ADOLESCENT SELF-REGULATION AND THE INFLUENCE OF PEER

VICTIMIZATION: EXAMINING DYNAMIC INTERACTIONS

by

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DISSERTATION ABSTRACT

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Title: Adolescent Self-Regulation and the Influence of Peer Victimization: Examining Dynamic Interactions

Self-regulation is essential for successful social functioning, yet more remains to be understood about the influence of peers on this important developmental skill. This study examined the influence of verbal peer victimization on the growth of self-regulation across four years of early adolescence using parallel process growth modeling. For all adolescents, higher levels of self-regulation buffered early adolescents from the effects of negative peer interactions. In addition, early adolescents with initially low levels of self-regulation also had higher levels of depression and experienced higher levels of peer victimization than their better regulated peers. Importantly the Family Check-Up, a brief preventative intervention, resulted in improvements in self-regulation that was sustained over time. The relationship between peer victimization and self-regulation was not predictive; however, a significant persisting association was observed suggesting that improvements in adolescent self-regulation abilities help buffer youth from the impact of negative peer interactions. This research highlights the importance of the social context on the development of self-regulation during adolescence and contributes novel findings of the effect of contextual variables on self-regulation development. These findings support an ecological prevention approach, including family-centered intervention and

social-emotional curricula, to promote increased self-regulation and reduce peer

victimization among adolescents.

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DEDICATION

In loving memory of my father, William Byrne Knoble, and in honor of my grandparents, Mary Byrne Knoble and William Rankin Knoble, as well as Mary Javoronok Jacoby Mahoney and Charles Michael Mahoney.

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CHAPTER I

INTRODUCTION

Self-regulation is essential for successful social functioning across the life course. Adolescence is a pivotal time in the development of self-regulation given the demands of physiological development, peer socialization, and increased opportunities for autonomy from parents. Adolescents with self-regulation difficulties are at-risk for engaging in high-risk behaviors including substance use (Wills, Sandy, & Yaeger, 2002), more sexual partners (Hessler & Katz, 2010), aggression (Herts, McLaughlin, & Hatzenbuehler, 2012), and future romantic relationship conflict (Kim, Pears, Capaldi, & Owen, 2009) compared to better-regulated peers. In addition, evidence suggests adolescents with self-regulation difficulties are at greater risk for peer victimization than their well-regulated peers. Peer victimization during adolescence is also associated with a range of negative health outcomes including depression (Espelage, Low, & De La Rue, 2012), anxiety (Van Oort, Greaves-Lord, Ormel, Verhulst, & Huizink, 2011), substance use (Carlyle & Steinman, 2007), suicidal ideation and self-injurious behavior (Fisher et al., 2012; Winsper, Lereya, Zanarini, & Wolke, 2012), and severe aggression (Ttofi, Farrington, & Lösel, 2012). While some research with children suggests peer victimization exacerbates self-regulation difficulties, more remains to be known about this dynamic interaction during adolescence. This study furthers knowledge in this area through a longitudinal investigation of the effects of peer victimization on the developmental trajectories of adolescent self-regulation.

Self-Regulation: Theoretical Foundations

Given the plasticity of emotional and behavioral development across childhood and adolescence (Durston et al., 2002), the study of self-regulation is best understood through a theoretical framework of dynamic developmental systems theory (Granic, Dishion, & Hollenstein, 2008; Sameroff, 2009). Biological, social, and contextual factors shape—and are shaped by—an individual's emotions and behavior (Sameroff, 2009). The development of self-regulation is inherently transactional, influenced primarily by parent-child interactions during infancy and early childhood (Skowron et al., 2011) and later through interactions with parents, peers, teachers, and romantic partners across adolescence and into adulthood (Calkins, 2010; Finkel, DeWall, Slotter, Oaten, & Foshee, 2009). Broader cultural influences are also theorized to influence self-regulation development through social learning (e.g., behavioral modeling, parenting practices) and cultural emotional socialization (Chen & French, 2008; Dunsmore & Halberstadt, 2009; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Trommsdorff, 2009). As a pivotal developmental phase (Granic et al., 2008), understanding more about the development of self-regulation during adolescence and related social outcomes may help inform prevention programs promoting youth well-being.

Self-regulation is defined as intrinsic processes of directing attention, initiating and inhibiting behavior, and expressing emotions (Eisenberg, Spinrad, & Eggum, 2010; Gross & Thompson, 2007). Self-regulation comprises interrelated biological capacities, such as an individual's neurobiology (Lewis & Stieben, 2004; Posner, Rothbart, Sheese,

& Tang, 2007; Thompson, 2011), executive functioning sub-skills (Riggs, Jahromi, Razza, Dillworth-Bart, & Mueller, 2006), and behavioral control (Calkins & Fox, 2002). A core feature of self-regulation is effortful control (Véronneau et al., 2014), which comprises indicators of attentional, activational, and inhibitory control responses. Effortful control, defined as the ability to intentionally manage attention and behavioral responses (Eisenberg, Hofer, & Vaughan, 2007), is a widely studied construct that has been linked to emotion regulation and executive functioning (Rothbart & Sheese, 2007; Simonds, Kieras, Rueda, & Rothbart, 2007), adolescent social-emotional outcomes (Fosco, Caruthers, & Dishion, 2012), and academic achievement (Valiente et al., 2013). Effortful control has also been examined as a mediator in peer victimization research (e.g., Iyer, Kochenderfer-Ladd, Eisenberg, & Thompson, 2010).

Trajectories of Self-Regulation

Few studies have investigated trajectories of adolescent self-regulation across four or more years. Evidence suggests self-regulation varies across the transition from early to late adolescence. In longitudinal studies of self-regulation including early adolescents, evidence suggested moderate stability from middle childhood to early adolescence (Raffaelli, Crockett, & Shen, 2005) and between ages 12 to 13 years old (Brody & Ge, 2001). While the majority of studies have not found evidence for gender differences (e.g., Bowers et al., 2011; King, Lengua, & Monahan, 2013), Raffaelli at al. (2005) observed gender differences with girls demonstrating consistently higher levels of self-regulation than boys. In a longitudinal study of adolescent self-regulation across seven years using growth mixture modeling, four trajectories were identified including elevated, steady decline, pronounced decline, and late onset with differentiation of elevated and late onset

groups occurring around age 14 years (Bowers et al., 2011). In a three-year longitudinal study with a community of sample of preadolescents (mean age at initial assessment 9.5 years), evidence suggested variance in initial levels and growth with children increasing in effortful control over time (King, Lengua, & Monahan, 2013). Of note, King et al. (2013) found that children exposed to stressful life events had initially lower levels of effortful control, but increased at a faster rate in effortful control abilities across the three years than their less distressed peers. However, in a four-year study with a sample of 11-year to 14-year-olds King and colleagues (King, Fleming, Monahan, & Catalano, 2011) found that attention and self-control, constructs closely related to self-regulation, declined over time. In the current study, following King et al. (2013), King et al., (2011), and Bowers et al. (2011), it is hypothesized that adolescents will vary in their initial levels of self-regulation with differing growth rates across the transition to high school with some adolescents declining in self-regulation and others increasing in their overall abilities.

Ethnicity and Self-Regulation

A less examined aspect in the study of self-regulation, and less explored in developmental literature broadly (Perry-Parrish & Zeman, 2011), is the role of ethnicity. Culture and ethnicity are vital factors in shaping child and adolescent self-regulation (Chen & French, 2008; Dunsmore & Halberstadt, 2009; García Coll et al., 1996; Yasui & Dishion, 2007), with evidence suggesting substantive cultural influences on emotional expression (Morelen, Zeman, Perry-Parrish, & Anderson, 2012; Novin & Rieffe, 2012), parenting practices (Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000), and peer relationships (Edwards, De Guzman, Brown, & Kumru, 2006) all of which are formative factors in the development of self-regulation. In addition to culturally-informed norms of

self-regulation, in the United States ethnic minority communities disproportionately experience chronic stressors, including poverty (Costello, Keeler, & Angold, 2001; Evans & Rosenbaum, 2008) and discrimination (Corcoran & Nichols-Casebolt, 2004), which are hypothesized to influence self-regulation through the negative consequences of physiological strain (Blair & Raver, 2012a). While longitudinal evidence suggests some children in chronic poverty have poorer self-regulation and are at increased risk for internalizing problems (Flouri, Midouhas, & Joshi, 2014), adaptive self-regulatory abilities may buffer youth from the dysregulating effects of chronic stress due to poverty and other forms of strain (Blair & Raver, 2012b; Evans & Kim, 2013).

Adolescence is a salient time for increased ethnic identity salience and development (Huang & Stormshak, 2011) which may also influence self-regulation development. Specifically, during adolescence youth report an increase in discrimination experiences related to ethnic minority identities which is associated with negative health outcomes (Benner & Kim, 2009; Brody et al., 2006; Fisher, Wallace, & Fenton, 2000). Of note, evidence suggests experiencing higher levels of ethnic discrimination by peers is associated with higher level of depressive and anxious symptoms among adolescents (Benner & Graham, 2013). The current study will test for ethnic group differences in self-regulation trajectories, which could provide a substantive contribution to this area given the influence of cultural socialization and contextual factors on the development of self-regulation. It is likely that adolescents of diverse ethnicities will report varying levels and varying trajectories of growth in self-regulation possibly due to differences in levels of stress as well as resilience.

Self-Regulation in the Peer Context

Very little research has examined the effects of self-regulation on social outcomes with adolescent samples. Adolescent self-regulation has been hypothesized to be a resilience factor in the context of delinquent peers and other contextual risk factors (Wills & Dishion, 2004). In a two year study with an ethnically diverse sample, adolescents' self-reported self-regulation abilities were a protective factor for exposure to antisocial peers (Gardner, Dishion, & Connell, 2008), which may suggest self-regulation abilities buffer adolescents from negative peer influences and future problem behaviors (Dishion & Tipsord, 2011). It is possible well-developed self-regulation abilities, such as good impulse control and self-motivation, may promote higher levels of emotional regulation and social competence which may serve to buffer adolescents from the negative effects of peer victimization.

Self-Regulation and Intervention Outcomes

In addition to the influence of parenting, peers, and culture on the development of self-regulation, research indicates self-regulation abilities are impacted by intervention as well. Programs with young children indicate poor self-regulation is responsive to early intervention (Blair & Diamond, 2008; Pears, Kim, Healey, Yoerger, & Fisher, 2014). While the majority of this research has investigated school-based interventions (Pears et al., 2014; Raver, 2012), a growing body of research indicates early family-based interventions promotes young children's self-regulation by increasing effective parenting practices (Chang, Shaw, Dishion, Gardner, & Wilson, 2014; Sanders & Mazzucchelli, 2013; Somech & Elizur, 2012). It is hypothesized that these intervention programs

promote children's abilities to manage attention, appropriately express emotions, and inhibit behavior which promotes positive academic outcomes during the transition to school (Blair & Diamond, 2008).

While less research has examined intervention effects on the change in adolescent self-regulation abilities, emerging research indicates early adolescent self-regulation is effectively increased by family- and school-based interventions as well (Fosco, Frank, Stormshak, & Dishion, 2013; Pokhrel et al., 2013). The Family Check-Up, a brief preventative intervention, has demonstrated effectiveness with improving the self-regulation abilities across childhood from young children (Chang et al., 2014) to early adolescents (Fosco et al., 2013). The Family Check-Up prevention model, adapted from the Adolescent Transitions Program (Stormshak & Dishion, 2009), is delivered within public middle schools and provides universal family support, screening for youth at-risk for problem behaviors, and more intensive family services through three brief intervention sessions (Stormshak, Fosco, & Dishion, 2010). The three goals of the Family Check-Up are to (1) promote collaboration between school professionals and parents, (2) to bolster evidence-based family management practices, and (3) provide school-based, family-centered interventions (e.g., parent training, family management workshops, academic monitoring services) (Stormshak et al., 2011). In addition to improving parental monitoring and reducing family conflict, increasing early adolescent effortful control is hypothesized to be a mechanism through which the Family Check-Up promotes positive outcomes (Fosco et al., 2013). While prior Family Check-Up research has examined self-regulation as a mediator of youth outcomes, the current study examines intervention effects of the Family Check-Up on the development of self-regulation over four years.

Peer Victimization

During adolescence, peer victimization frequently co-occurs with other forms of aggression including dating violence and sexual harassment (Miller et al., 2013). Peer victimization is defined as when an individual is the victim of targeted aggression (i.e., physical, verbal, cyber, relational) by another individual or group who are connected in an ongoing relationship in which a power imbalance is present (Harel-Fisch et al., 2011; Olweus, 1995). Bias against nonmajority groups (e.g., racial, ethnic, religious, gender and sexual minorities) is also a factor in some acts of peer victimization (Mishna, 2012; Verkuyten, 2006). Name calling, teasing, and other forms of verbal victimization comprise a distinct construct of peer victimization from physical and relational bullying (Marsh et al., 2011). Further, verbal victimization is the most frequently reported type of peer victimization in studies of children and adolescents when compared to other forms, such as physical, relational, and cyber aggression (Low & Espelage, 2013; Sweeting, Young, West, & Der, 2006; Wang, Iannotti, & Luk, 2012). For example in a cross-sectional study comparing five forms of bullying, specifically verbal, physical, cyber, exclusion, and spreading rumors, verbal-relational victimization comprised a distinct subtype of peer victimization and verbal aggression co-occurred with all other forms of victimization (Wang, Iannotti, Luk, & Nansel, 2010). Of note, Wang and colleagues (2010) posited that teasing and name calling were likely associated with experiencing social exclusion by peer groups. In a three-year longitudinal study with ethnically diverse middle school students, (Nylund, Bellmore, Nishina, & Graham, 2007), youth who reported the most victimization (including verbal, physical, and relational aggression)

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had a very high likelihood (with an 86% probability) of being verbally victimized. Verbal peer victimization alone is associated with negative health outcomes including dysregulated stress responses in children (Vaillancourt et al., 2008), increased internalizing symptoms (Yeung Thompson & Leadbeater, 2012), and a negative self-concept (Marsh et al., 2011).

