

PROMOTING HIGH SCHOOL GRADUATION  
IN A PREDOMINANTLY LATINO/A COMMUNITY: FOUR-YEAR EFFECTS OF A  
PEER-LED HIGH SCHOOL PREVENTION PROGRAM

By

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## ABSTRACT OF THE DISSERTATION

Promoting high school graduation in a predominantly Latino/a community: Four-year effects of a peer-led high school prevention program

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Research has shown that school-based prevention programs can prevent substance misuse and promote graduation. Few studies have investigated high school-based programs, their long-term effects, and their intervening processes. Prosocial bonding to an entity outside of oneself has been theoretically (Finn, 1989; Hirschi, 1969) and empirically (McNeely & Falci, 2004) associated with positive behavioral outcomes for youth and rarely studied as a mediator of school-based prevention program effects. The current study examined the impact of Peer Group Connection (PGC) on students' marijuana use and high school graduation. This study also examined school belonging as a mediator and acculturation as a moderator of potential program effects. In 2005, 268 students (92% Latino) were randomized to the control ( $n = 175$ ) or program ( $n = 93$ ) condition. Trained upperclassmen delivered weekly forty-minute, manualized sessions to ninth grade

students. Latent growth curve analysis, using baseline, post-test, one-year follow-up, and two-year follow-up data showed an interaction. Specifically, the more acculturated PGC participants were more likely to graduate than similar controls (84.6% vs. 60.3%, respectively; Pseudo R-square = 9%). No evidence was found that school belonging mediated this effect. No intervention effect was observed for marijuana use. Thus, there is evidence that PGC benefited the Latino students who were most at risk for school dropout in this sample—those who were most acculturated.

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## **Introduction**

Bronfenbrenner's (1979) articulation of the ecology of human behavior describes the varying sources of contextual influence on human development. For example, adolescent problem behaviors (e.g., substance misuse and school dropout) are not merely a function of individual characteristics but also a function of characteristics of adolescents' family, peer, school, social/cultural and developmental contexts as well as the relationships between contexts. In the study of urban Latino/a youth, a contextual focus is important because Latino/a youth often encounter language barriers, experience low economic status, discrimination and other factors that contribute negatively to their well-being (Martinez & Cranston-Gingras, 1996; Martinez, Cranston-Gingras, & Velazquez, 2001). Of particular concern is that a) national statistics have shown that high school dropout rates are high among Latino/a youth (29%) relative to White youth (17%; Stillwell & Sable, 2013) and b) although Latino/a youth in high school tend to use substances at similar rates when compared to White youth, they are disproportionately involved in the negative consequences of substance use such as school failure, incarceration and poor health (Kandel, 1995; Pentz, 1995). Yet many Latino/a youth manage to graduate high school and refrain from substance use.

In developmental psychopathology, increasing importance has been placed on understanding the intersection of normality and pathology (Cicchetti, 2006). Within this perspective, the study of normative development informs understandings of pathology and, equally important, the study of pathology promotes the understanding of normative development. Studies along this line of research have revealed that one of the most consistent protective factors that help youth avoid negative outcomes in the face of

adverse conditions is their connection to a prosocial adult or peer (for a review, see Werner, 2005). Given that research has shown that the influence of peers on academic behaviors increases in adolescence (Masten, Juvonen & Spatzier, 2009), it is important to examine how peers' influence can be used to promote high school graduation.

High school completion and dropout are significant life events that alter individual trajectories in several important life domains. Individuals who do not have a high school diploma have limited economic opportunities and reduced wages relative to persons who have completed high school (Vernez, Krop, & Rydell, 1999); a high school dropout earns, on average, 65% of the median U.S. income (Vernez et al., 1999). Additionally, the less schooling persons have, the poorer their health (Freudenberg & Ruglis, 2007).

As with school dropout, early onset of substances use has been associated with negative outcomes (Kandel, 1995; Pentz, 1995). While some experimentation with drugs and alcohol is expected among youth (and may even be developmentally normative), there is also evidence to suggest that some adolescents progress to more harmful patterns of substance use (Johnston, O'Malley, Bachman, & Schulenberg, 2012). Researchers have yet to determine a reliable means for differentiating those who progress to harmful patterns from those who do not. Given that adolescent substance use is associated with greater risk for engaging in other high risk behaviors and experiencing negative consequences, substance use among adolescents is a major public health concern and universal substance use prevention programs are necessary to address this concern.

Research has also shown that as middle school students transition into high school, many of them experience declines in protective factors, which have been shown

to provide a buffer against drug abuse (e.g., school bonding; Barber & Olsen, 2004). These declines are often coupled with increases in risk factors, which can augment their likelihood of abusing drugs (Barber & Olsen, 2004; Benner & Graham, 2009). In particular, marijuana use has been shown to emerge relatively late in adolescence (Kosterman, Hawkins, Guo, Catalano, & Abbott, 2000), making it likely that high school-based interventions would have a greater potential to influence marijuana use trajectories, relative to trajectories for other substances that are initiated earlier in life (i.e., cigarettes and alcohol). It should be noted that difficulties related to the high school transition have typically been magnified for Latino/a youth relative to White youth (Brenner & Graham, 2009). Thus, it is likely that high school-aged Latino/a youth would benefit from participating in an efficacious prevention program aimed at addressing this critical period of transition.

Despite the demonstrated significance of the middle school to high school transitional period, there have been few efficacy studies of universal, school-based prevention programs specifically designed for ninth grade youth and even fewer studies have examined ninth grade prevention programs delivered to Latino/a samples (see Faggiano et al., 2008). Below is a review of the literature on the role of bonding to family, community and school in influencing problem behaviors, as well as interventions developed to prevent the two problem behaviors, substance use and high school dropout. More specifically, the potential for school belonging to mediate prevention program effects on marijuana trajectory group membership and high school graduation is discussed.

## **Review of Literature**

### **Belonging and Problem Behaviors**

Connection to an entity outside of one's self is considered an essential basic human need (Baumeister & Leary, 1995) and the significance of this experience is evidenced by a number of influential psychological theories highlighting its relevance for human development. Attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1973), for example, suggests that for normal social and emotional development to occur, infants need to experience at least one primary caretaker as consistently sensitive and responsive to their needs. Furthermore, in infancy, interactions with caretakers create internal working models for how social connections with others should work. Thus, the nature of attachment between children and caretakers in earlier life influences future relationships with friends and other important individuals encountered in later life. More specifically, strong bonds with caretakers generalize to strong relationships outside the home. Conversely, insecure relationships in the home can have unfavorable outcomes.

Following the work of Ainsworth and colleagues (1978), Connell (1990) proposes a Self-System Model of Motivational development wherein perceptions of relatedness, in addition to two other factors (perceptions of competence and autonomy), are important predictors of youth engagement in or disengagement from academic endeavors. Within this model, when teachers and adults in the school (or other individuals in the school) provide warmth and involvement, a sense of relatedness is communicated to youth. When youth feel valued in the academic context, it is anticipated that there will be a beneficial effect with regard to emotional and behavioral engagement and achievement. Youth may

persist when faced with an academic challenge, seek academic help as needed and enjoy tasks they are engaged in. When youths' sense of relatedness is undermined by negativity or hostility on the part of teachers, staff, or peers, youth may disengage from the academic endeavor by being absent or tardy, refusing to complete assignments and ultimately dropping out of school. Thus, promoting engagement via a sense of relatedness is particularly important for reducing problem behaviors.

In addition to considering initial connections with individuals (as does Attachment theory), Hirschi's social control theory (1969) considers connection to society and institutions at large such as the school. According to social control theory, connections to society are comprised of concern over what others think (attachment), deciding to conform one's behavior to what is deemed acceptable (commitment), and acceptance of the principles endorsed by social institutions (belief). When bonds are strong, individuals feel connected to family, school and community. When they are weak, problem behaviors, ranging from truancy, dropout, substance and antisocial behavior, are more likely to occur. Similarly, Finn's (1989) "identification-participation" model posits that in order for youth to be successful academically and engage in achievement-related behaviors, students must value school and feel a sense of belonging to the academic context.

There is empirical support for the relevance of connections to individuals and society in promoting positive behavior and curbing negative behavior. First, research has shown that closeness to teachers is related to better academic performance among kindergarten-aged students (Birch & Ladd, 1997). In middle school, student reported caring by the teacher has been related to motivation for academic performance (Wentzel,

1997). In adolescence, positive connections with teachers have been related to reduced tendency for dropout, grade retention, suspension (Catalano, Haggerty, Oesterle, Fleming, & Hawkins, 2004; Klem & Connell, 2004) and drug use (McNeely & Falci, 2004). Second, connections with peers have been shown to play a similarly important role. Social support from prosocial peers has been positively associated with school engagement (Garcia-Reid, Reid, & Peterson, 2005); whereas, rejection has been associated with less interest in school and a greater tendency to dropout (Osterman, 2000). Lastly, connection to the broader school environment (which may include relationship to teachers, but generally refers to “people” in the school) has also been predictive of positive behavioral outcomes. Goodenow found that adolescents who felt positively about school had higher levels of academic motivation, higher grades and fewer absences (Goodenow, 1993a, 1993b). Controlling for prior achievement, Roeser, Midgley and Urdan (1996) found that school belonging had positive effects on year-end grades. Additionally, bonding (to the family, school and/or community) has been shown to be an important protective factor against substance abuse and school dropout (Hawkins, Guo, Hill, Battin-Pearson, & Abbott, 2001).

Of concern is that longitudinal observations of school bonding have found that bonding decreases over time. Hawkins et al. (2001) found that from ages 13 to 18 school bonding decreased. This decrease in belonging may place youth in this age range at risk for the development of problem behaviors. One major development during this time frame is the transition to high school. Weiss and Bearman (2007) have found that from eighth grade to ninth grade, students’ grades decreased, while substance use increased. Neild (2009) notes that the ninth grade is difficult for youth for several reasons a) it is an

important developmental period characterized by adjustments to reduced parental supervision and more peer influence, b) students break bonds with middle-school teachers and friends and must create new bonds, c) many students are not well prepared for high school, and d) many schools are not well organized to meet the needs of ninth grade students. Thus, there is a need for interventions that can address the challenges associated with the high school transition.

