Published in final edited form as:

Prev Sci. 2017 July ; 18(5): 555–566. doi:10.1007/s11121-017-0790-4.

Natural Peer Leaders as Substance Use Prevention Agents: The Teens' Life Choices Project

Megan M. Golonka*, Kristen F. Peairs*, Patrick S. Malone, Christina L. Grimes, and Philip R. Costanzo

Duke University

Abstract

In adolescent social groups, natural peer leaders have been found to engage in more frequent experimentation with substance use, and to possess disproportionate power to affect the behavior and social choices of their associated peer followers. In the current exploratory study, we used sociometrics and social cognitive mapping to identify natural leaders of cliques in a seventh grade population and invited the leaders to develop anti-drug presentations for an audience of younger peers. The program employed social-psychological approaches directed at having leaders proceed from extrinsic inducements to intrinsic identification with their persuasive products in the context of the group intervention process. The goals of the intervention were to induce substance resistant self-persuasion in the leaders and to produce a spread of this resistance effect to their peer-followers. To test the intervention, we compared the substance use behaviors of the selected leaders and their peers to a control cohort. The study found preliminary support that the intervention produced changes in the substance use behavior among the leaders who participated in the intervention, but did not detect a spread to non-leader peers in the short-term. This descriptive study speaks to the plausibility of employing self-persuasion paradigms to bring about change in high risk behaviors among highly central adolescents. In addition, it highlights the viability of applying social psychological principles to prevention work and calls for more research in this area.

Keywords

leaders; intervention; substance use; social networks

Experimentation with substances begins for some in early adolescence, and becomes increasingly normative through the high school years (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2014). Conformity to peers also peaks during middle school, as peer influence begins to supplant adult influence as a prime factor in shaping behavioral

Correspondence concerning this article should be addressed to: Megan M. Golonka, Duke University, Center for the Study of Adolescent Risk and Resilience, Box 90420, Durham, NC 27708-0086. Phone: 919-681-3927. Fax: (919) 668-6923. mgolonka@duke.edu.

*Both authors contributed equally to the paper and are listed in alphabetical order.

Compliance with Ethical Standards

The authors have no conflicts of interest. All procedures performed in studies involving human participants were in accordance with ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants.

norms, beliefs, and behaviors (Brown, Clasen, & Eicher, 1986; Costanzo & Shaw, 1966; Steinberg & Monahan, 2007). Theoretical accounts, empirical studies, and prevention trials have shown that social influences play a primary role in the adolescent initiation of drug use and abuse (e.g., Brechwald & Prinstein, 2011; Donaldson, et al., 1996; Harrison, Fulkerson, & Park, 2000; Kandel & Adler, 1982), and that social networks are important influencers of substance use (e.g., Alexander, Piazza, Mekos, & Valente, 2001; Ennett, Bauman, & Koch, 1994; Urberg, Degirmencioglu, & Pilgrim, 1997). Within the social network, adolescent clique leaders, in particular, hold tremendous sway over their followers and can shape their clique members' attitudes and behaviors regarding substance use (Miller-Johnson & Costanzo, 2004). Given the influence that leaders have over their peer groups, employing clique leaders is a potentially efficient prevention approach. However, the young adolescents who are most influential among their peers are also often among the most likely to use substances themselves (e.g., Allen, Porter, McFarland, Marsh, & McElhaney, 2005; Tucker, et al., 2012), which could render them unenthusiastic or disingenuous leaders of prevention programs. Together this raises interesting questions about the ways in which substance use intervention efforts can be designed to harness the natural dynamics of peer influence in adolescence.

The goal of this paper is to demonstrate the feasibility and promise of combining long-standing social psychological principles of influence with developmentally sound and evidence-based prevention strategies in order to prevent substance use among early adolescents. We present a unique method of engaging natural peer leaders as substance use prevention agents by inducing influential adolescent leaders (including those at risk for using substances or who already use them) to advocate for substance use desistance and prevention. We first review the role of peers in traditional school-based drug prevention programs, examine types of peer leaders, and summarize established principles of social influence before presenting the results from an exploratory study of a novel, school-based, peer-led intervention program.

Peer Influence and Traditional School-based Drug Prevention

Many school-based prevention programs include some form of peer leader involvement (see Cuijpers, 2002 and Tobler et al., 2000 for lists of peer-led programs), and studies have shown a positive benefit for the inclusion of peers as leaders (Cuijpers, 2002; Gottfredson & Wilson, 2003; Tobler et al., 2000). However, programs vary widely in the selection and roles of peer leaders, and few are specifically designed to optimize the promising positive aspects of peer influence by using natural peer leaders. Further, peer-led drug prevention programs have not been focused on the self-persuasive consequences of natural peer leader advocacy.

