Published in final edited form as:

Prev Sci. 2012 February ; 13(1): 75–85. doi:10.1007/s11121-011-0248-z.

Evaluating the Impact of a Substance Use Intervention Program on the Peer Status and Influence of Adolescent Peer Leaders

Christopher S. Sheppard, Megan Golonka, and Philip R. Costanzo

Department of Psychology and Neuroscience, Duke University, Box 90086, Durham, NC 27708, USA

Philip R. Costanzo: costanzo@duke.edu

Abstract

The current study involved an examination of the impact of a peer-led substance use intervention program on the peer leaders beyond the substance use-related goals of the intervention. Specifically, unintended consequences of an adult-sanctioned intervention on the targeted peer leader change agents were investigated, including whether their participation affected their peer status, social influence, or self perceptions. Twenty-two 7th grade peer-identified intervention leaders were compared to 22 control leaders (who did not experience the intervention) and 146 cohort peers. Three groups of measures were employed: sociometric and behavioral nominations, social cognitive mapping, and leadership self-perceptions. Results indicated that unintended consequences appear to be a legitimate concern for females. Female intervention leaders declined in perceived popularity and liked most nominations over time, whereas males increased in total leader nominations. Explanations for these results are discussed and further directions suggested.

Keywords

Adolescents; Peer leaders; Peer influence; School-based prevention; Substance use; Social status

Social influences are the primary factor in adolescent initiation of drug using and abusing behaviors (Donaldson et al. 1996; Flom et al. 2001; Harrison et al. 2000; Kandel and Adler 1982; Olds and Thombs 2001). Conformity to peers and susceptibility to peer pressure peak during early adolescence as peers supplant adults as a major influence in the shaping of their norms, behaviors, and beliefs (Costanzo and Shaw 1966; Steinberg and Monahan 2007). Peer influence has been connected with alcohol initiation and drinking to intoxication in adolescence (Bot et al. 2005; Urberg et al. 1997). In particular, peer leaders of “cliques” have strong influence on the attitudes and behaviors of their clique members, and can encourage positive or negative attitudes regarding substance use (Miller-Johnson and Costanzo 2004).

Despite the fact that peer social dynamics are important contributors to adolescent substance use, a vast majority of intervention programs do not employ the power of peer influence as

Correspondence to: Philip R. Costanzo, costanzo@duke.edu.

Portions of this research were presented at the 2010 biennial meeting of the Society for Research on Adolescence in Philadelphia, PA.

the driving force of the intervention. If peers are used at all, they are used as a small component of a larger intervention (Valente et al. 2007). Indeed, many preventive interventions targeting adolescent drug use employ peer resistance inductions rather than positive peer influence approaches. When positive peer influence approaches have been employed, these peer-led interventions have been found to be quite successful in comparison to other types of interventions. In particular, peer-led interventions employing natural peer leaders appear to be more effective than teacher-led interventions (Valente et al. 2007).

An intervention targeted at social network leaders might be a low-cost alternative to intervention with the entire social group. By altering peer leader substance use and attitudes, one might create a “trickle down” effect that would impact all of the adolescents in the leader’s social network, even though these network associates were not directly the targets of the intervention. Along with Valente et al.’s (2007) demonstration that peer leader-based interventions are effective in changing substance use behaviors in the leaders, a demonstration of the spread of effect of leader-targeted interventions to others in the network would render them a very efficient preventive approach by employing the natural power of peers and the natural dynamics of peer influence in adolescence.

Two Types of Leaders: Conventional and Deviant

One traditional group of peer leaders for intervention attempts are conventional leaders who are generally considered to be “model” leaders. They occupy positive leadership roles among their peers (e.g., student government) and tend to be favored by teachers and adults (Miller-Johnson et al. 2003). Along with their adult “endorsements,” they are likely to be rated as popular by their peers (Farmer and Rodkin 1996; Miller-Johnson et al. 2003; Rodkin et al. 2000). These conventional leaders should be credible transmitters of an anti-alcohol message to their peers as their network centrality and the high esteem in which they are held should result in the adoption and modeling of their behavior and attitudes by their peers (Bandura 1977).

A second group of leaders who hold great influence over their peers, but are traditionally excluded from involvement in adult-sanctioned leadership positions, are deviant leaders. Whereas members of deviant peer groups tend to be aggressive, disruptive and rejected among their peers, their leaders are frequently considered to be popular and cool (Bagwell et al. 2000; Coie and Dodge 1998; Farmer et al. 1999; Rodkin et al. 2000). These deviant leaders set trends and establish risky behavior as the “norm” among their peer networks (Farmer and Rodkin 1996; Miller-Johnson et al. 2003). These leaders have sway over the individuals who may be most in need of intervention to prevent risky behavior.

Inclusion of both conventional and deviant leaders should increase the success of substance use prevention programs. A peer leader intervention that is performed without involving deviant leaders may be limited in its impact on the rest of the social network. Deviant leaders are especially important to target since the peer groups that they lead will more likely be the groups using substances. Similarly, any intervention done without involving conventional leaders may not impact the less aggressive or less deviant social groups.

Current Implementation of Peer Leader Interventions

Studies have shown the benefits of including nontraditional peer leaders in prevention efforts. Miller-Johnson and Costanzo (2004) piloted a small-scale intervention program designed to reduce violence, substance use, and early and risky sexual behaviors among middle school students. Both peer-nominated conventional and unconventional leaders were the targets of the intervention and employed as social change agents to promote an anti-deviance message and behavioral model for their peers. Although a formal evaluation was not conducted due to unanticipated school redistricting, the authors reported anecdotally that the intervention was sufficiently motivating and resulted in a sustained lessening of deviant attitudes and behaviors among the targeted leaders.

