaptation to academic, social and environmental challenges. Zimmerman proposed that highly motivated and self-efficacious learners who seek help from appropriate peers and adults, self-monitor their own goals, engage in self-control, and self-evaluate academic outcomes are those who are more academically successful. Successful self-regulation requires remaining task-focused when facing competing alternatives to temporarily distant but valuable goals. To be successful over the long term, adolescents need to make appropriate choices, be self-directed and self-efficacious, be proactive learners, and delay gratification. A myriad of research supports Zimmerman's theory (Baumeister & Vohs, 2007; Bembenutty et al., 2013; DiBenedetto & Bembenutty, 2013; Zimmerman & Schunk, 2011).

Studies have shown a relationship between race/ethnicity, socioeconomic status, and free or reduced school lunch and their negative association on math test performance (Nisbett, 2011). Adolescents that engage in deviant behavior often live in low socioeconomic neighborhoods where crime and drug use is often present (Anderson-Butcher, Lawson, & Barkdull, 2003). Male youth tend to display more aggressive behavior and have more encounters with the law than female youth.

According to Grunbaum, Kann, and Kinchen (2000), the rapid advancement of delinquent and violent behavior in our youth inside and outside the classroom has manifested itself in the proliferation of disciplinary alternative education programs (DAEPs). Failure in students to manage their impulses in relation to gratification control has been directly linked to deviant behavior that is increasingly destructive and even deadly, such as violence (Dolan & Fullam, 2004; Tangney, Wagner, Barlow, Marschall, & Gramzow, 1996) and substance abuse (Ayduk et al., 2000), giving rise to the realization that a student's inability to sufficiently delay gratification may be a gateway to a multitude of societal ills that permeate into our schools (Wulfert et al., 2002). Nowhere is the need to understand the interrelationships among these variables more important than with those youth already identified as at-risk due to being sent to alternative schools for primarily behavioral and disciplinary reasons.

1.2. The present study

The aims of the present study were fourfold. First, we examined the strength of association between academic delay of gratification, violent behavior, substance abuse, and math test scores. Second, we investigated whether students differed with regard to their tendencies towards delay of gratification, violent behavior, substance abuse, and math test scores based on gender, race/ethnicity, and SES. Third, we analyzed whether group means on math test scores differed after controlling for the effects of academic delay of gratification, violent behavior, and substance abuse. Fourth, we examined the direct and indirect effect of these variables on math test performance. We expected that delay of gratification would mediate the effect of the categorical and continuous variables on math test performance and investigated whether the hypothesized model displayed in Fig. 1 fit the data well by using data from middle school students enrolled in an alternative disciplinary school. We considered that females would have higher math test scores, and this effect would be mediated positively through academic delay of gratification and negatively through violent behavior and substance abuse. SES was presupposed to have a negative direct effect on math test scores mediated negatively through delay of gratification and positively through violent behavior and substance abuse. We hypothesized that race/ethnicity, with a comparison group indicating Caucasian youth, would have a positive direct effect on math test scores mediated positively through academic delay of gratification and negatively through violent behavior and substance abuse, with the understanding that these associations are a function of socioeconomic status rather than ethnic group inherent characteristics. Finally, we speculated that academic delay of gratification would have a direct effect on math test scores. Alpha estimates of reliability provided in the study are collected from this study's data.

2. Method

2.1. Participants

The participants in this study ($N = 391$) were middle school children chosen from an alternative learning school. The alternative school is comprised of a rotating population of students that must serve for 45 "good" days, which means 45 school days without disciplinary suspension or unexcused absence. Upon successful completion of the program, they are reinstated back to their original schools. 53% were male, 56% were Caucasian, 15% were African American, 28% were Hispanic, and 2% chose "other" for their racial/ethnic identity. 88% of our sample received free or reduced school lunch.

2.2. Measures

2.2.1. Academic delay of gratification

The 10-question Academic Delay of Gratification Scale (ADOGS; Bembenutty & Karabenick, 1998) assessed students' willingness to make choices based on long-term consequences rather than short-term, desirable rewards (e.g., "Stay in the library to make certain that you finish an assignment in this course that is due the next day, OR Leave to have fun with your friends and try to complete it when you get home later that night"). Participants answered by using a 4-point Likert scale: *Definitely choose A*; *Probably choose A*; *Probably choose B*; and *Definitely choose B* ($\alpha = .74$).