There have been a number of social influence-based drug prevention programs initiated in curricular contexts with variable success, but most programs appear to target refusal or resistance skills as the centerpiece of the peer influence related component (e.g., Botvin, Griffin, Diaz, & Ifill-Williams, 2001). A review of the effective components of school-based drug prevention programs did not find support for resistance training as a significant mediator in the success of the programs (Tobler et al., 2000; Lynam et al., 1999). An additional social influence approach to prevention has been the use of peer leaders as the

providers of drug abuse knowledge and/or peer influence resistance skills training (Arkin, Roemhild, Johnson, Luepker, & Murray, 1981; Perry et al., 1996; Price, Gioci, Penner, & Trautlein, 1993). Although such approaches have great promise because they acknowledge the centrality of peer-based sources of attitudinal and behavioral norms for adolescents, there are limitations to this work. Frequently, peer leaders in such programs serve ancillary roles to the adult program leaders (see Botvin, 2000), and are typically selected by adults or volunteer for leadership training. However, by deploying adult-sanctioned peer leaders who implicitly compete with natural adolescent group leaders in setting norms, most peer leader-based prevention programs are probably least effective with adolescents who function as deviant peer leaders and who may be at greatest risk for substance abuse (Miller-Johnson & Costanzo, 2004). A notable exception is the work by Valente and colleagues (e.g., Valente et al., 2003; Valente et al., 2007). Their work suggests peer-led programs are most effective when the composition of existing peer groups is considered in the selection of peer leaders and formation of groups, as well as when a positive peer influence approach is taken in contrast to the ineffective resistance approach. In fact, peer-led interventions employing natural peer leaders appear to be more effective than teacher-led interventions.

Heterogeneity of Adolescent Peer Leaders

Research has revealed notable heterogeneity in adolescent leadership within existing peer networks (e.g., Cairns, Cairns, Neckerman, Gest, & Gariepy, 1988; de Bruyn & Cillessen, 2006). There are *conventional* leaders, often considered “model” leaders, who hold positive and adult-sanctioned leadership roles (Miller-Johnson et al., 2003), but are also well-liked and rated as popular by their peers (Rodkin, Farmer, Pearl & Von Acker, 2000). Additionally, there are *unconventional* or *deviant* leaders, traditionally excluded from involvement in adult-sanctioned leadership positions, who hold great influence over their peers and are frequently considered to be more aggressive but popular and cool, setting trends and establishing risky behavior as the norm in social networks (de Bruyn & Cillessen, 2006; Miller-Johnson & Costanzo, 2004; Rodkin et al., 2000). These leaders appeal to adolescent followers who seek to define themselves as separate from adults (Miller-Johnson & Costanzo, 2004). Because they are central in cliques characterized by antisocial behavior, they may hold particular sway over adolescents who are inclined toward deviance and may be most in need of intervention to prevent risky behavior (Bagwell, Coie, Terry, & Lochman, 2000; Ellis & Zarbatany, 2007). It follows that inclusion of both types of leaders (conventional and deviant) should increase the success of substance use prevention programs. Without involving deviant leaders, intervention efforts may be limited in their impact on the rest of the social network, especially if the aim is to target antisocial peer groups in which deviant leaders are more likely to lead. Similarly, without conventional leaders the intervention may not impact the less aggressive or deviant groups.

When discussing deviant peer groups and leaders it is important to acknowledge the body of work demonstrating the iatrogenic effects of bringing adolescents with problem behavior together (see Dishion & Dodge, 2005). However, peer contagion research typically focuses on deviant adolescents who are grouped together because of their deviance rather than their leadership status. Indeed, when groups comprise uniformly “deviant” leaders, it is clear to them that the basis for gathering them is their shared deviance. An intervention that tries to

capitalize on the status and influence of the leaders involved, not their deviance, has potential to result in positive change. The challenge becomes designing an intervention that effectively persuades the leaders to “buy in” by advocating a prosocial goal without invalidating their standing among peers and, thus, the avenue by which change can spread. Furthermore, combining conventional and deviant leaders in the same working groups is expected to offset the potential for iatrogenic effects while ensuring that a representative sample of natural peer leaders is deployed.

Translating Principles of Social Influence into Intervention Format

From a developmental or socialization-based life course perspective, individual behavior and attitude change typically occur by proceeding from the extrinsic to the intrinsic. That is, the initial acquisition of new behaviors, beliefs and attitudes is likely to begin with externally imposed influences (such as peer leaders or highly credible adults), but extrinsic influences alone are not enough to bring about more lasting attitude or behavior change. Instead, the desired change reaches its culmination when the individual locates “self” as the intrinsic origin of those attitudes, behaviors and beliefs. In Kelman’s (1961) classic model of the microgenesis of social influence, the movement to internalization of attitudes and beliefs is mediated by a middle step of identification with the original external source of influence. This formulation implies that interventions can take advantage of the naturally occurring socialization process by using peer leaders to change the attitudes and behavior of other youth.

The second broad dimension employed in the social influence literature refers to the *centrality* or *peripherality* of the route to influence (Petty & Cacioppo, 1981; Petty, Wegener, & Fabrigar, 1997). *Central influence routes* allow an individual to carefully consider information presented in support of an argument and to deliberate and engage in behavior consistent with these deliberations. In contrast, *peripheral influence routes* are those that occur as a result of simple cues in the persuasion context in order to associate desirable people or desirable things with a particular object, belief or behavior. Peripheral cues (see Petty and Cacioppo, 1981) operate in automatic fashion and can induce change without necessitating scrutiny of the true merits of the information presented, whereas central cues are the product of a deliberative process. In much of the literature on social influence, peripheral cues are described as resulting in a more rapid and immediate, but less enduring, effect on attitudes than central cues (see Eagley & Chaiken, 1993). The central route and the effortful processing it promotes engender more enduring attitude change. Thus, in developmental or socialization-based contexts, it is important to arrange a sequence of attitude socialization efforts from initial, peripheral influence to subsequent central processing of information-rich sources.

