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Autonomy and relatedness in early adolescent friendships as predictors of short- and long-term academic success

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Abstract

This study examined early adolescent autonomy and relatedness during disagreements with friends as key social competencies likely to predict academic achievement during the transition to high school and academic attainment into early adulthood. A sample of 184 adolescents was followed through age 29 to assess predictions to academic success from observed autonomy and relatedness during a disagreement task with a close friend. Observed autonomy and relatedness at age 13 predicted relative increases in grade point average (GPA) from 13 to 15, and greater academic attainment by age 29, after accounting for baseline GPA. Findings remained after accounting for peer acceptance, social competence, scholastic competence, externalizing and depressive symptoms, suggesting a key role for autonomy and relatedness during disagreements in helping adolescents navigate challenges in the transition to high school and beyond.

Keywords

autonomy; relatedness; academic achievement; friendships; observational coding

The transition from middle school to high school (usually occurring between the ages of 13 and 15) can be daunting, leaving many young adolescents struggling both academically and socially (Alspaugh, 1998; Barber & Olsen, 2004). Early adolescents typically are faced with new, larger schools and classes as well as greater academic demands and the pressures of preparing for college or careers. Importantly, they attend school in a peer environment characterized by decreased valuing of academic engagement and achievement, with grades often slipping during this period (Wigfield & Eccles, 2000). Peer relationships also are becoming more complex, and adolescents must learn to negotiate the challenges of increasing peer pressure and deepening relationships in the school context (Laursen, 1996). Equally importantly, this is a time of cognitive change and rapid development and adolescents thrive academically in environments that support this development (Eccles et al., 1993; Forehand, Long, Brody, & Fauber, 1986). This study examined the hypothesis that quality peer relationships—particularly those where disagreements are handled skillfully—can both protect against the devaluing of academics and facilitate cognitive development necessary to succeed in high school and beyond.

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Adolescents who enter high school without relationships that foster the ability to navigate increasingly difficult social and academic contexts are likely to feel stressed, distracted, and disengaged, which, in turn, may hinder academic achievement (Kaplan, Liu, & Kaplan, 2005; Petrides, Frederickson, & Furnham, 2004; Wang, Chow, Hofkens, & Salmela-Aro, 2015). The early high school years are also important in terms of long-term academic attainment: Those who do well in their freshman and sophomore years of school are more likely to graduate and/or go on to postsecondary education (Allensworth & Easton, 2007; Easton, Johnson, & Sartain, 2017; Neild, Stoner-Eby, & Furstenberg, 2008).

As peer relationships deepen and increase in complexity, both theory and research suggest that success in handling these relationships during this pivotal period is likely to be critical to academic achievement (Juvonen, Espinoza, & Knifsend, 2012). We know that a sense of belonging in school is linked tightly to academic success, and that high quality peer relationships can facilitate both a sense of belonging and academic functioning (Burack et al., 2013; Dubow, Tisak, Causey, Hryshko, & Reid, 1991; Goodenow, 1993; Nelson & DeBacker, 2008). Notably, one study has found that support from friends actually predicts relative increases in grades over a one-year period (Gonzales, Cauce, Friedman, & Mason, 1996). In the longer-term, two studies have linked social connection in adolescence to higher academic attainment in adulthood (Allen, Robbins, Casillas, & Oh, 2008; Jimerson, Egeland, Sroufe, & Carlson, 2000).

In addition to developing supportive relationships with peers, however, early adolescents also face the critical additional challenge of learning to manage peer pressure and handle themselves in disagreements in peer relationships (Laursen, 1996). As adolescents transition from middle school to high school, the task of navigating situations in which they and friends disagree thus becomes increasingly salient (Adams & Laursen, 2007). According to Self-Determination Theory, autonomy and relatedness are two basic needs that must be met in order for individuals to experience wellbeing (Ryan & Deci, 2000). Adolescents who experience relationships that promote the fulfillment of these needs are likely to thrive in the realm of motivation and achievement. Although seemingly far-removed from academic outcomes, friendships characterized by success in handling disagreements, particularly those characterized by high levels of autonomy and relatedness, are likely to be associated with higher academic functioning for several reasons.

First, adolescents must learn to deal with increasing levels of peer pressure, which are particularly likely to interfere with learning in a school context during adolescence (Allen, Porter, & McFarland, 2006). Given that peer influences during this period shift to becoming unsupportive of academic effort and achievement (Wigfield & Eccles, 2000), maintaining both academic orientation and successful peer relationships requires particular skill. In essence, the adolescent must establish sufficient autonomy so as to pursue sometimes unpopular routes involving academic effort, yet do so in a way that maintains positive peer relationships. By entering into relationships in which they can practice ways to assert themselves while maintaining the relationship during disagreement (thus establishing *autonomy* and maintaining *relatedness*), adolescents can prepare to manage potentially fraught interactions with peers and successfully resist the normative slide into academic disengagement.

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Second, managing disagreements successfully is likely critical for minimizing levels of social stress, which is one of the strongest predictors of academic underperformance and school dropout (French & Conrad, 2001; Jimerson et al., 2000; Resnick, 1997). The experience of social threat has been found to impair capacities including working memory, self-control, test performance, and measured IQ (Eisenberger, Lieberman, & Williams, 2003; Twenge, Catanese, & Baumeister, 2003). Adolescents with friendships in which disagreements are handled poorly are likely to experience more stress in relationships, which in turn can impair cognitive and academic functioning. In addition, adolescents in friendships in which disagreements are managed well are likely to benefit from the social support and social facilitation of having high quality relationships, support which we know to be linked to increased academic success (Fass & Tubman, 2002).