2.2.2. Substance use

Substance Abuse Screening Test (CRAFFT; Knight, Sherritt, Shrier, Harris, & Chang, 2002) assessed teenagers' involvement in substance abuse. The test is a 6-item survey (an answer of yes is one point) that tests for alcohol, marijuana, and serious drug use. An example question is "Do you ever use alcohol or drugs while you are by yourself, alone?" ($\alpha = .79$).

2.2.3. Violent behavior

The Anger Response Inventory (ARI; Tangney, Wagner, Marschall, & Gramzow, 1991) assessed responses to a succession of hypothetical events intended to evoke anger. Participants used a 5-point Likert scale to rate four separate categories: (a) their level of anger in each scenario, (b) what each scenario makes each student *wish* they could do, (c) what they feel they actually *will* do, and (d) their self-evaluation of the aftereffects of their imaginary actions in terms of not only themselves, but the object of their anger as well as their relationship ($\alpha = .88$).

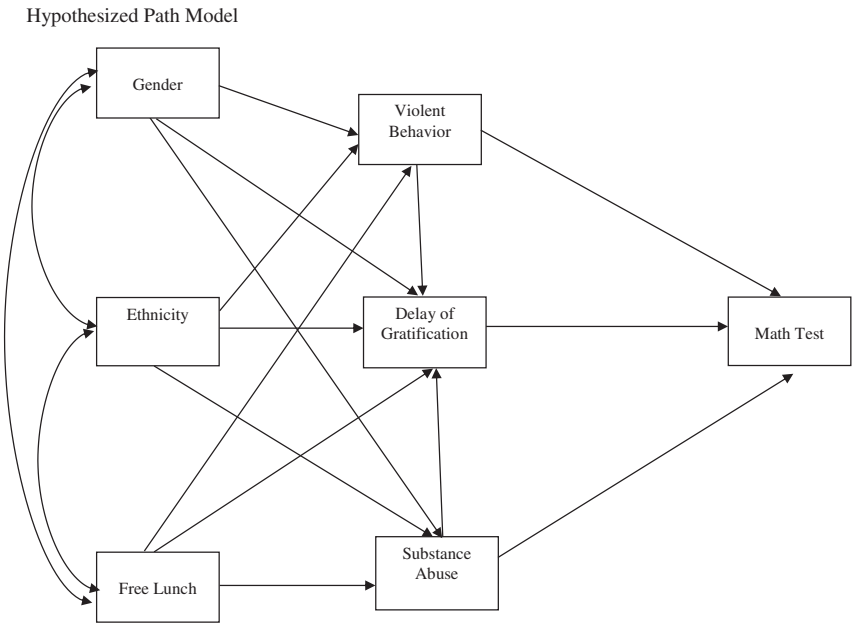


Fig. 1. Hypothesized path model.

2.2.4. Academic achievement

The State Comprehensive Assessment Test (SCAT) scores in mathematics were collected as evidence of academic achievement.

2.2.5. Demographic measures

Demographic measures were obtained from the students' record: received free or reduced school lunch as a proxy for SES, gender, and race/ethnicity.

2.3. Procedures

After obtaining parental consent and student consent, the instruments were administered to each student in their regular classroom. Students who were absent on the day of the initial assessment were invited to complete the survey the next time they were in class. All students agreed to participate in the study. Instruments were administered at the beginning of the school quarter.

3. Results

3.1. Correlational analyses

Math test scores were positively correlated to delay of gratification ($r = .35$) and negatively correlated to violent behavior ($r = -.40$) and substance abuse ($r = -12$) (see Table 1). Delay of gratification was negatively related to violent behavior ($r = -.17$) and to substance abuse ($r = -.31$). Students who reported engaging in violent behavior also reported higher use of substance abuse and lower willingness to delay gratification.

Table 1
Descriptive statistics, Cronbach's alphas, and Pearson correlations between the variables.

Variables	1	2	3	4
1. Math standardized test	1			
2. Violent behavior	−.40**	1		
3. Academic delay of gratification	.35**	−.17**	1	
4. Substance abuse	−.12*	−.02	−.31**	1
Mean	1.88	3.62	2.17	2.98
Standard deviation	.88	.86	.63	2.04
Cronbach's alpha	–	.88	.74	.79

Note. * = $p < .05$. ** = $p < .01$.

