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A Good Student but not a Good Friend: Domain-Specific Self-Control in Middle School Students

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A year-long longitudinal study explored how self-control varies by domain in middle-school students. The current study confirms that self-control can be separated into schoolwork and interpersonal self-control domains and that each domain predicts theoretically relevant academic and social outcomes. At the beginning of the school year, teachers rated their students on behaviors that exemplified self-control in schoolwork and interpersonal contexts. Confirmatory factor analyses supported a two-factor domain-specific self-control model. Self-control in schoolwork predicted more active class engagement, which in turn increased academic achievement at the end of the school year. Interpersonal self-control predicted less anger, which thereby reduced peer conflict at the end of the school year. Collectively, the current findings empirically support the domain specificity of self-control and reveal its impact on affective, motivational, social, and academic outcomes. Implications for future self-control intervention studies are discussed.

Key words : self-control, domain-specificity, achievement, engagement, peer conflict, anger

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I am indeed, a king,
because I know how to rule myself.

Pietro Aretino, 1539

What makes us work on writing an introduction to a journal article instead of surfing the Internet? What makes us work out rather than indulge in the culinary delight of a chocolate cake? Self-control refers to one's ability to resist the temptation to indulge in immediate pleasure in lieu of a bigger gain in the future. Self-control is the effortful regulation of the conflict between long-term goals (e.g., being healthy) and short-term desires (e.g., eating cake instead of working out) (Duckworth & Steinberg, 2015). In psychology, self-control has been studied widely under different monikers, such as self-regulation, effortful control, delayed gratification, and willpower. Indeed, 3% of published peer-reviewed psychological articles in 2010 had "self-control" or a closely related term as a keyword (Duckworth, 2011).

In parallel, a growing body of evidence suggests that self-control has extensive and persisting effects in an individual's life (장혜인, 박형인, 2015; Mischel, Shoda, & Rodriguez, 1989). Childhood self-control is related to academic, social, emotional, and health outcomes in later life (Ayduk et al., 2000; Duckworth & Seligman, 2005; Moffitt et al., 2011; Shoda, Mischel, & Peake, 1990; Tangney, Baumeister, & Boone, 2004). Children who demonstrate high self-control at age 4 are more socially and academically competent during adolescence than four-year-olds who demonstrate low self-control (Mischel, Shoda, & Peake, 1988). Similarly, childhood self-control, measured between the ages of 3 and 11, predicted health, wealth, and a low crime conviction rate by age 32. Individuals with lower childhood self-control tend to have more physical health problems (e.g., cardiovascular, respiratory, dental, and sexual health) and lower socioeconomic status (e.g., lower income, single-parent child rearing, and financial problems), and are more likely to be convicted of a crime compared to individuals with higher childhood self-control (Moffitt et al., 2011).

Self-control tends to predict both desirable and undesirable outcomes (Baumeister, Bratslavsky, Muraven, & Tice, 1998; de Ridder. de Boer, Lugtig, Bakker, & van Hooft, 2011), because self-control has two dimensions: initiating or facilitating positive behaviors (e.g., studying for an exam rather than surfing the Internet) and stopping or prohibiting negative behaviors (e.g., quitting smoking). Supporting this logic, a recent study (Converse, Piccone, & Tocci, 2014) showed that self-control positively predicted desirable behavior (studying) and negatively predicted undesirable behavior (stealing) during adolescence, which in turn predicted career success in adulthood.

Despite well-established research on the effects of self-control, less is known about whether self-control is domain-general or domain-specific.

For example, a child who comes to class prepared every day may not be able to keep his temper in check when others tease him. Likewise, a child who can stop him- or her-self from saying something rude to others may not be able to resist distractions in class. The current research examines the domain specificity of self-control among middle-school students. Specifically, whether self-control appears to be domain specific in middle school students, and if so, whether each domain deferentially predicts social and academic outcomes. Additionally, the current study investigates underpinning motivational and affective mechanisms by which domain-specific self-control influences the outcomes.