### **Drug Use, Dropout and Belonging: The Role of Acculturation and Gender**

Research has shown that involvement in U. S. culture (i.e., acculturation) may serve as both a risk and a protective factor for Latino/a youth problems. Among Latino/a youth, research has shown that greater participation in U. S. culture is related to greater levels of substance use (Epstein, Botvin, & Diaz, 2000, 2001; Harrison & Kennedy, 1994; Zayas, Rojas, & Malgady, 1998). Some research has suggested that this is because along with other American values, acculturating youth begin to adopt pro-drug beliefs (Castro et al., 2009). In contrast, research has shown that greater acculturation is *positively* associated with high school completion (Martinez, DeGarmo, & Eddy, 2004), perhaps due to the acquisition of an understanding of norms and expectations in the U.S. educational system.

Although research on the moderating role of acculturation on prevention program effects is limited, at least one study has found that level of acculturation (linguistic acculturation, in particular) moderated intervention effects. Specifically, Marsiglia, Kulis, Wagstaff, Elek, and Dran (2005) examined a sample of 2,146 seventh grade Mexican and Mexican-American youth in Phoenix, Arizona who had participated in the larger study of the keeping' it REAL intervention. Fourteen months after the baseline assessment, the

researchers found that those youth in the program group who were “English dominant” in their communication had lower levels of substance use relative to “English dominant” youth in the control group. Additionally, youth in the program and control groups who were “Spanish dominant” or “bilingual” did not significantly differ with regard to their substance use.

As with acculturation, gender may serve as both a risk factor and a protective factor for problem behaviors. Recent national data have shown that high school girls use some substances (e.g., marijuana or other illicit substances) at similar or only slightly higher rates as compared to boys’ use and it is not clear why this pattern has emerged (Centers for Disease Control and Prevention [CDC], 2008; Johnston et al., 2012). Additionally, studies have also shown that Latinas are *more likely* to finish high school than Latinos (National Center for Education Statistics [NCES], 2010; Wojtkiewicz & Donato, 1995). Research on the moderating role of gender in Latino/a youth problem prevention is sparse. However, in a recent study, Johnson, Simon, and Mun (in press) found that a school-based universal, peer-led prevention program implemented among 268 high school ninth grade students prevented high school dropout among Latinos, but not among Latinas.

School belonging has been shown to function similarly among minorities and Latino/a youth, relative to White youth (Goodenow & Grady, 1993; Sánchez, Colón, & Esparza, 2005; Tucker et al., 2002). In addition, perceiving support in the environment has been shown to buffer the negative effects of the at-risk environments that urban Latino/a youth are likely to be exposed to (Garcia-Reid et al., 2005). Gonzalez and Padilla (1997) found that, among Latino/a high school students, school belonging was the



only significant predictor of academic performance even when important variables such as supportive academic environment and cultural loyalty were included in the model. In Goodenow and Grady's study (1993) of Black, White and Latino/a seventh to ninth students, sense of school belonging was more strongly related to Latino/a students' intrinsic values, expectancies for success and academic effort relative to students of other racial backgrounds. The authors theorized that the relationship between sense of school belonging and Latino/a youth's academic outcomes was stronger because of their communal values, which contrast with individualistic or competition values of U.S. culture. Research has also shown that girls have a greater sense of school belonging relative to boys (Goodenow & Grady, 1993).

In sum, several psychological theories and empirical investigations suggest that connection to prosocial individuals in one's environment is an important predictor of youth not engaging in substance use and remaining in high school (Ainsworth et al., 1978; Bowlby, 1969/1973; Catalano et al., 2004; Conell, 1990; Hirschi, 1969; McNeely & Falci, 2004). Additionally, studies have shown that culture and gender are important predictors of school belonging, high dropout and substance use (CDC, 2008; Epstein et al., 2001; Johnston et al., 2012). There is some preliminary evidence to suggest that linguistic acculturation, in particular, can moderate program effects. Lastly, there is longitudinal evidence to suggest that for many students, connection to the school declines after the transition to high school (Hawkins et al., 2001). Given the importance of school belonging in promoting positive behavior, interventions to prevent declines in high school belonging may prevent later problem behaviors such as marijuana use and high school dropout.

## Substance Use Prevention Programs

Most substance use interventions have been guided by a risk and protective factor framework, which emphasizes reducing psychosocial risk factors while increasing protective factors (Hawkins, Catalano & Miller, 1992). Using this approach, many studies have shown significant positive influences on substance use (Botvin, Griffin, Diaz, & Ifill-Williams, 2001; Donaldson, Graham, & Hansen, 1994; Komro, Perry, Williams, Stigler et al., 2001; Liu, Flay, & Aban Aya Investigators 2009; MacKinnon, Johnson, Pentz, & Dwyer, 1991; McNeal, Hansen, Harrington, & Giles 2004; Orlando, Ellickson, McCaffrey & Longshore, 2005). The key question in substance use prevention is no longer whether preventative interventions work, but rather, why they work (La Greaca, Silverman, & Lochman, 2009).

MacKinnon and Dwyer (1993) identified four reasons for studying the mediating processes of prevention programs: a) mediation analysis provides a “manipulation check” to ensure that the intervention altered the constructs it was theorized to change, b) mediation analysis can reveal which program components need to be altered, c) program effects on mediators but not on the outcome may suggest that effects on the outcome can emerge later, and d) mediation analysis using statistics provides evidence that prevention program effects are mediated by a specific variable. To date, to my best knowledge, there have been seven studies that examined the mediators of *middle school-based* universal prevention program effects on alcohol or marijuana use and were delivered to youth living in the U.S. (Botvin et al., 2001; Donaldson et al., 1994; Komro et al., 2001; Liu et al. 2009; MacKinnon et al., 1991; McNeal et al., 2004; Orlando et al., 2005). Based on the existing studies of the mediation effects of prevention programs, there is

some evidence to suggest that beliefs about substance use, either in the form of normative estimates or expectancies of use, are important mediators of prevention programs (Komro et al., 2001; Orlando et al., 2005), as are friends' reactions to drug use (MacKinnon et al. 1991). Given the current study's focus on school bonding and marijuana use, the studies examining school bonding as a potential mediator of intervention effects and studies examining mediators of intervention effects on marijuana use are reviewed below.

Using a sample of 1,822 mostly White students (69%) from 14 middle schools in Lexington and Louisville, Kentucky, McNeal and colleagues (2004) conducted a study of the *All Stars* program. The *All Stars* intervention administered a classroom-based curriculum aimed at preventing the erosion of four known predictors of substance use: normative beliefs against substance use, perceived incongruence between drug use and one's desired lifestyle, commitment (intentionality) to avoid drug use, and school bonding. The students were assessed at the beginning of the fall marking period and again at the end of the school year. Hierarchical linear modeling techniques were used to analyze the data. They found that normative beliefs about drug use significantly mediated program effects on marijuana use. Participation in the program did not significantly impact school bonding, although there was a trend toward significance. One of the assumptions of mediation analyses is that the mediator temporally precedes the outcome variable in a causal chain of events. Thus, a limitation of this study and many other mediation studies (Komro et al., 2001; MacKinnon et al., 1991; Orlando et al., 2005) is that they only used two waves of data and assessed the mediator at the same time as the outcome variable.

In another evaluation of a school-based prevention program, the *Adolescent Alcohol Prevention Trial*, Donaldson et al. (1994) followed a group of 3,077 fifth graders from 124 schools in California. The majority of the participants were White (57%), although a large percentage of the participants were Hispanic (27%). This study looked at the effects of implementing programs in fifth grade and booster sessions in seventh grade on eighth grade substance use. They examined three waves of data, including a baseline assessment, a process questionnaire in seventh grade and an eighth grade post test assessment, using multiple group path analysis. They evaluated separate components of the intervention, a resistance training component and a normative education component, to test their theory of intervention. Among other findings, in the resistance training component, they did not observe a significant indirect effect of resistance skills on marijuana use. In the normative education component, they did, however, find that “estimates of prevalence of offers to use” mediated intervention effects on marijuana use for those who participated in that component. One strong point of this study was that in order to test the generalizability of their findings, Donaldson and colleagues also tested their mediational model among a subsample of Latino/as in their study. Although their initial model found that the relationship between resistance training and resistance skills was significant, this relationship was not significant for Latino youth. That is, the program did not result in increased resistance skills among Latino youth. All other previously found relationships were significant for Latino/a youth. This study suggested that the mediational relationships between program effects and substance use outcomes may be similar for Latino/a youth and other youth in the United States, but there may also be a few effects that do not generalize to Latino/a youth.

In sum, among the seven mediation studies found, only one examined school bonding as a potential mediator (McNeal et al., 2004). Moreover, only two studies identified mediators of marijuana use (Donaldson et al., 1994; McNeal et al., 2004). What is clear is that not much is known about the mediators of the effects of school-based prevention programs on marijuana use. Nor is much known about the role of school belonging in contributing to program effects on substance use.

### **School Dropout Prevention Programs**

While there has been much research on the factors that are related to school dropout, few studies exist that examined the effectiveness of school dropout prevention programs (Prevatt & Kelly, 2003). At present, dropout prevention programs come in several forms. Because school systems are charged with educating and graduating youth, some of the interventions have sought to change the structure of schools. For example, *Career Academies* creates small learning communities and adds vocational courses/work-based learning initiatives (Kemple & Snipes, 2000). *Talent Development High Schools* targets the organizational/management aspects of the school, promotes innovation in the school curriculum, promotes professional development, and parent/community involvement (Jordan, McPartland, Legters & Blfanz, 2000). While both of these interventions have had a desirable impact on retention rates, there has not been peer-reviewed evidence demonstrating an effect on graduation rates.

One of the most rigorously evaluated school dropout prevention interventions is the Chicago Child-Parent Center (CPC) intervention (Ou & Reynolds, 2010; Reynolds, Temple, Ou, Arteaga & White, 2011). The CPC program is a government funded program aimed at providing educational services to families with children between the

ages of three and nine (preschool to third grade). The program places emphasis on language and math skills for the children and provides support services as needed to parents. There have been several long term evaluations of the program. At age 28, participation in the program was related to higher educational attainment, income, SES and insurance coverage, lower rates of juvenile justice involvement and substance abuse. Results also showed that males were more likely to benefit from the intervention, as were the children of persons who had dropped out of high school (Reynolds et al., 2011). Ou and Reynolds (2010) investigated the mediators of this early intervention on educational attainment and found that increased cognitive advantage, family support and motivation advantage mediated the intervention's effects on educational attainment. The effects of cognitive advantage and motivation advantage were greater for males relative to females. Consistent with previous research on relatedness for girls, the effects of increased family support were greater for girls. The results from the CPC intervention provide evidence that early childhood interventions focusing on academic skills have the potential to influence educational attainment. While the CPC intervention provides a solid foundation for preventing dropout, the dropout prevention literature is still very limited. More specifically, there is a need for empirically supported dropout prevention programs.