Roles of victims and perpetrators in peer victimization are not always clearly delineated. Research suggests some youth are "aggressive victims," involved in bullying as both perpetrators and victims (Solberg, Olweus, & Endresen, 2007; Toblin, Schwartz, Hopmeyer Gorman, & Abou-ezzeddine, 2005). Further investigation into aggressive-victims found evidence of this reciprocal relationship for physical, but not verbal, victimization, thus suggesting this dual-role category of behavior may not apply to verbal peer victimization (Marsh et al., 2011). This evidence suggests verbal peer victimization is a unique experience from other forms of bullying. Given its frequency and co-occurrence with other forms of peer victimization, the current study investigates the growth and change in verbal victimization during early adolescence and influence on adolescent self-regulation functioning.

Trajectories of Peer Victimization During Adolescence

Prior research has demonstrated varying levels of peer victimization across the transition from childhood to adolescence, which may be due in part to issues of measurement. In a longitudinal analysis spanning four years from middle to late childhood, three peer victimization trajectories were identified: low stable, extreme decreasing, and high-increasing with significantly more boys than girls in the high-increasing group (Boivin, Petitclerc, Feng, & Barker, 2010). In this study, peer

victimization was measured with indicators of both verbal and relational aggression. With an early adolescent sample followed across one and a half years, four peer victimization groups were identified: non-victims, desisters (high to low victimization over time), late onset (low to high victimization), and stable victims with boys and girls equally represented in all groups (Goldbaum, Craig, Pepler, & Connolly, 2003). Physical and verbal forms of aggression were combined to measure peer victimization in the Goldbaum et al. (2003) study.

In a sample of urban and rural adolescents followed over nearly two years, four trajectories of peer aggression and victimization were also identified: well-adjusted, non-victimized aggressive, predominantly victimized, and aggressive-victims (Bettencourt, Farrell, Liu, & Sullivan, 2012). In this study, adolescents with higher levels of emotional dysregulation were more likely to be classified as aggressive-victims and non-victimized aggressors than in the well-adjusted group. The perpetration and victimization of physical and verbal aggression were measured separately and probabilities of engagement were analyzed both separately and together. In addition, boys were more likely to be aggressive victims and both boys and girls were similarly likely to be nonvictimized aggressors (Bettencourt et al., 2012). In a longitudinal study of adolescents across high school, trajectories of verbal peer victimization suggested an overall decline in victimization over time (Marsh et al., 2011). In this study, verbal, physical, and relational victimization and perpetration were measured separately and analyzed separately.

These results of peer victimization trajectories suggest inconsistencies across measurement strategies as well as findings regarding gender differences. In addition these results suggest dysregulation is associated with an increased likelihood for aggression

and peer victimization. Notably, ethnic group differences among peer victimization trajectories were not examined in these studies. In the proposed study, peer verbal victimization is hypothesized to vary across adolescence with increasing growth for some adolescents over time.

Peer Victimization and Self-Regulation

Emerging evidence from cross-sectional and longitudinal research with children and early adolescents indicates an association between peer victimization and self-regulation difficulties among children. Research with children suggests increased peer victimization is associated with increased emotional and behavioral dysregulation (Garner & Hinton, 2010; Kochenderfer-Ladd, 2004; Rieffe, Camodeca, Pouw, Lange, & Stockmann, 2012; Shields & Cicchetti, 2001). In a cross-sectional study with a sample of African-American children and early adolescents, results suggested levels of coping with sadness regulation moderated the association between sadness inhibition and relational aggression such that children demonstrating lower levels of sadness coping with high sadness inhibition were associated with higher levels of relational aggression with no differences by gender (Sullivan, Helms, Kliewer, & Goodman, 2010). In a cross-sectional study with an ethnically diverse sample of boys age 9 years, there was an indirect association from emotion regulation strategy of active distraction through peer rejection to antisocial behavior (Trentacosta & Shaw, 2009). With a sample primarily comprising Latino and European-American children age 7 years followed over 9 months, results suggest a delayed effect of peer victimization on effortful control such that higher levels of peer victimization predicted lower effortful control (Iyer et al., 2010). With an ethnically diverse sample of 9 year olds over two years, emotional dysregulation

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predicted future peer victimization and mediated the effect of community victimization on future peer victimization (Kelly, Schwartz, Gorman, & Nakamoto, 2008).

Among adolescent samples, less is known about the association between peer victimization and self-regulation. In an Australian adolescent sample followed over one year, peer victimization predicted the onset of internalizing symptoms especially for girls (Bond, Carlin, Thomas, Rubin, & Patton, 2001). In a four-month study of ethnically diverse adolescents, evidence suggested emotion dysregulation mediated the effects of peer victimization on future aggressive behavior for both boys and girls (Herts et al., 2012). With an ethnically diverse adolescent sample followed over seven months, peer victimization was associated with an increase in emotional dysregulation (McLaughlin, Hatzenbuehler, & Hilt, 2009). In addition, dysregulated anger and sadness mediated the relationship between relational peer victimization and internalizing symptoms for both boys and girls (McLaughlin et al., 2009). These results suggest an interaction and possible mediating relationship between self-regulation, peer victimization, and behavioral outcomes during adolescence. Due to the relatively brief duration of these studies, more remains to be known about the potentially dynamic interaction between peer victimization and self-regulation across the developmental phase of adolescence.

Depressive Symptoms, Peer Victimization, and Self-Regulation

Internalizing symptomatology (such as irritability, social withdrawal, and persisting sadness) is associated with both peer victimization and self-regulation. Research has identified that dysregulated affect expression, especially sadness (Perry-Parrish & Zeman, 2011), impairs youth social functioning and contributes to peer rejection (Halberstadt, Denham, & Dunsmore, 2001). In addition, experiencing higher

levels of peer victimization is associated with the onset and persistence of depressive symptoms among children and adolescents (Yeung Thompson & Leadbeater, 2012, Zwierzynska, Wolke, & Lereya, 2013). Self-regulation difficulty, especially poor inhibitory control, is also associated with depressive symptoms and psychopathology during adolescence and extending into early adulthood (Aldao, Nolen-Hoeksema, & Schweizer, 2010; Buckner, Mezzacappa, & Beardslee, 2009; Rudolph, Troop-Gordon, & Llewellyn, 2013). Due to the co-occurrence of depressive symptoms with peer victimization and self-regulation, youth baseline depressive symptoms will be accounted for in the current study.

Summary

The influence of peers on the development of adolescent self-regulation, specifically victimization by peers, across adolescence has received little longitudinal research attention. Both peer victimization and low levels of self-regulation are associated with depressive symptoms. In addition, the influence of ethnicity on the development of self-regulation has received less attention than other factors, such as caregiver influences. Understanding more about the influence of ethnicity, peer context, and depressive symptoms on adolescent self-regulation development will expand knowledge in this topic area and contribute to the development of family and school-based interventions.

Study Purpose and Research Aims

There are three aims for the current study. First, this study examines individual differences in self-regulation trajectories across adolescence by gender and ethnicity accounting for depressive symptoms. Drawing from previous research, it is hypothesized

that adolescents will vary in their initial levels of self-regulation with differing growth rates across the transition to high school and a trend toward improvement in regulation abilities over time. Further, early adolescents with higher levels of depressive symptoms are hypothesized to have initially lower levels of self-regulation and higher levels of peer victimization. Consistent with prior research it is hypothesized that there will be no statistically significant effect of gender on self-regulation trajectories. Given the lack of data regarding the influence of ethnicity on the development of self-regulation, there are no specific hypotheses and analyses are considered exploratory.

Second, this study examines individual differences in peer victimization trajectories across adolescence. Based on previous research, peer victimization is hypothesized to vary across adolescence with increasing growth for some adolescents over time, especially those who experience the most initial victimization. While no treatment effects of the intervention are hypothesized to directly influence peer victimization, group differences by ethnicity, gender, and treatment assignment will be tested and included as covariates if group differences are identified.

Third, this study sexamines the time-specific directional relationships between self-regulation and peer victimization across adolescence. Based on findings with late childhood and early adolescent samples, adolescents reporting higher levels of dysregulation are hypothesized to experience higher levels of peer victimization at subsequent assessments across adolescence. All study aims will be tested using latent growth modeling and parallel process modeling (Bollen & Curran, 2006).

For all three aims, treatment engagement in the Family-Check Up will be included as a covariate to control for known intervention effects on adolescent self-

regulation (Fosco, Frank, Stormshak, & Dishion, 2013; Stormshak, Fosco, & Dishion, 2010) and to examine persisting intervention effects over three years. In addition, depressive symptoms at baseline will be included as a covariate.

CHAPTER II

METHODS

Existing data from a large, multi-wave longitudinal intervention study, Project

Alliance 2 ([PAL2]; DA 018374) was used to examine hypotheses. The PAL 2 study was

designed to prevent the development of youth problem behaviors by supporting families

across the transition from late childhood to adolescence. Participants are currently being

followed into young adulthood. Families in an urban area in the Pacific Northwest were

recruited from three public middle schools.

Participants

At recruitment, 80% of families invited to participate agreed to the study.

Adolescents were recruited to the study in two cohorts resulting in 593 participants at the

baseline assessment. Participant retention across the four years of the study was more

than 80%. At the baseline assessment, 51% were male participants and the ethnic

composition of the sample was about 36% European American ($n = 213$), 19%

multiethnic ($n = 114$), 18% Hispanic-Latino ($n = 107$), 15% African American ($n = 90$),

9% Asian/Pacific Islander American ($n = 53$), and 2% Native American ($n = 15$). The

mean age for participants at the baseline assessment in sixth grade was 11.90 years. The

current study comprises all participating adolescents reporting an ethnic identity ($N = 592$).

Procedures

In the spring of each academic year beginning in 2006 through 2010 (grades 6

through 10), students were surveyed with a self-report questionnaire measuring a range of

problem behaviors. This questionnaire was an adaptation from a survey developed by the Oregon Research Institute (Metzler, Biglan, Rusby, & Sprague, 2001). School personnel administered the questionnaires in school, unless a student relocated or was absent. In those cases, assessments were mailed to participants. All participants were compensated $20 USD for each year an assessment was completed.

Family Check-Up Implementation

Participants were randomly assigned to the Family Check-Up (FCU), a brief three-session intervention designed to identify family strengths and challenges, support family management, and promote family engagement in additional services as-needed. The Family Check-Up is modeled after Motivational Interviewing interventions including empathy and promoting parent self-efficacy (Miller & Rollnick, 2002). A fundamental component of the Family Check-Up is sharing data from multiple sources (e.g., teacher, observations) with families. Finally, the Family Check-Up has demonstrated multicultural responsiveness at the level of the intervention design and delivery (Smith et al., 2014).

The first meeting is a collaborative initial interview to identify parent concerns and behavioral goals while eliciting family motivation for change. The second session involves an ecological assessment including parent, child, and teacher reports on a brief assessment packet as well as video-taped observation of family interactions. The third meeting comprises a strength-based feedback session to discuss the results of the assessment, address parent concerns, and provide a menu of resources and intervention options to support family management practices (Stormshak et al., 2011).

Of the 277 families randomly assigned to the intervention condition, 38%
engaged in and received the full FCU intervention. Of the families receiving the Family
Check-Up, 29% received follow-support services (e.g., parent skills training). Whenever
possible, families were matched to a Family Check-Up interventionist with the same
ethnicity and primary language (e.g., English, Spanish). Previous research indicates youth
ethnicity and self-regulation were not significant predictors of FCU engagement
(Stormshak et al., 2010).

Measures

All survey questionnaires can be found in Appendix B. For all measures, internal
consistency was tested Cronbach's alpha ($\alpha > .70$ will be considered acceptable) using
SPSS version 21.0 (IBM Corp, 2011).

Demographic variables. Students provided demographic information regarding
age, gender, and ethnicity. Gender was a dichotomous variable coded zero for females
and one for males. Ethnicity was coded zero for adolescents of primarily European
ancestry and one for all other self-reported ethnic identity.

Treatment assignment. Random assignment to the Family Check-Up
intervention was a categorical variable coded zero for control group and one for treatment
completion.

Depression. Depression was measured at T1 with youth self-report on 14-items
assessing difficulties with sadness, crankiness, and other depressive symptoms within the
past month (e.g., "In the last month I felt nervous or worried"). Responses were scored on
a 5-point Likert-style scale and a mean score was taken with lower scores indicating
fewer depressive symptoms and higher scores indicating greater depressive symptoms (*M*

= 1.85, *SD* = 0.78). Reliability of the 14-items was excellent, Cronbach's alpha = 0.93 (see Table 1; see Appendix B for all tables).

Self-regulation. Self-regulation was measured across all four assessment years with youth self-report on an abbreviated effortful control questionnaire (EATQ-R; Ellis & Rothbart, 2001; Ellis, Rothbart, & Posner, 2004; Muris & Meesters, 2009). Eight items were reverse coded for ease of interpretation with higher scores indicating greater levels of self-regulation (see Appendix B). A mean score was taken with lower scores indicating lower levels of self-regulation and higher scores indicating higher levels of self-regulation. This abbreviated measure demonstrated good reliability across the four years, Cronbach's alpha = .79 (see Table 1).