Third, establishing the capacity to form friendships in which disagreements are handled successfully likely also provides a fertile ground for cognitive and academic development (Dunn, 1998; Wentzel, 1991). Friendships that are characterized by a skillfully handled give-and-take during disagreements are likely to prepare adolescents to handle situations that call for similar cognitive skills. Learning to make a case for one's position and respond to a friend's differing position during a disagreement, for example, requires (and may promote the development of) similar skills to asserting oneself in class discussions, to crafting arguments in essays and papers, and to appreciating conflicting points of view—cognitively demanding tasks that become increasingly important in high school. These skills can then aid in academic development, while simultaneously reducing social stress in ways that likely facilitate emotional health and the ability to learn (Fass & Tubman, 2002; Wentzel, 2005).

Although research with infants and young children has examined the types of social environments that are likely to be enriching for cognitive development (Perry, 2002; Richter & Grieve, 1991), much less research has examined this same question in adolescence. Existing research suggests the importance of managing disagreements but focuses on parental relationships and academic environments. For example, family interactions characterized by high levels of autonomy and relatedness during disagreements have been associated with greater cognitive maturity and higher self-esteem, as well as lower depression, loneliness, externalizing problems, and stress for adolescents (Allen, Hauser, Bell, & O'Connor, 1994; Inguglia, Ingoglia, Liga, Coco, & Cricchio, 2015). Moderate amounts of disagreement in the context of high quality relationships have been shown to predict higher grades for 11–18 year-old youths (Adams & Laursen, 2007). Similarly, within the classroom, students' experiences of autonomy and relatedness have been linked repeatedly to their level of academic engagement (Hafen et al., 2012; Niemiec & Ryan, 2009; Ruzek et al., 2016). However, early adolescents increasingly are coming to view peer relationships, especially friendships, as primary (Collins & Laursen, 2004), so interactions within such relationships are likely to be particularly influential for cognitive development (Wentzel, 2009). Given the role of autonomy and relatedness in adolescents' broader development, friendships that allow teens to practice these processes during disagreements appear likely to bolster academic functioning similarly.

For reasons outlined above, close friendships are likely to provide one of the most important contexts in which autonomy and relatedness skills during disagreements can be developed

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and demonstrated. Evidence of strong autonomy and relatedness skills on a dyadic level would imply not only that an adolescent has developed autonomy and relatedness skills, but also that s/he is able to establish and maintain relationships in which both parties support such skillful behavior. Establishing such relationships may create a context that further supports the adolescents' psychosocial development and reduces negative pressures in a way that is more likely to be sustained and reinforced going forward. We therefore posited that friendships typified by autonomy and relatedness by *both* parties during a disagreement would be linked to target adolescents' later academic success.

Although we hypothesized that friendships typified by autonomy and relatedness during disagreements would predict greater future academic achievement, we know of no studies that have examined this hypothesis via either self-report or observational data. Rather, the bulk of existing studies have focused on peer support (as opposed to autonomy and relatedness during disagreements) and typically have been either correlational or, at best, longitudinal but without controls for baseline achievement. Identifying qualities of adolescent friendships that are not simply correlated with achievement, but that can predict relative *increases* in academic achievement across the transition from middle school to high school can provide valuable insights into the specific social processes and skills that may best support adolescents as they navigate this transition. In addition, it is important to examine predictions to academic success while accounting for potential confounds. In particular, demographic factors such as family income and parental educational attainment are likely to be associated with adolescents' academic attainment (Dubow, Boxer, & Huesmann, 2009). Moreover, general social competence and overall peer acceptance have been found to be related to academic achievement and attainment (Rabiner, Godwin, & Dodge, 2016; Wentzel & Caldwell, 1997), so we accounted for these factors. Next, to account for the possibility that the most academically able participants are simply the most likely to have skillful relationships and higher academic attainment, we will account for friend-reported scholastic competence. Finally, to account for the possibility that more distressed participants are less likely to have skillful relationships and more likely to have lower academic attainment, we accounted for and externalizing and depressive symptoms (Masten et al., 2005; Quiroga, Janosz, Bisset, & Morin, 2013). Predictions over and above such confounds would suggest that having a friendship characterized by high levels of autonomy and relatedness during disagreements contributes uniquely to understanding levels of later academic achievement. If the main hypotheses were supported, we proposed to test an additional question, namely, whether observed effects would be independent of social competence, peer acceptance, perceived scholastic competence and depressive and externalizing symptoms. Whenever possible, it also is important to use reports other than the adolescent's own to avoid the potential confounds of relying on self-report data.

Using longitudinal, multimethod data in a diverse community sample followed from age 13 to 29, this paper examined the hypotheses that:

1. Autonomy and relatedness during disagreements in a close friendship at age 13 will predict relative increases in grades by age 15 (during the transition from middle school to high school).

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2. Autonomy and relatedness in a close friendship at age 13 will predict higher levels of educational attainment by age 29.

3. GPA at age 15 will mediate the relation between observed autonomy and relatedness at age 13 and academic attainment by age 29.