3.2. T-test analyses

A series of independent-samples t-tests were conducted to compare gender differences, free and reduced school lunch, and racial/ethnic differences among participants (see Fig. 2). Race/ethnicity was coded zero (0) for non-Caucasian youth (African-American, Hispanic, and two participants who identified themselves as members of other non-Caucasian groups) and one (1) for Caucasian youth. Not receiving free and reduced school lunch was coded zero (0) and receiving free lunch was coded one (1). Male was coded zero (0) and female was coded one (1). Mean differences in math test scores were found between males ($M = 1.61$, $SD = .73$) and females ($M = 2.19$, $SD = .94$); $t(389) = -6.87$, $p = .001$; Cohen's $d = .70$, and in violent behavior between males ($M = 3.69$, $SD = .71$) and females ($M = 3.52$, $SD = .99$); $t(389) = 1.98$,

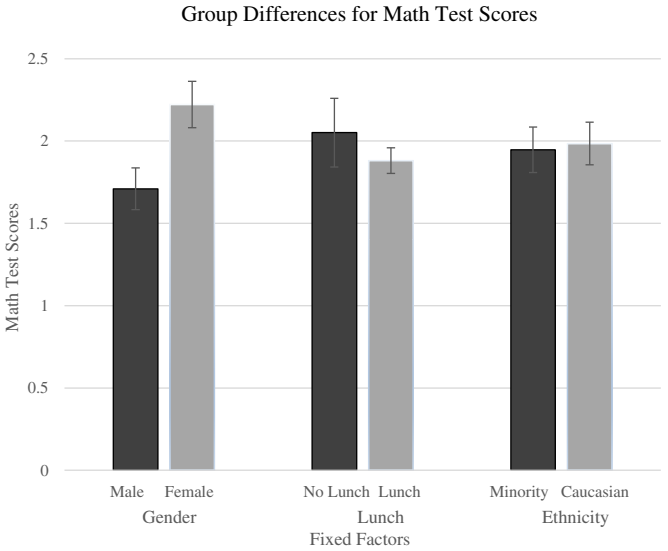


Fig. 2. Group differences for math test scores.

Table 2
Analysis of Covariance (ANCOVA) for the effects of demographic characteristics, academic delay of gratification, and deviant behavior predicting mathematics test performance.

Variables	B	SE	t	p	95% CI		η^2
					LB	UB	
Gender	−.51	.07	−6.77	.000	−.66	−.36	.11
Lunch	.17	.11	1.51	.133	−.05	.39	.01
Race/ethnicity	−.81	.33	−2.46	.014	−1.45	−.16	.02
Academic delay of gratification	.39	.06	6.22	.000	.27	.52	.09
Violent behavior	−.42	.06	−7.57	.000	−.53	−.31	.13
Substance abuse	.01	.02	.03	.978	−.04	.04	.01
Non-Caucasian * violent behavior	.21	.09	2.40	.017	.04	.39	.02

Note. Gender: male is coded 0, female is coded 1. Lunch/free lunch is coded 0; No lunch/free lunch is coded 1. Ethnicity: Non-Caucasian is coded 0; Caucasian is coded 1.

$p = .049$; Cohen's $d = .20$. There was also mean difference in substance abuse between males ($M = 3.26$, $SD = 2.13$) and females ($M = 2.67$, $SD = 1.87$); $t(389) = 2.89$, $p = .004$; Cohen's $d = .30$. The results revealed a non-significant mean differences in willingness to delay gratification between males ($M = 2.13$, $SD = .77$) and females ($M = 2.21$, $SD = .42$); $t(389) = -1.27$, $p = .205$; Cohen's $d = .13$. With 88% of the disciplinary alternative students being on free and reduced lunch compared with 49% for the respective sending schools, free and reduced lunch as a variable would appear significant in terms of the students' placement at the disciplinary alternative education program. However, having free or reduced school lunch was not significantly associated with math test scores. Mean differences in violent behavior and substance abuse also did not yield significant mean differences in SES and race/ethnicity.