Several evaluation studies of interventions for high school students have not demonstrated a significant effect on preventing dropout (Catterall, 1987; Iver, 2011; Reyes & Jason, 1991; Slicker & Palmer, 1993). However, the *Check & Connect* program for ninth grade students has shown beneficial effects. The *Check & Connect* program (Evelo, Sinclair, Hurley, Christenson, & Thurlow, 1996) targeted student engagement, attendance and participation. Students were assigned to a mentor based at the school who

worked to promote effective problem solving. The program staff engaged in monitoring of student indicators of engagement, individualized intervention, relationship building, assistance with persistence, followed students from school to school and promoted affiliation to school. In a study by Sinclair, Christenson, and Thurlow (2005), *Check & Connect* was implemented among ninth grade youth with emotional or behavioral disabilities. Participants were mostly African American and male. Results showed lower rates of dropout and higher levels of attendance for those who participated in the program relative to those who had not.

In a review, Prevatt and Kelly (2003) noted that the existing research is challenged by major issues with design, sampling, statistical analysis and implementation. In 2008, Bradshaw, O'Brennan and McNeely noted that since Prevatt and Kelly's initial review, the existing literature on dropout prevention still leaves much to be desired. Given the difficulties in recruiting participants or randomizing students within the school system, many researchers continue to report on interventions that did not use random assignment (Gonzales, Dumka, Deardrof, Carter, & McCray, 2004; Gottfredson, Jones, & Gore, 2004). Additionally, many interventions have reported null findings (Catterall, 1987; Iver, 2011; Reyes & Jason, 1991; Slicker & Palmer, 1993; Vitaro, Brendgen, & Tremblay, 1999). Nevertheless, there are a few notable exceptions (Reynolds, et al., 2011; Sinclair et al., 2005). The fact that only one study examined the mediating processes of dropout prevention programs suggests more research is necessary. The mediating role for belonging in dropout prevention should be examined.

### **Peer Group Connection**

The present study examined a prevention program that was aimed at promoting high school graduation and prevention substance use, Peer Group Connection (PGC). The PGC is a high school-based peer leadership program focused on reducing risk factors and promoting protective factors (Powell, 1993). The program's approach to influencing risk and protective factors was theoretically based and relied heavily on the social development model (Hawkins & Weis, 1985; Catalano, Kosterman, Hawkins, Newcomb, & Abbott, 1996). The social development model integrates (a) control theory (Briar & Piliavin, 1965; Hindelang, 1973; Hirschi, 1969; Kornhauser, 1978; Nye, 1958; Reiss, 1951); (b) social learning theory (Akers, 1977; Akers, Krohn, Lance-Kaduce, & Radosevich, 1979; Bandura, 1973, 1977; Burgess & Akers, 1966; Conger, 1976, 1980); and (c) differential association theory (Cressey, 1953; Matsueda, 1982, 1988; Matza, 1969). The social development model proposes that for positive socialization to occur youth should 1) have the opportunity to participate in activities that promote conforming to prosocial norms, 2) develop requisite skills for involvement, and 3) receive consistent rewards for the desired behavior from their socializing agents (e.g., family, peers, school, community or society at large). Furthermore, the model posits that the positive socialization process should contribute to the development of bonding to the social unit, commitment to the conforming behavior and belief in the conventional order. The model proposes that social bonds prevent delinquent behavior, potentially by inhibiting association with delinquent peers.

In line with the social development model, first-year high school students in ninth grade who participated in PGC attended weekly PGC group sessions, led by older peers, who received instruction during the academic year for four days a week on how to



implement the program curriculum and serve as agents of positive socialization. In PGC sessions, the peer leaders modeled pro-social attitudes and behaviors. Additionally, PGC's activity-based curriculum provided opportunities for ninth grade students to practice the modeled behaviors and receive group feedback (thus shaping and providing positive reinforcement of pro-social attitudes and behaviors). Specifically, the curriculum emphasized practicing important developmental skills (e.g., social skills, decision making, and resistance skills) and the development of realistic expectations of drug use. As part of skill development, students learned to communicate, resolve conflict, identify when they are being faced with peer pressure, and use strategies to resist offers to use drugs. It was expected that these learned strategies, in the face of real-life situations, would culminate in the low likelihood of using drugs by decreasing positive beliefs about alcohol and marijuana use, increasing bonding to school, increasing disapproval of peer substance use, and increasing personal and social competence among the freshmen. Research has shown that the program has effects on skill development and disapproval of peer substance use (Johnson, Holt, Bry, & Powell, 2008).

Preliminary investigations have shown that PGC is a promising intervention for Latino/a high school students. In one study, Johnson, Mun, and Pandina (2008) found that at the one-year follow-up, participation in the program was related to abstaining from substance use; and that program students who experienced an improved general sense of competency were more likely to have abstained from alcohol use than were students in the control group. This study, however, did not examine additional potential mediators, and the effects of the intervention were not examined beyond one year. In sum, research is needed to determine if there are additional mediators of program effects (i.e., sense

school of belonging) and to investigate whether these program effects persist two years after the intervention.

### **The Current Study**

The current study had three primary goals. First, the study examined whether the Peer Group Connection (PGC) benefits students in the long term with regard to marijuana use (two years after implementation) and school graduation (three years after implementation). Second, the current study examined whether sense of school belonging mediated PGC's effects on marijuana trajectory membership and high school graduation. Third, the current study examined whether linguistic acculturation interacted with the program group to predict program effects on marijuana use and high school graduation.

Semi-parametric group-based modeling (SGM; Nagin, 2005) was used to identify marijuana trajectory groups because previous studies have shown that for adolescent marijuana use, diverse patterns of behavior may exist within one population (Brook, Zhang, & Brook, 2011). In the main analysis, the use of marijuana trajectory group membership as the outcome variable made it possible to capture different patterns of marijuana use with one variable.

Once the marijuana trajectory groups had been identified, Latent Growth Curve Modeling (LGCM; see Muthén, & Muthén, 2010 for more information) was used to examine whether school bonding mediated program effects on marijuana trajectory group membership and school graduation. The LGCM approach is appropriate for this research because LGCM a) allows examination of inter-individual differences (i.e., program vs. control students in the present study) in change over time, b) allows investigation of the predictors of change (i.e., acculturation and gender ), as well as the outcomes of change

parameters, c) provides group level statistics such as mean growth rate and mean intercept, d) tests hypotheses about specific trajectories, and e) allows data to be modeled using time-varying or time-invariant covariates (Preacher, Wichman, MacCallum, & Briggs, 2008).

It was expected that participation in PGC would be significantly related to higher graduation rates and membership in a marijuana trajectory group associated with lower levels of use (see Figure 1). It was also expected that the program, by using peers to model and deliver an activity-based curriculum that facilitates the practice of important life skills and the discussion of prosocial attitudes and behaviors, would contribute to greater increases in bonding to school (i.e., slopes) for participants in the program group relative to participants in the control group. Additionally, it was expected that students with greater increases in school belonging, would in turn have a higher likelihood of graduation and belong to marijuana use trajectory groups that reflect lower likelihoods of marijuana use. In this way, growth in school belonging was hypothesized to mediate the hypothesized program effects on the likelihood of graduation and marijuana trajectory group membership. A moderation effect was also anticipated. The analyses also included gender and linguistic acculturation as covariates to account for gender and differences in level of acculturation. It was expected that acculturation would interact with intervention condition such that Latino youth who are more acculturated would experience a stronger beneficial intervention effect for marijuana trajectory group membership and high school graduation. The expected associations between the covariates and other variables of interest are shown in Figure 1. It was also expected that the initial levels of school

belonging would be negatively related to marijuana trajectory group membership and positively related to high school graduation.

## **Method**

### **Participants**

Data for this study came from the National Institute on Drug Abuse (NIDA)-funded prevention study of PGC through the Rutgers Transdisciplinary Prevention Research Center (TPRC). Participants of this prevention study were 269 ninth grade students (133 girls) from a low-income urban high school in New Jersey. Two hundred sixty-nine students were randomly assigned to either prevention or control groups. Ninety-four students were assigned to participate in the prevention program. One of these students was home-schooled and therefore did not participate in the assigned condition. The 175 students in the control condition followed the normal school schedule. The majority of the participants were Latino/a (92%)<sup>1</sup>. Only 6% of the participants were part of an “other” category and 2% were African American. The participants completed assessments before program implementation at the beginning of ninth grade in September of 2005, after program implementation at the end of ninth grade in May of 2006 ( $n = 252$ ), one year after the end of program implementation in May of 2007 ( $n = 199$ ), and two years after the end of program implementation in May of 2008 ( $n = 167$ ; see Figure 2).

### **Design and Procedures**

**Overview.** The research protocol was approved by the high school and by the university Institutional Review Board for research involving human subjects. The participants were provided with both English and Spanish versions of the questionnaire. A passive parental consent procedure was used whereby letters were mailed to parents

stating that they should sign and mail a letter if they did not want their child to participate in the survey administration. No parent/guardian objected to their child's participation. Students were told they could discontinue their participation at any time. Students were told not to write their name on the survey and questionnaires were labeled only with an identification number. To minimize the spillover of program benefits to students in the control group, the study participants in the program group were randomized into one of three "small learning communities" (SLCs) within the high school, and students in the control group were assigned to the other two SLCs. Spillover effects in school were minimized because students within each SLC had the same group of teachers and only had classes with students in their SLC. Of course, this design did not control for possible spillover effects in the community.

**Peer Group Connection (PGC) procedures.** The program implementation structure consisted of a three-person faculty team that trained 14 peer leaders (juniors and seniors), who then delivered the program curriculum to seven groups of 12-14 ninth grade students. From September to May, peer leaders met with their groups once a week for approximately 40 minutes. These meetings occurred during one of the scheduled physical education classes. The weekly topics included: team building, stress and anger management, risk assessment, conflicts in relationships, normative beliefs about drug and alcohol use, refusal skills, decision making, and communication skills. Cross-cutting themes included problem-solving (the students' real life experiences were brought into the PGC session and the group discussed multiple approaches to solving a particular problems), goal setting, and communication. In addition to the weekly sessions, peer leaders coordinated a number of social events for their students to develop their social

skills and positive peer relationships. Another important component involved family night, wherein the students and parents discussed skills taught by the curriculum and participated in discussions about issues important to the transition to high school. The groups participated in an end-of-the-year ritual to discuss changes and developments over the year. Lastly, three peer-led booster sessions were conducted when the students were in 10<sup>th</sup> grade.