A second intervention program designed to harness the power of both conventional peer leaders and deviant peer leaders was developed and implemented with middle school students (Golonka et al. 2007). The primary aim of the intervention was to change not only the leaders' attitudes and behaviors regarding alcohol use, but to induce a "spread of effect" through a change in the leaders to the larger student body's behavior and social norms. Preliminary analyses indicated that the peer-led intervention successfully decreased the leaders' alcohol use, the reported alcohol use of their friends, and their favorable attitudes toward alcohol relative to a matched control group. Other researchers have had similar success using peer leaders to reduce substance use (Valente et al. 2007).

The initial results of this line of intervention research are promising and deserve confirmation. However, there is a potential form of "catch-22" in the use of peer leaders as a source of trickle down influence that should be investigated. In the transition from the pre-teen years to adolescence, peer norms tend to shift from compliance with authority figures to compliance with and conformity to peers. In doing so, the power to establish peer norms shifts from leaders who are compliant with authority figures to those who are seen as in conflict with authority (Miller-Johnson and Costanzo 2004). Being part of an adult-sanctioned intervention program may jeopardize the social position and influence of the participating peer leaders. Deviant leaders, in particular, derive some of their influence from their deviance, including a willingness to engage in behavior counter to authority such as underage drinking (Engels et al. 2006). One potential unintended consequence of successfully changing the behavior of deviant peer leaders (and maybe even conventional leaders) is that they lose their appeal as leaders and thus their influence on peer drinking behavior.

The Current Study: Intended and Unintended Consequences of Intervention

The primary purpose of the present study was to determine whether the enlistment of deviant and conventional leaders as change agents in a substance use program does, in turn, reduce the popularity and social influence that these adolescents have amongst their peers. Much of the research on peer influence primarily focuses its lens on the impact of the intervention on substance use (the goal of the intervention) to the exclusion of other potential unintended consequences. The present research attempts to fill this void by focusing on the impact of a

peer-led intervention on the peer leaders' peer status, social influence, as well as their social self perceptions.

Investigating the secondary effects of the intervention on the targeted peer leaders is important for several reasons. First, if the peer status or the social influence of the leaders on their peers decreases, then the vehicle through which the intervention's message is transferred will not be as effective. Secondly, it is important to ensure that participation in an adult sanctioned substance use program does not negatively affect the self-perceptions of the leaders. The intervention would not be a viable option if it negatively affects other aspects of the participants' lives.

A final objective of the study was to examine if there are gender differences in the social cognitive and peer status effects of the intervention on its leaders. None of the previous research examining deviant or unconventional leaders included girls (Farmer and Rodkin 1996; Miller-Johnson et al. 2003; Miller-Johnson and Costanzo 2004; Rodkin et al. 2000). As Gaughan (2006) recently pointed out, the role that gender plays in the peer influence process is not well understood. The initial evaluation of the current intervention program did not provide evidence of any differences in the effectiveness of male and female peer leaders. Sumter et al. (2009) reported no gender differences in susceptibility in peer influence during early adolescence. Thus, as these gender analyses were exploratory, no gender differences were predicted.

Method

Participants

Universal Sample—Two consecutive cohorts of 7th graders attending a public magnet middle school (specializing in the arts) located in a mid-size Southeastern city were invited to participate in the intervention study, which was approved by the Institutional Review Board and by the school district and school principal. Consent from parents and student assent were obtained from 327 students, with approximately the same participation rate across the two cohorts (80% and 82% among those who returned forms, respectively). The first cohort of 7th graders served as the no treatment Control Cohort, and the second cohort served as the Experimental (Intervention) Cohort. Each cohort was assessed at three time points: the fall and spring of 7th grade and the fall of 8th grade. The Control Cohort preceded the Experimental Cohort by one academic year.

The mean age was similar for the Experimental and Control Cohorts (12.24 and 12.22 years, respectively). However, the Experimental Cohort had a significantly different gender composition (84 males, 84 females) than the Control Cohort (98 females, 61 males) [$\chi^2(1, 327)=4.48, p<.05$]. The Experimental Cohort was 47% African American, 40% European American, 7% Latino, 3% multi-racial, and 3% other races. The Control Cohort was 44% African American, 39% European American, 7% Latino, 7% multi-racial, and 3% other races. There was no significant ethnicity difference or difference in socioeconomic status (as measured by Hollingshead's 1979 index) between the two cohorts.

Leader Sample—After the first round of assessments, 22 leaders from the Experimental Cohort were identified to participate in the intervention program. Similarly, 22 leaders were selected from the Control Cohort to serve as the non-intervention comparison group. These 44 students were chosen as leaders because they were deemed to be the most influential students in the 7th grade as determined by peer nominations. These leader samples were comprised of both “deviant” and “conventional” leaders and were representative of multiple cliques, ethnic groups, and both genders within the two cohorts. In each cohort, there were 10 deviant leaders (5 male; 5 female) and 12 conventional leaders (6 male; 6 female).

The following process was used to make these selections (see Measures for a full description of each measure used): Social Cognitive Mapping (SCM) was used to identify the two highest nominated members from each clique. This process identified students who were central not only within their own peer group, but also within the entire grade-wide social network. Peer sociometric nominations were used to identify deviant and conventional leaders. Students receiving a Z score over 1.00 on the peer nomination item “is good at getting other kids to break the rules” were identified as “deviant” leaders. Students receiving a Z score over 1.00 on the peer nomination item “is a leader and good to have in charge” were identified as “conventional” leaders. In the Experimental Cohort, the leaders were informed that they had been selected by their peers as leaders in their grade, and that they were invited to join the project so that they could use their leadership status to help keep other students from using drugs. All of the 22 students selected for the intervention program received parental consent and assented to participate. The Experimental Cohort leaders were 52% male, 52% European American, 30% African American, 9% multi-racial, 4% Latino, and 4% from other races.