3.3. ANCOVA analyses

An analysis of covariance (ANCOVA) was performed on math test scores. Independent variables were gender, free lunch, and race/ethnicity (non-Caucasian & Caucasian). Covariates were academic delay of gratification, violent behavior, and substance abuse. All possible main effects and interaction terms were examined and non-significant interactions were dropped from subsequent analyses. ANCOVA results revealed that after adjustment by covariates math test scores varied significantly between gender ($F(1, 383) = 45.84$, $p < .001$; $\eta_p^2 = .10$, a medium effect size; see Table 2). Average math test scores for males were lower compared to female students ($\beta = -.51$). Math test scores varied significantly as a function of group membership ($F(1, 383) = 6.07$, $p < .05$; $\eta_p^2 = .02$, a small effect size); the average math test scores for non-Caucasian students were lower compared to Caucasian students ($\beta = -.81$). No statistically significant main effect of receiving free or reduced school lunch was found.

After adjusting for other covariates, main effects, and interaction, academic delay of gratification had a main effect[1] on math test scores ($F(1, 383) = 38.70$, $p < .001$; $\eta_p^2 = .09$, a medium effect size). Students with higher tendencies to delay gratification obtained higher grades. However, violent behavior yielded a negative direct effect on math test scores ($F(1, 383) = 50.09$, $p < .001$; $\eta_p^2 = .12$, a medium effect size). Use of substance abuse provided no statistically significant effect on math test scores.

The only significant interaction was between ethnicity and violent behavior (see Fig. 3). Although there were not mean differences between group membership on math test scores (non-Caucasian, $M = 1.86$, $SD = .82$; Caucasian, $M = 1.89$; $SD = .94$; $t(1, 389) = -.35$, $p > .05$), ANCOVA revealed that the negative effect of violent behavior on math test scores was more pronounced in non-Caucasian students than in Caucasian students.

Interactions Effects of Ethnicity and Violent Behavior on Math Test Scores

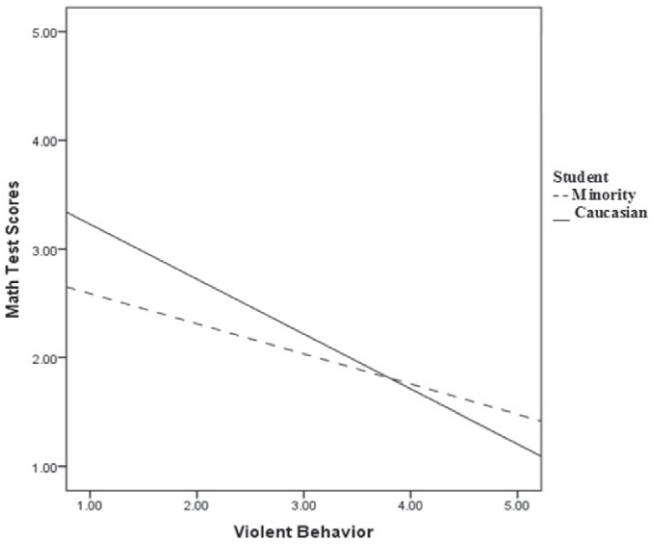


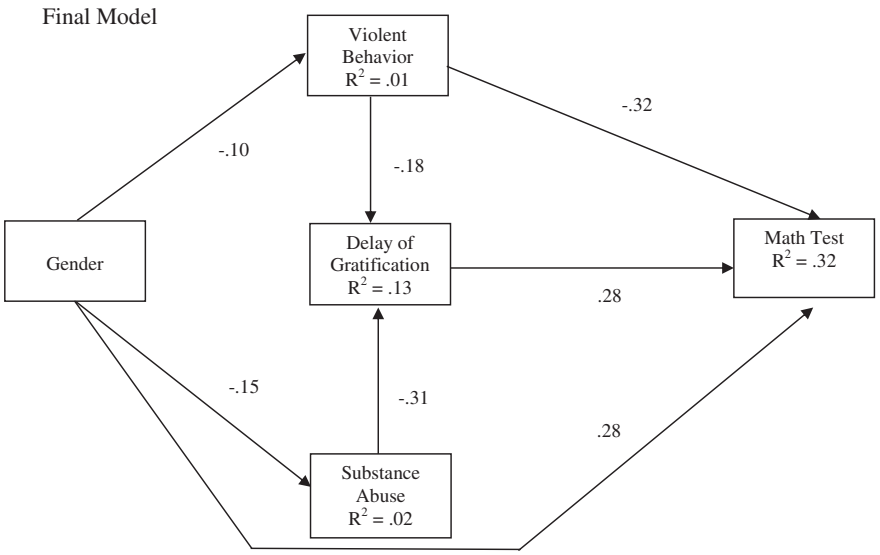
Fig. 3. Interactions effects of ethnicity and violent behavior on math test scores.