Lastly, classic models of cognitive consistency derived from social psychology (Aronson, 1968; Nel, Helmreich & Aronson, 1969) would suggest that the extent to which leaders in an intervention adopt the prosocial advocacy goal they are being asked to promote (e.g., discourage risky substance use behaviors) would result in self-persuasion and, thus, an actual reduction in the same behaviors they are advocating for others (e.g. positive substance use choices and abstinence). Indeed, Stice and colleagues (2013) have demonstrated that the

deployment of the dissonance-based self-persuasion principle has lasting effects on the reduction in eating disorder symptoms in college females. It follows that this principle could be just as easily applied to substance use in an adolescent population.

The Current Study

Combining extant research on the principles of cognitive dissonance, social influence, and self-persuasion, along with social network analysis, the current study was designed to harness peer influence by changing the attitudes and behaviors of the most influential students and, in turn, trying to change the attitudes and behaviors of their peers. We enlisted natural adolescent leaders of cliques, including both deviant and conventional, with the premise they were being recruited to create and deliver anti-drug messages to younger students at their school. Our goal was not to determine whether they succeeded in their public efforts to prevent substance use in younger cohorts (who were less likely to invalidate leaders' standing among same-grade peers). Instead, we wanted to explore the feasibility of an intervention that would induce adolescent leaders to adopt a prosocial advocacy goal (i.e., substance use prevention), resulting in their own self-persuasion that would potentially spread among their same-aged peers in their grade given their position of social influence. While exploratory and descriptive in nature, the current study aims to answer specifically 1) Did the intervention leaders reduce their substance use behavior as compared to leaders in a control cohort?; and 2) If so, is there a similar reduction in substance use among non-leader peers in the intervention cohort compared to non-leader peers in the control cohort?

Method

Participants

Universal sample—The study involved one magnet school (grades 6–12) specializing in the arts in a mid-size Southeastern city. Magnet school attendance is popular in this school district, where one-third of all students attend one of the district's 23 magnet schools. Magnet attendance is determined via lottery, with any student in the county eligible to enter. Twenty-five percent of students at the school receive free or reduced lunch, versus 47% of students in the district at large. All 7th grade students in two consecutive school years were invited to participate. Parent consent and student assent were obtained for 83% and 80% of the respective cohorts. Data were collected from 324 students across two cohorts in consecutive grades at the same school; the control cohort (CC) study was conducted one year ahead of the experimental cohort (EC). See Figure 1 for a chart of participant flow. At Time 1, the mean age of the students in both the EC and the CC was 12.2. The gender ratio in the EC (98 females, 61 males) was different from the gender ratio in the CC (84 males, 84 females), $\chi^2(1, 327) = 4.48, p = .034$. Average socioeconomic status scores were calculated using the Hollingshead Four Factor Index of Socioeconomic Status (1975). The EC and CC cohorts were respectively $M = 42.00, SD = 13.98$, and $M = 42.54, SD = 13.01$, and not significantly different from one another, $t(304) = -0.35, p = .728$. The EC included 70 African Americans (44%), 62 European Americans (39%), 11 Latinos (7%), 12 multi-ethnic students (7%), and 4 students from other races (3%). The CC was comprised of 79 African Americans (47%), 68 European Americans (40%), 12 Latinos (7%), 5 multi-ethnic students

(3%), and 4 students from other ethnicities (3%). There was no group difference in the ethnic distributions between the two cohorts, $\chi^2(5, 327) = 3.50, p = .623$, or between consented participants in relation to the larger population of the school.

Leader sample—The most influential conventional and deviant leaders were selected from the EC to participate in the Teens' Life Choices (TLC) intervention program. In order to ensure the selected leaders represented multiple cliques, ethnic groups, and both genders, the following selection process was used: 1) Social Cognitive Mapping (SCM – discussed further in *Measures* section) was used to identify the top two highly nominated members from each clique. 2) Standardized scores above one standard deviation on two peer nominations (discussed further in *Measures* section) were used to classify students as a conventional or deviant leader. 3) Students who met the criteria were then selected for participation with the goal of representing both leadership types (conventional and deviant) as well as both genders and multiple ethnicities. Selected leaders from the EC were told by a member of the project staff at school that they were selected by their peers as leaders and were invited to participate in the TLC Project so they could use their status to help other kids stay away from drugs. All 23 students who were selected obtained parental consent and agreed to participate (12 conventional leaders; 11 male; 12 European-American, 7 African American, and 4 students from other ethnicities). The same selection process was employed in the CC to establish a leader control group (selected CC leaders did not actually participate in the intervention program). Specifically, each EC leader was matched with a leader in the CC on measures of SCM centrality, conventional and deviant peer nomination scores, race, and gender (12 conventional leaders; 11 male; 11 European-American, 11 African-American, and 1 student from another ethnicity).

Procedures

Universal survey—All students were surveyed at three time points: once in October (Time 1) and once in May (Time 2) of their 7th grade school year, and again in October (Time 3) of their 8th grade year. Project staff administered a survey to all consenting students in each cohort during two 50-minute class periods in a regular classroom setting. Students received \$5 for completing the survey at each time point. The 60-page survey included measures across multiple dimensions such as peers, friendship, dating, ethnic identity, and behavioral and psychological adjustment. Substance use items were a small part of the survey and were not highlighted as its focus.