The same SCM and sociometric nomination procedures were used to identify the most influential students in the Control Cohort. The twenty-two students selected as leaders from the Control Cohort were not notified of their “leader” status, nor did they participate in any form of intervention. This entire cohort was a no-treatment control group, and leaders in this cohort simply completed the surveys (described below). The leaders in the Control Cohort were 52% male, 48% European American, 48% African American, and 4% multi-racial.

Procedure

Universal Sample Survey—All surveys were administered in the fall and spring of 7th grade, and again in the fall of the 8th grade year. The measures reported in the present study were part of a larger assessment battery. The survey was administered to students in each cohort during two 50-minute class periods in their regular science classroom. Students were reminded that their answers were confidential, that they could omit any questions they were not comfortable answering, and that they could stop at any time. The teachers remained in the room during this time but were not involved in the administration of the survey. Students received \$5 for the completion of the survey at each time point.

Measures

Sociometric and Behavioral Nominations—Students were given a roster of all 7th graders and asked to provide unlimited nominations of who they “like the most” and who

they “like the least.” The students were then asked to nominate peers who fit different behavioral and social influence descriptors, including who they considered to be conventional leaders (“Kids who are leaders and good to have in charge”) and deviant leaders (“Kids who are good at getting other kids to break the rules”). To assess perceived popularity, students were instructed to name the “Kids who are the most popular in this grade level.” A computer program (Sociometric Collection and Analysis [SCAN] version 5.0.5; DeRosier and Thomas 2003) was used for data entry and to create standardized scores for participants for individual items.

Social Cognitive Mapping (SCM)—The Social Cognitive Map procedure developed by Cairns and his colleagues (e.g., Cairns et al. 1988, 1991) was used to identify the social groups within the two cohorts. The students were asked, “Are there some kids in your grade who hang around together a lot?” They were then instructed to list all of the names of 7th graders who hang around together, naming all of the social groups that they could. Students generated names from memory; no student roster was provided. For each group generated, the students were asked to circle the name of the group leader. A computer program (SCM version 4.0) was used to compile the information from all participants and determine the groups within the social network according to the SCM procedures set forth by Cairns et al. (1988). The program uses a co-occurrence matrix of the number of nominations each student received for being a member of a clique along with other particular peers in order to define individuals’ centrality within the group. The centrality ranges from peripheral members who received few clique nominations, to nuclear members who received many such nominations.

Leadership Self-Perceptions—Students completed a measure called “Leaders” created for the larger study to assess self-reported dimensions of leadership broadly defined. Students were asked to rate “where you think you fall” on a 7-point Likert scale ranging from 1 (not very) to 7 (very). For the present study, six items were used to provide an assessment of the students’ self-perceived leadership competence: (1) “able to get people to do things,” (2) “able to stand for self and others,” (3) “power to decide who’s ‘in’ and who’s ‘out,’” (4) “good at hanging out with lots of kids,” (5) “cool,” and (6) “easy time getting a boy/girlfriend.”

Intervention Program

The Teens’ Life Choices intervention program was comprised of sixteen 50-minute sessions that took place at the students’ school (see Golonka et al. 2007 for a more detailed description). The 22 Experimental Cohort student leaders participated in two sessions per week for 8 weeks. The student leaders were told that the researchers believed they could use their leadership status to help influence younger students to stay away from drugs. The leaders were divided into groups to work on creating anti-drug messages to present to the 6th graders at their school. Discussion about existing anti-drug messages and their views of what was effective and what was not was also encouraged. Topics covered during the program included leadership, effective messages, and the propagation of scientifically sound substance knowledge. The project staff focused primarily on providing and presenting non-biased, scientifically accurate information about alcohol, tobacco, and marijuana. Student leaders from a local university, referred to as “Authority Stars” (e.g., athletes, student

government leaders), assisted in the initial sessions of the intervention to provide extrinsic motivation for the investment of the intervention leaders in the program. Each group's message was conveyed to the 6th graders at an assembly at the conclusion of the 8-week program.

Analytic Strategy

First, the intervention leaders were compared to their Experimental Cohort peers (students from the same class year not selected as leaders) through a series of omnibus repeated-measures Multivariate Analyses of Variance (MANOVA) conducted on each of the four groups of variables (sociometric/behavioral nominations, social cognitive mapping, leadership self-perceptions, and other self-report measures). Follow-up repeated-measures univariate analyses of variance (ANOVAs) were then conducted to examine the locus of any significant MANOVA results found. Because the purpose of the study was to consider the effects of the intervention on these variables, results are only reported for significant main effects of time or significant interactions involving time. Second, the intervention leaders were compared to the control leaders (leaders selected in the previous year's class who did not participate in the intervention) through a series of repeated measures MANOVAs conducted on each of the four groups of variables. Follow-up univariate repeated-measures ANOVAs were then computed to determine the locus of any significant MANOVA interaction results. Again, only results involving time were reported. This served an additional purpose of controlling for initial differences between the experimental and control cohort leaders in the analyses.