Peer victimization. Peer victimization was measured with 15-items total of *teasing, being picked on*, and *sworn at by another student*. *Teasing* comprised 7-items of youth self-report on being teased by peers (e.g., In the last month, how often were you teased by kids at school for how you look or what you wear) which were on a 5-point Likert-style scale. Due to a low frequency of endorsement, each item was collapsed to a dichotomous response with a score of zero indicating never or rarely and a score one indicating sometimes, often, and always. *Being picked on* comprised 8-items of youth self-report of events in the past year such as, "Going to or from school, have you been picked on about your race or skin color?" Responses were coded zero for no responses and one for yes responses. The two measures were summed and demonstrated good reliability (see Table 1).

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CHAPTER III

RESULTS

Descriptive statistics for all variables were examined using SPSS version 21.0
(IBM Corp, 2011). Table 1 presents the means, standard deviations, skew and kurtosis
index, and reliability while Tables 2 and 3 presents Pearson *r* bivariate correlations for all
variables by ethnicity and gender. Scores on depression at T1 were not significantly
different for girls compared to boys (*M* = 1.90, *SD* .80, and *M* = 1.81, *SD* = 0.77
respectively) or for ethnically diverse adolescents compared to adolescents of primarily
European ancestry (*M* = 1.84, *SD* = 0.74, and *M* = 1.88, *SD* = 0.85 respectively).

Regarding self-regulation, a decrease in the observed means and variance of self-
regulation for all adolescents over time was observed. Notably, ethnically diverse
adolescents reported consistently lower mean scores across all assessments (M = 3.61, *SD*
= 0.58 at T1 to *M* = 3.47, *SD* = 0.54 at T4) compared to adolescents of primarily
European ancestry (*M* = 3.77, *SD* = 0.60 at T1 to *M* = 3.69, *SD* = 0.59 at T4). Both
groups reported an overall decline in self-regulation with ethnically diverse adolescents
reporting a greater decline than adolescents of primarily European ancestry, although
European American adolescents demonstrated slightly more variability.

Regarding peer victimization, an overall decline in the mean level of peer
victimization was observed; however, kurtosis test values at Time 2 and Time 3 indicated
substantive positive skew and departure from normality (DeCarlo, 1997). In addition,
girls and boys appeared to have differing initial reports of peer victimization and changes
over time. Boys reported a higher initial mean than girls (*M* = 3.08, *SD* = 3.19 and *M* =
2.59, *SD* = 2.83 respectively) with a steeper mean decrease over time (*M* = 2.54, *SD* =

3.14 at T2 to $M = 1.59$, $SD = 2.57$ at T4) while girls reported higher means than boys across T2 through T4 with a more gradual decline ($M = 2.93$, $SD = 3.11$ at T2 to $M = 1.83$, $SD = 2.48$). Kurtosis index values were within acceptable limits with the exception of peer victimization at T4 ($Kurtosis = 3.38$, $SE = 0.22$). However, ML estimation is robust to non-normal distribution (Kline, 2011) and the level of skew is assumed to reflect adolescents' experiences rather than data anomalies. These results suggest boys reported initially higher levels of peer victimization than girls with a reported decline over time, while girls increased in reports of peer victimization at the second assessment with a less pronounced decline over time than boys suggesting girls experienced more peer victimization than boys.

Correlations

Inspection of bivariate correlations indicated gender did not appear to be consistently significantly correlated with other variables. However, for ethnically diverse adolescents, gender was significantly negatively correlated with peer victimization at T2 and T3 ($r = -0.17$ and -0.46) suggesting that ethnically diverse boys reported less peer victimization than ethnically diverse girls at the second and third assessment. Gender was significantly negatively correlated for European ancestry adolescents' reports of self-regulation at T1 and T2 ($r = -0.18$ and -0.19) as well as significantly correlated with peer victimization at T1 ($r = .16$, $p < .05$), suggesting European ancestry boys reported less peer victimization than European ancestry girls at the first and second assessments and European ancestry boys reported higher initial levels of self-regulation than European ancestry girls. Gender was weakly and non-significantly correlated with self-regulation

for ethnically diverse adolescents across all assessments ($r = 0.05$ to -0.03), suggesting no gender differences.

Peer victimization was significantly moderately and positively correlated with future peer victimization assessments ($r = .51$ to $.60$) suggesting that adolescents experiencing prior peer victimization were very likely to experience future victimization. For all adolescents, self-regulation and peer victimization were negatively correlated across all assessments ranging from small to weak correlations over time, indicating adolescents with better self-regulation are less likely to report victimization. Depression at T1 was significantly negatively correlated with self-regulation with a moderate correlation at T1 and T2 ($r = -0.39$ to -0.28) and a weaker correlation at T3 and T4 ($r = -0.18$ to -0.12) indicating that depression was initially associated with lower reported levels of self-regulation and lower self-regulation reports over time. Of note, the correlation of depression and self-regulation was weaker for ethnically diverse adolescents than adolescents of European ancestry across all assessments. Depression was significantly positively correlated with peer victimization across all assessments for all adolescents ($r = .30$ to $.40$) suggesting that adolescents reporting higher levels of peer victimization were also more depressed than those who reported fewer peer victimization experiences.

Cross-Lagged Models

To address the first and second aims regarding the stability and growth in peer victimization and self-regulation among early adolescents, separate cross-lagged models were tested using MPlus 7.11 (Muthén & Muthén, 2013) to examine if the assumption of

equal means was met. Following recommendations by Hu and Bentler (1999), the relative fit indices of all following models will be estimated with significance tests examined at $\alpha \leq .05$, chi-square likelihood ratio test, standardized root-mean squared residual (SRMR $\leq$ .08), root-mean square error of approximation (RMSEA $\leq .06$), comparative fit index (CFI $\geq .90$), and the Tucker-Lewis Index (TLI $\geq .90$) to inform model fit.

Peer victimization. Following model development recommendations by Curran and Bollen (2001; Bollen & Curran, 2004), separate univariate cross-lagged (autoregressive) models were estimated without covariates to assess for equality of means and variance over time. The unconstrained cross-lagged model of peer victimization had unacceptable fit, $\chi^2(3) = 38.41$, $p < .001$, $RMSEA = 0.15$, $CFI = .94$, $TLI = .88$, $SRMR = .07$. Model fit recommendations suggested correlating error variance between T3 and T4. After correlating error variance between T3 and T4, model fit did not improve to within acceptable limits, $\chi^2(2) = 19.54$, $p < .001$, $RMSEA = 0.13$, $CFI = .97$, $TLI = .91$, $SRMR = .04$. The poor model fit indicated modeling the mean structure of peer victimization did not acceptably represent these data, likely due to individual variance, and an equal means model for peer victimization was rejected.

Self-regulation. An unconstrained cross-lagged model of self-regulation also had fit lower than accepted standards, $\chi^2(3) = 38.87$, $p < .001$, $RMSEA = 0.15$, $CFI = .94$, $TLI = .89$, $SRMR = .07$. Following model fit recommendations, error variance between T1 and T3 was correlated. With constraints, the model fit improved to within acceptable limits, $\chi^2(2) = 9.0$, $p < .001$, $RMSEA = 0.08$, $CFI = .99$, $TLI = .97$, $SRMR = .03$. Model fit statistics suggest the univariate cross-lagged model of self-regulation should not be rejected; however, the model implies that the relative influence of preceding assessments

is entirely mediated by intervening measurements (Curran & Bollen, 2001). The correlation of error variance between self-regulation at T1 and T3 appears to violate the implications of the univariate autoregressive model. Thus, the univariate cross-lagged model for self-regulation were rejected suggesting significant variance in the growth of self-regulation and potentially differing paths due to initially reported levels of self-regulation.

Latent Growth Models

To continue to address the first and second study aims regarding the stability and growth in peer victimization and self-regulation among early adolescents, univariate latent growth models were estimated to examine longitudinal patterns (i.e., individual variance of initial levels, change over time) of peer victimization and self-regulation using MPlus 7.11 (Muthén & Muthén, 2013). Given the rejection of the univariate cross-lagged models, intercept-only latent curve models were not expected to have acceptable fit and thus a growth component was estimated with random variance for both the intercept and slope. Otherwise, model development was approached incrementally following the recommendations of Bollen and Curran (2004). For both univariate growth models, initial model estimation constrained growth estimates to 0 through 3. Two-way interactions of covariates with latent growth factors were plotted to ease interpretation with open source computational tools (Preacher, Curran, & Bauer, 2006).

Peer victimization. For peer victimization, the unconditional latent growth model had adequate fit, $\chi^2(5) = 39.04$, $p < .001$, $AIC = 10043.99$, $BIC = 10083.45$, $ABIC = 10054.88$, $RMSEA = 0.11$, $CFI = .94$, $TLI = .93$, $SRMR = .05$. When the slope factor

loading for T4 was allowed to be freely estimated, model fit statistics improved ($\chi^2(4)$ = 24.96, $p < .001$, *RMSEA* = 0.09, *CFI* = .96, *TLI* = .95, *SRMR* = .050) and additional fit statistics indicated the model was more parsimonious, *AIC* = 10031.90, *BIC* = 10075.75, *ABIC* = 10044.01. When freely estimated, the slope parameter for T3 was b = 5.76, *SE* = 1.51, indicating a nonlinear increase in the growth of peer victimization between T3 and T4. When the slope estimate of T3 was freed and T4 fixed to 2, the model fit was weaker than when T4 was freely estimated and this model was less parsimonious than the unconditional model, $\chi^2(4)$ = 52.09, $p < .001$, *AIC* = 10059.03, *BIC* = 10102.89, *ABIC* = 10071.14, *RMSEA* = 0.14, *CFI* = .92, *TLI* = .88, *SRMR* = .06. When the slope estimates of both T3 and T4 were freed, the model did not converge. When the residual variances of T3 and T4 were correlated and factor loadings fixed (0 to 3), model fit was excellent, $\chi^2(4)$ = 8.41, $p < .001$, *RMSEA* = 0.04, *CFI* = .99, *TLI* = .99, *SRMR* = .03. Further, fit statistics indicated this model was the most parsimonious when compared to the unconditional model, *AIC* = 10015.35, *BIC* = 10059.20, *ABIC* = 10027.45. The constrained peer victimization growth model with fixed slope factor loadings and correlated error variance at T3 and T4 was retained for further analyses. The correlated error between T3 and T4 suggests the possible presence of a secondary emergent victimization variable.

Overall, results of the constrained latent growth peer victimization model showed peer victimization significantly decreased over time, b = -0.39, *SE* = 0.05, $p < .001$. There was also significant variance for the slope (*slope variance* = 0.58, *SE* = 0.10, $p < .001$) suggesting individual variation for the change in peer victimization over time. There was significant variance for the intercept at T1 (*intercept M* = 2.92, *SE* = 0.12, *intercept*

variance 6.23, *SE* = 0.60, *p* < .001) suggesting adolescents widely differed in their initial reported levels of peer victimization. Additionally, the intercept and slope were significantly correlated (*r* = -0.17, *SE* = -.21, *p* < .001) indicating initial levels of peer victimization were related to change over time.

Gender. When gender was included as a predictor of the intercept and slope the model fit remained within acceptable limits, $\chi^2(6) = 22.16$, *p* < .001, *AIC* = 10011.90, *BIC* = 10064.52, *ABIC* = 10026.43, *RMSEA* = 0.07, *CFI* = .97, *TLI* = .96, *SRMR* = .04. Gender did not significantly predict the intercept suggesting initial differences in reported levels of peer victimization were not statistically significant, *b* = 0.30, *SE* = 0.24, *p* = 0.22; however, gender significantly predicted the slope (*b* = -0.24, *SE* = 0.09, *p* < .01) indicating that boys had a steeper decrease in peer victimization over time compared to girls (see Figure 1 for a plot of this interaction; see Appendix B for all figures). Gender was retained as a predictor of peer victimization's slope in further analyses.

Group-level comparisons were conducted to examine specific growth differences in peer victimization between girls and boys. Model fit statistics indicated acceptable fit, $\chi^2(6) = 24.81$, *p* < .001, *AIC* = 10015.00, *BIC* = 10102.71, *ABIC* = 10039.21, *RMSEA* = 0.08, *CFI* = .97, *TLI* = .96, *SRMR* = .05. The contribution to the χ^2 estimate was greater for girls than boys, χ^2 = 22.92 for girls, χ^2 = 1.89 for boys. All estimated parameters were similar for girls and boys with the exception of the residual variance of T3 and T4. For girls, the correlation of error of T3 and T4 was significant, *r* = 2.49, *SE* = 0.50, *p* < .001, but, this path was non-significant for boys, *r* = 0.71, *SE* = 0.40, *p*= 0.08. This difference indicates that the secondary factor that emerges between T3 and T4 is may be unique to girls' experience of peer victimization.

Ethnicity. When ethnicity was included as a predictor of the intercept and slope the model fit remained within acceptable limits, $\chi^2(6) = 14.16$, $p < .001$, $AIC = 10012.38$, $BIC = 10064.98$, $ABIC = 10026.88$, $RMSEA = 0.05$, $CFI = .99$, $TLI = .98$, $SRMR = .03$. Ethnicity did not significantly predict the intercept ($b = -0.36$, $SE = 0.25$, $p = .16$) or slope ($b = 0.03$, $SE = 0.09$, $p = .72$) and was not retained in the peer victimization model. This model implies change in peer victimization during early adolescence was not a function of ethnicity.