The Teens' Life Choices Project—The TLC Project consisted of sixteen 50-minute sessions at school. (See Table 1 for more detailed summary of curriculum and social psychological principles). The 23 selected leaders in the EC met with project staff twice per week for eight weeks during their homeroom period. The program began three months after the initial universal survey and ended two months before the Time 2 universal survey in the spring of seventh grade. Leaders were invited to work in groups to create novel anti-drug messages to present to sixth graders at school. Students were encouraged to explore existing anti-drug advertising campaigns and share impressions of what was effective. The curriculum included topics such as leadership, effective messages, and the dissemination of non-judgmental, scientifically sound information about alcohol, tobacco, and marijuana.

Authority stars from a local university assisted with the TLC project as part of a psychology/public policy course. These students were highly visible at the university in some way (e.g., athletes, student government leaders, musicians, artists etc.). Authority stars' level of involvement was decreased gradually over the course of the intervention, with the expectation that participants would progress from extrinsically-motivated participation to individual identification with the persuasive messages they created. At the conclusion of the program, the leaders presented their anti-drug messages in skit and video form to sixth graders at their school in a special assembly.

Measures

Social Cognitive Map (SCM)—Procedures developed by Cairns, Garipey, and Kindermann (1991) were used to identify social groups within the seventh grade. The students were first asked “Are there some kids here in your grade who hang around together a lot?” They were then instructed to list together the names of all the children who hang around together and to name all the groups that they could. Students were not provided with a roster of names for this task. The software SCM version 4.0 was used to find groups within a social network based on the Cairns et al. (1991) SCM procedure. The selection 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 to define individuals' level of centrality within the group (ranging from peripheral members who are infrequently nominated as being members of the clique, to the nuclear members who are frequently nominated as being members of the clique). The program also identifies the level of centrality of each clique within the grade-wide network.

Sociometric nominations—Students were provided with a roster of all of the students in their grade at their school and asked to make unlimited nominations of peers who fit various behavioral and social influence descriptors. To assess *conventional leadership*, students circled the names of students who were “leaders and good to have in charge.” To assess *deviant leadership*, students circled the names of students who were “good at getting other kids to break the rules.” The packaged computer program Sociometric Collection and Analysis version 5.0.5 (DeRosier & Thomas, 2003) was used to create standardized scores for individual items.

Substance use—Students were asked to report on their own substance use in the past 30 days. Frequency of alcohol use, tobacco use, and marijuana use were measured by three separate self-report questions “On how many days in the last month (30 days) did you [have an alcoholic drink; smoke a cigarette; smoke marijuana]?” with response choices 0=*None*; 1= *1 to 2 days*; 2= *3 to 5 days*; 3= *6 to 9 days*; 4= *10 to 19 days*; 5= *20 to 31 days*. An additional question was asked of students who reported drinking alcohol in the past 30 days to assess degree of alcohol consumption in a drinking episode: “On the days you drink alcohol, about how many drinks do you have?” with response categories ranging from 1= *less than 1 drink* to 5= *5 or more drinks*. Finally, to assess an individual's peer group climate of substance use, students were asked to self-report on how many of their friends use alcohol, tobacco and marijuana by answering three separate questions “About how many of your friends [drink alcohol; use tobacco; smoke marijuana]?” with responses choices 0 =

None, 1 = *1 or 2*, 2 = *Some*, 3 = *Most*, and 4 = *All*. Table 2 summarizes the descriptives for all seven substance use variables used in analyses.

Analytic strategy

To answer the first research question, a series of independent *t*-tests compared TLC leaders from the EC to matched leaders in the CC on the seven substance use questions post-intervention at Time 2 and Time 3. Additionally, a series of paired *t*-tests examined differences from Time 1 to Time 3 on the seven substance use questions within the EC and CC leader groups separately to assess change over time. The same set of analyses was employed to address the second research question, this time comparing the non-leader peers in the EC to the non-leader peers in the CC on the seven substance use questions. Table 3 summarizes the post-intervention between-group comparisons at Time 2 and Time 3, and Table 4 summarizes the within-group comparisons across time from Time 1 to Time 3. The results section takes a descriptive approach and concentrates not only on significant differences revealed by the *t*-tests but also on meaningful patterns of mean difference scores and Hedges' *g* effect sizes, which is interpretable as Cohen's *d* but incorporates an adjustment for small samples. Due to the small sample size for several analyses, a pairwise deletion strategy was employed in all analyses to maximize all data available on an analysis by analysis basis (Table 2 summarizes all available data).

Results

Pre-Intervention

To establish any baseline differences a series of analysis of covariance (ANCOVAs) were conducted comparing leaders and their peers, controlling for cohort, on the seven substance use variables at Time 1. Leaders, not surprisingly, reported using alcohol, $F(1, 314) = 14.76$, $p = .000$, and marijuana, $F(1, 315) = 10.92$, $p = .001$, more days in a month than their grade-mate peers. No differences between leaders and their peers were found for self-reported tobacco use, $F(1, 317) = 2.60$, $p = .108$, or number of alcoholic drinks consumed in a drinking episode, $F(2, 314) = 0.01$, $p = .934$. Furthermore, leaders self-reported having more friends that smoke tobacco, $F(1, 318) = 4.86$, $p = .028$, and marijuana, $F(2, 329) = 7.97$, $p = .005$, than did their grade-mate peers. Differences in number of friends using alcohol were not found between leaders and peers.