Investigating the domain specificity of self-control has both theoretical and practical implications. Theoretically, it enriches our understanding of self-control by revealing that context systematically influences within-individual differences in behaviors. Practically, understanding mechanisms in which self-control relates to different outcomes will provide insight into how to design interventions and prevention programs for children with different types of self-control problems. For instance, teaching how to focus on work while ignoring distractions will be of greater benefit than teaching how to control one's temper for students who have a hard time completing their homework.

The idea that behaviors can vary across situations is not new. Several leading personality psychologists have argued that individual differences in behaviors across situations should be treated as meaningful information rather than mere errors or noise (Fleeson, 2007; Lucas & Donnellan, 2009; Mischel, 2004). Mischel and his colleagues (Mischel, 1969; Mischel, Mendoza-Denton, & Shoda, 2002), for instance, found that an individual's behaviors are only weakly correlated across situations; thus, the authors argued that "variability of behavior across situations, at least partly, may be a meaningful expression of the enduring but dynamic personality system itself and its stable underlying organization" (p. 51). This statement does not necessarily suggest that there are no "general" personal traits but rather that different contexts should not be ignored when examining an individual's patterns of behavior.

Likewise, a recent study has suggested that self-control is domain-specific in adolescents (Tsukayama, Duckworth, & Kim, 2013). Across three empirical studies, Tsukayama and his colleagues (Tsukayama et al., 2013) suggested that adolescents' self-control has *at least* two distinct, but not mutually exclusive, domains (Tsukayama et al., 2013): schoolwork self-control and interpersonal self-control. That is, focusing on completing one's homework while avoiding distractions is different from keeping one's temper in check. The authors found that each domain of self-control was related to personality and achievement in theoretically predicted directions. Schoolwork self-control was related to

Openness and Conscientiousness, while interpersonal self-control was associated with Extraversion, Agreeableness, and Neuroticism. Additionally, schoolwork self-control, but not interpersonal self-control, predicted a high GPA at the end of the school year. Although these results suggest that different aspects of self-control are separable and predict different outcomes, they fail to reveal a significant relation between interpersonal self-control and popularity (i.e., nominating three close friends). Thus, two unanswered yet important questions from these findings are: 1) Does interpersonal self-control have any impact on social relation? And 2) What are the underpinning psychological mechanism by which self-control influences adolescents' academic and social outcomes?

If self-control is truly domain-specific, each domain should have consequential effects on different outcomes in theoretically predicted ways. Presumably, schoolwork self-control should be related to academic outcomes, whereas interpersonal self-control should be related to harmonious social relations. Additionally, if interpersonal self-control does not influence social relation, is it necessary to teach children to keep their tempers in check?

Current Investigation

The current study was based on the prior research suggesting domain specificity of self-control in adolescents (Tsukayama et al., 2013). The aim of the current investigation is to answer the questions posed above. To test whether interpersonal self-control affects social relation, the current study examined peer conflict. Instead of measuring popularity (i.e., the number of times a child was nominated as a close friend by other children), the current study measured the frequency of conflicts students encountered with their friends. Peer conflict is an inevitable and ubiquitous aspect of interpersonal relations during adolescence and represents the second most frequent type of conflict in adolescent relationships (Laursen, 1995). Given solid theoretical and empirical evidence supporting the positive relation between self-control and harmonious social relations (설경옥, 경예나, 지영진, 2015; Eisenberg, Murphy, & Shepard, 1997; Gottfredson & Hirschi, 1990; Mischel et al., 1988; Shoda et al., 1990), it is surprising that interpersonal self-control was not related to popularity in the previous study (Tsukayama et al., 2013). However, it is possible that Tsukayama and colleagues (2013) failed to find such a positive association because the popularity measure used in their study was an insensitive scale of harmonious social interactions. In support of this claim, prior studies have also failed to find significant effects with the same popularity measure when it was used as an index of sociometric status (Jarvinen & Nicholls, 1996). Another possibility is that interpersonal self-control may not be related to popularity per

se. In other words, popular kids may not necessary be the one who can rule their emotion. Rather, it could be the opposite. Prior research has shown that mean kids who often engage in competition and conflict could be popular especially in early adolescence (Merten, 1997). Thus, interpersonal self-control may not be a strong predictor of popularity.