Method

The current sample was part of a larger longitudinal study of adolescent social development in familial and peer contexts. The original sample included 184 seventh and eighth graders (86 male and 98 female) and their parents. The sample was racially, ethnically, and socioeconomically diverse: 107 adolescents (58%) identified themselves as Caucasian, 53 (29%) as African American, 15 (8%) as of mixed race/ethnicity, and 9 (5%) as being from other minority groups. Adolescents' parents reported a median family income in the $40,000–$59,999 range. Adolescents were originally recruited from the seventh and eighth grades at a public middle school drawing from suburban and urban populations in the Southeastern United States. Students were recruited via an initial mailing to all parents of students in the school, along with follow-up contact efforts at school lunches. Adolescents who indicated they were interested in the study were contacted by telephone. Of all students eligible for participation, 63% agreed to participate either as target participants, or as peers providing collateral information. Eighty-three percent of participants were retained across the 16 years of the study through regular contact (e.g., birthday cards, newsletters) maintaining up-to-date records of participants' contact information from participants, friends, and family, as well as through increasing monetary compensation over time. This study, Family Contexts of Developing Adolescent Peer Relations, received institutional review board approval from the Institutional Review Board for Social and Behavioral Research at University of Virginia, protocol number #97–082. For the current study, participants provided data at three time points: at age 13 (M age = 13.35, SD = 0.64) at age 15 (M age = 15.21, SD = 0.81) and at age 29 (M age = 28.59, SD = 1.02). At the age 13 assessment, participants (N = 184), their close friends, and parents provided data. Close friends were defined as "people you know well, spend time with, and whom you talk to about things that happen in your life." These close friends were chosen by the teen and may not have reciprocally considered the target teen to be their closest friend. Participants identified and ranked up to 12 friends; the closest friend's parents were contacted. If that friend was unable or unwilling to participate, the next closest friend's parents were contacted, and so on. Most participants (80.33%) had their first or second choice of friend participate. Friends were close in age to participants (i.e., their ages differed on average by less than a month from target adolescents' ages) and were specified to be the same gender. Close friends reported that they had known the participants for an average of 4.02 years (SD = 2.88) and rated themselves as very close to participants on average (M = 4.41 out of a possible 5; SD = .75). Academic records also were collected for participants at age 13. At the age 15 assessment, academic records also were collected for participants (N = 134, 72.8% of the original sample). At the age 29 assessment, participants (N = 153, 83.2% of the original sample) reported the highest level of education they had obtained.

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Attrition Analyses

Of those adolescents who did not participate at the age 15 data collection, the majority attended a high school where we were unable to obtain academic records. Analyses indicated that adolescents who participated at age 15 had significantly higher GPAs at age 13 ($M_{continued\ participation}$ = 3.09, SD = .67 vs. $M_{missing\ age15\ GPA}$ = 2.15, SD = .69; t = −4.89, p = .001). Females were significantly more likely to participate at age 29 than males (χ^2 = 8.79, p = .003). No other significant differences were found between those who did vs. did not participate at any of the three waves.

To best address any potential biases due to attrition and missing data in longitudinal analyses, full information maximum likelihood methods were used, with analyses including all variables that were linked to attrition (i.e., where data were not missing completely at random). Because these procedures have been found to yield less biased estimates than approaches (e.g., simple regression) that use listwise deletion of cases with missing data, the entire original sample of 184 for the larger study was utilized for these analyses. This analytic technique does not impute or create any new data nor does it artificially inflate significance levels. Rather, it simply takes into account distributional characteristics of data in the full sample so as to provide the least biased estimates of parameters obtained when some data are missing (Arbuckle, 1996).

For all data collections, adolescents and their peers provided informed assent, and their parents provided informed consent before each interview session. Once participants reached age 18, they provided informed consent. Interviews took place in private offices within a university academic building. Adolescents and peers were all paid for their participation. Participants' data were protected by a Confidentiality Certificate issued by the U.S. Department of Health and Human Services, which further protects information from subpoena by federal, state, and local courts. When necessary, transportation and child care were provided to participants.

Measures

Highest Parent Education Level (Age 13)—Participants' parents reported the highest level of education they had obtained. The highest level of education reported by either parent (or the level reported by a single parent) was used. Responses were coded from 1 (less than an 8th grade education) to 9 (post college degree). Looking at the highest level of education completed by either parent, 1 parent (.54%) completed less than 8th grade; 5 parents (2.72%) completed some high school; 21 parents (11.41%) were regular high school graduates; 6 parents (3.26%) earned a general equivalency diploma (GED); 47 parents (25.54%) completed some college or technical training beyond high school; 14 parents (7.61%) completed an associate's degree; 27 (14.67%) completed a bachelor's degree; 13 (7.07%) completed some graduate work and 50 parents (27.17%) completed a post college degree. The mean and median level of education completed were both an associate's degree, whereas the mode was a post college degree.

Friend-rated Social Competence (Age 13)—Friend reports of the adolescent's social competence were assessed using a modified version of the Adolescent Self-Perception

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Profile (Harter, 1985). The original items were modified to allow friend ratings of the adolescent, rather than self-ratings. Friends chose between two contrasting statements that could describe the participant. They then rated how true of the participant the selected item was on a 2-point scale. The scale consisted of four items. An example item is: “Some teenagers understand how to get peers to accept them BUT other teenagers don’t understand how to get peers to accept them.” Internal consistency for this scale was acceptable (Cronbach’s $\alpha = .77$).

Friend-rated Scholastic Competence (Age 13)—Friend reports of the adolescent’s scholastic competence were assessed using a modified version of the Adolescent Self-Perception Profile (Harter, 1985). The original items were modified to allow friend ratings of the adolescent, rather than self-ratings. The scale consisted of four items. An example item is: “Some teenagers feel like they are just as smart as others their age BUT other teenagers aren’t so sure and wonder if they are as smart.” Internal consistency for this scale was acceptable (Cronbach’s $\alpha = .74$).

Peer Acceptance (Age 13)—Peer acceptance was assessed using a limited nomination sociometric procedure adapted from (Coie, Dodge, & Coppotelli, 1982) and modified for adolescents (Franzoi, Davis, & Vasquez-Suson, 1994). Each student nominated up to 10 peers in their grade with whom they would most like to spend free time outside of school. Total peer acceptance was calculated for each participant by taking the number of “most like” nominations received, divided by the number of peers making nominations. This procedure resulted in a sample of 72 – 146 teens (depending on the grade level), comprising approximately 38% of the entire student population in these grades, who provided nominations of anyone in their grade at school. Grade-based nominations were utilized rather than classroom-based nominations due to the age and classroom structure of the school that all of the participants attended. The large number of raters for each teen means that this subsample of nominators is likely to yield fairly reliable estimates of preference for each teen (Prinstein, 2007). This procedure has been shown to yield good stability across time (Coie & Dodge, 1983; McElhaney, Antonishak, & Allen, 2008) and situation (Coie, Dodge, & Kupersmidt, 1990). In addition, this measure has been validated previously in several studies (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; McElhaney et al., 2008; Narr, Allen, Tan, & Loeb, 2017).