Post-Intervention

The EC leaders were compared to the CC matched leaders at Time 2 (block 1 of Table 3). The point estimates and effect sizes for the differences indicate an emerging pattern in which CC leaders' report greater use and number of friends using substance relative to EC leaders at Time 2, with number of alcoholic drinks consumed being a significant difference. This pattern is continued and is more pronounced by Time 3 (block 3 of Table 2). Point estimates and effect sizes continue to show a pattern suggesting that leaders in the CC had higher self-reports on all substance use variables when compared to the EC leaders involved in the intervention, with significant differences found for alcohol use in past month and number of friends using all three substances. Next, we examined whether substance use increased across time within the two leader groups (blocks 1 and 2 of Table 3). A pattern of positive

point estimate and effect sizes indicate CC leaders increased from Time 1 to Time 3 on all the substance use measures (with alcoholic drink consumption, number of friends who use alcohol and marijuana significant) and, conversely, a pattern of negative point estimates and effect sizes indicate the EC leaders involved in the intervention demonstrated declines from Time 1 to Time 3 on all seven of the substance use variables (with number of friends being significant). An examination of the confidence intervals between the two leader groups reveal that with only one exception (tobacco use in the past month) the point estimate difference for the CC leaders falls outside the confidence interval limits of the differences for EC leaders on the remaining six measures. This is further supported by direct contrasts which revealed number of alcoholic drinks consumed in drinking episode, $F(1, 38) = 7.44$, $p = .010$, marijuana use in the past month, $F(1, 39) = 3.30$, $p = .077$, reported number of friends who smoked tobacco, $F(1, 39) = 6.69$, $p = .014$, drank alcohol, $F(1, 39) = 2.89$, $p = .097$, and smoked marijuana, $F(1, 39) = 3.41$, $p = .072$, were significant or approaching significance. Together this provides preliminary support that EC leaders did not show significant increase in any variable and appear to be avoiding the increase. This pattern is clear, even if only some are in the significant range.

Given the initial evidence that the leaders involved in the intervention did appear to experience reduction (or suppression) regarding their substance use, the second aim of the intervention was to determine whether this spread to their cohort peers who were not directly involved in the intervention themselves but may have been influenced by way of their interactions with the leaders in their cohort. As such, the non-leader peers in the EC were compared to the non-leader peers in the CC at Time 2 and Time 3 on the seven substance use variables (blocks 2 and 4 of Table 3). Unfortunately, at neither time point is there any pattern to the point estimates or effect sizes to suggest the non-leader peer group in the EC had lower reports when compared to the non-leader peers group in the CC. This is further supported by the comparisons across time in Table 3 (blocks 3 and 4 of Table 4) where point estimates and effect sizes indicate both groups of non-leader peers generally increase across time on all measures of substance, with alcohol and marijuana use in the past month, and number of friends using alcohol and marijuana significant for both groups. Taken together, the current results do not support preliminary evidence for a spread effect of the intervention to the peers of the leaders in the EC in the short-term.

Discussion

Findings from the current study provide initial support that using social psychological principles of influence in an intervention format promotes attitudinal and behavioral change for young adolescent intervention leaders. We know from previous research that both conventional and deviant leaders are at higher risk for substance use than their non-leader peers (e.g., Miller-Johnson et al., 2003; Costanzo, Lansford, Polanichka, Chu, & Arrington, 2005), and this exploratory intervention appears to have had, at least in the short-term, the desired effect on high-risk individuals who have the potential to influence others. By providing the adolescents with the choice to create messages designed to get younger students to avoid the use of drugs, classic social psychological principles would suggest that the intervention leaders subsequently internalized and re-identified with anti-drug values. In this prevention trial, we see shades of cognitive dissonance research re-confirmed. Such

reasoning has already been applied to other analyses of the applicability of now classic cognitive dissonance approaches to changes in socially embedded attitudes and associated behaviors (see Stice et al., 2008; Cooper & Aronson, 1992). Encouraging adolescents to create their own messages and advocate for them are important elements of the Teens' Life Choices intervention and serve as components of the peripheral route to persuasion (i.e., the route not strictly due to the message itself), as evidenced by the intervention leaders' decrease in substance use and the suppression of an increase in substance use over time.

The results for substance reduction/suppression among the leaders also lends support to the notion that deviant peer contagion can be mitigated by certain conditions or groups, and that deviancy training is less of a concern when adolescents participate in highly structured programs that do not emphasize participants' own engagement in deviant behaviors (Dishion & Dodge, 2005). Our mix of deviant and prosocial leaders also conveyed to participants that their influential status is the factor that brought them together in groups, and we reinforced this by telling them that they were selected to participate because their peers consider them leaders.