Results

Baseline Effects

A series of *t*-tests were conducted on all Time 1 measures to examine whether the intervention leaders differed from their Experimental Cohort peers and Control Group leaders prior to the onset of the intervention as expected. As can be seen in Table 1, the intervention leaders were significantly higher than their peers on almost all of the variables assessed at Time 1, with very few exceptions. They were better liked by their peers, more likely to be seen as leaders (both conventional, deviant, and SCM) by their peers, perceived as more central within the group and to be more popular by their peers, and more likely to report more positive self-perceptions than their cohort peers. They did not differ from their peers in terms of how disliked they were, or in their self-reported ability to stand up for self or others. Intervention leaders were also higher than Control Group leaders on perceived popularity, centrality of the subject and the subject's group and four of the self-perception measures: power to decide who is "in" and who is "out," good at hanging out with lots of kids, cool and easy time getting boy/girlfriend. These differences limit the value of the Control Group leaders as a comparison group, but given that the differences were not as large as those involving the cohort peers and that some important baseline measures were not significantly different, we decided to include this group in our analyses.

Intervention Leader Versus Cohort Peer Analyses

Omnibus Analyses—Three 2 (gender) $\times$ 2 (leader vs. peer cohort) $\times$ 3 (time) MANOVAs were conducted examining the sociometric and behavioral nominations, the social cognitive mapping clique variables, and the self-report measures of leadership (see Table 2). For the omnibus analyses as well as the follow-up analyses, the critical findings for the purposes of this study were those indexing the leader*time and leader*gender*time interactions. Simple main effects and the gender*time interactions reported below were ancillary to the main thrust of the analyses and they were typically qualified by the more pertinent higher order interactions found between leader, gender and time. We report them in order to provide a full account of the analyses and to track the nature of higher-order interactive qualifications.

For the sociometric and behavioral nominations, there was a significant gender*time interaction [$F(10,510)=2.18, p<.05$], which was qualified by a significant leader*gender*time three-way interaction [$F(10,510)=1.96, p<.05$]. For the MANOVA conducted on social cognitive mapping, there was a main effect for time [$F(6,454)=4.80, p<.001$], a leader*time interaction [$F(6,454)=2.705, p<.05$], a gender*time interaction [$F(6,454)=2.32, p<.05$], and a leader*gender*time interaction [$F(6,454)=2.84, p<.01$]. Finally, the MANOVA involving leader self-perceptions revealed only a significant leader*gender*time interaction [$F(10,490)=1.85, p<.05$]. For these three significant MANOVAs, one-way repeated measures ANOVAs were conducted for all sociometric/behavioral nominations, social cognitive mapping, and leader self-perception variables.

Sociometric/Behavioral Nominations—As can be seen in Table 3, follow-up 2 (gender) $\times$ 2 (leader vs. peer cohort) $\times$ 3 (time) repeated measures ANOVAs were conducted on the liked least, liked most, and perceived popularity nominations, as well as the two leader (conventional and deviant) nominations. There were no significant effects involving time for the liked least or the two leader type (conventional and deviant) nominations. There was a significant leader/cohort*gender*time interaction found for liked most nominations [$F(2,282)=3.82, p<.05$]. Figure 1 shows the pattern for male and female leaders versus cohort peers over time. It is clear that female leaders declined significantly from Time 1 to Time 3 (post hoc, $p<.05$), while the three other groups remained constant over time. In terms of perceived popularity, there was a significant gender*time interaction [$F(2,282)=9.80, p<.001$]. The two way interaction between gender and time for perceived popularity revealed that females ($M=.98$) were perceived to be more popular at Time 1 than males ($M=.44$), but their perceived popularity ($M=.72$) converged with males ($M=.66$) over time such that there are no significant differences at Time 3. This interaction, however, was qualified by a significant leader/cohort*gender*time interaction [$F(2,282)=9.37, p<.001$], revealing that this effect was entirely due to male and female leaders. Female leaders started out being perceived as more popular than male leaders, but the perceived popularity levels of males and females converged over time. For male and female cohort peers, there were no significant differences across any of the three time periods. Again, there was a significant decline from Time 1 to Time 3 for female leaders (post hoc, $p<.05$). There were no significant differences across time for the other three groups.

Social Cognitive Mapping Measures—Three 2 (gender) $\times$ 2 (leader vs. peer cohort) $\times$ 3 (time) repeated measures ANOVAs were run on the SCM leader nominations, individual subject centrality, and centrality of subject's group measures. There were no significant effects involving time for either subject centrality or centrality of subject's group. However, the analyses involving the SCM leader variable revealed significant main effects for time [$F(2,284)=16.38, p<.001$], gender*time [$F(2,284)=6.51, p<.01$], time*leader/cohort [$F(2,284)=5.28, p<.01$], and leader/cohort*gender*time [$F(2,284)=7.78, p<.001$]. Regarding the main effect for time, the number of SCM leader nominations was significantly higher at Time 2 ($M=5.32$) than either at Time 1 ($M=3.24$) or at Time 3 ($M=3.98$), which did not differ from each other. The time*gender interaction showed that the effect of time was stronger for males than females, simply because the number of leader nominations for males ($M=2.20$) was lower than for females ($M=4.27$) at Time 1. The leader/cohort*time interaction revealed that the effect involving time was entirely among leaders. Figure 2 reveals that this effect was exaggerated for male leaders relative to female leaders because their initial leader nominations were so much lower at Time 1.

Leadership Self-Perceptions—Only the ANOVA for the “ability to decide who's ‘in’ and who's ‘out’” item revealed any significant effect for time among the leadership self-perception items. The significant result involved a leader/cohort*gender*time three-way interaction [$F(2,260)=3.88, p<.05$]. The results show opposite trends for male and female leaders such that male leaders declined significantly at Time 2 ($M_{\text{Time 1}}=6.18, M_{\text{Time 2}}=5.09$), whereas female leaders rose significantly at Time 2 ($M_{\text{Time 1}}=5.50, M_{\text{Time 2}}=6.70$). The males then increased at Time 3 ($M=5.73$) and the females declined at Time 3 ($M=6.10$) such that there was once again no significant difference between them. Thus, the effect of the intervention was opposite for male and female leaders, but not long lasting.