To address the second question concerning the underlying mechanism explaining the link between domain-specific self-control and outcomes, in a year-long longitudinal study, the current investigation examined a series of psychologically more proximal and direct motivations and affective outcomes of self-control, such as class engagement and anger. Specifically, I hypothesized that the extent to which students actively participated in the classroom would act as a mediator between schoolwork self-control and GPA, whereas how often they felt angry was tested as a mediator between interpersonal self-control and peer conflict. That is, students who pay attention and follow directions will be more likely to participate in classroom activities, and such active engagement during classes will improve their grades. Likewise, individuals who are able to control their temper are less likely to experience anger, and such a lower level of negative affect will reduce conflict with their peers. Examining class engagement and anger as underlying mechanisms is especially warranted in light of accumulating evidence of the correlation between class engagement and achievement (Connell, Spencer, & Aber, 1994; Connell & Wellborn, 1991; Fredricks, Blumenfeld, & Paris, 2004; Skinner, Wellborn, & Connell, 1990), as well as the link between anger and interpersonal relations (Kochanska, Murray, & Harlan, 2000; Murphy & Eisenberg, 1997).

Finally, similar to prior research, teachers were asked to rate their students on two types of self-control. Teachers rather than students were asked to provide the ratings so as to prevent unwanted response bias, such as social desirability bias, in which respondents answer questions in a way that represents them in a positive light. Had the students provided the ratings, they might have been prone to rate their own behavior overly positively. In addition, teachers rather than parents were chosen as raters not only because middle-school students spend an increasing amount of time at school but also because the two domains of self-control this study examines, schoolwork and interpersonal self-control, can be better tested in school than at home.

Research Questions

1. Is self-control domain-specific?
2. If so, do different domains of self-control predict theoretically relevant outcomes longitudinally?
   a. Does schoolwork self-control predict class participation, which in turn predicts GPA in the following school year?

b. Does interpersonal self-control predict anger, which in turn predicts peer conflict in the following school year?

Method

Participants

The current study was approved by the Institutional Review Board (IRB) at University of Pennsylvania. Students were recruited through opt-out consent forms that were sent home. Four-hundred ninety-one students returned their forms. Of these, 154 students did not have self-control ratings from teachers and 24 did not have outcome data. Thus, these children were excluded from the analyses. The final sample consists of 313 students from sixth through eighth grade (Table 1) at two urban charter middle schools in the northeastern United States (school 1 n = 145, school 2 n =168). Each student was rated by up to six teachers (5.78 teachers per student, on average), who taught them various academic subjects, such as math, science, language, and social studies.

Table 1. Demographic information

	6th grade	7th grade	8th grade
Boys	46	49	47
Girls	59	53	59

Procedure

As part of a larger longitudinal study examining character development among adolescents, students and teachers completed a series of online questionnaires. At the beginning of the school year (the first three months), teachers rated their students on self-control. At the end of the school year (the last three months), students completed a series of outcome measures (i.e., class engagement, anger, peer conflict). Additionally, end-of-year GPA was collected from school records.

Measures

Self-Control

The teachers rated their students by completing an eight-item self-control scale (Duckworth et al., 2014) adapted from the Domain-Specific Impulsivity Scale (Tsukayama et al., 2013). Four items assessed self-control in the domains of schoolwork (e.g., "s/he comes to class prepared"), and four items assessed interpersonal relationships (e.g., "s/he was polite to classmates"), using a five-point Likert scale (1 = *never*, 5 = *always*). The mean intraclass correlation coefficient was .79 (ranging from .73 to .82), suggesting that teachers strongly agreed on their ratings of students. Thus, ratings from different teachers were averaged to create a more reliable measure of student self-control. Internal reliability was .95 and .96 for schoolwork

self-control and interpersonal self-control, respectively.