Depressive Symptoms (Age 13)—The Childhood Depression Inventory (Kovacs & Beck, 1977) is a 27-item inventory based on the Beck Depression Inventory. Adolescents reported on their depressive symptoms in the past week. Internal consistency was good (Cronbach’s $\alpha = .85$).

Externalizing Symptoms (Age 13)—The Child Behavior Checklist (Achenbach, 1991; Achenbach & Edelbrock, 1981) was originally a 113-item measure of mental health functioning. The current study used friend reports of items used to create subscales for the following externalizing problems: Aggression (12 items), hostility (8 items), delinquency (6 items), and hyperactivity (6 items). An example item is: “She gets in many fights” (aggression). Friends reported on a three-point scale from 0 (not true) to 2 (very true or often

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true). The subscales were combined into an overall externalizing scale. Internal consistency for the overall scale was good (Cronbach's $\alpha = .81$).

Observed Autonomy and Relatedness During Disagreements (Age 13)— Participants and friends completed an 8-minute, video-recorded disagreement task in which they were each presented separately with a list of 12 fictional people and instructed to decide which 7 should be placed on a hypothetical failing shuttle trip from Mars. Then the friends came together and were instructed to come to a consensus. Participants and friends were recorded during this discussion and later coded for autonomy and relatedness behaviors (see Table 1) while attempting to reach consensus. (Allen, Hauser, Bell, & McElhaney, 2000; Allen, Hauser, Eickholt, Bell, & O'Connor, 1994). The coding system employed has been translated into four languages and has been used extensively in capturing autonomy and relatedness processes in dyads (Becker-Stoll, Fremmer-Bombik, Wartner, Zimmermann, & Grossmann, 2008; Pavlidis & McCauley, 2001; Samuolis, Hogue, Dauber, & Liddle, 2006; Zhang & Slesnick, 2017). Ratings are molar in nature, yielding overall scores for participants' behaviors across the entire interaction; however, these molar scores are derived from an anchored coding system that considers both the frequency and intensity of each speech relevant to that behavior during the interaction in assigning the overall molar score.

Specific interactive behaviors were considered, and used to derive an anchored overall code for the extent to which both participants and friends employed autonomy and relatedness-promoting behaviors. Participants were rated on behaviors comprising both autonomy and relatedness. Autonomy behaviors considered included the extent to which the individual stated reasons for the position they took and the extent to which the individual spoke assertively and without hesitation. Relatedness behaviors considered included the degree to which an individual displayed behaviors showing warmth and engagement, such as genuine smiles, friendly tone, validating the other person's ideas or the other person, and showing signs of carefully listening to the other person and; the degree to which the individual genuinely tried to work collaboratively toward a common solution, rather than just pushing for his or her own point of view. Autonomy and relatedness were considered together as one construct, consistent with past research (Niolon, Kuperminc, & Allen, 2015; Oudekerk, Allen, Hessel, & Molloy, 2015). Two graduate students were trained by the PI over a 13-week period. Coders first read the coding manual and then watched recordings that had already been coded; codes given were discussed with the PI. They subsequently began coding on their own for 10–15 recordings until they reached reliability. Interrater reliability was calculated for the overall scale using the Shrout-Fleiss reliability for a fixed set and was in what is considered the "good" range for this statistic (Intraclass $r = .80$ (for target teens) and .81 (for friends) (Cicchetti & Sparrow, 1981). Participants' and friends' scores were averaged together to capture the amount of autonomy and relatedness shown at the dyadic level, an approach previously found to yield highly valid data (Allen, Grande, Tan, & Loeb, 2018; Allen et al., 2003; Tan et al., 2016).

GPA (Age 13 and 15)—Participants' academic records were collected and their grade point average (GPA) was calculated on a 0.0 to 5.0 scale (participants could earn higher than a 4.0 due to grade weighting, where a set number was added to the total GPA for each

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advanced, honors, and Advanced Placement course). At age 13, the mean GPA was 3.0, (*SD* = .72), ranging from a low of 1.0 to a high of 4.07. At age 15, the mean GPA was 2.65 (*SD* = 1.15), ranging from a low of 0.0 to a high of 4.43.

Education Level (Age 29)—Participants reported the highest level of education they had obtained by age 29. Education level was coded from 1 (8^{th} grade or less) to 10 (post college degree). Nine participants (5.88%) completed some high school; 20 participants (13.07%) obtained a GED; 45 participants (29.41%) earned a high school diploma; 12 participants (7.84%) completed an associate's degree; 35 participants (22.88%) completed a bachelor's degree; 8 participants (5.23%) completed some graduate work; whereas 24 participants (15.69%) completed a post-college degree. The mean and median level of education completed were both an associate's degree whereas the mode was a high school diploma.

Results

Preliminary Analyses

For descriptive purposes, Table 2 presents means, standard deviations, and intercorrelations of substantive variables. GPA at 13 and 15 were both positively correlated with educational attainment at 29 as well as parent education level and family income, hence these demographic factors were assessed as covariates in all analyses below. We also examined the possible two-way and three-way moderating effects of gender and family income on each of the relations described in the primary analyses below. All moderating effects analyzed were obtained by creating interaction terms based on the product of centered main effect variables. No moderating effects were found beyond what would be expected by chance, thus indicating that the results described below did not reliably differ between males and females or between adolescents from high- versus low-income families.