3.4. Path analysis

Although the ANCOVA revealed important information about mean differences between groups after the math test scores has been adjusted by the covariates, it did not explain the indirect and total effects between the variables. Thus, the hypothesized model (Fig. 1) for the relationship between the variables was tested by using LISREL 9.1 (Jöreskog & Sörbom, 2012). The hypothesized model did not fit the data well: $\chi^2(5, N = 398) = 45.67$, $p = .001$, Goodness of Fit Index (GFI) = .96, Root Mean Square Error of Approximation (RMSEA) = .14, and Comparative Fit Index (CFI) = .80; with no significant path between any of the exogenous and the endogenous variables with the exception of a negative association between gender substance use. After adjusting the model based on the program's recommended modifications and theoretical grounds, the data fit the model well: $\chi^2(3, N = 398) = 0.51$, $p = .92$, Goodness of Fit Index (GFI) = .99, Root Mean Square Error of Approximation (RMSEA) = .00, and Comparative Fit Index (CFI) = 1.00. Figure 4 shows the results of the final model, excluding free lunch and ethnicity from the model because they did not significantly contribute to the model. Table 3 displays the decomposition of the effects from the path analysis.

Path analysis revealed that gender as an exogenous factor was negatively related to violent behavior ($\beta = -.10$) and substance abuse ($\beta = -.15$), suggesting that males are more predisposed than females to violence and substance abuse. Gender had a positive direct effect on math test scores and also an indirect effect through violent behavior, substance abuse and academic delay of gratification, suggesting that females tend to report higher tendencies to delay gratification than males. Substance abuse ($\beta = -.31$) had a negative direct effect on delay of gratification and a significant indirect effect on math scores mediated by delay of gratification ($t = -4.67$, $p < .01$), which significantly contributed to the total amount of variance explained in math test scores ($R^2 = .32$) with a large effect size ($f^2 = .47$). Violent behavior had negative direct effects on academic delay of gratification ($\beta = -.18$) and math test scores ($\beta = -.32$) and an indirect effect on math test score through academic delay of gratification. Academic delay of gratification had a positive direct effect on math test scores ($\beta = .28$) and all the variables had an indirect effect on math test score through academic delay

[1] We use "effect" statistically to refer to indirect and direct relationships between variables, but we do not mean to imply a causal relation here; our results are purely correlational.



Chi-square = 0.51, df = 3, p = .0.92; RMSEA = .00; Goodness of Fit Index (GFI) = .99,

Comparative Fit Index (CFI) = 1.00. All paths are significant ($p < .05$)

Fig. 4. Final model.

of gratification and it account for 13% of the variance. The total variance explained on math test scores was 32%. The squared multiple correlations (R^2) ranged from .01 to .32. According to Cohen (1992), all effect sizes (f^2) ranged from small to large (Range = .01 to .47).

4. Discussion

We found that delay of gratification is negatively associated with both violent behavior and substance abuse. Findings support the notion that adolescents' determination to delay gratification is related to better academic outcomes and a decrease in violent behavior and substance abuse among youth enrolled in a disciplinary alternative school, bolstering the existing support for the importance of promoting self-regulatory skills among at-risk adolescents whose deviant behavior have negatively affected them during the critical developmental period of adolescence (Ayduk et al., 2000; Duckworth & Seligman, 2005; Herndon & Bembenutty, 2014; Mendoza-Denton et al., 1997). Based on findings from the path analysis, it was also revealed that the negative effect of violent behavior on math scores was influenced by racial/ethnic status as indicated by the significant interaction between non-Caucasians and violent behavior. The average math test score for non-Caucasian students was lower than for Caucasian students. Further, the difference in scores between male and females were significant even after controlling for drug abuse, delay of gratification, and racial/ethnic status.

Using a rarely studied population like alternative middle school children for examination is helpful in understanding the relationship between delay of gratification, individual differences, and deviant behaviors in this at-risk population and underscores the importance of strengthening self-regulation and providing interventions for those engaged in substance abuse and violent behavior. To date, no research has examined the relationship between delay of gratification and substance abuse with middle school children from alternative school environments. This study corrects this omission. In addition, very little research to date has been done connecting delay of gratification and violent behavior, in children or adults. This study helps to expand the dearth of data between delay of gratification and violent behavior and substance abuse among adolescents.