**Advisor selection and training.** Three faculty members volunteered to run the program as PGC advisors to the peer leaders. One of these faculty members also served as the PGC coordinator. These faculty members attended a four day training led by the Princeton Center for Leadership Training. During training, the faculty members practiced and experienced the activities that are part of the PGC curriculum. In addition to the four day conference, the coordinator and advisors participated in two additional one-day workshops.

**Peer leader selection and training.** PGC advisors selected an equal number of male and female students as peer leaders through an application process that recruited students at the end of their 10<sup>th</sup> or 11<sup>th</sup> grade year. The students selected demonstrated that they were responsible and caring individuals and were able to serve as role models for other students. Peer leaders were trained by faculty to lead the first-year group sessions. After attending a three-day skill-building/training retreat at the end of the summer before senior year, peer leaders were matched with a partner. Male/female pairs were chosen, with at least one bilingual peer leader.

During the school year, peer leaders enrolled in a year-long, high school class for academic course credit. In the classroom, they learned to examine their attitudes and

values about the topics discussed by the curriculum. They attended this course for five days a week. The peer leaders prepared to deliver the intervention (group sessions for first-year students) for three days during the week, led a group session on one day of the week, and evaluated their group session as part of their fifth day of class. Peer leaders attended an additional retreat (lasting two days) in the middle of winter to build on their current skills and to discuss successes and challenges they faced. During the winter, they also attended a conference sponsored by the Princeton Center for Leadership Training.

**Implementation fidelity.** To determine the degree to which the program was implemented with fidelity, trained research staff members observed and rated the teachers as they trained the peer leaders and observed the peer leaders as they delivered the curriculum to the first-year students. The trained observers used the Peer Leader Effectiveness scale to rate the group sessions. Items on this scale examined adherence to the program curriculum (sample item: “are peer leaders following the lessons as written?”) and quality of implementation (how well did program leaders implement skills). Adherence was determined by ratings from trained observers regarding organizational elements (such as having the necessary materials on hand) and quality of program was rated by trained observers of facilitation skill of peer leaders (e.g., use of active listening and open-ended questions). Using this scale, 89% of the peer leaders were rated as satisfactory or above, suggesting that fidelity was maintained. Dosage received was based on attendance data collected at each group session. Program participants attended an average of 18 out of the 34 group sessions ( $SD = 5$ ).

## **Measures**



**Demographics.** Participants indicated their age, gender, and race/ethnicity on the survey. Participants indicated their age in years. Gender was coded such that 0 = *male* and 1 = *female*. Race/ethnicity was coded such that 1 = *African American/Black*, 2 = *Caucasian/White*, 3 = *Latino/Hispanic*, 4 = *Asian American*, and 5 = *Other*. Group assignment was indicated such that 0 = *control group* and 1 = *program group*.

**Marijuana use.** At Time 1, students were asked how likely they were to try marijuana that year. Possible responses included *already tried*, *not likely*, *somewhat likely* and *very likely*. The later three responses were combined in subsequent analyses and represented those who had not used marijuana. At subsequent time points, one item asked the participants how many times they had used marijuana in the past year. Possible responses included, *never*, *1–2*, *3–5*, *6–9*, *10–19*, *20–39*, *40 or more times* (Pandina, Labouvie, & White, 1984). Marijuana use at Times 2–4 was dichotomized such that 0 = *no use* and 1 = *any use* so that the Time 1 scoring of marijuana would be the same as the scoring at Times 2–4. Examination of the stability of the marijuana use measures over years showed that, in the control group, the correlation coefficients for marijuana use, measured from Time 1 to Time 4, ranged from .28 to .69. In the intervention condition, marijuana use at Time 1 was not significantly correlated with use at the other time points, but the use at Times 2, 3, and 4 were significantly correlated with one another (correlations ranged from .27 to .48).

**High school graduation.** High school graduation information was obtained from official school records at the end of four years. High school graduation was coded such that 0 = *did not graduate from that school* and 1 = *graduated from that school*. The

school records did not indicate if students had graduated from other schools. This was equally true for both the program and control groups.

**Sense of school belonging.** A modified version of the Psychological Sense of School Membership Scale (Goodenow, 1993b) was used to assess sense of school belonging. This 13-item scale asked students about the extent to which they felt included, respected and encouraged at school. Sample items include: “Most teachers at this school are interested in me” and “I feel like a real part of this school.” Responses ranged from 1 = *not at all true* to 5 = *completely true* (see the Appendix for items). Examination of the stability of this measure showed that, in the control group, the correlations coefficients for sense of school belonging, measured from Time 1 to Time 4, ranged from .29 to .58. In the intervention condition, the correlations coefficients for sense of school belonging measured from Time 1 to Time 4 ranged from .30 to .55. In the control group, Cronbach’s alphas ranged from .77 to .82. In the program group, Cronbach’s alphas ranged from .75 to .80.

**Linguistic acculturation.** Although acculturation is a very complex concept that includes more than language, linguistic acculturation has been shown to be a good proxy for more sophisticated measures of acculturation by accounting for up to 65% of the variance in degree of acculturation (Rogler, Cortes, & Malgady, 1991; Samaniego, & Gonzales, 1999). A modified version of the linguistic acculturation subscale of the General Ethnicity Questionnaire (Tsai, Ying, & Lee, 1998) was used to measure linguistic acculturation. Three items asked about the languages spoken in different contexts (e.g., “How much do you speak another language, besides English, at home?”).

These items were rated using a five point-point scale (1= *never* to 5 = *always*; see the Appendix for items;  $\alpha = .87$ ).

### **Data Analytic Approach**

**Preliminary analysis.** Missing values and their pattern of missingness were examined. For categorical outcomes, the Mplus program (Muthén & Muthén, 2010) uses the weighted least squares (WLSMV) estimator, for which a pair-wise deletion approach to missing data is invoked. Simulations have shown that this approach is better than a list-wise deletion (Asparouhov & Muthén, 2010). Baseline equivalence across the program and control groups was examined by comparing the means of the variables of interest at baseline using *t*-tests.

**Data analysis.** As noted before, data were analyzed using SGM and LGCM, a special form of structural equation modeling, using SAS (Version 9.2; SAS Institute, 2008) and Mplus (Version 6.0; Muthén & Muthén, 2010), respectively. SGM was conducted using the Proc Traj SAS macro (Jones, Nagin, & Roeder, 2007). The goal of the SGM was to identify trajectory groups for marijuana use. The maximum number and shape of trajectory groups for marijuana use was determined by comparing model fits. These groups were then used as the outcome variable in LGCM analysis using Mplus.

After the marijuana trajectory groups were identified, the longitudinal mediation analysis proceeded in several steps, following the guidelines provided by MacKinnon (2008). To test whether school belonging was an intervening mechanism through which the intervention exerts an impact on marijuana trajectory group membership and high school graduation, one combined model was tested examining the two outcomes simultaneously. In this model, intervention assignment was a dichotomous covariate,

school belonging was the mediator and marijuana trajectory group and high school graduation were the outcome variables (see Figure 1). The mediated effect was determined by the product of the coefficients of paths from the intervention to the mediator and from the mediator to substance use or high school graduation. Gender and linguistic acculturation were included in all analyses as covariates.

**Model fit.** To evaluate fit of several candidate models in SGM, the Bayesian Information Criterion (BIC) was used. BIC values closer to zero for this goodness of fit measure indicate better fit (Nagin, 2005). Additionally, the size of trajectory groups and standard errors were examined for extreme values as recommended by Nagin. For the LGCM, model fit was determined by examining five indices. The first was the model chi-square ( $\chi^2$ ). A nonsignificant model chi-square ( $p < .05$ ) is usually indicative of good fit. However, the chi-square value is sensitive to sample size and thus, in large samples a significant chi-square may not necessarily indicate poor fit. Thus, the ratio of the model chi-square to degrees of freedom ( $\chi^2/df$ ) was utilized. Models with a ratio less than 3 were deemed adequate. The indicators of goodness of fit were Bentler's comparative fit index (CFI; Bentler, 1988) and the Tucker-Lewis index (TLI; Bentler & Bonett, 1980). CFI and TLI values of .95 or greater indicate good fit (Hu & Bentler, 1999). Lastly, a root mean square error of approximation (RMSEA; Browne & Cudeck, 1993) of less than or equal to .05 indicate good model fit (Browne & Cudeck, 1993). The Wald test statistic, AIC and BIC values were additionally used to compare model fit, where appropriate.

## Results

### Preliminary Analysis

Means and standard deviations for the variables of interest are presented in Table 1. The data were generally multivariate normal. In the total sample, skewness ranged from -.78 (school bonding at Time 1) to -.10 (linguistic acculturation) and kurtosis ranged from -.77 (linguistic acculturation) to 1.48 (school bonding at Time 1). In the program group, skewness ranged from -.74 (sense of school belonging at Time 4) to -.01 (linguistic acculturation) and kurtosis ranged from -.80 (linguistic acculturation) to -.23 (sense of school belonging at Time 4). In the control group, skewness ranged from -.101 (sense of school belonging at Time 1) to -.14 (linguistic acculturation) and kurtosis ranged from -.74 (linguistic acculturation) to 1.99 (sense of school belonging at Time 1).

Examination of Mahalanobis distance scores indicated that there were five multivariate outliers,  $\chi^2(7) > 14.07, p < .05$ . Two of these participants were from the program group and three were from the control group. These five participants represented girls who had relatively high levels of school bonding, did not use marijuana and did not graduate. The two outliers in the program who did not graduate had low levels of acculturation (raw scale score  $< 3$ )<sup>2</sup>. In contrast, the three outliers in the control group who did not graduate had relatively high levels of acculturation (raw score  $> 5$ ). Given that the results followed the same general pattern when these girls were excluded from the analysis, they were retained in the analysis.

As shown in Table 1,  $t$  tests and  $\chi^2$  tests indicated that there was no significant difference between participants in the program group and control group on baseline characteristics (linguistic acculturation, sense of school belonging at Time 1, gender and

marijuana use at Time 1). In addition, there was no significant mean difference between program and control groups in sense of school belonging at each assessment from Time 2 to Time 4 and marijuana use at each assessment from Time 2 to Time 4. Correlations among the study variables are shown in Table 2. None of the variables of interest were significantly correlated with intervention condition.