Primary Analyses

Next, regression analyses using Full Information Maximum Likelihood were conducted in MPlus (Version 7.2; (Muthén & Muthén, 2015).

> Hypothesis 1: Autonomy and relatedness during disagreements in a close friendship at age 13 will predict relative increases in grades by age 15.

See Table 3: Controlling for gender, family income, parent education level and GPA at age 13, observed autonomy and relatedness with a friend at age 13 predicted relative increases in GPA (i.e., accounting for baseline GPA) from age 13 to age 15 ($\beta = .20$, $p = .001$). This finding suggests that, apart from demographic variables, having a friendship characterized by autonomy and relatedness during a disagreement at 13 was predictive of relative increases in GPA during the transition to high school.

> Hypothesis 2: Autonomy and relatedness in a close friendship at age 13 will predict higher levels of educational attainment by age 29.

As shown in Table 4, after controlling for gender, family income, highest parent education level and GPA at age 13, observed autonomy and relatedness with a friend during a disagreement at age 13 predicted higher levels of education by age 29 ($\beta = .19$, $p = .004$).

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This suggests that, apart from demographic variables and baseline GPA, having a friendship characterized by autonomy and relatedness during disagreements at 13 was predictive of higher academic attainment into adulthood.

> Hypothesis 3: GPA at age 15 will mediate the relation between observed autonomy and relatedness at age 13 and academic attainment by age 29.

To test for mediation, we used the "model indirect" command in MPlus, specifying 5000 bootstraps for the confidence interval estimates. As shown in Figure 1, after controlling for gender, family income, and highest parent education level, GPA at age 15 predicted higher levels of education by age 29 ($\beta = .54$, $p = .001$). Using bootstrapped confidence intervals, GPA at age 15 was found to mediate the relation between observed autonomy and relatedness during a disagreement at age 13 and education level at age 29 (Indirect effect from observed positive behaviors to education level = .121, $p = .002$, 95% CI = .03; .21). This suggests that GPA at age 15 potentially accounted for the link between observed autonomy and relatedness during a disagreement at age 13 and academic attainment by age 29.

Post-hoc analyses

To examine the possibility that other adolescent-specific social relationship qualities that previously have been associated with achievement might explain these findings, we tested several competing explanations. Each covariate was considered one-by-one in separate regression analyses (where each regression also included gender, family income, and baseline GPA) due to high covariance among control variables. Due to the large number of analyses conducted, a Bonferroni correction was applied. We used an alpha level of .004 for all statistical tests. We found that, after including each of close-friend rated social competence, friend-rated scholastic competence, and peer acceptance (i.e., the number of "like" nominations) in the regressions, autonomy and relatedness continued to predict GPA significantly at 15 and education level at 29. This pattern of findings suggests that findings were not better explained by social competence, social acceptance, or general scholastic competence as perceived by a close friend.

Next, to examine the possibility that depressive or externalizing problems might underlie both autonomy and relatedness during disagreements in friendships and academic outcomes, we examined, individually, self-reported depressive symptoms and friend-reported externalizing concerns. We found that, after including these variables in the regressions, the prediction from autonomy and relatedness and GPA at 15 and education level at 29 remained significant (see Figure 2). Finally, to examine whether it was solely the adolescent's own autonomy and relatedness abilities that were important for academic achievement, the target adolescent's behavior and the close friend's behavior were examined separately as predictors of GPA and academic attainment. Each remained a significant predictor when examined individually, even while continuing to account for demographic characteristics and GPA at age 13. After adjusting the alpha for the number of tests run, the effect from target participants' autonomy and relatedness at 13 to academic attainment was marginally significant ($p = .007$).

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Discussion

The current study found that observable autonomy and relatedness during disagreements in early adolescent friendships predicted relative increases in GPA from age 13 to age 15 as well as higher academic attainment by age 29 (also after accounting for baseline GPA). GPA at age 15 mediated the relationship between autonomy and relatedness with friends at 13 and academic attainment at 29, consistent with our expectation that grades during the early years of high school would be important for academic attainment (Allensworth & Easton, 2007; Easton, Johnson, & Sartain, 2017; Neild, Stoner-Eby, & Furstenberg, 2008). These findings are consistent with Self-Determination Theory, which has shown that autonomy and relatedness are key needs that, when satisfied, tend to promote intrinsic motivation and achievement (Niemiec & Ryan, 2009; Ryan & Deci, 2000). The current results suggest that the capacity to establish friendships characterized by autonomy and relatedness in handling disagreements during this crucial developmental period may have far-reaching implications for future academic outcomes.

The Importance of Friendships

It is important to note that the combined score from observed behavior of both members of a friendship dyad was used to capture observed autonomy and relatedness at age 13. This suggests that, beyond an individual's own autonomy and relatedness skills, a *friendship* characterized by successful disagreement negotiation is important. When examined separately, both the target participant and close friend's behaviors each remained predictive of relative increases in GPA by age 15 and higher academic attainment by age 29. These findings are consistent with the idea that adolescents with strong abilities to manage disagreements are able to seek out and maintain friendships in which skillful management of disagreements becomes a property of the *dyad.* This capacity to seek out and/or create highly functional friendships—to create one's social environment going forward—may be one factor explaining the extremely long-term nature of the associations with positive outcomes observed in this study.

Social Competence and Acceptance

In contrast, when we examined friend-rated social competence, we found that it did not contribute significantly to relative increases in grades from age 13 to 15 or academic attainment by 29. When we examined peer acceptance (measured by the number of "like" nominations from peers), we found that, although peer acceptance was correlated positively with GPA at both age 13 and age 15 as well as academic attainment by age 29, it did not predict relative change in GPA from age 13 to 15 significantly nor academic attainment by age 29 when observed autonomy and relatedness at age 13 were included in the model. Much of the extant literature suggests that social acceptance is an underlying attribute that contributes to academic success, but importantly, the majority of this research is short-term and/or focused on younger children (Wentzel & Caldwell, 1997).