Depression. Depression at T1 was included as a predictor of the intercept and slope the model fit was excellent, $\chi^2(6) = 10.11$, $p < .001$, $AIC = 9735.56$, $BIC = 9787.98$, $ABIC = 9749.88$, $RMSEA = 0.03$, $CFI = .99$, $TLI = .98$, $SRMR = .02$. Depression significantly predicted the intercept ($b = 1.39$, $SE = 0.15$, $p < .001$) and slope ($b = -0.12$, $SE = 0.06$, $p < .05$) and was retained in the model. Inferring from the model, adolescents reporting the highest initial levels of depression concurrently reported the highest initial levels of peer victimization with a sharper decline in victimization over time when compared to less depressed peers (see Figure 2). When gender was added to this model as a predictor of the slope, model fit diminished but was still within acceptable limits, $\chi^2(9) = 27.24$, $p < .001$, $AIC = 9733.60$, $BIC = 9790.34$, $ABIC = 9749.12$, $RMSEA = 0.06$, $CFI = .97$, $TLI = .96$, $SRMR = .03$. Depression remained a significant predictor of the intercept ($b = 1.39$, $SE = 0.15$, $p < .001$) and slope ($b = -0.12$, $SE = 0.06$, $p < .05$) with no observable differences in path estimation compared to the model estimated without gender. Gender remained a significant predictor of the slope ($b = -0.13$, $SE = 0.07$, $p < .05$), although lesser in magnitude than in the gender-only model. This model was retained in further analyses (see Figure 3) and implies depression reported at T1 is

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associated with initially higher levels of peer victimization, but a sharper decline over time and that boys also report a steeper decline over time than girls.

To probe the interaction effect of depression and gender on peer victimization growth, group-level comparisons were conducted. Model fit statistics indicated acceptable fit, $\chi^2(12) = 29.09$, $p < .01$, $AIC = 9728.56$, $BIC = 9833.39$, $ABIC = 9757.20$, $RMSEA = 0.07$, $CFI = .98$, $TLI = .96$, $SRMR = .05$. When the models for girls and boys were estimated separately, the magnitude of the path estimation of the intercept regressed on depression appeared to differ, $b = 1.00$, $SE = 0.20$, $p < .001$ and $b = 1.87$, $SE = 0.26$, $p < .001$ respectively. When depression was regressed on the slope factor the path estimation was no longer statistically significant for girls, but remained significant for boys, $b = -0.04$, $SE = 0.08$, $p = .64$ and $b = -0.22$, $SE = 0.08$, $p < .01$. Further, the magnitude of the correlation between the intercept and slope appeared greater for girls than boys, $b = -1.28$, $SE = 0.29$, $p < .001$ and $b = -0.89$, $SE = 0.26$, $p < .001$ respectively. Consistent with the group level comparison model of peer victimization by gender, the correlated error variance between T3 and T4 measurements were non-significant for boys. This model implies the interaction of depression and peer victimization functions differently for girls than boys such that boys reporting higher initial levels of depression reported higher initial levels of peer victimization than girls with depression significantly predicting the decline of peer victimization for boys, but not for girls.

Self-regulation. The unconditional latent growth model of self-regulation had very good fit, $\chi^2(5) = 17.54$, $p < .001$, $AIC = 3074.39$, $BIC = 3113.83$, $ABIC = 3085.26$, $RMSEA = 0.07$, $CFI = .98$, $TLI = .98$, $SRMR = .07$. The correlation between the intercept and slope was negative and significant ($b = -0.03$, $SE = 0.08$, $p < .001$) indicating that

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adolescents' initial reports were related to their growth rates over time. Further, the variance for the intercept (*intercept M* = 3.64, *SE* = 0.02, *p* < .001, *intercept variance* = 0.22, *SE* = 0.02, *p* < .001) and slope (*slope M* = -0.04, *SE* = 0.01, *p* < .001, *slope variance* = 0.02, *SE* = .003, *p* < .001) were both statistically significant indicating individual differences in initial self-regulation reports and change over time. This model implies an overall decline in self-regulation for adolescents across four years with significant intercept and slope variance suggesting differing trajectories for youth despite the mean structure.

Separately, the slope factor loading for T3 ($\chi^2(4)$ = 16.62, *p* < .01, *RMSEA* = 0.07, *CFI* = .98, *TLI* = .97, *SRMR* = .07) and T4 ($\chi^2(4)$ = 15.22, *p* < .01, *RMSEA* = 0.07, *CFI* = .98, *TLI* = .97, *SRMR* = .07) were allowed to be freely estimated and model fit statistics for both models were substantively similar to the unconditional model. Additional fit statistics indicated the freed loading models were no more parsimonious than the unconditional model (T3: *AIC* = 3075.48, *BIC* = 3119.30, *ABIC* = 3087.55; T4: *AIC* = 3074.08, *BIC* = 3117.89, *ABIC* = 3086.15). Due to the lack of substantial change in model fit and to avoid over-fitting the model, the unconditional model was retained.

Intervention effects. When participation in the Family Check-Up was included as a predictor of the slope of self-regulation, model fit was lower than acceptable limits, $\chi^2(9)$ = 49.73, *p* < .001, *AIC* = 3092.94, *BIC* = 3132.38, *ABIC* = 3103.81, *RMSEA* = 0.09, *CFI* = .94, *TLI* = .93, *SRMR* = .122. Results indicated participation in the Family Check-Up had a significant effect on the change in self-regulation over time such that participation in the intervention buffered the decline of self-regulation across time, *b* =

0.04, $SE = 0.02$, $p < .05$ (see Figure 4 for a plot of this interaction). The intervention was retained as a predictor of the slope and further modeling.

Gender. When gender was included as a predictor of the intercept and slope the model fit was within acceptable limits, $\chi^2(7) = 19.30$, $p < .01$, $AIC = 3077.51$, $BIC = 3125.71$, $ABIC = 3090.79$, $RMSEA = 0.06$, $CFI = .98$, $TLI = .97$, $SRMR = .06$. Results indicated gender did not significantly predict the intercept ($b = -0.04$, $SE = 0.05$, $p = .36$) or slope ($b = 0.01$, $SE = 0.02$, $p = .48$) indicating no gender differences for the growth of self-regulation. Gender was not retained for further modeling.

Ethnicity. When ethnicity was added to the unconditional model as a predictor of the intercept and slope, model fit improved over the unconditional model, $\chi^2(7) = 18.83$, $p < .001$, $AIC = 3047.26$, $BIC = 3095.44$, $ABIC = 3060.52$, $RMSEA = 0.05$, $CFI = .98$, $TLI = .97$, $SRMR = .06$. Results indicated ethnicity was a significant predictor of the intercept ($b = -0.17$, $SE = 0.05$, $p < .001$), but not the slope ($b = -0.02$, $SE = 0.02$, $p = .22$). These results indicate that ethnically diverse adolescents reported lower initial levels of self-regulation than adolescents of primarily European ancestry. Both ethnicity and the intervention were included in the model resulting in excellent model fit and a more parsimonious fit from the unconditional model, $\chi^2(11) = 28.44$, $p < .001$, $AIC = 3043.15$, $BIC = 3091.33$, $ABIC = 3056.41$, $RMSEA = 0.05$, $CFI = .97$, $TLI = .97$, $SRMR = .05$. Ethnicity remained a significant predictor of the intercept ($b = -0.21$, $SE = 0.04$, $p < .001$) and the intervention remained a significant predictor of the slope ($b = 0.04$, $SE = 0.02$, $p < .05$), implying that the protective effects of the Family Check-Up on the overall decline in self-regulation were significant for youth of all ethnicities.

Depression. When depression was added to the unconditional model as a

predictor of the intercept and slope, model fit improved over the unconditional model,

$\chi^2(7) = 16.74$, $p < .001$, *AIC* = 2968.29, *BIC* = 3016.32, *ABIC* = 2981.40, *RMSEA* = 0.05,

CFI = .99, *TLI* = .98, *SRMR* = .06. Depression significantly predicted both the intercept

(b = -0.25, *SE* = 0.03, $p < .001$) and slope (b = 0.05, *SE* = 0.01, $p < .001$). These results

indicate adolescents reporting higher levels of depression also reported initially lower

levels of self-regulation. In addition, when compared to youth reporting lower levels of

depression the self-regulation of the most depressed adolescents increased in self-

regulation over time. When ethnicity was added to the model with depression, results

indicated the self-regulation of ethnically diverse adolescents (see Figure 5) increased at a

faster rate over time than adolescents of primarily European ancestry (see Figure 6).

When depression, ethnicity, and intervention effects were included simultaneously in the

model, the fit was excellent, $\chi^2(13) = 27.61$, $p < .05$, *AIC* = 2932.32, *BIC* = 2989.06,

ABIC = 2947.79, *RMSEA* = 0.04, *CFI* = .98, *TLI* = .98, *SRMR* = .05. All respective

predictors of the intercept and slope remained statistically significant and this model was

retained in further analyses (see Figure 7).

Parallel Process Modeling

To address the third aim regarding co-occurring associations and directional

relationships between the stability and growth in peer victimization and self-regulation

among early adolescents, a parallel process model was tested. The two unconditional

univariate latent growth models were estimated concurrently and model fit was good,

$\chi^2(22) = 88.68$, $p < .001$, *AIC* = 13043.94, *BIC* = 13140.42, *ABIC* = 13070.57, *RMSEA* =

0.07, *CFI* = .95, *TLI* = .94, *SRMR* = .05. The intercept of peer victimization negatively

and significantly correlated with the intercept of self-regulation indicating adolescents with higher levels of peer victimization initially reported lower levels of self-regulation, r = -0.51, SE = 0.07, $p < .001$. The slope of peer victimization negatively and significantly correlated with the slope of self-regulation indicating that as self-regulation declines over time, peer victimization increases, r = -0.05, SE = 0.01, $p < .001$. In addition, initial levels of peer victimization were significantly and positively correlated with the growth of self-regulation, r = 0.12, SE = 0.03, $p < .001$. This correlation suggests higher initial levels of peer victimization are associated with a less rapid decline, and a possible small increase, in self-regulation over time. The intercept of self-regulation was also significantly and positively correlated with the slope of peer victimization, r = 0.10, SE = 0.03, $p < .001$. Inferring from the model, a higher initial level of self-regulation is associated with a less rapid decline in reported peer victimization possibly due to fewer initial reported victimization experiences.

When the covariates were added to the parallel process model the overall model fit improved, $\chi^2(46)$ = 99.86, $p < .001$, AIC = 12616.98, BIC = 12747.97, $ABIC$ = 12652.73, $RMSEA$ = 0.05, CFI = .96, TLI = .96, $SRMR$ = .04 (see Figure 8 for conceptual model). Covariate estimates and correlation coefficients did not substantively change in the combined model from the separately estimated growth models (see Figure 9 for estimates of slope and intercept covariance). The coefficient estimate between the intercept of peer victimization and the slope of self-regulation was slightly attenuated in the combined model, r = 0.10, SE = 0.02, $p < .001$. In addition, the estimate between the intercept of self-regulation and peer victimization was also attenuated, but still of moderate magnitude, r = -0.32, SE = 0.06, $p < .001$. All other paths were unchanged from

the unconditional parallel process model. The combined parallel process model implies that the growth in self-regulation and peer victimization are associated and the inclusion of covariates accounts for the association between these two concurrent processes.

Next, regression paths between latent variables were added to the model. When the slope of self-regulation was regressed on the intercept of peer victimization model fit significantly deprecated from prior models, beyond recommended fit estimates, and structural estimates were considered unreliable, $\chi^2(48) = 170.10$, $p < .001$, $AIC = 12683.22$, $BIC = 12805.48$, $ABIC = 12716.59$, $RMSEA = 0.07$, $CFI = .92$, $TLI = .90$, $SRMR = .06$. When the slope of peer victimization was regressed on the intercept of self-regulation, model fit was within the low end of acceptable limits, $\chi^2(48) = 144.52$, $p < .001$, $AIC = 12657.64$, $BIC = 12779.90$, $ABIC = 12691.01$, $RMSEA = 0.06$, $CFI = .94$, $TLI = .92$, $SRMR = .07$. The slope of peer victimization was not significantly predicted by the intercept of self-regulation, $b = 0.04$, $SE = 0.12$, $p = 0.77$, implying that the covarying parallel process model best models the structure of these data and that there is not a predictive relationship between the growth of self-regulation and peer victimization.

CHAPTER IV

DISCUSSION

This study had three main goals: to examine the stability and growth of (1) peer victimization and (2) self-regulation during early adolescence including the influence of covariates (i.e., ethnicity, gender, depression, intervention effects), and (3) to investigate the relative influence of the growth of peer victimization on the growth of self-regulation. In summary, self-regulation appears to buffer early adolescents from the effects of negative peer interactions. The models imply that early adolescents with initially low levels of self-regulation also have higher initial levels of depression and experience higher levels of peer victimization than their better regulated peers. Importantly the Family Check-Up, a brief preventative intervention, resulted in improvements in self-regulation for these children. While the models imply that the development of peer victimization and self-regulation significantly co-occur and are significantly associated, there does not appear to be a predictive relationship. However, a nuanced understanding of the relationship between the development of self-regulation in the context of peer victimization provides insight into the buffering effects of self-regulation in the face of challenging social circumstances and the promise of intervention to improve youth development.