### **Missing Data**

Sixty-two percent of the cases had complete data and overall, 8% of the observations studied in here were missing. Seven missing value patterns emerged. Three of these patterns represented 94% of the cases: Participants who had complete responses ( $n = 165$ ); participants with missing data for Time 3 and Time 4 assessments only ( $n = 56$ ); and participants with missing data for the Time 4 assessment only ( $n = 31$ ).

Attrition for this study is shown in Figure 2. Participants who had missing data at Time 3 ( $M = 3.32$ ;  $SD = .52$ ) had a lower level of sense of school belonging at Time 2 than those who participated in the Time 3 data collection ( $M = 3.65$ ;  $SD = .48$ ;  $t(83.6) = 4.3$ ,  $p < .05$ ). Similarly, participants with missing data at Time 4 ( $M = 3.44$ ;  $SD = .55$ ) had a lower level of sense of school belonging at Time 2 than those without missing data at time 4 ( $M = 3.65$ ,  $SD = .47$ ;  $t(153) = 3$ ,  $p < .05$ ). At Time 4, the odds of having missing data were greater for boys (44% cases missing) than girls (32% cases missing;  $OR = 1.68$ ,  $p < .05$ ). Overall, participants with missing data tended to be boys and have lower levels of school belonging.

Understanding the nature of missingness in the data helps to determine the extent to which inference may be biased (Schafer & Graham, 2002). Missing data can either be described as missing at random (MAR; missingness depends on observed data but not

missing data) or missing completely at random (MCAR; missingness does not depend on observed data or missing data). In longitudinal data analysis, especially when variables associated with missingness are included in a model, the MAR assumption is generally reasonable, and any resulting inference bias may be ignorable (Graham, 2009; Graham, Palen, Smith, & Caldwell, 2008).

### **Marijuana Trajectory Analysis**

The marijuana outcome for the analysis was obtained from semi-parametric group based modeling. First the number of trajectory groups was examined and second how well linear, quadratic, and cubic patterns of change fit the trajectory groups was examined. Additional polynomial terms were not examined because there were only four time points analyzed and because additional polynomial terms were deemed conceptually unreasonable. Because marijuana use across the four time points was coded as a binary outcome (0 = *no use*, 1 = *use*), Proc Traj's logit model was used and the outcome variable is shown in log odds in Figure 3. Results from model fitting are shown in Table 3. A baseline model (Model 1), hypothesizing a one-group model, was fit first. This model was specified with a quadratic trend based on preliminary examination of the data. Results showed that the BIC values moved closer to zero when a two-group model (Model 2) was compared to the baseline model (Model 1). Additionally, the BIC values moved further from zero (relative to Model 2) when a three-group model was tested (Model 3), suggesting that Model 2 fit the data better.

In the next step, nonsignificant parameter estimates were removed from Model 2. Results indicated that there was indeed one group for which the odds of using marijuana was very low and steady over time (Group 1: Low likelihood of marijuana use; see

Figure 3). The second group's odds of marijuana use increased then decreased over time (Group 2: Marijuana users), this pattern was indicated by a significant quadratic trend. Table 3 shows the parameter estimates for Model 2. Table 3 also shows the number of participants in each trajectory group for Model 2. An overwhelming majority of the participants were in the low likelihood of marijuana use trajectory group (Group 1). In the marijuana users group, all students had used marijuana at least once over the course of the study. In the low likelihood of use group, 88% of the cases had not used marijuana at all over the course of the study. The average posterior probability estimates of those in the most likely group were high (.97 for Group 1 and .84 for Group 2), providing further support for the selected model. Almost twice as many students in the control group (17%) relative to the program group (9%) belonged to the Marijuana Users.

### **Growth Model of Sense of School Belonging**

Prior to testing the study hypotheses, analyses first determined the shape of the growth model for sense of school belonging across the four time points for the program and control groups together. In the first unconditional, linear growth model (Model 1) tested, the intercept of the linear growth model was specified by setting the factor loadings to be 1. The linear slope was specified by setting the factor loadings of sense of school belonging across four time points at 0, 0.8, 2, and 3.2. As such, one month in time was represented by 0.1. This initial measurement model did not fit the data well (AIC = 1097.57, BIC = 1129.89,  $\chi^2 = 24.88$ ,  $df = 5$ , RMSEA = .12, CFI = .91, TLI = .89). Therefore, a quadratic term was added in the next model tested (Model 2). The loadings for the quadratic growth term were set at 0, 0.64, 4.0, and 10.24. The inclusion of a quadratic term improved model fit (AIC = 1085.78, BIC = 1121.69,  $\chi^2 = 11.09$ ,  $df = 4$ ,



RMSEA = .08, CFI = .97, TLI = .95). Furthermore, in addition to the means and variances of the intercept ( $M = 3.38$ , Variance = 0.14) and linear slope ( $M = 0.22$ , Variance = 0.02) being significantly different from zero, the mean of the quadratic term ( $M = -.04$ ) was significantly different from zero, with  $p < .05$  for each estimate. The variance of the quadratic term was set to zero because this is a typical model specification involving a quadratic term. Overall, sense of school belonging increased sharply from Time 1 to Time 2 and continued to increase to Time 4, although less sharply.

### **Predicting Marijuana Trajectory Group Membership and High School Graduation**

To determine whether assignment to the intervention condition had an influence on marijuana trajectory group membership and high school graduation, and to examine sense of school belonging's potential mediation role, three models were tested in this phase of the analysis: 1) the hypothesized mediation model (Model 3), 2) hypothesized mediation model with the intervention condition by linguistic acculturation interaction term, predicting marijuana use trajectory group (Model 4), and 3) hypothesized mediation model with the intervention condition by linguistic acculturation interaction term, predicting graduation (Model 5). The hypothesized associations are shown in Figure 1.

Model 3 had poor fit ( $\chi^2 = 26.46$ ,  $df = 11$ , RMSEA = .07, CFI = .92, TLI = .85). In Model 4, the Wald test statistic was not significant (Wald test statistic = 1.70,  $df = 1$ ,  $p = .19$ ), indicating that adding a path from the acculturation X intervention condition interaction term to marijuana trajectory group membership did not improve model fit ( $\chi^2 = 27.86$ ,  $df = 12$ , RMSEA = .07, CFI = .91, TLI = .84); In Model 5, the Wald test statistic for the path from the interaction term to graduation was significant (Wald statistic = 10.73,  $df = 1$ ,  $p = .001$ ) and improved model fit ( $\chi^2 = 23.05$ ,  $df = 13$ , RMSEA = .05, CFI =

.94, TLI = .91). Thus, the tests of Models 3 through 5 showed that a model without the interaction term did not fit the data well (Model 3) and a model with the interaction term predicting marijuana trajectory group (Model 4) did not improve fit, whereas a model with the interaction term predicting high school graduation (Model 5) did significantly improve model fit.

The structural relationships in Model 5 can be interpreted as follows (see Figure 4 of Model 5). A main effect of PGC on marijuana use trajectory group membership was not observed. Similarly, results did not show a main effect of PGC on high school graduation. There was also no observed effect of PGC on sense of school belonging. Thus, there was no evidence that overall PGC played a role in graduation or marijuana use. Further, there was no evidence that PGC increased sense of school belonging. Thus, the hypothesized roles of PGC in these outcome variables and the hypothesized mediational link were not supported. It should also be noted that higher initial levels of and increases in school belonging over time were associated with a lower likelihood of belonging to the Marijuana Users trajectory group, but were not associated with high school graduation.

Contrary to the current study's hypotheses, linguistic acculturation was negatively related to graduation and gender was not significantly associated with initial levels and rates of change in school belonging. Additionally, gender was not significantly associated with graduation status. Furthermore, gender and linguistic acculturation were not significantly associated with marijuana trajectory group membership, which was unexpected.

As noted before, the acculturation X intervention interaction significantly predicted high school graduation but not marijuana use trajectory group membership. Given that there is no readily available way to probe interactions within the Mplus setting, the interaction was probed using a chi-square test in SPSS. First, the sample was split in half by linguistic acculturation status (high vs. low linguistic acculturation). Then a chi-square test was conducted to examine the effect of the program on graduation in each of the linguistic acculturation groups. Students with high linguistic acculturation were more likely to benefit from the intervention (i.e. graduate) ( $\chi^2 = 7.14$ ,  $df = 1$ ,  $p = .01$ , graduation rate for program = 84.6%, graduation rate for control = 60.3%). The intervention did not significantly influence graduation among students low on linguistic acculturation ( $\chi^2 = .14$ ,  $df = 1$ ,  $p = .71$ ; graduation rate for program = 70.4%, graduation rate for control = 73.2%).

## **Discussion**

In many communities in the U.S. between 30-40 % of high school students do not graduate or fail to graduate on time (Stillwell & Sable, 2013). Additionally, substance use is of concern. Forty-nine percent of U.S. students report trying an illicit substance by the time they leave high school (Johnston et al., 2012) and there is evidence to suggest that substance use and academic problems co-occur (Brook et al., 2008). Research has also shown that Latino youth drop out of high school (Stillwell & Sable, 2013) and use substances at higher rates (Johnston et al., 2012) relative to other minority youth. Despite the high rates of school dropout among Latino youth, few empirical investigations have examined the ability of school-based interventions to promote graduation among these youth. While there have been several investigations of whether school-based interventions can influence substance use among Latino youth, the mediators of such interventions are not well known. Furthermore, there are few studies that follow students for several years after an intervention. Thus, the current study examined whether Peer Group Connection, a peer-led, school-based prevention program, benefits students in the long-run with regard to marijuana use and school graduation. A second question asked if program benefits were mediated by changes in sense of school belonging over four years of high school. Finally, the study asked if student's acculturation affected program effects.

### **School Graduation**

PGC significantly increased graduation among youth with higher levels of linguistic acculturation. Among youth who were more acculturated, participation in PGC

resulted in higher graduation rates relative to youth in the control group. Among youth who were less acculturated, there was no intervention effect observed. A previous study of PGC (Johnson et al., in press) showed that boys in the general population and boys who were at highest risk for school dropout benefited from the intervention. In contrast to the previous study, the current study shows that when level of acculturation is taken into consideration, both girls and boys at higher levels of acculturation benefit from participating in the intervention.