Control Leader Versus Intervention Leader Analyses

Omnibus Analyses—Three 2 (gender) $\times$ 2 (control leader vs. intervention leader) $\times$ 3 (time) repeated-measures MANOVAs were conducted looking at the sociometric and behavioral nominations (liked most, liked least, perceived popularity, conventional leader, deviant leader), SCM (leader nominations, subject centrality, and centrality of subject's group) and leadership self-perception items (able to get people to do things, power to decide who's “in” and who's “out,” good at hanging out with lots of kids, cool, and easy time getting a boy/girlfriend). There were no significant time effects for the MANOVA involving sociometric and behavioral nominations, or the social cognitive mapping variables. However, there was a significant effect for the leadership self-perception variables, specifically, a leader/cohort*gender*time three-way interaction [$F(10,138)=2.64, p<.01$].

Leadership Self-Perceptions—Of the six leadership self-perception items, only the ANOVAs for the “cool” and able to stand up for self and others” items had significant results (see Table 3). The “cool” self-perception item revealed a cohort*gender*time three-way interaction [$F(2,74)=4.95, p<.05$], with a similar pattern to that seen in the “power to decide who's in and who's out” from the earlier analyses. Male intervention leaders decreased from Time 1 ($M=6.70$) to Time 2 ($M=6.40$) and then increased at Time 3 ($M=6.70$), whereas female intervention leaders increased from Time 1 ($M=6.30$) to Time 2 ($M=7.0$), and then

decreased at Time 3 ($M=6.70$). The ANOVA run on the “able to stand up for self and others” item revealed a three-way interaction for cohort*gender*time as well [$F(2,74)=5.57, p<.01$]. Male control leaders stayed relatively constant and females increased. For the intervention leaders, males increased sharply between Time 1 and 2, whereas females declined at Time 2, and increased to be equal with males at Time 3.

Sociometric Nomination Analyses—In order to understand the pattern of gender differences, two separate analyses were conducted looking at the gender of each nominator of the cohort leader across time for both the “well liked” and “perceived popularity” variables. For both “well-liked” [$F(1,41)=8.225, p<.01$] and “perceived popularity” [$F(1,41)=8.58, p<.01$], there was a three-way interaction between cohort*gender*time. Male intervention leaders’ number of total nominations increased, but the number of nominations they received from females decreased. Female intervention leaders received fewer votes after the intervention, but increased in the number of votes they received from females, suggesting that the number of votes they received decreased only due to fewer male nominations.

Discussion

Recently, some investigators have begun to establish the efficacy of peer-led intervention approaches in affecting substance use behaviors in adolescents, and have argued for the benefits of such programs over adult-led or educational interventions because they employ the natural social power of peer leaders on behalf of positive change (see Golonka et al. 2007 and Valente et al. 2007). However, a potential limiting factor and irony in the use of natural peer leaders is that their very advocacy of adult-approved behaviors could somehow weaken their leadership status and attenuate their ability to truly affect their peers. In the current study we have reported on findings that indicate that natural peer leaders who participate as agents in prevention of substance use generally do not suffer serious declines in their social standing. In fact, we have found that intervention-leader boys and girls retain their network centrality in their peer groups after participating in the intervention. The male intervention group leaders also retained their sociometric status and popularity subsequent to the intervention. While the female intervention group leaders did suffer a significant decline in sociometric preference after their participation in the intervention, their overall social status still remained above that of their non-leader cohort peers.

All in all, our findings indicate that there appears to be minimal collateral reputational damage experienced by peer leaders who participate in prevention programming. This is important because the efficacy of peer leader prevention programming for the long term depends on the continuing positive influence of leaders trained as prevention agents in affecting the substance use behavior of their peers. Furthermore, we have found in this and other studies on the current sample (see Golonka et al. 2007 and Lansford et al. 2009) that for the 7th and 8th graders we surveyed there was a clear linkage between centrality/sociometric leadership and substance use prior to intervention as well as in our control cohort across time. Because young adolescent peer leaders are the earliest users of substances (also see Killea-Jones et al. 2007), when their own use declines (or fails to rise) as a function of their participation as prevention agents, their lower overall use should also have salutary long term effects on their “follower” peers given that their status remains

intact. Put another way, if selective prevention programming can change the substance use behavior of typically heavier-using central peers then it might be an economical channel for affecting the behavior of the entire network of peers in a collective unit. In the current sample we were not yet able to observe this significant trickle down to “follower” peers by early 8th grade. However, this is understandable. Since the substance use of the non-leader early teens was quite low, such a leader-modeled effect might not be able to be observed until the peer cohort is in its later teens. Indeed, since we found significant substance use reductions in our intervention peer leaders by the 8th grade, and since we found that, for the most part, they retained their social status, such a longer-term effect is plausible. We are currently investigating these longer-term effects. More importantly, with this discovery that advocacy of drug use reductions by peer leaders does not result in serious injury to their status, then future approaches designed with natural peer leader prevention models might also witness the success of the approach.

Despite the overall effect we discerned of intervention leader social status retention, it is nevertheless important to consider why the female intervention leaders experienced a significant (but not devastating) decline in sociometric nominations by their peers. As reported in the results, we found that the female leaders primarily experienced the decline in status because of a post-intervention reduction in the frequency of leadership nominations for them by their male - but not their female - peers. In light of a body of research that has indicated that a portal of entry for substance use among teenage girls is their growing associations with boys in both friendship and romantic relationships (Haynie 2003; Zimmer-Gembeck et al. 2003), it may well be that the efficacy of the prevention program in attenuating the substance use of female peer leaders resulted in their greater distancing from drug-using male peers, and hence their lower sociometric choice by those boys. Nevertheless, it is important that the female intervention leaders do retain their social status among their same-sex peers, and one might expect that they would have continued influence over the girls in their peer group.