In contrast to the preliminary support of the intervention's effectiveness in reducing substance use among the leaders themselves, this preliminary trial did not find compelling evidence of a spread effect to their peers, which was a second aim of the intervention. Even though intervention leaders self-reported stable or declining numbers of friends using substances relative to increasing reports provided by the matched leaders in the control cohort, these differences in self-report measures of the peer climate did not translate to what the peers in their cohort actually reported regarding their own substance use (as peers in both cohorts self-reported greater use over time). As such, we can only preliminarily conclude the intervention had an impact on substance use behavior and perception of their friends' substance on the leaders involved in the intervention, but the "trickle-down" to a reduction or change in the larger peer group was not detected. The failure to detect spread to the cohort peers is not surprising considering that, prior to the start of the intervention, peer substance use (as contrasted with leaders' use) is reported at very low frequency. Further change downward is very limited by a floor effect. Additionally, "trickle down" influence likely takes time, so it is possible that the spread would reveal itself as a delayed effect if peers were tracked into later grades when an increase in substance use is likely. Furthermore, the manipulation used in this study might result in a spread of effect with the help of continued "booster" sessions for leaders as they traverse later adolescence.

Limitations

The measures of substance use in the current study were coarse measurements of this type of behavior, and the lack of more data points post-intervention were limitations of this study. Implementing a more nuanced measurement of substance use, such as daily diary, might enhance the ability to better track spread in real-time as opposed to static and retrospective measurements used in the current study. Following participants into later adolescence with these measures would also provide more information about the possible delayed effects of the intervention. Additionally, the preliminary and exploratory nature of the current study allowed for looking at the substances separately, but certainly these measures are related,

and additional studies would benefit from more detailed tests of whether such interventions better target certain substances over others. Although the sample was too small to take race into account in a meaningful way, the fact that the effects sustain significance in a mixed race group suggests that whatever statistical error that might arise from analyzing adolescents of different races together is not sufficient to defeat the overall effect.

In this intervention trial, the control and experimental groups were in the same school and were surveyed during different academic years, introducing the potential for history confounds. To guard against this, we could have surveyed a control cohort of seventh graders at the same time as the experimental cohort in a different school, which would bring with it its own confounds. Additionally, the school required lottery entry, and the lower free and reduced lunch rate as compared to the district at large suggests that this sample may be a relatively higher socioeconomic status than average for the geographic area, thus increasing the likelihood of selection effects. Replication of this intervention method must be tested further in multiple schools to address current limitations and to begin to understand what is generalizable from this exploratory trial.

The fact that peer leaders comprise a small part of our sample raises reliability questions. Yet, by definition, the most influential adolescent clique leaders are only a small percentage of the school's population as they reflect the group of "elite" peers that should come to wield influence over their peers. We acknowledge that analyses based on the leader (and matched) subsample have relatively low statistical power but feel the results show a meaningful rather than spurious pattern of results that is worthy of a replication trial with a larger sample. We believe replication is further validated by findings from a recently published large-scale multi-site study in which influential students, or "social referents", effectively influenced social norms and behaviors of their peers, producing greater change in perceived norms of conflict at the school climate level (Paluck, Shepherd, & Aronow, 2016). Although our study has limitations due to its sample size and the results are preliminary, our proposal to use natural leaders as contagion agents for positive behavioral change among peers serves as a promising addition to the growing array of intervention studies that have examined similar methods of influence. In this respect it is an initial demonstration that the use of self-persuasion approaches with notable adolescent leaders serve as a potentially fruitful direction for substance use intervention in early teens.

Conclusions and Implications

This study included a number of strengths, such as the use of longitudinal data, peer ratings of social groups, and a mixed-race sample of early adolescents. Furthermore, the results of this study highlight the viability of applying social psychological principles to preventive intervention with adolescents to bring about change in high risk behaviors among those for whom substance use is most likely. To our knowledge, dissonance-based principles of attitude and behavior change processes have yet to be specifically applied to substance use prevention programs for young adolescents. As principles of influence from classic models of social psychology would predict, adolescents' self-identification with their own creation of a prosocially motivated message appears to have been effective for the leaders in this intervention trial. This self-persuasion dynamic used in the current intervention trial shows

promise as a useful component of educationally situated models of prevention of and intervention in substance use during early adolescence - the peak years for alcohol and drug use initiation.

In a larger sense, the findings of this study suggest that prevention science and practice can be enhanced when the targets of prevention are made to serve as the agents of their own change. This lesson derives from a long history of social psychological research and theory demonstrating that passive recipients of influential communications are less likely to be affected by those communications than those who actively listen and/or behaviorally commit to the message, especially when the topic of influence is one of high personal relevance. Further, this study lends support to the notion that peer support and mutual involvement in early adolescent subgroups are invaluable components in effective drug prevention efforts. In the current intervention, the interactive peer context, the creative influence-directed co-products issuing from that context, and the motivated participation of the teens were likely critical elements in preventing increased substance use among peer leaders. Further development of models that induce behavioral commitment in youngsters provides a promising channel for future substance use prevention efforts. As the old Chinese proverb goes: "Tell me, and I'll forget. Show me and I'll remember. Involve me and I'll understand." This ancient proverb has been demonstrated repeatedly in the study of the social psychology of persuasion. This is fertile ground to till for future developments in the science of preventative intervention.

Acknowledgments

This manuscript was supported by NIDA grants 1 P20 DA017589-02 and P30 DA023026.