There are several reasons why the intervention may have helped the youth who have a higher level of linguistic acculturation. The first is that the intervention was primarily delivered in English and so youth who spoke English most often could have been more likely to understand the program material and incorporate the skills taught into regular practice. While this is a possibility, the influence of having a curriculum that was mainly delivered in English was likely diminished in the current implementation because there were Spanish speaking peer leaders in each peer group. Another more likely possibility is that more acculturated youth had experienced an erosion of cultural protective factors. Balls Organista, Organista and Kurasaki (2003) have written about how a close and supportive extended family system can protect Latinos from difficulties associated with acculturation, but may actually be weakened by the acculturation process. The existing literature also suggests that more acculturated Latinos experience a greater risk of negative life outcomes such as physical health problems (Myers & Rodriguez, 2003), mental health problems (Myers & Rodriguez, 2003), and substance use problems (Epstein, Botvin, & Diaz, 2001). The more acculturated youth may have benefited more from the program because what was being discussed was particularly relevant to their

current experiences. As such, for the more acculturated group, the intervention may have contributed protective factors to mitigate the risk of becoming more acculturated. Finally, the more acculturated youth may have benefited more from the program because their group had more room for improvement. They were at higher risk for dropping out of school than were their less acculturated classmates.

It should be acknowledged that acculturation is a multi-dimensional construct and as such the use of linguistic acculturation as a proxy for the larger process of acculturation is a limitation of the current study. The use of linguistic acculturation is justified, however, given that language preference accounts for substantial amount of variance in more complex scales of acculturation (Cuéllar, Harris, & Jasso, 1980; Marin & Marin 1991). Indeed, other prevention programs have found differential program effects on substance use based on level of linguistic acculturation (Marsiglia et al., 2005). The current study, to the best of our knowledge, is the first randomized controlled trial to show differential program effects on high school graduation based on level of linguistic acculturation. Thus, the current findings highlight the importance of considering level of acculturation (even if only with a language preference as a proxy) in studies of dropout prevention programs involving Latino youth.

In line with the view of acculturation as a risk factor for youth problems, the current data indicated that the youth who were more acculturated were less likely to graduate than those who were less acculturated. This finding contrasts with existing research on school dropout and acculturation among Latino youth (Martinez et al., 2004). Martinez et al. (2004) found that youth who were less acculturated were more likely to drop out of high school. They also found that among the contributing factors to dropout

were institutional barriers and discriminatory experiences. Given the fact that the youth in the current study resided in a predominantly Latino community, the current study may have differed from previous research in that the institutional barriers and discriminatory experiences for the less acculturated youth may have been reduced by presence of more Latinos in the school.

While the current study found that level of acculturation at the beginning of ninth grade has important implications for high school graduation four years later for some students, the ways in which levels of acculturation change over time may also be important for understanding prevention among Latino youth. More specifically, it is possible that school-based interventions may inadvertently influence the acculturation process for the better (or worse). The very process of bringing youth together to talk about behavior may provide cultural information. Thus, an important question for future research is whether or not interventions influence the acculturation process.

### **Marijuana Use**

The current study did not find evidence, however, to support an intervention effect on marijuana use trajectory membership. In trying to understand this finding, it is important to acknowledge that relative to national samples, the Latino youth in the current study reported low levels of substance use. In national samples, 31% of Latinos report having used marijuana in the past year in 10th grade (Johnston et al., 2012). In the current sample, at most 16% of the students in the control group reported using marijuana in the past year in 10th grade. It is possible that the current study was limited by the use

of self-report data for substance use and that respondents underreported their use.

Another factor that may have contributed to the low level of reported use in the current sample is that the youth in this sample resided in a neighborhood characterized by high risk for exposure to crime, poverty and drugs. Research suggests that in such neighborhoods, parents “buffer” the effects of environmental risk by engaging in parenting practices that protect youth from substance use (Tobler, Komro, & Maldonado, 2009). In the context of such potential protective factors, the youth who were using substances in the current sample may represent more extreme cases and may have been in need of a more intensive substance use- targeting intervention than a universal school-based prevention program. Also, sense of school belonging increased for participants in both the control and program groups. Perhaps this contributed to a ceiling effect.

### **Sense of School Belonging**

The current study did not find evidence that the intervention had a significant impact on sense of school belonging. This finding was unexpected because PGC was designed to target sense of school belonging through regular opportunities for sharing about personal concerns and social events. Additionally, the choice of this mediator was based on several prominent theories of behavior, including social control theory, the social development model and attachment theory. Moreover, previous studies have shown that sense of school belonging is a significant protective factor against both academic disengagement (Sánchez et al. 2005) and substance use (Gaba, 2009) among Latino youth.



There may be a number of reasons for this observation. First, this study was limited in that follow-up data were not obtained for youth who had dropped out of school. It is possible that the findings could be altered if one received information about how these youth felt about their local school throughout the study. Advanced longitudinal data analytic approaches were used in an attempt to mitigate the effects of such missing data, but in future studies follow-up of these youth is warranted. Furthermore, future studies could examine temporal relationships between changes in school belonging and changes in marijuana use. Additionally, while it is possible the intervention may need to be modified to more intensely target sense of school belonging, it should also be noted that youth in the current study had fairly high levels of sense of school belonging. The observed high levels of school belonging may be due to the fact that Latino culture places high value on collectivism (Triandis, McCusker, & Hu, 1990). Indeed other researchers have suggested that Latino culture can affect levels of school belonging. For example, Sánchez et al. (2005), after they did not observe expected gender differences in sense of school belonging, suggested that Latino cultural values for collectivism may dampen gender differences in sense of school belonging among Latino youth. The current study replicated their findings and did not find evidence to suggest that gender was related to initial levels of sense of school belonging. Another factor that may have contributed to difficulty influencing sense of school belonging is the fact that these youth were in an almost entirely Latino school. Research has shown that in schools where more than 80% of students are Latino, youth feel more attached to school than do students in schools that are not predominantly Latino (McNeely, Nonnemaker, & Blum, 2002). Taking these

factors into consideration, there may have been limited opportunity for the intervention to impact sense of school belonging.

While support for intervention effects on sense of school belonging was not found, the results provided support for the findings of previous studies in non-intervention samples, where sense of school belonging predicted substance use among Latino youth (Gaba, 2009). The current study was unique in that it was able to demonstrate that lower initial levels of sense of school belonging as well as slower increases in sense of school belonging predicted greater likelihood of belonging to a marijuana using trajectory. In contrast, results did not show a relationship between the sense of school belonging variables and high school graduation among the Latino youth in the current sample. These results suggest that for Latino youth, there may be other factors that play a greater role than sense of school belonging in the predication of high school graduation.

### **Implications and Future Research**

Our findings suggest that as schools in predominantly Latino communities attempt to promote graduation among Latino youth, they need to pay particular attention to Latino youth who are more acculturated. These youth are at greater risk for academic problems relative to less acculturated youth and the findings suggest that they can benefit from a school-based intervention based on principles of the social development model. This is not to suggest that interventions should not be targeted toward less acculturated youth. Indeed, there may be unique risk factors associated with the acculturation process

for less acculturated youth that contribute to their high school dropout (Martinez et al., 2004).

The current study is unique in that peers delivered the intervention. It has been shown empirically that peers can exert a powerful influence on youth behavior (Masten, et al. 2009; Weerman, 2011). In the current study, PGC, a peer-led preventive intervention, helped to prevent youth problems. Future investigations should consider how to continue to make use of peers in the promotion of high school graduation. Additionally, it is unclear what effects the intervention had on the youth who were selected to be the peer leaders. It is possible that these youth in delivering messages promoting prosocial norms, further internalized them. Future research should consider how PGC influenced the peer leaders.

It should be noted that dropout is still of considerable concern in this community. Even with intervention, about 30% of more acculturated youth did not graduate high school. The results of this study show that this prevention effort has shifted graduation in the intended direction, but suggest that there is more work to be done to promote high school graduation among these youth.

It is well established that school dropout is a multi-determined process and not a single moment event (Rosenthal, 1998). Because school dropout is the result of a number of different factors, it is likely that a multi-level, multi-component intervention approach will be necessary to enhance to effects of this intervention in this community and others like it. Such interventions may include the coordination of the efforts of policy-makers, schools, non-profit community organizations, police officers and other entities.

It is also recognized that the Latino culture is very diverse and that the current sample was relatively small. A larger sample size may have allowed us to analyze subsamples of youth from different Latin countries in hopes of identifying subgroups for whom the intervention is most (or least) effective. In future investigations, it will be useful to examine how consideration of ethnicity may influence prevention outcomes.

While it was possible to identify for whom the intervention had beneficial effects, why the intervention influenced school dropout is still unclear. Thus, in future studies additional mediators should be considered. These may include changes in students' social networks, academic skills, decision making skills or other skills.

## **Conclusions**

Research has shown that school-based prevention programs can prevent substance misuse and promote graduation. Few studies have investigated high school-based programs, their long-term effects, and their intervening processes. The current study examined the impact of Peer Group Connection (PGC) on students' marijuana use and high school graduation. This study also examined school belonging as a mediator and acculturation as a moderator of potential program effects. In 2005, 268 students (92% Latino) were randomized to the control ( $n = 175$ ) or program ( $n = 93$ ) condition. Trained upperclassmen delivered weekly forty-minute, manualized sessions to ninth grade students. Latent growth curve analysis, using baseline, post-test, one-year follow-up, and two-year follow-up data showed an interaction. Specifically, the more acculturated PGC participants were more likely to graduate than controls (84.6% vs. 60.3%, respectively; Pseudo R-square = 9%). No evidence was found that school belonging mediated this effect. No intervention effect was observed for marijuana use. Thus, there is evidence that

PGC benefited the Latino students who were most at risk for school dropout in the sample—those who were most acculturated.

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### **Endnotes**

1. The reported analyses represent findings for all ethnic groups. Results were similar when only Latinos/as were included in the model.
2. Raw scores were less than three for these participants because they did not answer one of the items on the scale.