One feature of the prevention trial used to estimate collateral effects in this study that should be noted is that our selected peer leaders were engaged in the construction of substance use prevention messages for *younger* cohorts rather for their age cohort of peers. This may be a quite important factor in their retention of social centrality in their peer groups and cliques. It is likely the case that teen peer leaders are better able to construe their advocacy for substance resistance as a positive social act and a consequence of their leadership attributes more easily when younger youth (rather than their same-age peers) are the targets of their influence attempts. This provides a relatively “safe” circumstance of advocacy while still promoting the kind of self-persuasion effects that occasion their own reduced tendency to use substances. In the circumstance in which peer leader programming is employed in same-age peer groups, one might observe a greater reduction in peer status among the leaders as a function of their advocacy. One might also observe less enthusiastic participation by the peer leaders because of their awareness of the status-deflating effects that might arise from public advocacy of the adult-approved and derived messages they would be asked to construct. By using the strengths of a teen’s leadership status and abilities for “low casualty, high gain” issues, one increases the probability of producing self-influence reductions in substance use

by the very subgroup of leaders who others have found to be at greatest risk for accelerated substance use over the teen years (see Miller-Johnson et al. 2003).

Limitations and Future Directions

One of the main limitations of the study is that two of the four groups of variables we assessed are reliant upon self-report measures. Self-report measures have evident limitations when exploring intervention-based changes because of the possibility of social desirability and demand characteristics. That said, three of the most significant findings were actually peer-rated measures, deriving from the sociometric nominations and SCM variables. Given the compatibility of the findings obtained with self-report vs. other-report measures, it does not appear that self-report biases could have accounted for the pattern of findings.

Another potential limitation of the study is the small leader sample. There are only 44 leaders in total and only 22 in the intervention cohort. Having a small leader sample does reduce the power and generalizability of the study. However, the fact that the results were still significant, even with the smaller number, indicates that the effects were very robust. Any peer leader intervention conducted in a single school will necessarily involve comparatively small samples since 7th and 8th grade teenagers in positions of leadership in their peer groups comprise approximately one-sixth of the population in any single sample. Clearly, however, increasing the size and diversity of both the larger cohort sample, and thus the size and diversity of the leader subgroup, would help to improve the generalizability of the results. The increased sample size would also allow for an analysis comparing the deviant leaders to the conventional leaders, which could indicate whether the intervention would benefit from tailoring it by leadership type (in addition to potentially being tailored by gender). A necessary future step will be to conduct the prevention protocol employed in this study with peer leaders and cohorts from multiple school contexts, in order to establish the efficacy of the intervention and the low rate of collateral problems, as well as to provide an opportunity to explore differences between variants of teenage leaders.

Given the somewhat negative unintended collateral consequences of the intervention found for females, who appear to lose some of their social status and influence as a result of the intervention, there are two obvious follow-up studies. The first is to attempt to tease out the reason for the sustained decline of liked-most and perceived popularity nominations for female leaders following the intervention. The second would be to determine if there is any way to mitigate this result through status-maintaining additions to the intervention protocol for both the peer cohort and peer leaders. Further, our supposition that the selective loss of sociometric status among the boys in the sample may have been the result of the intervention leader girls' lower engagement with substances requires empirical confirmation.

A final limitation of the current results of the prevention trial reported upon was that it was, at this point, only followed through the 7th and early 8th grade years when substance use is quite low (especially among the non-leaders). As we follow the data on these samples through their older teen years, it will paint a better and more compelling picture of the trickle-down of leader substance changes to "followers," as well as our examination of collateral status stability.

Despite these limitations, the study provides rather firm evidence that the use of peer leaders as prevention agents is a viable way to promote substance use resistance in them without a loss of the status necessary for these effects to spread to their peers.

Acknowledgments

This research was supported by National Institute on Drug Abuse (NIDA) Grants P20 DA017589-02 and P30 DA023026. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of NIDA. The first and second authors received support from the Duke University Vertical Integration Program and the first author also was funded by a Jacqueline Anne Morris Research Fellowship. The authors are grateful to the adolescents and teachers who participated in this research and to the staff of the Center for Child and Family Policy for their contributions to data collection.