Outcomes

The students completed the outcome measures. *Class engagement* was measured using two items assessing class participation: "When was the last time you raised your hand in class?" and "When was the last time you volunteered to write something on the board during class?" on a 4-point Likert scale. Response options were "Today or yesterday," "Within the last week," "Within the last month," and "More than a month ago." Scores were reverse-coded so that higher scores represented higher levels of class engagement. The correlation between the two items was $r = .32$, $p < .001$.

Anger was assessed using one items asking how often students experienced anger on a 5-point Likert scale (adapted from Diener et al., 2010). Response options were "Never," "Rarely," "Sometimes," "Usually," and "Always." Higher scores represent higher levels of anger experienced by students.

Peer conflict was measured using two items assessing the frequency of conflict students encountered with friends – "When was the last time you argued with a friend?" and "When was the last time you were mean to someone?" – on a 4-point Likert scale ranging from "Today or yesterday" to "More than a month ago." Scores were reverse-coded so that higher scores represented more frequent peer conflict encountered by students. The correlation between the two items was $r = .37$, $p < .001$.

GPA was collected from school records. In order to standardize grading systems across schools, GPA scores within each school were z-standardized, and then scores were standardized across schools, thereby combining them into a single, standardized GPA variable ($M = 0$, $SD = 1$; see Galla et al., 2014, for a similar method).

Results

Analytic Strategy

First, the two-factor structure of self-control was examined by conducting confirmatory factor analysis (CFA). Whereas exploratory factor analysis (EFA) is recommended for initial data exploration, CFA is recommended when examining a theoretically identified model. Unlike EFA, which does not have a priori structure identified, CFA requires a predetermined number of factors and indicators for each factor (Curran, West, & Finch, 1996). CFA models often provide "strong evidence about the convergent and discriminant validity of a set of measured variables and allow tests among a set of theories of measurement structure" (p. 16; Curran et al., 1996). Because the current investigation is based on empirical

research that has already established the domain specificity of self-control (Tsukayama et al., 2013), CFAs were conducted using maximum likelihood estimator in *Mplus* (Muthen & Muthen, 1998). Subsequently, in order to examine the unique one-year predictive relationship between each outcome and each domain of self-control above and beyond each other, simultaneous multiple regression models were conducted for peer conflict and GPA. Lastly, in an attempt to investigate how each domain of self-control influences social and academic outcomes, mediation analyses were run using anger and class participation as mediators.

Descriptive Statistics

Table 2 below shows the descriptive statistics and zero-order correlations of all variables included in the analyses. Similar to prior work (Tsukayama et al., 2013), schoolwork self-control and interpersonal self-control were highly correlated, $r(311) = .80$, $p < .001$, indicating that students with high self-control in schoolwork tend to have high interpersonal self-control as well. Students whose teachers rated them highly in schoolwork self-control at the beginning of the school year tended to have high class engagement, $r(311) = .17$, $p < .01$, high GPA, $r(311) = .67$, $p < .001$, and low peer conflict, $r(311) = -.18$, $p < .01$, at the end of the school year. Students who were highly rated in interpersonal self-control at the beginning of the school year had lower levels of anger, $r(311) = -.20$, $p < .001$, less peer conflict, $r(311) = -.26$, $p < .001$, and higher GPA, $r(311) = .45$, $p < .001$, at the end of the school year. Girls were rated higher than boys in both schoolwork and interpersonal self-control, $rs > .20$, $ps < .001$.