The findings of this study imply that a family-centered intervention during early adolescence likely improves adolescent social functioning by increasing self-regulation and possibly reducing peer victimization events. Increasing family functioning by reducing family conflict and improving adolescent self-regulation may be a vital component in creating an ecologically-focused peer victimization prevention program

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within school systems (Swearer et al., 2010). In addition, these findings support the efficacy of promoting adaptive self-regulation skills among children and adolescents through social-emotional curricula emphasizing self-regulation and socially competent emotional regulation (Durlak et al., 2011).

Peer Victimization

Overall, the majority of adolescents (approximately 75 percent) reported experiencing very low frequency of verbal peer victimization across the four years of assessment. While the rate of verbal peer victimization decreased for all adolescents over time, boys experienced a sharper decline than girls. When depression was included as a covariate, the model implies that early adolescents reporting lower levels of depression reported initially lower levels of peer victimization and, conversely, adolescents reporting higher levels of depression reported initially high levels of verbal peer victimization. Inferring from the model, the magnitude of the effect of depression on initial victimization reports was greater for boys than girls and the slope effects for gender persisted. Of note, when interaction effects were probed depressive symptoms did not predict change over time in peer victimization for girls. Ethnicity was not a significant predictor in this model which suggests the growth and change of peer victimization during early adolescence was comparable among diverse ethnic groups in this high-risk sample.

These findings partially supported the study hypothesis of an overall increase in verbal victimization. While the mean findings align with the results of Marsh at al. (2011) who observed a mean decline in verbal peer victimization over time for high school

students, due to statistically significant variation in adolescents' initial reports of peer victimization and growth some youth reported highly variable levels of victimization over time with an overall increase in victimization. While the mean trajectory of peer victimization of adolescents in this sample is substantive and important, the experiences of adolescents beyond the mean are also informative.

Self-Regulation

Turning to self-regulation, the overall findings of this study align with prior research with an observed decline in self-regulation abilities across the four years for early adolescents with no apparent gender differences (Bowers et al., 2011; King et al., 2011; King, Lengua, & Monahan, 2013). The findings of the current study depart from results indicating an overall increase in effortful control during early adolescence (King et al., 2012); however, this difference may be due to the lower-stress context of King et al.'s community sample and the high-risk context of the sample for the current study. Depressive symptoms were associated with a lower initial report of self-regulation and contributed to a small, but substantive increase in self-regulation over time. While these findings may at first seem counterintuitive, they suggest that adolescents reporting the most depressive symptoms also report initially lower self-regulation scores and demonstrate a subtle increase in self-regulation over time. Due to the significantly lower initial self-regulation scores of these adolescents, this small improvement over time may be due to maturation and may or may not be socially meaningful for youth.

This study contributes novel findings regarding the effect of ethnicity on self-regulation trajectories. The models implied initial reported levels of self-regulation were

lower for ethnically diverse adolescents when compared to adolescents of primarily European ancestry which persisted in the presence of other covariates. Results indicated that ethnically diverse adolescents reporting the greatest initial depression increased in self-regulation at a faster rate when compared to adolescents of primarily European ancestry. Drawing from the work of Blair and Raver (2012b), it is possible that ethnically diverse adolescents in the present sample were disproportionately impacted by chronic stressors not accounted for by this model, such as poverty, that adolescents of primarily European ancestry do not experience to the same degree. The statistically significant finding of ethnic group differences in reported levels of self-regulation has not been examined in prior studies, is an under-studied area of self-regulation research, and is a substantive contribution of the current study warranting further exploration.

Finally, it is promising that the effects of the brief prevention program, the Family Check-Up, demonstrated a persisting buffering effect on adolescent self-regulation such that adolescents who received the intervention had a slower rate of decline in self-regulation than their control group peers. These results are consistent with prior research on the Family Check-Up that has found that positive change in self-regulation is an important outcome of this program (Fosco et al., 2013; Stormshak, Fosco, & Dishion, 2010). While these prior studies have examined self-regulation at grades six and seven as mediators of early adolescent behavioral change, the current study demonstrates that the beneficial effects of the Family Check-Up on self-regulation are sustained across the often challenging transition to high school through grade nine.

Parallel Processes

Models of parallel, longitudinal change implied that growth in peer victimization was significantly related to the decline observed in self-regulation. The intercepts and slopes of both constructs were significantly correlated which implies that, in the context of the covariates (i.e., depression, gender, ethnicity, intervention effects), verbal peer victimization and self-regulation shape and are shaped by other; however, this relationship is not predictive. The initial levels of both constructs were significantly negatively correlated and of moderate magnitude, implying that that early adolescents with stronger self-regulation skills buffers children from the effects of verbal peer victimization.

This finding aligns with research suggesting higher levels of self-regulation is a protective factor from the influence of delinquent peers (Dishion & Tipsord, 2011; Gardner, Dishion, & Connell, 2008). Conversely, early adolescents with lower self-regulation skills report higher levels of peer victimization, indicating dysregulation may put youth at-risk for victimization. In addition, adolescents with low-levels of self-regulation may be at greater risk for peer rejection as well as increased risk for inflicting verbal peer victimization themselves. The correlation between the intercept of peer victimization and the slope of self-regulation was positive and significant, suggesting higher initial levels of peer victimization are associated with a less rapid decline in self-regulation over time compared to the group mean. Similar to the finding of the effects of depression on the change in self-regulation, it is estimated that youth with initially high levels of peer victimization report substantively lower self-regulation and their positive growth over time does not necessarily imply an optimal level of self-regulation. Finally,

the positive correlation between intercept of self-regulation and slope of peer victimization implies a higher initial level of self-regulation was associated with a less rapid decline in reported peer victimization. As youth with higher self-regulation reported lower peer victimization levels, their less rapid decline may be due to overall fewer victimization experiences.

The findings from the parallel process model are substantive, novel contributions to this area of research as no known publication has examined self-regulation in the context of peer victimization over four years with early adolescents. While these co-occurring dynamics were not predictive of one another, the statistically significant associations between adolescents' social context and emotional-behavioral regulation indicates negative peer interactions co-occur with self-regulation and both are salient in shaping the lives of adolescents. Further, increasing the self-regulation abilities of early adolescents through family intervention benefits an adolescent's social context as well.

Limitations and Future Directions

While this study contributes to the existing literature in regards to the influence of peer victimization self-regulation during early adolescence, there were several notable limitations. First, all measurements were based on youth self-report. While self-report measurement is common for peer victimization research and likely captures adolescents' experiences due to face validity, reliance on self-report data has been a persisting limitation in self-regulation research (Adrian, Zeman, & Veits, 2011). Future research on this topic would benefit from multi-reporter measurement (e.g., parent, child, teacher) as

well as observational data. In addition, further research is needed to examine potential differential item functioning due to ethnicity within self-report measures.

Second, parallel process growth curve modeling may not optimally reflect the structure of the data due to the relatively low frequency of occurrence of peer victimization. Further investigation would benefit from alternative modeling of the count data of peer victimization with Poisson distribution or alternative categorical modeling. An emerging trend within peer victimization research is to use latent class/latent class transition analysis (LCA/LCTA) to provide more person-centered models (Bettencourt, Farrell, Liu, & Sullivan, 2012; Nylund et al., 2007; Wang, Iannotti, & Luk, 2012). If discreet groups of victims were identified this modeling strategy may represent a logically plausible alternative structure to these data. Future research in this area may benefit from LCA/LCTA analyses to capture the unique variability in adolescent experiences over time. In addition, self-regulation trajectories may be better modeled with non-linear means.

Finally, it is likely that other factors that were not included in these models may help account for the observed variability especially in regards to ethnic group differences in self-regulation and gender differences in peer victimization. Specifically, the observed mean difference in self-regulation among ethnically diverse adolescents when compared to adolescence of European ancestry may be explained by positive or negative adolescent ethnic identity development, which research suggests is associated with lower depressive symptoms and better mental health outcomes (Mandara, Gaylord-Harden, Richards, & Ragsdale, 2009; McMahon & Watts, 2002), self-awareness, economic status, or other intervening variables. Further study into the interaction of peer contexts and self-

regulation development during adolescence would benefit from integration of positive peer outcomes, such as prosocial peer involvement, in addition to other negative peer interactions, such as peer rejection.

Summary

In conclusion, the current study expands the understanding of self-regulation during early adolescence, an important extension of a topic that has been developed primarily through research with young children. In addition, this research highlights the importance of the social context on the emergence of self-regulation during a developmental phase when social acceptance is especially valued. Finally, this study lends support to the merit of interventions focused on increasing the self-regulation skills of youth at-risk for social and behavioral difficulties. This nuanced understanding of the interaction of self-regulation and socially challenging circumstances during adolescence can help promote adaptive self-regulation among adolescence toward improved social functioning and optimal health outcomes.

APPENDIX A

MEASURES

Depressive symptoms (14-items from Metzler et al., 2001)

Did any of these feelings bother you in the LAST MONTH?

		Never or almost Never	Some-Times	About half the time	Often	Always or almost always
1.	Nervous or worried	○	○	○	○	○
2.	Depressed, sad, feeling down	○	○	○	○	○
3.	Feeling hopeless	○	○	○	○	○
4.	Cranky or grumpy	○	○	○	○	○
5.	Loss of appetite or interest in food	○	○	○	○	○
6.	Not wanting to do normal activities	○	○	○	○	○
7.	Moody	○	○	○	○	○
8.	Afraid	○	○	○	○	○
9.	Hard to think or focus	○	○	○	○	○
10.	Sleep problems or trouble sleeping	○	○	○	○	○
11.	Feeling slowed down, difficulty moving	○	○	○	○	○
12.	Feeling restless or agitated	○	○	○	○	○
13.	Feeling too tired to do things	○	○	○	○	○
14.	Feeling worthless	○	○	○	○	○

Self-Regulation: Effortful Control, Revised (EATQ-R, Ellis & Rothbart, 2001)
Items that were reverse scored are indicated with superscript *R*.

How true are each of these statements for you?	Almost always not true	Usually not true	Sometimes true	Usually true	Almost always true
1. It is easy for me to really concentrate on homework problems.	○	○	○	○	○
2. I find it hard to shift gears when I go from one class to another at school.[R]	○	○	○	○	○
3. When trying to study, I have difficulty tuning out background noise and concentrating. [R]	○	○	○	○	○
4. I am good at keeping track of several different things that are happening around me.	○	○	○	○	○
5. I pay close attention when someone tells me how to do something.	○	○	○	○	○
6. I tend to get in the middle of one thing, then go off and do something else. [R]	○	○	○	○	○
7. I have a hard time finishing things on time. [R]	○	○	○	○	○
8. I do something fun for a while before starting my homework, even when I'm not supposed to. [R]	○	○	○	○	○
9. If I have a hard assignment to do, I get started right away.	○	○	○	○	○
10. I finish my homework before the due date.	○	○	○	○	○
11. I put off working on projects until right before they are due. [R]	○	○	○	○	○
12. It's hard for me not to open presents before I'm supposed to. [R]	○	○	○	○	○
13. When someone tells me to stop doing something, it is easy for me to stop.	○	○	○	○	○
14. The more I try to stop myself from doing something I shouldn't, the more likely I am to do it. [R]	○	○	○	○	○
15. It's easy for me to keep a secret.	○	○	○	○	○
16. I can stick with my plans and goals.	○	○	○	○	○

Peer Victimization Measures

Teasing (7-items from Metzler et al., 2001)

In the LAST MONTH, how often have you been…

	Never	Rarely	Sometimes	Often	Always
1. … teased by kids at school for no reason.	○	○	○	○	○
2. … teased by kids at school for how I look or what I wear.	○	○	○	○	○
3. … ignored/avoided by kids at school I would like to hang out with.	○	○	○	○	○
4. … teased by kids at school because of my race or skin color.	○	○	○	○	○
5. … ignored or avoided by kids because of my race or skin color.	○	○	○	○	○
6. … teased by kids at school because of being a good student.	○	○	○	○	○
7. … teased by kids at school because of being a bad student.	○	○	○	○	○

Picked on (8-items from Metzler et al., 2001)

This year going to or from school, have you been picked on…

	Yes	No
1. … about your race or skin color.	○	○
2. … by getting unwanted sexual comments or attention.	○	○
3. … because someone thought you were gay or lesbian.	○	○
4. … about your weight, acne, or how you look.	○	○
5. … about your group of friends.	○	○
6. … for what you believe in.	○	○
7. … for no reason.	○	○
8. … for other reasons.	○	○

Swear at (1-item from Metzler et al., 2001)

In the LAST MONTH, how often …

	Never	Rarely	Sometimes	Often	Always
… did any student call you names, swear at you, or say mean things to you?	○	○	○	○	○

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Table 1. Means, Standard Deviations, Reliability, and Skew of Study Variables by Demographics

					Ethnicity		Gender	
Variable	α	Sample	Skew	Kurtosis	Multi-Ethnic	White	Girls	Boys
1. Self-Regulation T1	.79	3.67(0.59)	-.05(.10)	-.14(.20)	3.61(0.58)	3.77(0.60)	3.69(0.60)	3.65(0.58)
2. Self-Regulation T2	.79	3.57(0.59)	.23(.11)	-.13(.21)	3.49(0.58)	3.71(0.57)	3.59(0.61)	3.56(0.56)
3. Self-Regulation T3	.79	3.57(0.57)	.24(.11)	-.08(.22)	3.48(0.54)	3.72(0.57)	3.60(0.56)	3.54(0.57)
4. Self-Regulation T4	.79	3.56(0.57)	.13(.11)	.08(.22)	3.48(0.54)	3.70(0.59)	3.55(0.55)	3.58(0.59)
5. Peer Vic T1	.83	2.71(3.13)	1.14(.10)	.84(.20)	2.75(2.86)	2.99(3.31)	2.58(2.83)	3.08(3.19)
6. Peer Vic T2	.85	2.71(3.13)	1.28(.11)	1.10(.21)	2.47(2.98)	3.11(3.33)	2.93(3.11)	2.48(3.14)
7. Peer Vic T3	.85	2.29(3.07)	1.58(.11)	1.89(.22)	2.06(2.89)	2.67(3.31)	2.64(3.21)	1.96(2.89)
8. Peer Vic T4	.83	1.71(2.52)	1.90(.11)	3.38(.22)	1.69(2.54)	1.73(2.51)	1.83(2.48)	1.58(2.57)
9. Depression T1	.93	1.85(0.78)	1.38(.10)	2.03(.20)	1.84(0.74)	1.88(0.85)	1.91(0.80)	1.81(0.77)

Note. Peer Vic = Peer victimization, α = Cronbach's α, Sample = total sample; Sample size at T1=593; Skew and Kurtosis Indices reported with standard errors; All means reported with standard deviations.