References

- Bagwell CL, Coie JD, Terry RA, Lochman JE. Peer clique participation and social status in preadolescence. *Merrill Palmer Quarterly*. 2000; 45:280–305.
- Bandura, A. *Social learning theory*. New York: General Learning Press; 1977.
- Bot SM, Engels RCME, Knibbe RA, Meeus W. Friends' drinking and adolescent alcohol consumption: The moderating role of friendship characteristics. *Addictive Behaviors*. 2005; 30:929–947. DOI: 10.1016/j.addbeh.2004.09.012 [PubMed: 15893090]
- Cairns RB, Cairns BD, Neckerman HJ, Gest S, Garipey JL. Social networks and aggressive behavior: Peer support or peer rejection? *Developmental Psychology*. 1988; 24:815–823. DOI: 10.1037/0012-1649.24.6.815
- Cairns, RB.; Garipey, JL.; Kindermann, T. *Identifying natural clusters in natural settings*. Chapel Hill: University of North Carolina; 1991.
- Coie, JD.; Dodge, KA. Aggression and antisocial behavior. In: Damon, W.; Eisenberg, N., editors. *Handbook of child psychology*, 5th edition, Volume 3: Social, emotional, and personality development. New York: Wiley; 1998. p. 779–861.
- Costanzo P, Shaw M. Conformity as a function of age level. *Child Development*. 1966; 37:967–975. Retrieved from: <http://www.srce.org/>.
- DeRosier ME, Thomas JM. Strengthening sociometric prediction: Scientific advances in assessment of children's peer relations. *Child Development*. 2003; 74:1379–1392. DOI: 10.1111/1467-8624.00613 [PubMed: 14552404]
- Donaldson SI, Sussman S, MacKinnon DP, Severson HH, Glynn T, Murray DM, et al. Drug abuse prevention programming: Do we know what content works? . *American Behavioral Scientist*. 1996; 39:868–883. DOI: 10.1177/0002764296039007008
- Engels R, Scholte R, van Lieshout C, Kemp R, Overbeek G. Peer group reputation and smoking and alcohol consumption in early adolescence. *Addictive Behaviors*. 2006; 31:440–449. DOI: 10.1016/j.addbeh.2005.05.026 [PubMed: 16046078]
- Farmer TW, Rodkin PC. Antisocial and prosocial correlates of classroom social positions: The social network centrality perspective. *Social Development*. 1996; 5:174–188. DOI: 10.1111/j.1467-9507.1996.tb00079.x
- Farmer TW, Rodkin PC, Pearl R, Van Acker R. Teacher-assessed behavioral configurations, peer-assessments, and self-concepts of elementary students with mild disabilities. *Journal of Special Education*. 1999; 33:66–80. DOI: 10.1177/002246699903300201
- Flom PL, Friedman SR, Jose B, Curtis R. Peer norms regarding drug use and drug selling among household youth in a low-income 'drug supermarket' urban neighborhood. *Drugs: Education, Policy, and Prevention*. 2001; 8:219–232. DOI: 10.1080/09687630124478
- Gaughan M. The gender structure of adolescent peer influence on drinking. *Journal of Health and Social Behavior*. 2006; 47:47–61. DOI: 10.1177/002214650604700104 [PubMed: 16583775]
- Golonka, M.; Peairs, K.; Grimes, CL.; Costanzo, PR. Using natural peer leaders as substance use prevention agents: A preliminary trial. Paper presented at the 15th annual meeting of the Society for Prevention Research; Washington, D.C. 2007.

- Harrison PA, Fulkerson JA, Park E. The relative importance of social versus commercial sources in youth access to tobacco, alcohol, and other drugs. *Preventive Medicine*. 2000; 31:39–48. DOI: 10.1006/pmed.2000.0691 [PubMed: 10896842]
- Haynie DL. Contexts of risk? Explaining the link between girls' pubertal development and their delinquency involvement. *Social Forces*. 2003; 82:355–397.
- Hollingshead, AB. Four-factor index of social status. New Haven, CT: 1979. Unpublished manuscript
- Kandel DB, Adler I. Socialization into marijuana use among French adolescents: A cross-cultural comparison with the United States. *Journal of Health and Social Behavior*. 1982; 23:295–309. Retrieved from: <http://www.asanet.org/jhsb/index.cfm>. [PubMed: 6984448]
- Killea-Jones LA, Nakajima R, Costanzo PR. Peer standing and substance use in early-adolescent grade-level networks: A short-term longitudinal study. *Prevention Science*. 2007; 8:11–23. DOI: 10.1007/s11121-006-0053-2 [PubMed: 17013672]
- Lansford JE, Miller S, Malone PS, Costanzo PR, Grimes C, Putallaz M. Social network centrality and leadership status: Links with problem behaviors and tests of gender differences. *Merrill-Palmer Quarterly*. 2009; 55:1–25. [PubMed: 19763241]
- Miller-Johnson, S.; Costanzo, PR. If you can't beat 'em... have them join you: Peer-based interventions during adolescence. In: Kupersmidt, JB.; Dodge, KA., editors. *Children's peer relations: From development to intervention to policy: A festschrift in honor of John D Coie*. Washington, DC: American Psychological Association; 2004. p. 209–222.
- Miller-Johnson S, Costanzo PR, Coie JD, Rose MR, Browne DC, Johnson C. Peer social structure and risk-taking behaviors among African American early adolescents. *Journal of Youth and Adolescence*. 2003; 32:375–384. DOI: 10.1023/A:1024926132419
- Olds RS, Thoms DL. The relationship of adolescents' perceptions of peer norms and parent involvement to cigarette and alcohol use. *Journal of School Health*. 2001; 71:223–228. DOI: 10.1111/j.1746-1561.2001.tb01322.x [PubMed: 11512489]
- Rodkin PC, Farmer TW, Pearl R, Van Acker R. Heterogeneity of popular boys: Antisocial and prosocial configurations. *Developmental Psychology*. 2000; 36:14–24. DOI: 10.1037/0012-1649.36.1.14 [PubMed: 10645741]
- Steinberg L, Monahan KC. Age differences in resistance to peer influence. *Developmental Psychology*. 2007; 43:1531–1543. DOI: 10.1037/0012-1649.43.6.1531 [PubMed: 18020830]
- Sumter SR, Bokhorst CL, Steinberg L, Westenberg PM. The developmental pattern of resistance to peer influence in adolescence: Will the teenager ever be able to resist? *Journal of Adolescence*. 2009; 32:1009–1021. DOI: 10.1016/j.adolescence.2008.08.010 [PubMed: 18992936]
- Urberg KA, Degirmencioglu SM, Pilgrim C. Close friend and group influence on adolescent cigarette smoking and alcohol use. *Developmental Psychology*. 1997; 33:834–844. DOI: 10.1037/0012-1649.33.5.834 [PubMed: 9300216]
- Valente TW, Ritt-Olsen A, Stacy A, Unger JB, Okamoto J, Sussman S. Peer acceleration: Effects of a social network tailored substance abuse prevention program among high risk adolescents. *Addiction*. 2007; 102:1804–1815. DOI: 10.1111/j.1360-0443.2007.01992.x [PubMed: 17784893]
- Zimmer-Gembeck MJ, Siebenbruner J, Collins WA. A prospective study of intraindividual and peer influences on adolescents' heterosexual romantic and sexual behavior. *Archives of Sexual Behavior*. 2003; 33:381–394. doi: 0004-0002/04/0800-0381/0. [PubMed: 15162084]