Table 1

*Means and Standard Deviations for Ordinal Variables and Prevalence Rates for Dichotomous Variables*

	Program			Control			<i>t</i>	<i>df</i>
	<i>N</i> <sup>a</sup>	<i>M</i>	<i>SD</i>	<i>N</i> <sup>a</sup>	<i>M</i>	<i>SD</i>		
Linguistic Acculturation	93	6.16	2.30	175	5.97	2.16	-0.67	266
Sense of School Belonging - Time 1	93	3.36	0.43	175	3.37	0.49	0.15	266
Sense of School Belonging - Time 2	86	3.61	0.43	166	3.56	0.54	-0.67	250
Sense of School Belonging - Time 3	70	3.69	0.49	129	3.63	0.53	-0.71	197
Sense of School Belonging - Time 4	64	3.76	0.51	103	3.74	0.53	-0.25	165
	Program			Control			<i>X</i> <sup>2</sup>	<i>df</i>
	N	%		N	%			
Gender (Female=1)	93	51%		175	49%		0.05	1
High School Graduation (Graduated =1)	93	76%		175	67%		2.32	1
Marijuana - Time 1 (Use = 1)	93	9%		175	9%		0.00	1
Marijuana - Time 2 (Use = 1)	85	12%		166	14%		0.35	1
Marijuana - Time 3 (Use = 1)	70	13%		129	16%		0.42	1
Marijuana - Time 4 (Use = 1)	63	8%		103	11%		0.34	1
Marijuana Trajectory Group (greater odds of use)	93	9%		175	17%		3.24	1

\**p*<.05

Table 2

*Pearson and Phi Correlation Coefficients (program below diagonal, control above diagonal)*

	2	3	4	5	6	7	8	9	10	11	12
1. Intervention	-0.04	0.01	0.09	0.00	-0.04	-0.05	-0.05	-0.01	0.04	0.05	0.02
2. Linguistic Acculturation	1.00	-0.19*	-0.17	0.12	0.06	0.14	0.13	-0.19*	-0.06	0.01	-0.02
3. Gender (Female =1)	-0.16	1.00	0.10	-0.12	0.00	-0.09	0.18	0.11	0.07	0.11	-0.01
4. High School Graduation (Graduation =1)	0.23*	-0.10	1.00	-0.05	-0.20*	-0.08	0.06	0.07	0.16*	0.16	0.03
5. Marijuana Use – Time 1 (Use = 1)	-0.05	0.07	-0.10	1.00	0.28*	0.37*	0.28*	-0.07	-0.06	0.01	0.07
6. Marijuana Use – Time 2 (Use = 1)	0.00	-0.08	-0.08	0.18	1.00	0.45*	0.49*	-0.09	-0.18*	-0.15	-0.27*
7. Marijuana Use – Time 3 (Use = 1)	-0.13	0.29*	-0.09	0.19	0.48*	1.00	0.69*	0.00	-0.02	-0.16	-0.12
8. Marijuana Use – Time 4 (Use = 1)	-0.01	-0.07	0.05	-0.09	0.27*	0.27*	1.00	-0.06	-0.11	-0.25*	-0.25
9. Sense of School Belonging – Time 1	-0.23*	0.11	-0.15	-0.15	-0.20	-0.07	-0.02	1.00	0.57*	0.29*	0.33*
10. Sense of School Belonging – Time 2	-0.20	0.22*	0.18	0.14	-0.16	-0.10	-0.08	0.44*	1.00	0.49*	0.58*
11. Sense of School Belonging – Time 3	-0.40*	0.24*	-0.04	0.02	0.23	-0.12	-0.07	0.54*	0.55*	1.00	0.72
12. Sense of School Belonging – Time 4	0.21	0.23	-0.09	-0.21	-0.06	-0.08	-0.27*	0.37*	0.30*	0.32*	1.00

\* $p < .05$



Table 3

*Bayesian Information Criterion by Model Type, Parameter Estimates and Percentage of Participants in each Trajectory Group for Marijuana Use*

Model	BIC					
Model 1 (1 group)	-323.42					
Model 2 (2 groups)	-288.91					
Model 3 (3 groups)	-304.00					
Group	Parameter estimates			% of Total participants ( <i>n</i> )	% of Program participants ( <i>n</i> )	% of Control participants ( <i>n</i> )
	Intercept ( <i>SE</i> )	Linear ( <i>SE</i> )	Quadratic ( <i>SE</i> )			
Low Likelihood of Use (Group 1)	-3.13* (0.25)			86% (231)	91% (85)	83% (146)
Marijuana Users (Group 2)	0.84 (0.67)	-1.66* (0.81)	-0.67* (0.24)	14% (37)	9% (8)	17% (29)

\* $p < .05$

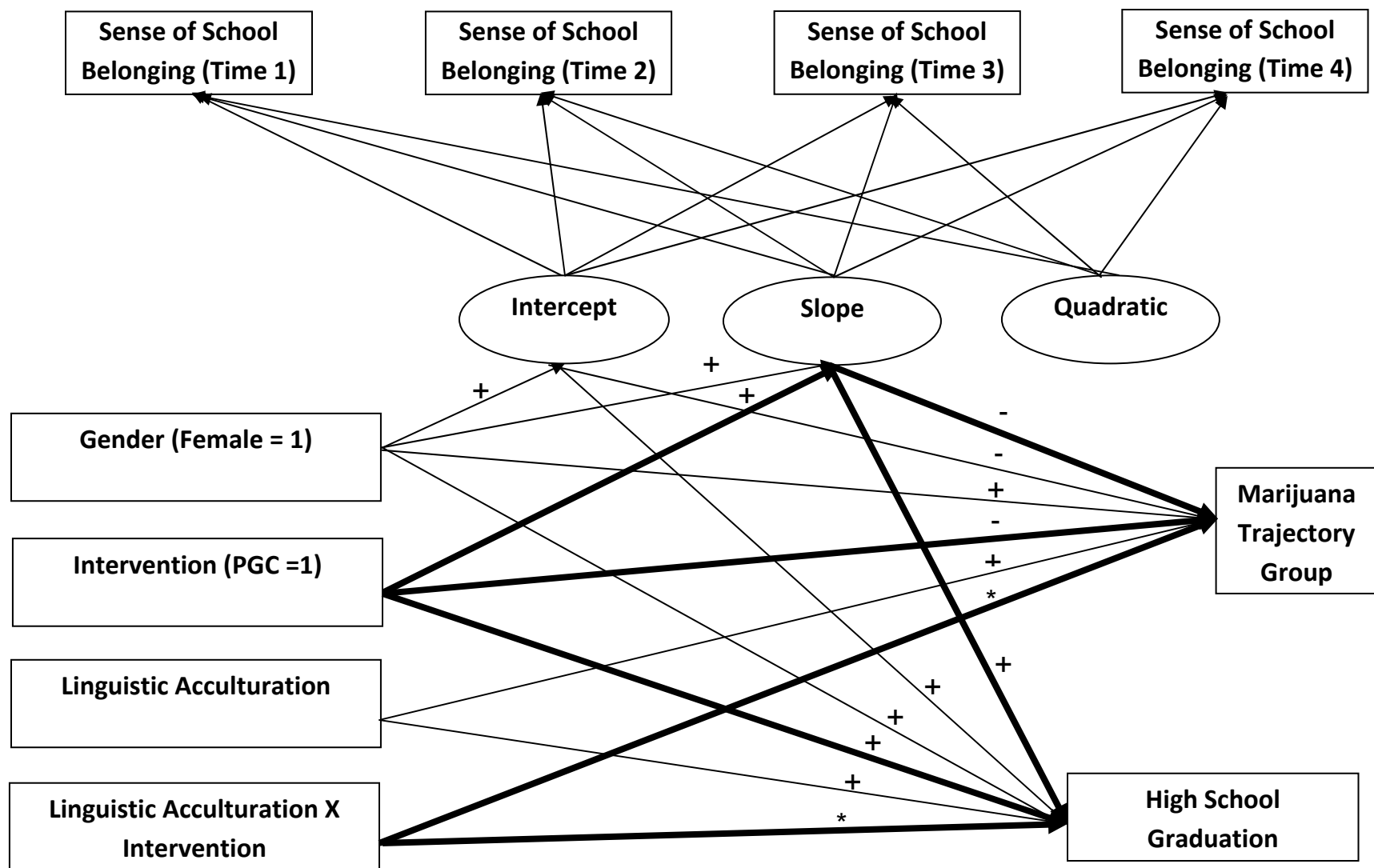


Figure 1. Hypothesized Relationships. Major hypotheses are shown in bold. The “+” denotes a positive relationship. The “-” denotes a negative relationship. The “\*” denotes an interaction hypothesizing that more acculturated youth would benefit more from the intervention. PGC = Peer Group Connection.

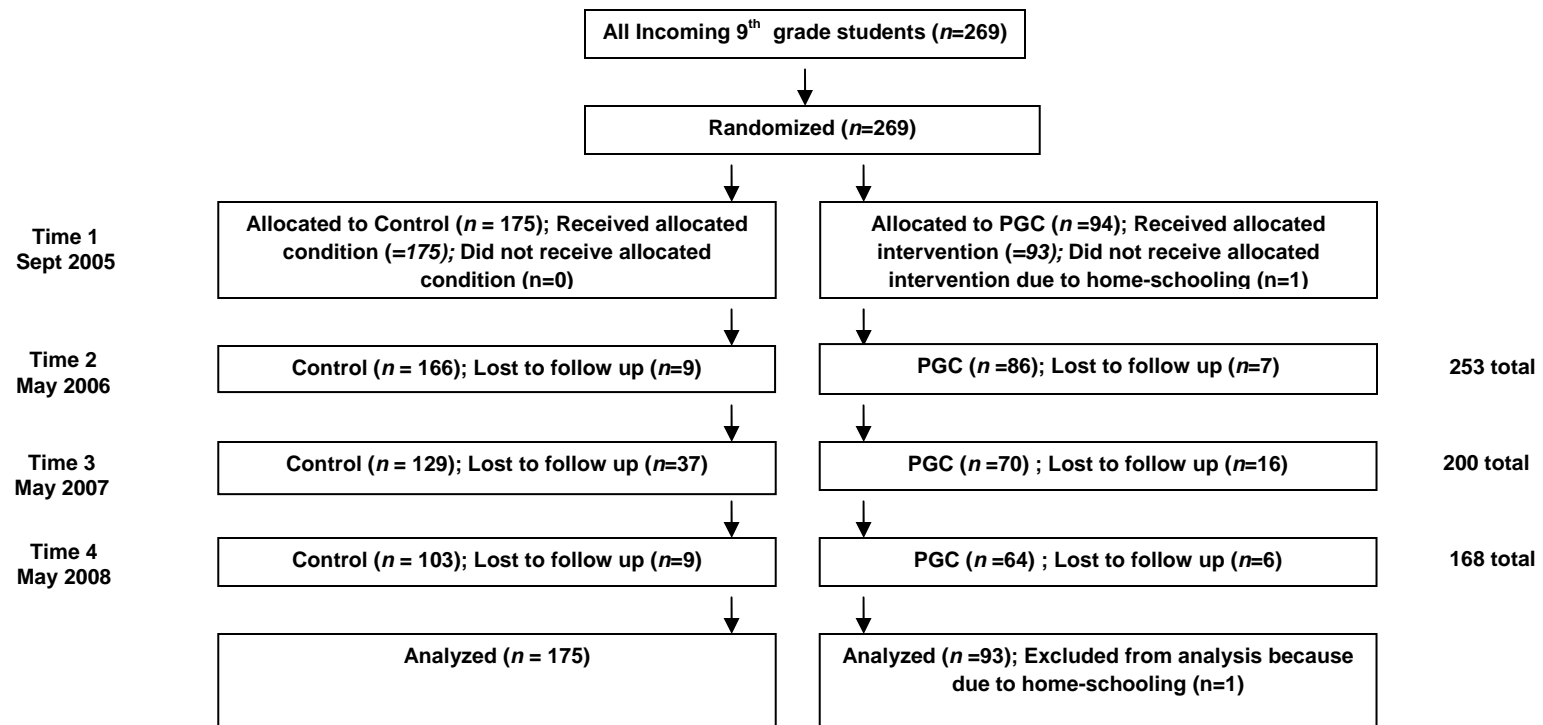


Figure 2. Participants at Each Time Point of Data Collection. PGC = Peer Group Connection.