Table 2. Descriptive statistics and bivariate correlations

	Measures	M	SD	1	2	3	4	5	6
1	Schoolwork Self-Control	3.70	0.61						
2	Interpersonal Self-Control	3.95	0.63	0.80***					
3	Engagement	3.25	0.76	0.17**	-0.01				
4	Anger	2.79	0.96	-0.16**	-0.20***	-0.10†			
5	Peer Conflict	2.50	0.92	-0.18**	-0.26***	0.07	0.19**		
6	GPA	0.00	1.00	0.67***	0.45***	0.24***	-0.07	-0.06	
7	Female	55%		0.39***	0.27***	0.06	0.06	-0.06	0.11†

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$.

Confirmatory Factor Analysis

First, the domain-specificity of self-control was examined to determine whether a two-factor model fits the data better than a domain-general one-factor model. In the domain-specific two-factor model, items were allowed to load freely on their respective factors, the factor loadings with other factors were set to zero, and the covariances between the factors were freely estimated (Table 3). In the domain-general one-factor model, all items were allowed to load freely on a single factor. Factors were scaled by setting the variance equal to 1.0. The domain-specific two-factor model fits the data well, $\chi^2(19) = 122.82$, $p < .001$, CFI = .97, TLI = .95, SRMR = .03. Although RMSEA was greater than .10 (.13), this does not necessarily indicate model misspecification, as small model and large factor loading can render greater RMSEA (Browne, MacCallum, Kim, Andersen, & Glaser, 2002; Kenny & McCoach, 2003; Miles & Shevlin, 2007). The domain-general model did not fit the data adequately, $\chi^2(20) = 677.66$, $p < .001$, CFI = .80, TLI = .73, SRMR = .06, RMSEA = .32. As expected, the domain-specific two-factor model fits the data better than the domain-general one-factor model, $\Delta\chi^2(1) = 554.84$, $p < .001$.

The Effect of Domain-Specific Self-Control on Academic and Social Outcomes

To test whether each type of self-control predicts theoretically relevant outcomes, over and above the other self-control, academic and social outcomes at the end of the school year were

Table 3. Two-factor confirmatory factor analysis

Item	1	2
Schoolwork Self-Control		
...come to class prepared	0.82	
...pay attention and resist distractions	0.95	
...remember and follow directions	0.95	
...get to work right away rather than procrastinating	0.94	
Interpersonal Self-Control		
...remain calm even when criticized or otherwise provoked		0.97
...allow others to speak without interruption		0.86
...polite to adults and peers		0.93
...keep my temper in check		0.95

Note. All factor loadings were significant at $p < .001$

regressed on domain-specific self-control at the beginning of the school year. In a simultaneous multiple regression model, both schoolwork and interpersonal self-control were included to predict GPA, while controlling for gender and school affiliation. As predicted, schoolwork self-control at the beginning of the school year positively predicted GPA at the end of the school year, β = .95, p <.001, over and above gender, school, and interpersonal self-control. In other words, students who were better able to stay focused on a task and avoid distraction during class tended to achieve high grades at the end of the school year. However, an unexpected negative relation emerged between interpersonal self-control and GPA, β = -.26, p <.001. Given the positive bivariate correlation between these two variables, r(311) = .45, p < .001, the variance inflation factor (VIF) has been examined. VIFs for schoolwork self-control and interpersonal self-control were 3.11 and 2.82, respectively, which are smaller figures than the most commonly used criterion of 10 (Hair, Anderson, Tatham, & Black, 1995).

When peer conflict was regressed on the two types of self-control, controlling for gender and school, interpersonal self-control predicted end-of-year peer conflict, β = -.31, p <.01, indicating that students who can keep their temper in check and avoid disturbing others at the beginning of the school year are less likely to engage in conflict with their peers at the end of the school year. Schoolwork self-control was not a significant predictor of peer conflict, β = .07, p > .40. VIFs for schoolwork self-control and interpersonal self-control were 3.11 and 2.82, respectively.

Mediation Analysis

Next, to examine whether the link between the different kinds of self-control on the one hand and GPA and peer conflict on the other could be explained by more proximal motivation and affect, such as class engagement and anger, mediation analysis was conducted using a bootstrapping approach (Hayes, 2013) with 5,000 replications. The indirect effect testing method has benefits over the classic Baron and Kenny (1986) method and Sobel test (Sobel, 1982, 1986), because it does not make assumptions about the sampling distribution, and it controls for Type I error (Hayes, 2009; Kenny & Judd, 2014).