References

- Alexander C, Piazza M, Mekos D, Valente T. Peers, schools, and adolescent cigarette smoking. *Journal of Adolescent Health*. 2001; 29:22–30. [PubMed: 11429302]
- Allen JP, Porter MR, McFarland FC, Marsh P, McElhaney KB. The two faces of adolescents' success with peers: Adolescent popularity, social adaptation, and deviant behavior. *Child Development*. 2005; 76:747–760. [PubMed: 15892790]
- Arkin RM, Roemhild H, Johnson C, Luepker R, Murray D. The Minnesota smoking prevention program: A seventh-grade health curriculum supplement. *Journal of School Health*. 1981; 51:611–616. [PubMed: 6913699]
- Aronson, E. Dissonance theory: Progress and problems. In: Abelson, R. McGuire, W. Newcomb, T. Rosenberg, M., Tannenbaum, P., editors. *Theories of Cognitive Consistency: A Source Book*. Chicago: Rand McNally; 1968.
- Botvin GJ. Preventing drug abuse in schools: Social and competence enhancement approaches targeting individual-level etiologic factors. *Addictive Behaviors*. 2000; 25:887–897. [PubMed: 11125777]
- Botvin GJ, Griffin KW, Diaz T, Ifill-Williams M. Drug abuse prevention among minority adolescents: Posttest and one-year follow-up of a school-based preventive intervention. *Prevention Science*. 2001; 1:1–13.
- Brechwald WA, Prinstein MJ. Beyond homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence*. 2011; 21:166–179. [PubMed: 23730122]
- Brown BB, Clasen DR, Eicher SA. Perceptions of peer pressure, peer conformity dispositions, and self-reported behavior among adolescents. *Developmental Psychology*. 1986; 22:521–530.

- Cairns, RB., Gariepy, JL., Kindermann, T. Identifying social clusters in natural settings. University of North Carolina at Chapel Hill; 1987. Unpublished manuscript
- Cooper, J., Aronson, J. Attitudes and consistency theories: Implications for mental health. In: Ruble, DN., Costanzo, PR., Oliveri, ME., editors. *The social psychology of mental health: Basic mechanisms and applications*. New York: Guilford; 1992. p. 279-300.
- Costanzo, PR., Lansford, JE., Polanichka, N., Chu, R., Arrington, K. Factors that differentiate deviant and conventional leaders of adolescent peer groups: Implications for drug use prevention efforts; Paper presented at the meeting of the Society for Prevention Research; Washington, DC: 2005 May.
- Costanzo PR, Shaw ME. Conformity as a function of age level. *Child Development*. 1966; 37:967–965.
- Cuijpers P. Effective ingredients of school-based drug prevention programs: A systematic review. *Addictive Behaviors*. 2002; 27:1009–1023. [PubMed: 12369469]
- De Bruyn EH, Cillessen AHN. Popularity in early adolescence: Prosocial and antisocial subtypes. *Journal of Adolescent Research*. 2006; 21:607–627.
- DeRosier M, Thomas JM. Strengthening sociometric predictors: Scientific advances in the assessment of children's peer relations. *Child Development*. 2003; 75:1379–1392.
- Dishion TJ, Dodge KA. Peer Contagion in Interventions for Children and Adolescents: Moving Towards an Understanding of the Ecology and Dynamics of Change. *Journal Of Abnormal Child Psychology*. 2005; 33(3):395–400. [PubMed: 15957566]
- Donaldson SI, Sussman S, MacKinnon DP, Severson HH, Glynn T, Murray DM, Stone EJ. Drug abuse prevention programming: Do we know what content works? *American Behavioral Scientist*. 1996; 39:868–883.
- Eagley, AE., Chaiken, S. *The psychology of attitudes*. Orlando, FL: Harcourt Brace Jovanovich, Inc; 1993.
- Ennett ST, Bauman KE, Koch GC. Variability in cigarette smoking within and between adolescent friendship cliques. *Addictive Behaviors*. 1994; 19:295–305. [PubMed: 7942247]
- Gottfredson DC, Wilson DB. Characteristics of effective school-based substance abuse prevention. *Prevention Science*. 2003; 4:27–38. [PubMed: 12611417]
- 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. [PubMed: 10896842]
- Hollingshead, AA. *Four-factor index of social status*. Yale University; New Haven, CT: 1975. Unpublished manuscript
- Johnston, LD., O'Malley, PM., Miech, RA., Bachman, JG., Schulenberg, JE. *Monitoring the Future national results on drug use: 1975–2013: Key findings on adolescent drug use*. Ann Arbor: Institute for Social Research, University of Michigan; 2014.
- 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. [PubMed: 6984448]
- Kelman HC. Processes of opinion change. *The Public Opinion Quarterly*. 1961; 25:57–78.
- Lynam DR, Milich R, Zimmerman R, Novak SP, Logan TK, Martin C, Leukefeld C, Clayton R. Project DARE: No effects at 10-year follow-up. *Journal of Consulting and Clinical Psychology*. 1999; 67:590–593. [PubMed: 10450631]
- 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.
- Miller-Johnson, S., Costanzo, P. If you can't beat 'em...induce them to join you: Peer-based interventions during adolescence. In: Kupersmidt, JB., Dodge, KA., editors. *Children's Peer Relations from Development to Intervention: Decade of behavior*. Washington, DC: American Psychological Association; 2004. p. 209-222.
- Nel E, Helmreich R, Aronson E. Opinion change in the advocate as a function of the persuasibility of his audience: A clarification of the meaning of dissonance. *Journal of Personality and Social Psychology*. 1969; 12:117–124. <http://dx.doi.org/10.1037/h0027566>. [PubMed: 5784713]