The results of the study also raise the issue of the importance of self-regulation training to students enrolled in disciplinary alternative schools as well as students enrolled in traditional school settings who are prone to violent behavior and substance abuse. Self-regulation training in the classroom involves building a child's intrinsic motivation through a classroom culture of focused yet enjoyable achievement. Examples include incorporating relatable accomplished peers as tutors, creating indirect competition through the usage of progress boards, and rewarding students with classroom privileges like a knowledgeable partner to work and converse with rather than a purely extrinsic motivator like candy. Adolescents need to be trained in setting proximal and distant academic goals, delaying gratification in school and out, sustaining motivation in spite of setbacks, and monitoring and evaluating academic outcomes to help increase their achievement in school and success after graduation (Zimmerman, 2013). In this study, youth who were able to remain task-focused and postpone immediately available rewards for the sake of pursuing distant goals were those who obtained higher math test scores in spite of having stressors similar to their counterparts.

Table 3
Decomposition of effects from the path analysis.

Variable	Direct effect	Indirect effect	Total effect	t-test	R^2	f^2
On substance abuse					.02	.02
Of gender	−.15	.00	−.15	−3.00*		
On violent behavior					.01	.01
Of gender	−.10	.00	−.10	−1.99*		
On delay of gratification					.13	.15
Of gender	.00	.07	.07	3.25*		
Of substance abuse	−.31	−.00	−.31	−6.64*		
Of violent behavior	−.18	.00	−.18	−3.74*		
On math test					.32	.47
Of delay of gratification	.28	.00	.28	3.49*		
Of gender	.28	.05	.33	7.21*		
Of substance abuse	.00	−.09	−.09	−4.67*		
Of violent behavior	−.32	−.05	−.37	−3.63*		

Note.
* $p < .05$.

A limitation of the present investigation is its correlational nature; causation cannot be inferred from our data. Additional limitations include: (a) the age variability of the students in each grade, (b) the study's reliance on self-report information and the inherent predisposition to peer pressure, (c) the population is not chosen at random and is solely from one county in the state, (d) the overwhelming percentage of lower socio-economic (SES) children suggest the SES portion of the findings is inherently insignificant, (e) the ranges found in delay of gratification results may be limited in the alternative learning environment due to expected lower levels in their ability to delay gratification, and (f) aggregating non-Caucasian students in a single group. A fundamental delimitation of the study is the significance of the students' performance on the standardized state test. It is not simply a benchmark assessment, but is a graduation requirement. In spite of these limitations, the findings of this study contribute key data about an issue (gratification delay) demanding serious national attention in conjunction with an ever-growing population of alternative schools aimed at youthful delinquents. Additional empirical research in the form of longitudinal analyses over varying populations, comparing at-risk and typical youth, with both general and specific measures of gratification delay, would be a viable future option in which students' actual delay of gratification behavior is observed.

In conclusion, results indicated the beneficial relationship between academic delay of gratification and academic performance, and that violent behavior and substance abuse contribute to difficulties with delaying gratification. These findings suggest that the recognition and development of self-regulation and delay of gratification skills will help students reach academic success, particularly those enrolled in disciplinary alternative education programs.

Appendix A. Sample items assessing academic delay of gratification, substance abuse, and violent behavior

A.1. Academic delay of gratification scale

(10 items; ADOGS; Bembenutty & Karabenick, 1998).

Response format consisted of a 4-point Likert scale.

(Definitely choose A; Probably choose A; Probably choose B; Definitely choose B).

A. Go to a favorite concert, play, or sporting event and study less for this course even though it may mean getting a lower grade on an exam you will take tomorrow or,

B. Stay home and study to increase your chances of getting a higher grade.

A.2. Substance abuse screening test

(6 items; CRAFFT; Knight et al., 2002).

Yes–No response format (*An answer of* yes *is one point*).

"Do you ever forget things you did while using alcohol or drugs?"

A.3. Anger Response Inventory (ARI)

(12 items; Tangney et al., 1991).

Response format of a 5-point Likert scale (1 = "*no anger*" to 5 = "*very, very angry*").

"During an argument, a friend calls you stupid."

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