To examine whether class engagement mediates the link between schoolwork self-control and GPA, the indirect path from beginning-of-year teacher-rated schoolwork self-control through students' end-of-year class engagement to end-of-year GPA was tested while controlling for gender and school affiliation. The indirect path was significant, as indicated by the fact that the confidence interval (CI) did not cross zero, 95% CI = [.008, .084], suggesting that schoolwork self-control increased class engagement, which in turn boosted

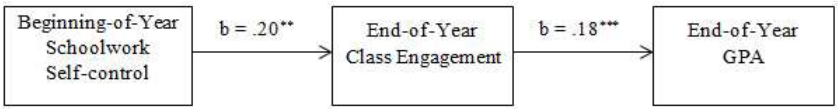

Figure 1. Indirect path model showing the effect of schoolwork self-control on GPA, as mediated by class engagement. Values shown are unstandardized coefficients

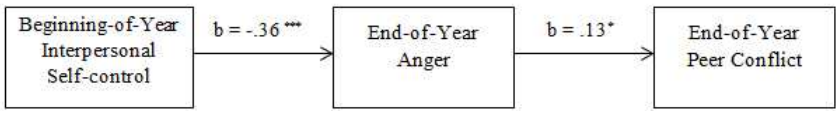

Figure 2. Indirect path model showing the effect of interpersonal self-control on peer conflict, as mediated by anger. Values shown are unstandardized coefficients

academic achievement (Figure 1). Notably, the indirect effect remained significant even after controlling for interpersonal self-control, 95% CI = [.022, .180].

Next, the indirect path from beginning-of-year interpersonal self-control through end-of-year anger to end-of-year peer conflict was tested. The indirect path was significant, CI = [-.110, -.011], indicating that interpersonal self-control decreased anger, thereby lowering the frequency of peer conflict (Figure 2). Again, the effect remained significant even after accounting for schoolwork self-control, CI = [-.122, -.005].

Taken together, these results provide further evidence that schoolwork self-control is distinct from interpersonal self-control and that each domain of self-control differentially predicts student outcomes. Additionally, domain-specific self-control predicted academic and social outcomes through psychologically proximal and direct affective and motivational factors. Students high in schoolwork self-control at the beginning of the school year were more likely to engage in class activities that helped them earn high grades at the end of the school year. On the other hand, students high in interpersonal self-control were less likely to experience anger, which in turn lowered their conflict with peers at the end of the school year (see Appendix A for path analysis results).

Discussion

In a year-long longitudinal multi-method study, the current research demonstrated that middle-school students' self-control spans *at least* two distinct domains, schoolwork and interpersonal self-control. CFAs suggest that the two-factor domain-specific self-control model fits the data better than the one-factor domain-general self-control model. Each domain

of self-control distinctively predicted outcomes across the school year. Specifically, higher schoolwork self-control at the beginning of the school year predicted a higher GPA at the end of the school year, whereas higher interpersonal self-control predicted less peer conflict at the end of the school year. Further, the current study provides a potential mechanism to explain how each type of self-control is related to later academic and social outcomes. That is, the indirect path analyses indicated that students who can manage their cognitive and behavioral attention in the academic context actively participate in class, which thereby improves their academic performance. Similarly, students who are able to control their temper and aggressive urges toward others experience fewer outbursts of anger, which in turn results in less frequent conflict with their peers.