Autonomy and Relatedness

In adolescence, as opposed to younger ages, there are several possible reasons why friendships characterized by autonomy and relatedness during disagreements might bolster

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academic achievement. One possibility is that high levels autonomy and relatedness reflect particularly warm and supportive *friendships*, which may be important to enhanced functioning in ways that broader peer preference are not (Gonzales et al., 1996; Narr et al., 2017). However, it also is important to note that the observations in the current study were made during a disagreement task. Dyads who were rated highly in terms of autonomy and relatedness were showing these positive qualities during a potentially fraught interaction. These dyads were balancing two important skills: the ability to confidently assert one's own opinion while simultaneously maintaining the relationship. Practicing these skills with a friend may bolster adolescents' abilities to navigate other potentially difficult situations, such as negotiating peer pressure—precisely during the time when peer norms increasingly begin to devalue academic achievement (Wigfield & Eccles, 2000). Adolescents who can navigate peer pressure skillfully at this age, asserting themselves without undermining relationships, may avoid the shift in values away from academic achievement and so may be poised for increasing academic success. These skills also are likely to benefit adolescents as they encounter increasingly complex social situations in high school. Adolescents who begin high school on a firm foundation of a relationship in which it is acceptable to disagree may be more resilient to the typical conflicts and relationship dissolutions that occur at this age (Hartl, Laursen, & Cillessen, 2015; Lessard & Juvonen, 2018).

In addition, learning the give-and-take of navigating disagreements may promote cognitive skills that are necessary for academic situations encountered in high school. Adolescents with such friendships are practicing confidently asserting themselves while taking into account other perspectives. These skills may translate directly into cognitively-, and at times, socially-, challenging activities such as participating in class discussions and writing persuasive papers. These findings are consistent with prior research suggesting that moderate amounts of conflict within high quality parental relationships are associated with higher academic achievement (Adams & Laursen, 2007). However, at a time when friendships are becoming primary for many early adolescents, the current findings suggest that peer relationships characterized by autonomy and relatedness during disagreements may provide a particularly enriching environment for cognitive and academic development. They also suggest a particularly important role for social and emotional learning programs in educational settings, particularly when these programs target conflict and disagreement management and/or involve peer interactions. Such programs may well have long-term educational benefits, in addition to social benefits (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011).

Limitations of Past Studies

An important difference between the current study and prior research in this area is that prior research has relied frequently upon cross-sectional designs which exacerbate the problem of unmeasured variable confounding. For example, it may be that students who are functioning well generally will be both popular and academically successful, even though the popularity is in no way driving the academic success. Although lagged longitudinal analyses cannot establish causal relations, they do eliminate at least *some* of the relations created by unmeasured factors. In this case, effects of peer acceptance, for example, drop out in longitudinal analyses, even though peer acceptance at 13 was correlated with GPA at 13.

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This approach made it somewhat more compelling that autonomy and relatedness during disagreements predicted future academic success even after accounting for links between skills and academic success at baseline. Clearly, the ability to handle the give-and-take of disagreements had a connection to *relative improvements* in functioning over time that simple levels of peer acceptance at age 13 did not. This pattern of findings is consistent with recent evidence suggesting that adolescent close friendship processes have both stronger and more positive implications for future functioning than broader measures of peer preference (Narr et al., 2017).

Strengths of the Current Study

These results suggest that, by age 13, having a friendship in which both people can express their opinions and stay connected may be more important for long-term academic success than general social competence or acceptance. We also know that there are some potential downsides to broad peer acceptance, with some adolescents choosing to focus more on socializing with peers rather than academics (Mihaly, 2009). These findings have implications for educators, parents, and others working with middle-school aged adolescents: in terms of academic success, there appears to be value in focusing on quality vs. quantity of peer relationships, with a particular focus on developing qualities to handle disagreements and conflicts adaptively.

Importantly, the current study accounted for both main and moderating effects of several potential confounding factors, including family income, adolescent gender, and parent education level, suggesting that demographic factors did not explain the current findings, and that friendships characterized by autonomy and relatedness appeared similarly beneficial to adolescents from various demographic backgrounds. It also suggested that the effects observed did not differ appreciably for male vs. female or more vs. less advantaged adolescents.

Limitations and Future Directions

Some limitations are important to note. We used hypothetical scenarios to elicit disagreements in friendships, given the difficulty of unobtrusively observing disagreements outside the laboratory. This approach has been used widely in the study of conflict and peer pressure, and resulting data has been associated with other measures of conflict and disagreement (Chango, Allen, Szwedo, & Schad, 2015; Ellis, Dumas, Mahdy, & Wolfe, 2012; Oudekerk et al., 2015; Shomaker & Furman, 2009). Close friends chosen by the target participants may not have reciprocally considered the target participants their closest friends. However, these friends agreed to be in the study, reported knowing the adolescent for several years on average and rated themselves as quite close to the target adolescent. We also note that our data are not completely independent, as individuals could serve as both target participants and close friends (this applies to only two participants). Close friends also could report on multiple target participants. This was true of 23 close friends (12.5%). However, data that are collected in a single school or grade is necessarily dependent to a degree as the individuals know each other. In addition, although the longitudinal nature of the data allowed us to examine relative change over time in our outcomes, we were not able to establish causal relations with these non-experimental data. Next, we examined the dyadic

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process of autonomy and relatedness in friendships, but future research could examine non-dyadic processes as well. We examined several potential competing explanations, but there may still be an underlying variable that explains both observed autonomy and relatedness and academic outcomes, such as IQ (although predicting relative *change* in GPA allowed us to somewhat account for this possibility). In addition, we measured academic attainment by age 29, when many individuals have graduated from college or obtained a post-graduate degree. However, some may graduate at later ages or go on to post-graduate education, and the current study did not allow us to capture these later degrees. Future research could examine more distal educational outcomes to better understand their links to early adolescent relationship processes.