Fig. 1.
Liked Most nominations over time as a function of gender and time

Fig. 2.
Leader nominations over time as a function of leader/cohort and gender

Comparison of intervention leaders vs cohort peers and intervention leaders vs control leaders on dependent variables before intervention (Time 1)

Table 1

Variable	Leader	Peers	df	t-value	p-value
Sociometric and Behavioral Nominations					
Liked most	1.27	-.15	1,159	-7.18	<.001
Liked least	.072	.05	1,159	-.11	ns
Perceived popularity	1.69	-.18	1,159	-10.06	<.001
Conventional leader	1.23	-.11	1,159	-6.48	<.001
Deviant leader	.89	-.12	1,159	-4.52	<.001
Social Cognitive Mapping Measures					
Leader nominations	6.22	.78	1,159	-10.35	<.001
Centrality subject	2.87	2.26	1,148	-4.06	<.001
Centrality of subject's group	2.52	1.77	1,148	-4.39	<.001
Leadership Self-perception Items					
Able to get people to do things	5.57	4.84	1,156	-2.19	<.05
Power to decide who is "in" and who is "out"	5.52	4.47	1,150	-2.45	<.05
Good at hanging out with lots of kids	6.52	5.44	1,156	-3.34	<.001
Cool	6.52	5.44	1,156	-3.34	<.001
Easy time getting boy/girlfriend	6.17	4.59	1,147	-3.45	<.001
Able to stand up for self and others	6.13	5.91	1,156	-.734	ns
Sociometric and Behavioral Nominations					
Liked most	1.27	.93	1, 44	-1.48	ns
Liked least	.72	.17	1, 44	.38	ns
Perceived popularity	1.69	.83	1, 44	-2.34	<.05
Conventional leader	1.23	1.40	1, 44	.52	ns
Deviant leader	.89	.59	1, 44	-.58	ns
Social Cognitive Mapping Measures					
Leader nominations	6.22	7.04	1, 44	.516	ns
Centrality subject	2.87	2.57	1, 44	-2.14	<.05
Centrality of subject's group	2.52	2.09	1, 44	-2.11	<.05
Leadership Self-perception Items					

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Variable	Leader	Peers	df	t-value	p-value
Able to get people to do things	5.57	4.91	1, 44	*analysis could not be done	
Power to decide who is “in” and who is “out”	5.52	3.80	1, 44		<.01
Good at hanging out with lots of kids	6.83	6.30	1, 44		<.05
Cool	6.52	5.93	1, 44		<.05
Easy time getting boy/girlfriend	6.17	4.98	1, 44		<.05
Able to stand up for self and others	6.13	6.17	1, 44	.129	ns

Table 2

MANOVAs testing overall significance of leader-cohort and gender differences over time

Variables	Effect	<i>df</i>	<i>F</i>	<i>p</i> -value
1. Conventional leader	time	4,564	.82	ns
2. Deviant leader	leader*time	4,564	1.23	ns
	gender*time	4,564	.70	ns
	leader*gender*time	4,564	.82	ns
1. Liked most	time	4,564	2.61	ns
2. Perceived popularity	leader*time	4,564	2.67	ns
	gender*time	4,564	10.69	<.001
	leader*gender*time	4,564	10.56	<.001
1. Leader nominations from social cognitive mapping	time	6,454	4.80	<.001
2. Centrality subject	leader*time	6,454	2.71	<.05
3. Centrality of subject's group	gender*time	6,454	2.32	<.05
	leader*gender*time	6,454	2.84	<.01

Table 3

ANOVAs of intervention leaders vs cohort peers and intervention leaders vs control leaders and gender differences over time

Variables	Effect	df	F	p-value
Leader-Cohort				
1. Liked most	time	2,282	2.59	ns
	leader*time	2,282	2.40	ns
	gender*time	2,282	2.32	ns
	leader*gender*time	2,82	3.82	<.05
2. Perceived popularity	time	2,282	.05	ns
	leader*time	2,282	.81	ns
	gender*time	2,282	9.80	<.001
	leader*gender*time	2,282	9.37	<.001
3. Leader nominations from social cognitive mapping	time	2,284	16.38	<.001
	leader*time	2,284	6.51	<.01
	gender*time	2,284	5.28	<.01
	leader*gender*time	2,284	7.78	<.001
4. Power to decide who's "in" and who's "out"	time	2,260	.40	ns
	leader*time	2,260	2.67	ns
	gender*time	2,260	.27	ns
	leader*gender*time	2,260	3.88	<.05
Leader-Leader				
5. Cool	time	2, 74	1.14	ns
	leader*time	2, 74	.59	ns
	gender*time	2, 74	1.82	ns
	leader*gender*time	2, 74	4.95	<.05
6. Able to stand up for self and others	time	2, 74	.77	ns
	leader*time	2, 74	.16	ns
	gender*time	2, 74	.80	ns
	leader*gender*time	2, 74	4.04	ns