Table 2. Bivariate Correlations of Self-Regulation, Peer Victimization, Depression, and Demographic Variables by Race/Ethnicity

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10
1. Self-Regulation T1	-	.50**	.53**	.39**	-.37**	-.16*	-.14	-.17*	-.39**	-.18**
2. Self-Regulation T2	.55**	-	.59**	.43**	-.16*	-.21**	-.21**	-.22**	-.32**	-.19**
3. Self-Regulation T3	.39**	.50**	-	.65**	-.25**	-.19**	-.20**	-.31**	-.29**	-.09
4. Self-Regulation T4	.30**	.40**	.59**	-	-.23**	-.19*	-.20**	-.24**	-.18*	-.03
5. Peer Victimization T1	-.33**	-.16**	-.09	-.09	-	.53**	.49**	.43**	.42**	.16*
6. Peer Victimization T2	-.25**	-.21**	-.11**	-.14*	.55**	-	.60**	.51**	.35**	.06
7. Peer Victimization T3	-.18**	-.22**	-.19**	-.20**	.42**	.59**	-	.55**	.36**	-.07
8. Peer Victimization T4	-.11	-.18**	-.18**	-.24**	.29**	.41**	.51**	-	.40**	.03
9. Depression T1	-.29	-.28**	-.18**	-.12*	.30**	.30**	.30**	.29**	-	-.01
10. Gender	.05	.06	-.03	.04	.03	-.17**	-.46**	-.10	-.10	-
N	584	524	509	493	592	525	510	493	583	593

Note. *$p<.05$, **$p<.01$, two-tailed significance; *N* reflects the full sample; Ethnically diverse adolescents are below and adolescents of primarily European ancestry are above the diagonal.

Table 3. Bivariate Correlations of Self-Regulation, Peer Victimization, Depression, and Demographic Variables by Gender

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10
1. Self-Regulation T1	-	.51**	.48**	.35**	-.32**	-.19*	-.13*	-.11	-.34**	-.18
2. Self-Regulation T2	.57**	-	.55**	.43**	-.11	-.16*	-.18**	-.20**	-.24**	-.08
3. Self-Regulation T3	.44**	.57**	-	.62**	-.15*	-.09	-.17**	-.19**	-.17**	-.19**
4. Self-Regulation T4	.35**	.44**	.63**	-	-.13*	-.15*	-.16**	-.20**	-.12	-.16**
5. Peer Victimization T1	-.36**	-.20**	-.14*	-.17**	-	.58**	.47**	.42**	.43**	-.10
6. Peer Victimization T2	-.22**	-.22**	-.14*	-.13	.51**	-	.56**	.50**	.44**	-.21**
7. Peer Victimization T3	-.17**	-.20**	-.19**	-.19**	.46**	.64**	-	.54**	.42**	-.14**
8. Peer Victimization T4	-.15*	-.18**	-.25**	-.28**	.27**	.40**	.51**	-	.37**	-.07
9. Depression T1	-.31**	-.33**	-.28**	-.15*	.29**	.20**	.23**	.30**	-	-.07
10. Ethnicity	-.24**	-.29**	-.26**	-.22**	.04	.01	-.07	.05	.01	-
N	584	524	509	493	592	525	510	493	583	593

*Note. *p<.05, **p<.01, two-tailed significance; N reflects the full sample; Girls are below and boys are above the diagonal.*
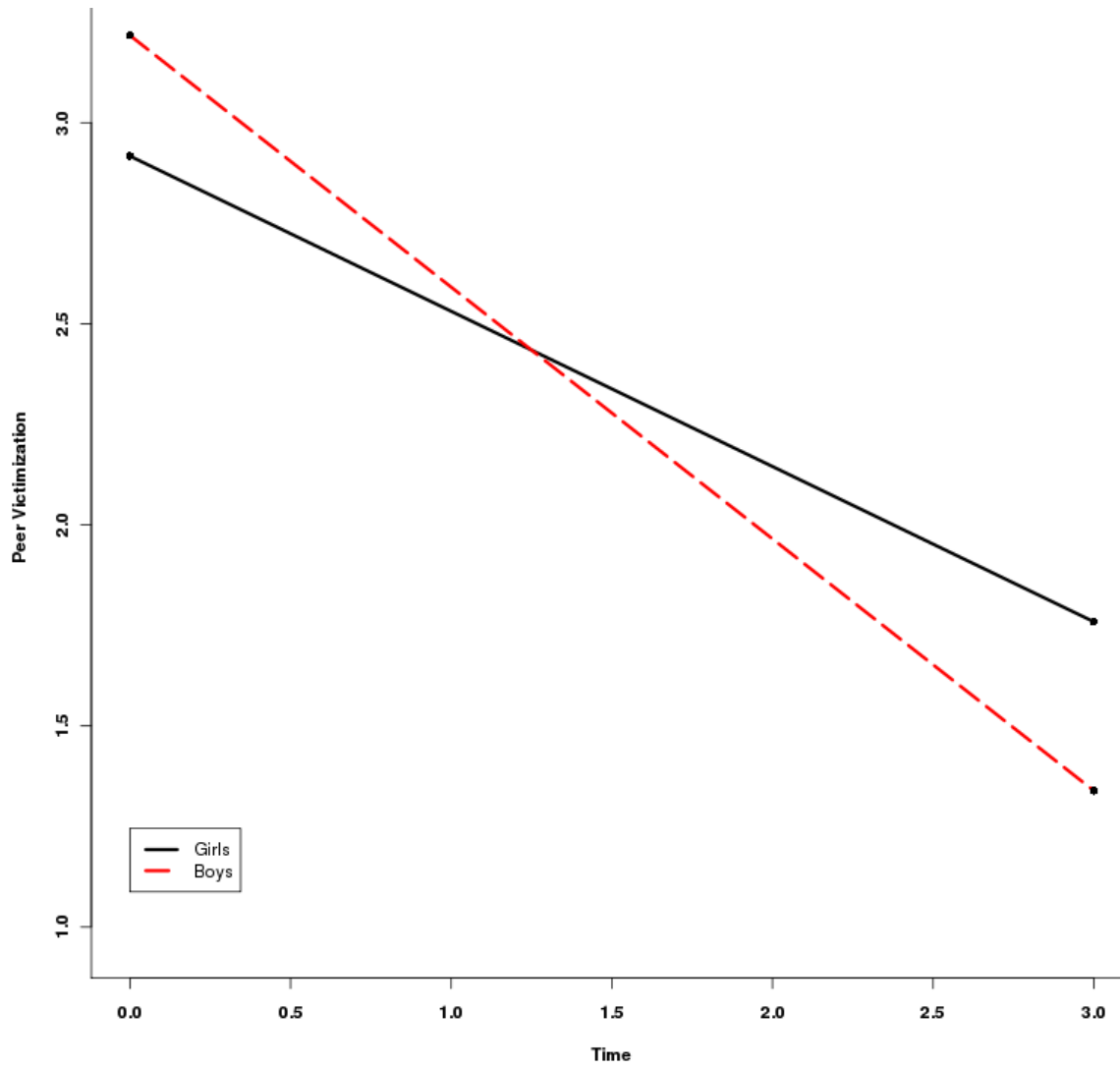
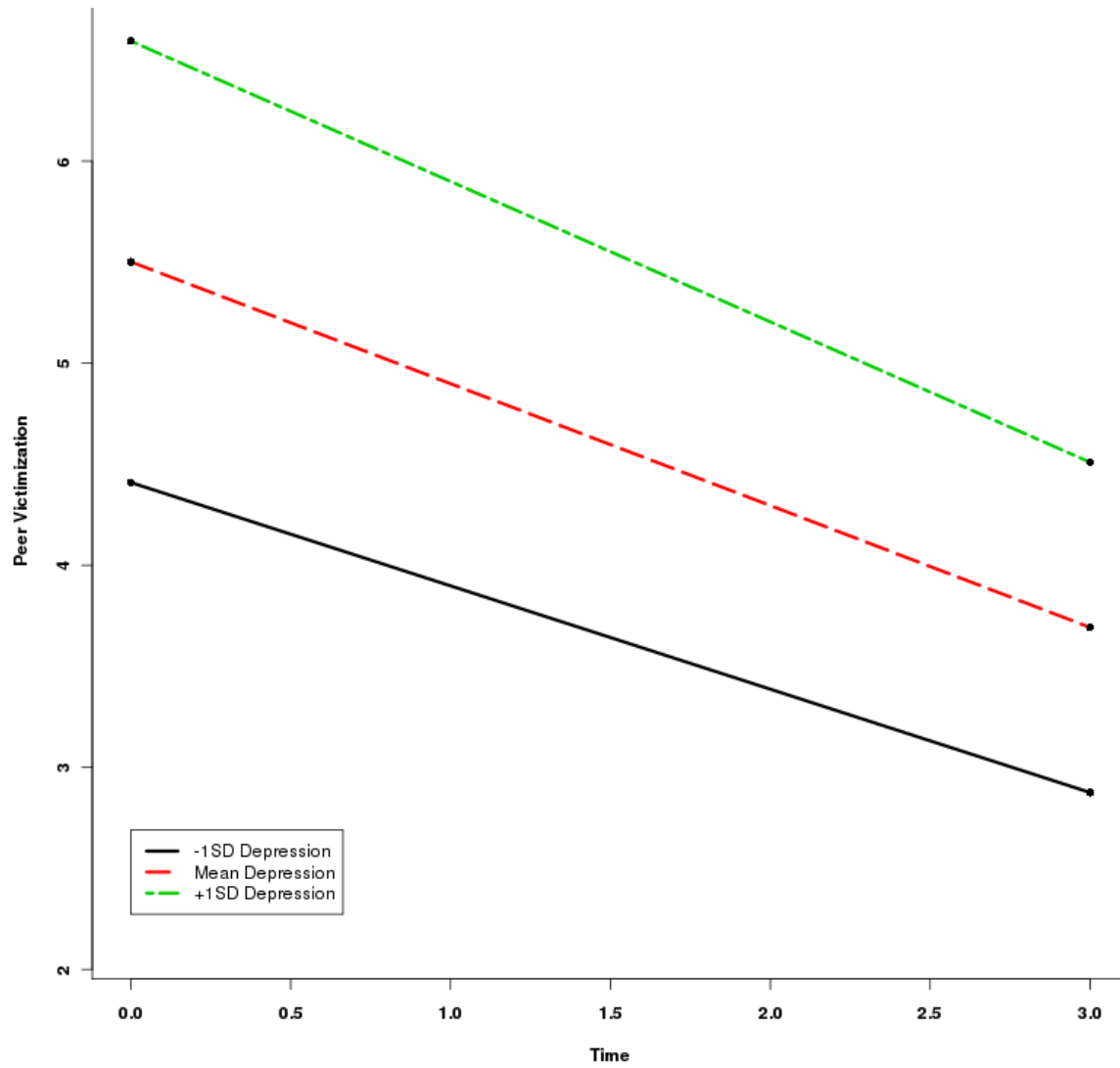*Figure 1.* Peer Victimization decline as a function of gender and time over four years.