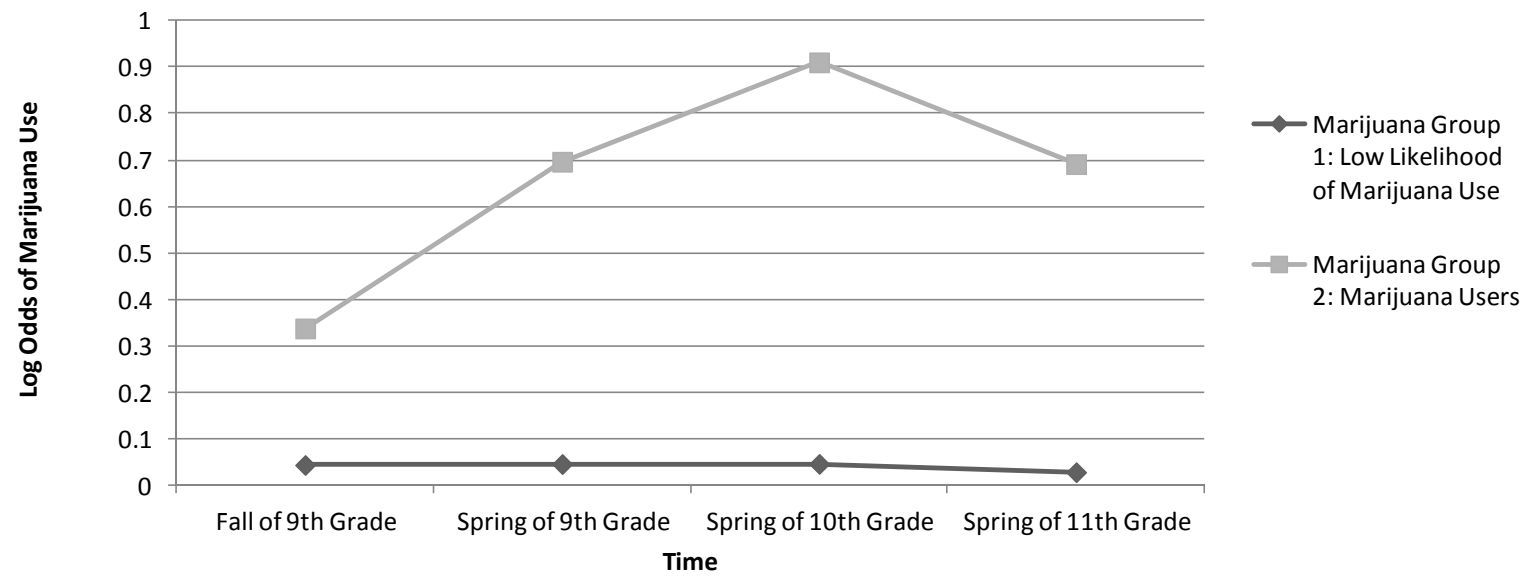


Figure 3. Growth Trajectories of the Likelihood of Marijuana Use.

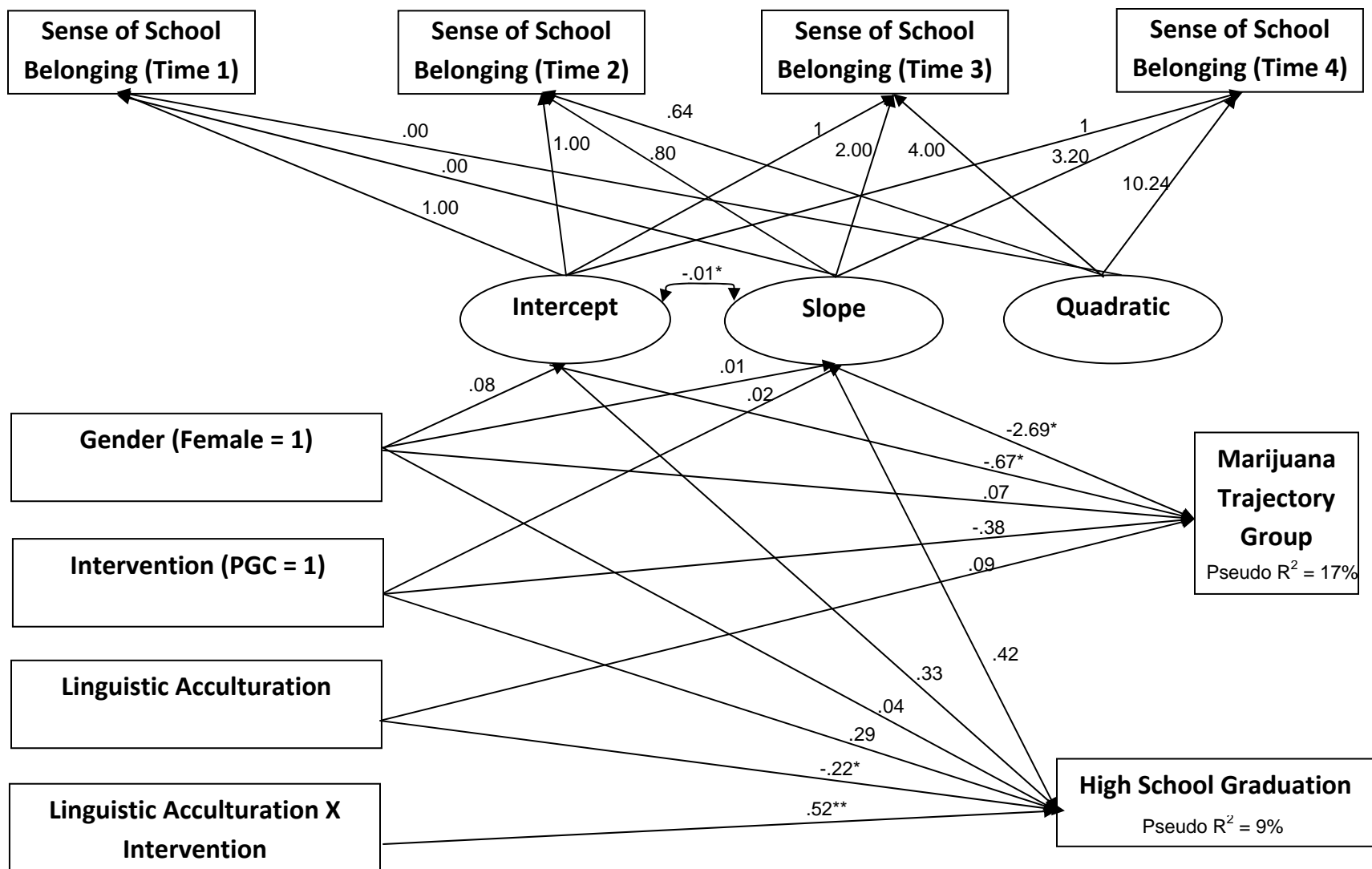


Figure 4. Parameter Estimates of Model 5. PGC = Peer Group Connection. Factor loadings for sense of school belonging were fixed. Growth terms were allowed to correlate.

## Appendix A

**Demographic Information****Are you:**

1. Female
2. Male

**Circle the group that BESTS describes who you are:**

1. African American/Black
2. Caucasian/White
3. Latino/Hispanic
4. Asian American
5. Other: \_\_\_\_\_  
(If other, please write description)

## Marijuana Use

**Circle the number next to the statement that is the best answer for you.**

If you have never tried marijuana (weed, pot), how likely do you think it will be that you will try marijuana in the next year?

- 0. I already tried
- 1. Not likely
- 2. Somewhat likely
- 3. Very likely

During this past school year (since September), how many times did you use marijuana (weed, grass, pot) or hashish (hash)?

- 0. never
- 1. 1-2 times
- 2. 3-5 times
- 3. 6-9 times
- 4. 10-19 times
- 5. 20-39 times
- 6. 40 or more times

## School Belonging

Please circle one answer indicating how much each statement is true for you.

	<b>Really False</b>	<b>Somewhat False</b>	<b>Somewhat True</b>	<b>Really True</b>
1. It is hard for someone like me to be accepted at this school.	1	2	3	4
2. Most teachers at school are interested in me.	1	2	3	4
3. Sometimes I feel as if I don't belong at this school.	1	2	3	4
4. People at this school are friendly to me.	1	2	3	4
5. I feel very different from most other students here.	1	2	3	4
6. The teachers here respect me.	1	2	3	4
7. People here know I can do good work.	1	2	3	4
8. I feel proud of belonging to this school.	1	2	3	4
9. There's at least one teacher or other adult in this school I can talk to if I have a problem.	1	2	3	4
10. Teachers here are not interested in people like me.	1	2	3	4
11. People here notice when I'm good at something.	1	2	3	4



12. Other students here like me the way I am.	1	2	3	4
13. I can really be myself at this school.	1	2	3	4

## Linguistic Acculturation

Please circle the answer to the following:	Never	Rarely	Sometimes	Often	Always
1. How much do you speak another language (besides English) at school?	1	2	3	4	5
2. How much do you speak another language (besides English) at home?	1	2	3	4	5
3. How much do you speak another language (besides English) with friends?	1	2	3	4	5