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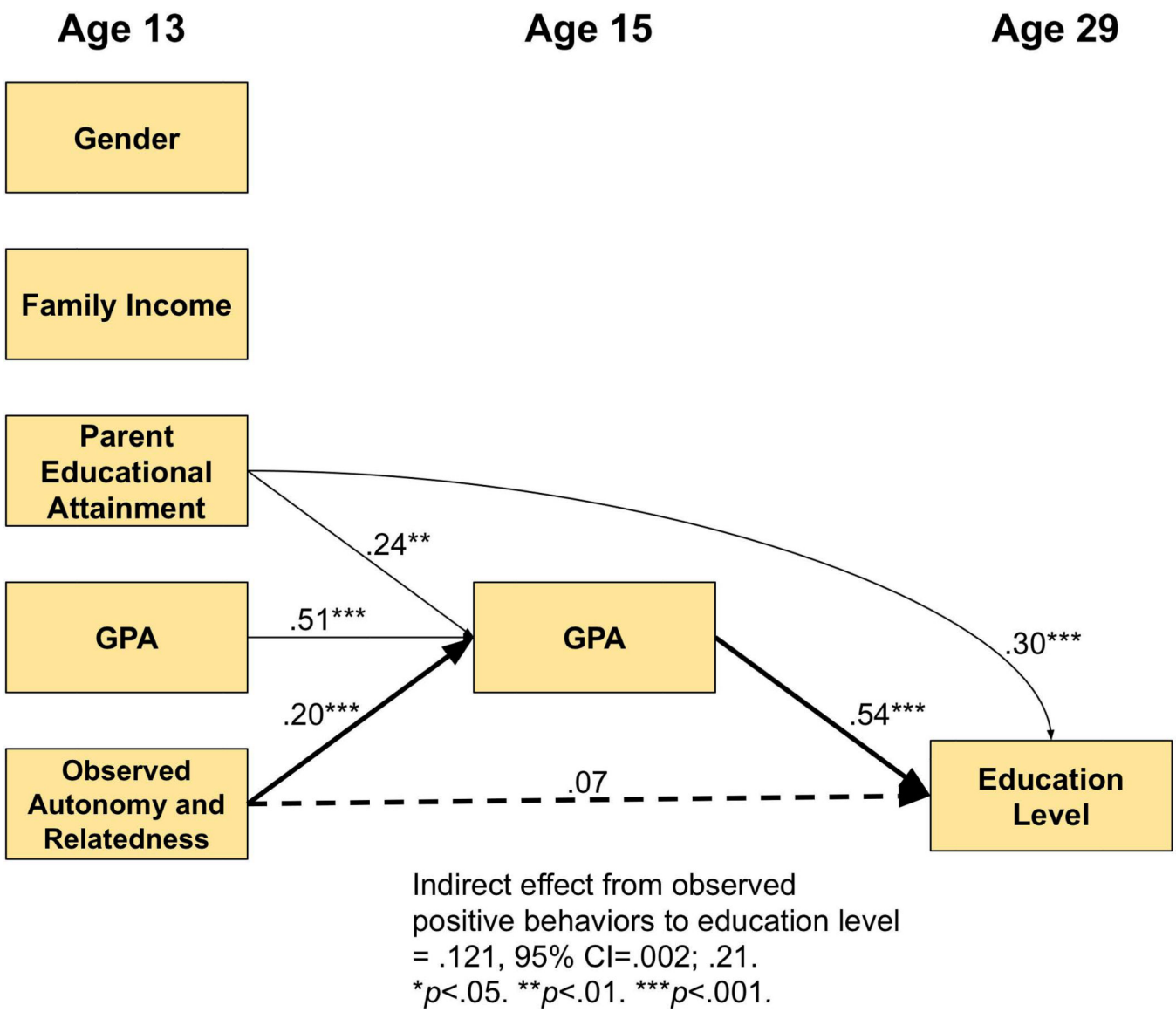

Figure 1.
Mediation model of observed autonomy and relatedness at 13 to GPA at age 15 and participant educational attainment at age 29.