Given the significant correlation between the two types of self-control, r = .80, one may wonder whether such a high correlation negates domain specificity. Naturally, given that both are measuring "self-control" (rather than one measuring self-control and the other measuring an unrelated construct), they should be expected to be correlated, as the correlation indicates that there is a common process in self-control. However, systematic variance across situations nonetheless supports domain-specific processes. When the students were divided into a third for each domain, 67% of individuals were high, medium, and low in both schoolwork and interpersonal self-control. For the remaining 33%, the children's level of self-control in one domain did not match their level of self-control in the other. Further, if self-control is one construct, the one-factor model should have fit the data better than the two-factor model. Lastly, if self-control is domain-general, each type of self-control should not distinctively predict theoretically relevant outcomes over and above the other type of self-control (e.g., schoolwork self-control predicted GPA after controlling for interpersonal self-control).

Although some personality psychologists have argued that domain-specific variance in personality should not be ignored (Bandura, 2006; Mischel & Shoda, 1995), most personality studies have focused on personality in general rather than in certain types of situations. The current investigation extends the existing literature by demonstrating that there are *at least* two distinct domains of self-control in adolescents. However, schoolwork and interpersonal self-control are by no means the only areas of self-control. It is possible that more domains exist, such as in the areas of food, exercise, and smoking. Likewise, the results from the current study do not negate the concept of domain-general self-control. As shown in the current data, self-control in one domain is highly correlated to self-control in a different domain. Rather, what this the current study seeks to demonstrate is that within a person, self-control can vary across psychologically

meaning situations, and this variance is crucial from a translational perspective. It is thus impractical for schools to provide self-control-enhancing programs focused on only one type of self-control.

It is not uncommon to see individuals who are very successful in their work exhibit a clear lack of self-control in other domains. For example, popular singers who do not smoke or drink for their vocal health can be addicted to drugs, and accomplished scholars who obviously have great volitional fortitude to survive through academia may commit sexual harassment. How can we reconcile such inconsistencies? The current findings suggest that these observations may not be inconsistencies at all, but rather may indicate that a person has strong self-control in one domain but not in another. In other words, self-control is domain-specific, at least from middle-school age.

Limitations and Directions for Future Research

As with other empirical studies, the current study has limitations that suggest directions for future study. First, the current investigation focused on early adolescence, when social and academic challenges peak (Roeser, Eccles, & Sameroff, 2000); thus, it is unknown how early the various aspects of self-control diverge into separate domains. One possibility is that self-control starts out as a single construct that diverges into different domains as children encounter more opportunities and temptations. Supporting this view, a study among adults found six different domains of self-control: work, interpersonal relations, drugs and alcohol, food, exercise, and finances (Tsukayama, Duckworth, & Kim, 2012). Another possibility is that self-control can be separated into multiple distinct domains early in childhood, but the range of domains of self-control has yet to be explored. Future longitudinal studies following young children through their adulthood will help to illuminate how and when domain-specific self-control emerges as a function of different life experiences.

Second, an unexpected negative link between interpersonal self-control and GPA was observed in the simultaneous regression model (in which where both types of self-control were entered together to predict GPA). If any link was found between interpersonal self-control and GPA, it was expected to be positive, based on prior research suggesting the beneficial effects of social competence on academic achievement (Elias & Haynes, 2008). Given that the bivariate correlation between interpersonal self-control and GPA was in the predicted direction, $r = .45$, the negative link between the two variables in the simultaneous regression model may indicate multicollinearity, rendering statistical suppression. Because multicollinearity is often caused by insufficient information in the data (Berry &

Feldman, 1985), future work is needed to obtain more precise estimates using multiple ways of gathering information on self-control.