Figure 2. Peer victimization as a function of depressive symptoms and time
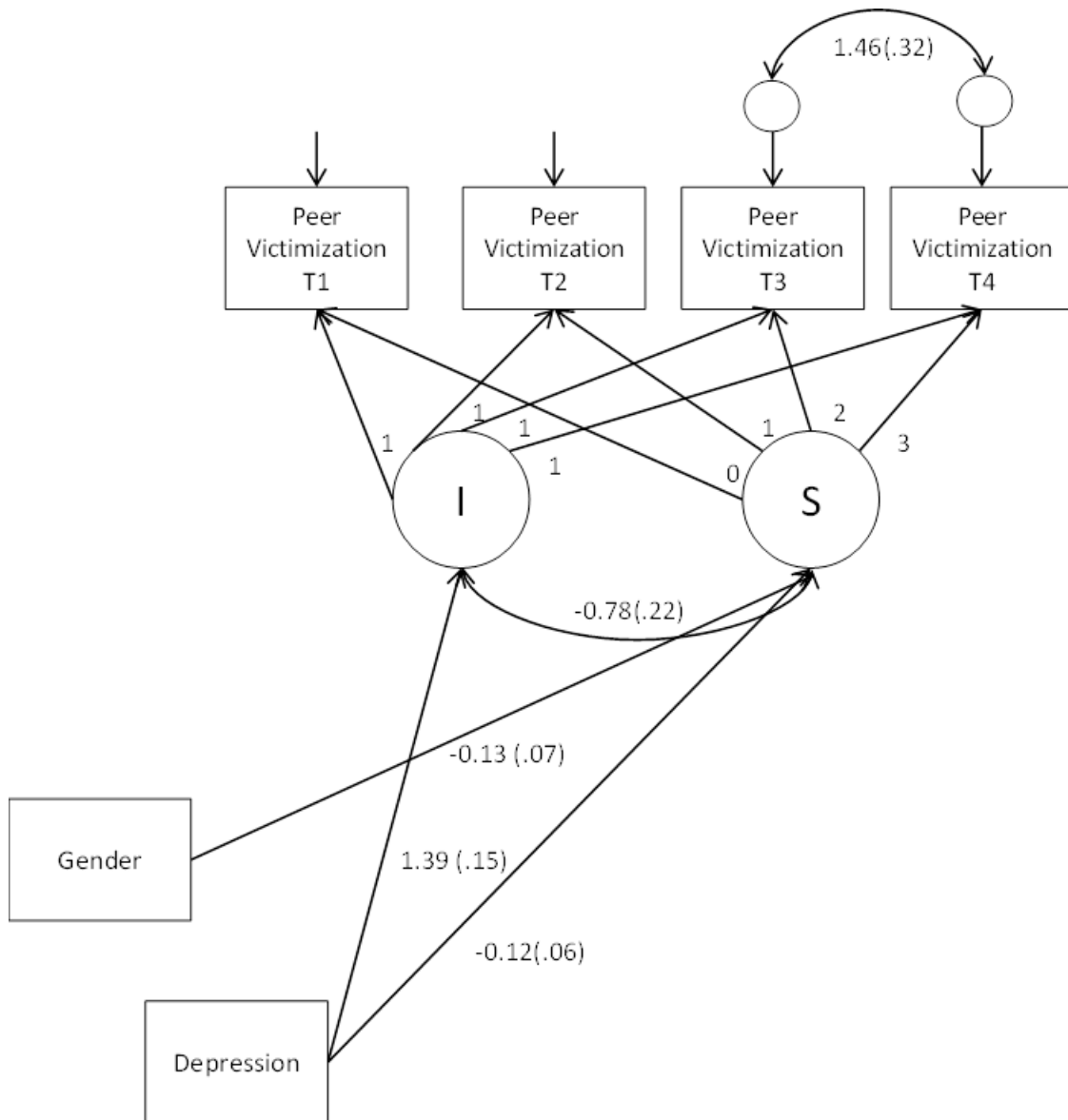
Figure 3. Unstandardized coefficients and their standard errors (in parentheses) for latent growth model of peer victimization with covariates of gender and depression. Latent constructs are shown in ellipses, and observed variables are shown in rectangles. All coefficients are significant at $p < .05$. Model fit indices were within acceptable limits: $\chi^2(9) = 27.24$, $p < .001$, $RMSEA = 0.06$, $CFI = .97$, $TLI = .96$, $SRMR = .03$.
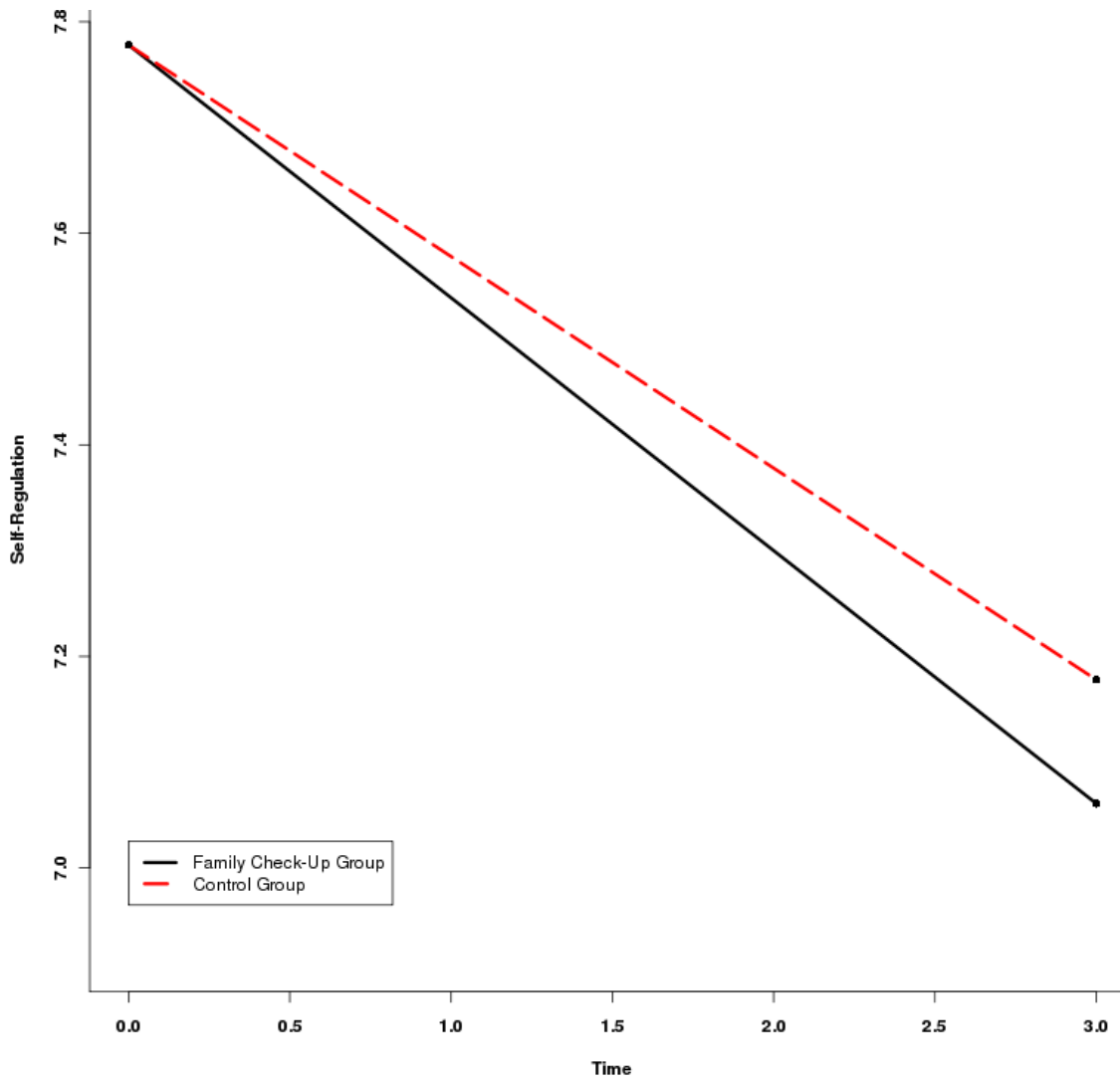
Figure 4. Plot of the growth of self-regulation by intervention group status and time.
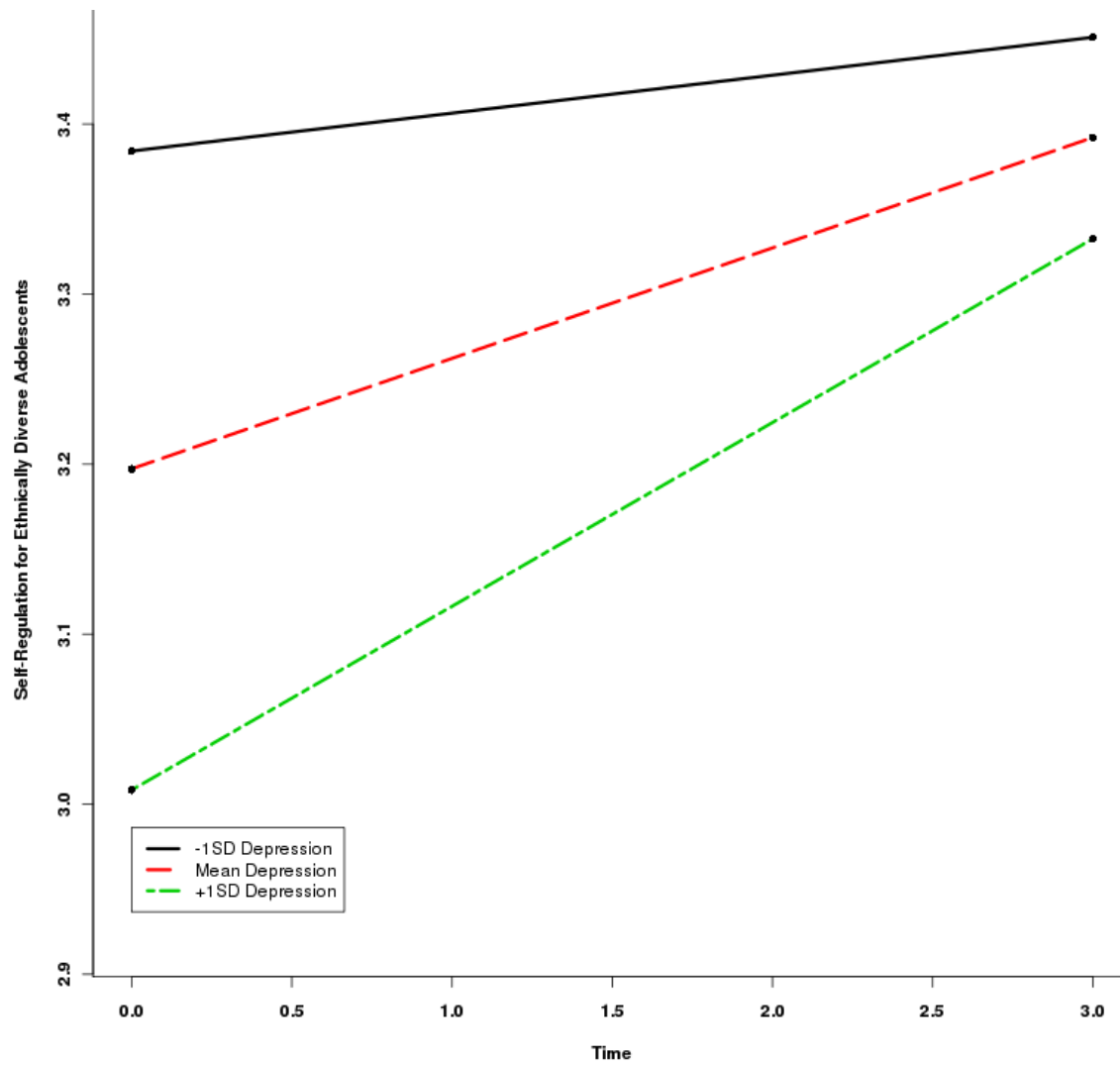
Figure 5. Plot of self-regulation growth by adolescents of diverse ethnicities and levels of depression
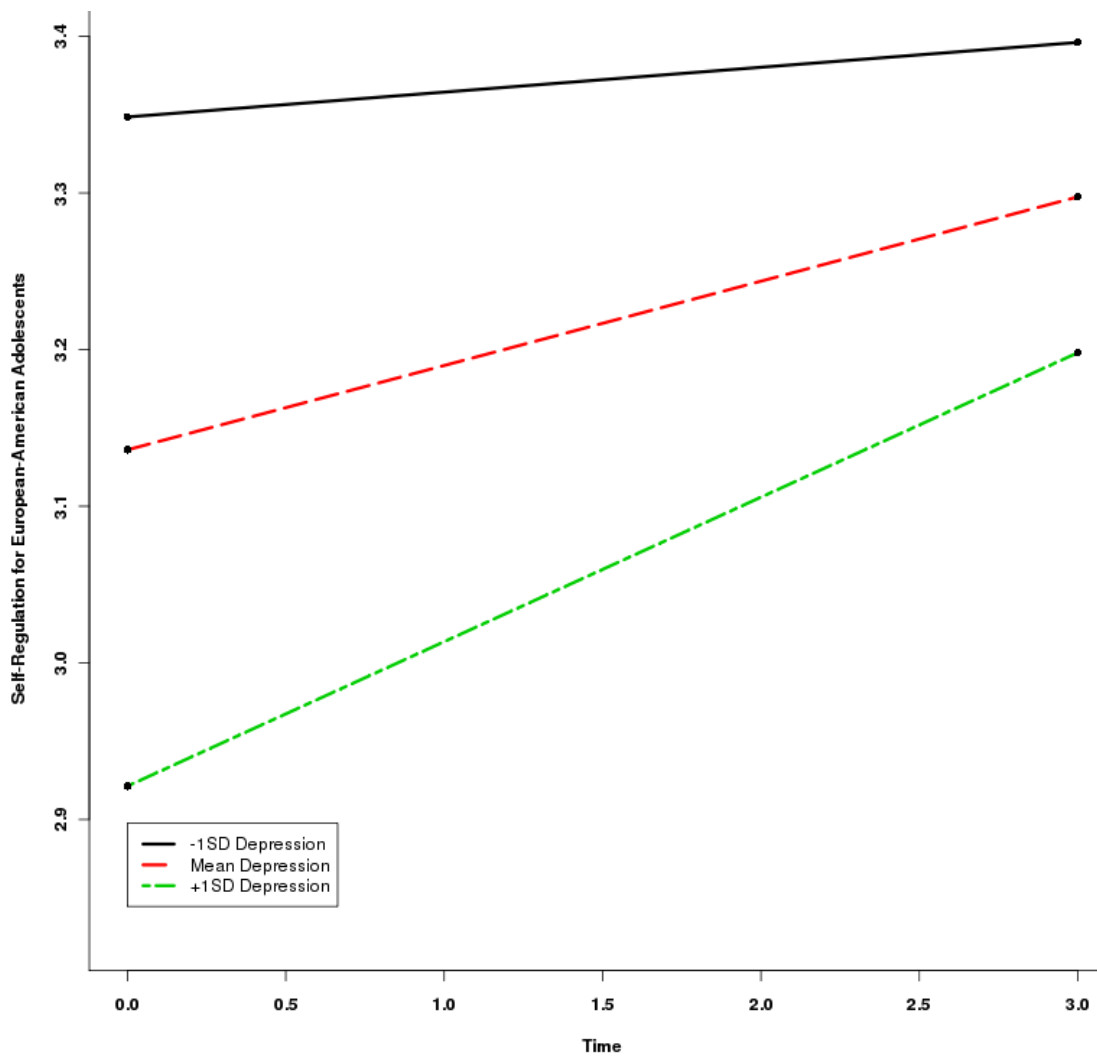
Figure 6. Plot of self-regulation growth by adolescents of primarily European ancestry and levels of depression
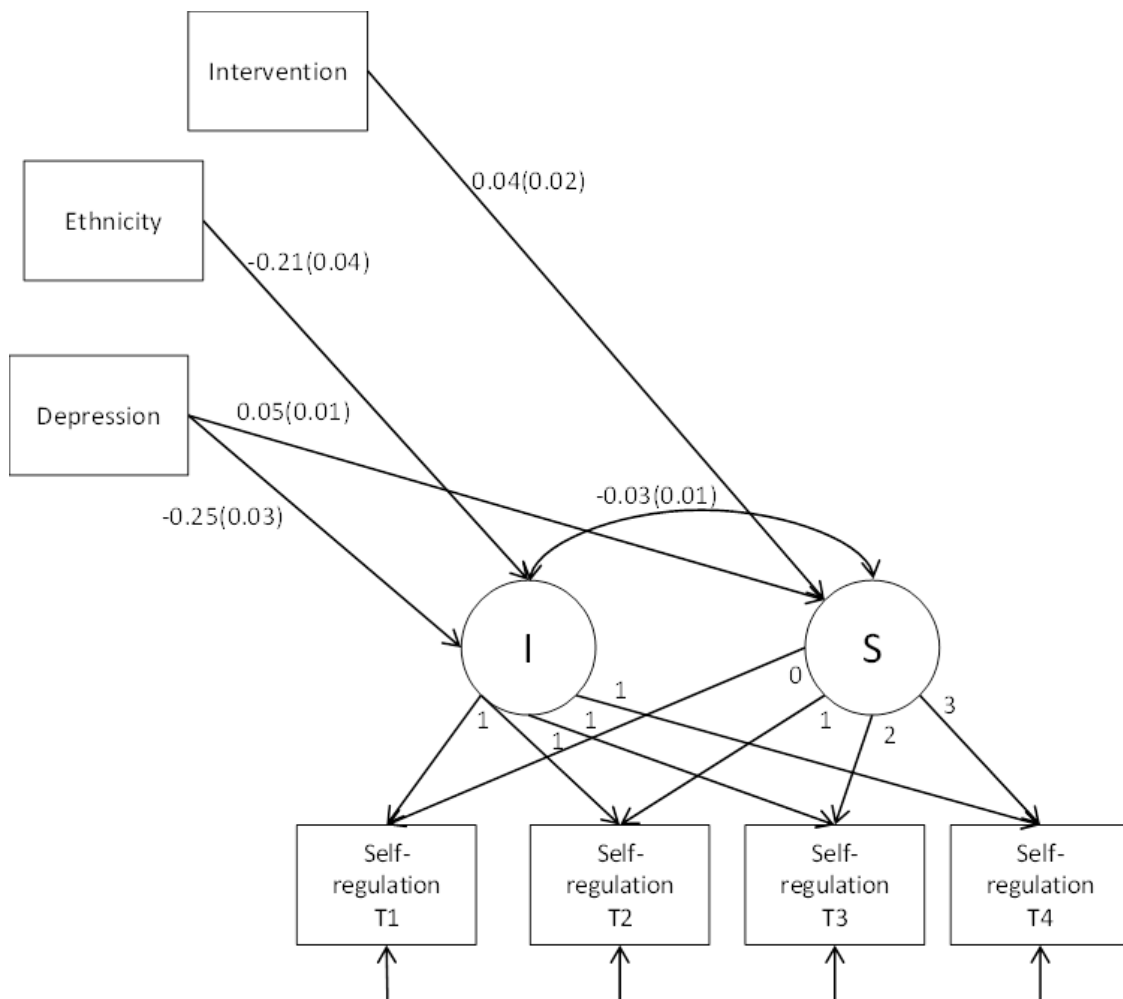