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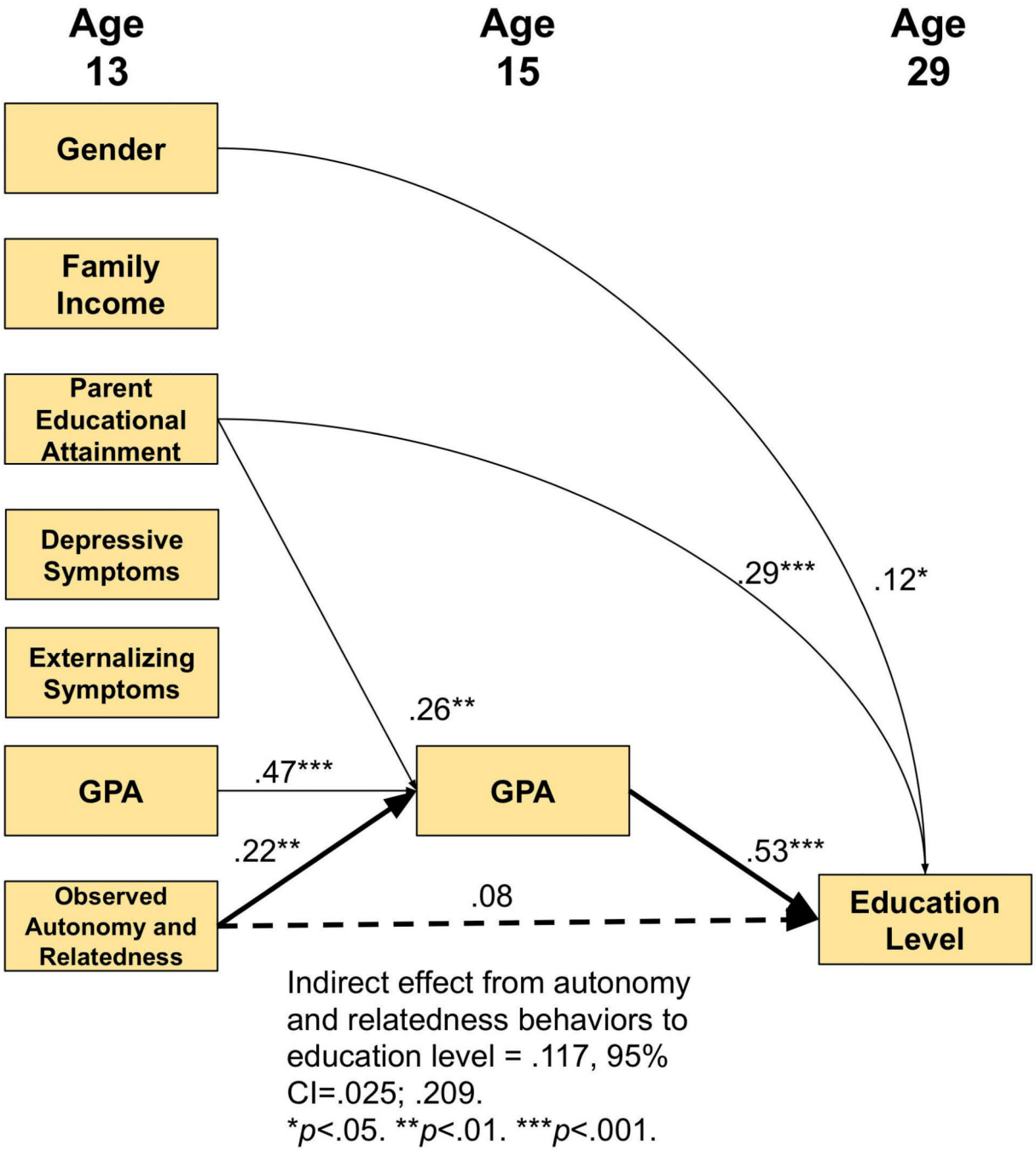

Figure 2.
Mediation model of observed autonomy and relatedness at 13 to GPA at age 15 and participant educational attainment at age 29, controlling for depressive and externalizing symptoms.

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Table 1

Elements of Positive Autonomy and Relatedness

Element	Description	Example
Use of Reasons	Reasoned statements that advance the adolescent's position. Scored based on the number of reasons given/the number of times the dyad disagreed	"I think we should take Aisha because she's a mother."
Speaking with Confidence	The extent to which an individual speaks forcefully and with confidence. Verbal and nonverbal behaviors considered	"We should definitely take George." (making eye contact, no uncertainty or hesitation)
Positive Connectedness	Captures signs of warmth and engagement in the relationship, verbal and nonverbal	Smiling genuinely, positive friendly tone, leaning in, validating/complementing, truly friendly jokes
Collaborative/ Cooperative Behavior	The degree to which each member of the dyad tries to exchange reasons and think about the disagreement vs. just trying to prove the other person wrong	"Why do you think we should take Juan?" (genuinely seeking information). "That's a really good point" (validating)

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Table 2

Correlations Among and Descriptive Statistics for Key Study Variables

	M (SD)	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Autonomy & Rel. (13)	2.38 (.60)	--	.07	.33***	−.06	−.11	.39***	.55***	.44***	.34***	.31***	−.08
2. Social competence (13)	12.87 (2.79)		--	.22**	.06	−.23**	−.04	.11	.04	.09	−.00	−.01
3. Peer acceptance (13)	.96 (1.35)			--	−.07	−.15*	.32***	.38***	.28***	.40***	.32***	.04
4. Depression (13)	5.07 (4.30)				--	.16*	−.16*	−.05	−.07	−.15*	−.11	.06
5. Externalizing (13)	3.77 (3.86)					--	−.32***	−.26**	−.30***	−.21**	−.22**	−.03
6. GPA (13)	3.00 (0.72)						--	.69***	.59***	.44***	.44***	.07
7. GPA (15)	2.65 (1.15)							--	.76***	.57***	.55***	−.02
8. Ed. attainment (29)	6.82 (2.19)								--	.60***	.40***	.02
9. Parent ed. attainment	6.30 (2.19)									--	.66***	−.16*
10. Family income	43,600 (22,4000)										--	−.11
11. Gender	--											--

*$p < .05$.

**$p < .01$

***$p < .001$.

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Table 3

Predicting GPA (Age 15)

	β	Δ R^2	Total R^2
Step 1.			
Gender (1=M; 2=F)	.03		
Family Income	.06		
Parent Education Level	.24**		
		.362***	.362***
Step 2.			
GPA (13)	.51***		
		.251***	.613***
Step 3.			
Autonomy and Relatedness in Close Friendship (13)	.20***		
		.014*	.627***

Note.

* $p < .05$

** $p \leq .01$

*** $p \leq .001$.

β's are from final model.

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Table 4

Predicting Educational Attainment (Age 29)

	β	Δ R^2	Total R^2
Step 1.			
Gender (1=M; 2=F)	.12 *		
Family Income	−.03		
Parent Education Level	.43 ***		
		.376 ***	.376 ***
Step 2.			
GPA (13)	.32 ***		
		.114 ***	.490 ***
Step 3.			
Autonomy and Relatedness in Close Friendship (13)	.19 **		
		.027 **	.517 ***

Note.

* $p < .05$

** $p \leq .01$

*** $p \leq .001$.

β's are from final model.