A related limitation is that the current study was based largely on questionnaires collected from teachers and students. Although a questionnaire is a quick and inexpensive way to collect data, it relies heavily on respondents' subjective evaluation. A behavioral task (for a review, see 장혜인, 2010) would provide a more objective measure to supplement the current findings. A well-established example of a behavior measure of self-control is a delayed gratification task, the Marshmallow task, developed by Mischel and colleagues (1989). In this task, preschool children's waiting time for a larger and more preferred reward (two marshmallows) after a delay, while foregoing a smaller immediate reward (one marshmallow), served as an index of self-control. Recently, a modified version of the delayed gratification task was developed for school-age children (Galla et al., 2014), in which students were asked to choose between "good for you" math problems and playing video games. I encourage future work to assess self-control with such behavioral tasks in addition to collecting questionnaire data. In addition, although the outcome measures were related with self-control in theoretically predicted ways (i.e., interpersonal self-control predicts anger and peer conflict; academic self-control predicts classroom engagement and GPA), the outcome measures used in the current study were invented as a part of a large developmental study. This may raise a question about the validity of the measures. Thus, future studies should it would be valuable to validate the outcome measure with a more objective behavior measure or observer's rating.

Lastly, although the current study followed a large number of children across the school year, the study is based on correlational data, which cannot speak to causality. Thus, an experimental study in which interventions target either schoolwork self-control or interpersonal self-control would help to illuminate a causal relation between domain-specific self-control and distinct outcomes.

Conclusion

Is self-control domain-specific in middle-school students? Do specific types of self-control have enduring effects on different areas of life in middle-school students? The current study suggests that the answer to both of these questions is yes. As early as middle school, self-control varies systematically by at least two domains: schoolwork and interpersonal self-control. These two types of self-control differentially predict affective, motivational, social, and academic outcomes across the school year. Specifically, higher schoolwork self-control predicts higher GPAs, through classroom engagement as a mediator, whereas higher

interpersonal self-control predicts lower peer conflict, through anger as a mediator. These findings reveal that, in order to fully understand the role of self-control in our lives, we must know the taxonomy of psychologically meaningful situations that can enhance or diminish an individual's temptation and impulsivity.

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중학생의 영역 특정적 자기 통제 능력

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본 연구는 1년간의 종단연구를 통하여 청소년의 자기 통제 능력과 영역 특수성과의 관계에 대하여 탐구하였다. 선행연구를 토대로 중학생들의 자기 통제 능력은 학습과 대인관계 영역으로 나뉘고, 학습 관련 통제 능력은 학업성취, 대인관계 통제 능력은 교우관계와 정적 상관관계가 있을 것으로 예측하였다. 1년간의 종단연구 기간 동안, 학기 초에 교사들은 학생들의 학습 관련 자기 통제 능력과 대인관계 자기 통제 능력을 측정하였다. 확인적 요인분석을 통해 자기 통제 능력은 학습관련과 대인관계 관련으로 구성되어 있음을 검증하였다. 또한 학습 관련 통제 능력은 학기말 성적, 대인관계 통제 능력은 학기말 또래 간의 갈등과 상관관계가 있는 것으로 나타났다. 매개 분석에 의하면, 학습관련 통제 능력이 높은 학생들은 적극적으로 학교생활에 참여하였고, 그 결과 학업성취가 높은 것으로 나타났다. 반면에, 대인관계 통제 능력이 높은 학생들은 분노표출이 낮았고, 그 결과 또래 갈등이 낮게 나타났다. 결론적으로, 본 연구는 영역 특수성을 지닌 자기 통제 능력이 학생들의 감정, 동기, 사회성, 학업과 깊은 관련이 있다는 점을 시사한다.

주요어 : 자기 통제 능력, 영역 특수성, 학업 성취, 학교 생활 참여, 또래 갈등, 분노

Appendix A

Using *Mplus* (Muthén & Muthén, 2002), path analysis was conducted. The model fits the data well: $\chi^2(1) = 3.13$, $p = .08$, CFI = .99, RMSEA = .07, SRMR = .01. Replicating ordinary least squares (OLS) regression findings, the indirect effect of schoolwork self-control to class participation to GPA (indirect = .05, SE = .02, $p = .02$), and the indirect effect of interpersonal self-control to anger to peer conflict (indirect = -.06, SE = .03, $p = .04$) are significant. However, the results from path analyses needed to be understood with caution because the ratio of cases (313) to parameter (43) in the current study (7:1) is smaller than the recommended parameter ratio (20:1; Tanaka, 1987).