Figure 7. Unstandardized coefficients and their standard errors (in parentheses) for latent growth model of self-regulation with covariates of ethnicity, intervention status, and depression. Latent constructs are shown in ellipses, and observed variables are shown in rectangles. All coefficients are significant at $p < .05$. Model fit indices were within acceptable limits: $\chi^2(13) = 27.61$, $p < .01$, $RMSEA = 0.04$, $CFI = .98$, $TLI = .97$, $SRMR = .05$.
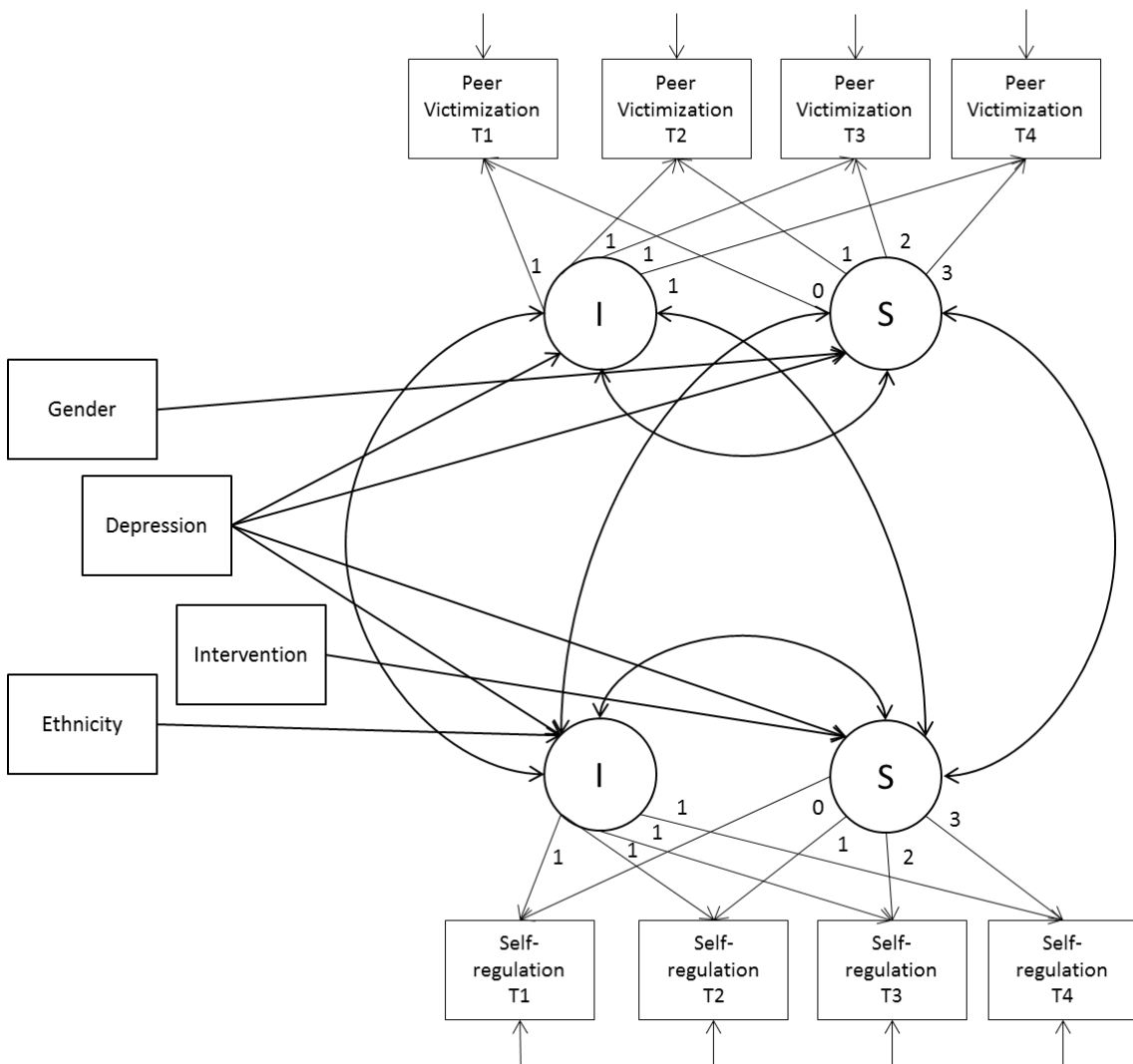
Figure 8. Conceptual model of parallel process growth with covariates.
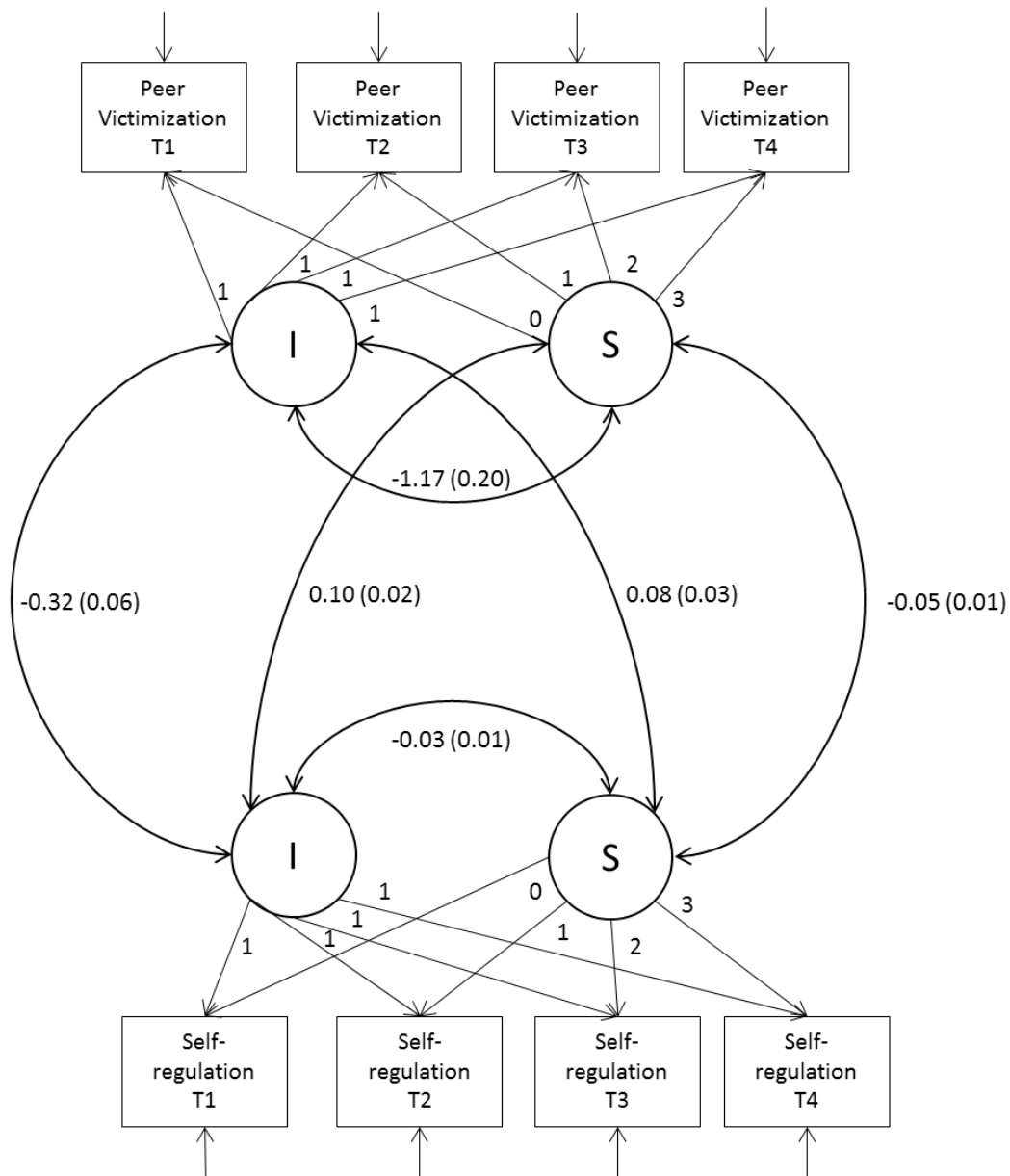
Figure 9. Unstandardized coefficients and their standard errors (in parentheses) for parallel process model of self-regulation and peer victimization. Covariates of ethnicity, intervention status, depression, and gender were included in the model and residual error between T3 and T4 peer victimization were correlated, but not illustrated for simplicity. Latent constructs are shown in ellipses, and observed variables are shown in rectangles. All coefficients are significant at $p < .05$. Model fit indices were within acceptable limits: $\chi^2(46) = 99.86$, $p < .001$, $RMSEA = 0.05$, $CFI = .96$, $TLI = .95$, $SRMR = .04$.

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