- Perry CL, Williams CL, Veblen-Mortenson S, Toomey TL, Komro K, Anstine P, McGovern PG, Finnegan JR, Forster JL, Wagenaar AC, Wolfson M. Project Northland: Outcomes of a community wide alcohol use prevention program during early adolescence. *American Journal of Public Health*. 1996; 86:956–965. [PubMed: 8669519]
- Petty, RE., Cacioppo, JT. Attitudes and persuasion: Classic and contemporary Approaches. Dubuque, IA: Wm. C. Brown; 1981.
- Petty RE, Wegener DT, Fabrigar LR. Attitudes and attitude change. *Annual Review of Psychology*. 1997; 48:609–647.
- Price, RH., Gioci, M., Penner, W., Trautlein, B. Webs of influence: School and community programs that enhance adolescent health and education. In: Takanishi, R., editor. *Adolescence in the 1990's: Risk and Opportunity*. New York: Teachers College Press; 1993. p. 29-63.
- Rodkin PC, Farmer TW, Pearl R, Van Acker R. Heterogeneity of popular boys: Antisocial and prosocial configurations. *Developmental Psychology*. 2000; 36:14–24. [PubMed: 10645741]
- Sheppard CS, Golonka M, Costanzo PA. Evaluating the impact of a substance use prevention program on the peer status and influence of adolescent peer leaders. *Prevention Science*. 2012; 13:75–85. [PubMed: 21935657]
- Steinberg L, Monahan KC. Age differences in resistance to peer influence. *Developmental Psychology*. 2007; 43:1531–1543. [PubMed: 18020830]
- Stice E, Butryn ML, Rohde P, Shaw H, Marti CN. An effectiveness trial of a new enhanced dissonance eating disorder prevention program among female college students. *Behavior Research Therapy*. 2013; 51:862–71.
- Stice EC, Marti N, Spoor S, Presnell K, Shaw H. Dissonance and healthy weight eating disorder prevention programs: long-term effects from a randomized efficacy. *Journal of Consulting Clinical Psychology*. 2008; 76:329–340. [PubMed: 18377128]
- Tobler NS, Roona MR, Ochshorn P, Marshall DG, Streke AV, Stackpole KM. School-based adolescent drug prevention programs: 1998 Meta-analysis. *Journal of Primary Prevention*. 2000; 4:275–336.
- Tucker JS, Miles JNV, D'Amico EJ, Zhou AJ, Green HD, Shih RA. Temporal associations of popularity and alcohol use among middle school students. *Journal of Adolescent Health*. 2013; 52:108–115. [PubMed: 23260843]
- Urberg KA, Degirmencioglu SM, Pilgrim C. Close friend and group influence adolescent cigarette smoking and alcohol use. *Developmental Psychology*. 1997; 33:834–844. [PubMed: 9300216]
- Valente TW, Hoffman BR, Ritt-Olson A, Lichtman K, Johnson CA. Effects of a social-network method for group assignment strategies on peer-led tobacco prevention programs in schools. *American Journal of Public Health*. 2003; 93:1837–1843. [PubMed: 14600050]
- Valente TW, Ritt-Olson A, Stacy A, Unger JB, Okamoto J, Sussman S. Peer acceleration: Effects of a social network tailored substance use prevention program among high-risk adolescents. *Addiction*. 2007; 102:1804–1815. [PubMed: 17784893]

Figure 1.
Participant flow chart for the Teens' Life Choices Project

Table 1

Curriculum and Social Psychological Principles Overview of the TLC's Intervention Program

Session	Topics Covered	Social Psychological Principles		
		Extrinsic Motivation	Peripheral Influence Routes	Stages of Influence
Session 1: Leadership	<ul style="list-style-type: none"> Introduce program, explain that students were chosen to participate because they are seen as leaders by their peers. Introduce facilitators and <i>Authority Stars</i> (high profile college students). Students learn about the Authority Stars through a Press Conference activity, and discuss "leadership" and "the responsibility of using leadership skills positively". 	Learning that peers chose them as leaders;	Authority Stars promote anti-drug and positive leadership messages;	Compliance
Session 2: Leadership Cont'd	<ul style="list-style-type: none"> Students assigned to small groups for introductions, ground rules, icebreaker. Students continue to learn about the influence they have with others as leaders, and reflect on their own leadership roles. Leadership interviews with Authority Stars prompt students to examine their own talents, attitudes, and behaviors as leaders, and how they might affect others. 	Missing class to participate in sessions;	Cues operate in automatic fashion;	
Session 3: Drug Basics	<ul style="list-style-type: none"> Guest lecture by pharmacologist: "Drug Basics". Students discuss how they would translate the "Drug Basics" information if they were going to share it with friends or younger students. Introduce <i>rolling library</i> – a resource full of scientifically accurate reference materials about substance use. 	Engaging with Authority Stars	Rapid, immediate effect on attitudes	
Session 4: Anti-drug messages	<ul style="list-style-type: none"> Students discuss and critique existing anti-drug messages. Students meet in small groups to brainstorm for their own anti-drug projects. Authority Stars lead discussion and facilitate small groups. 			
Session 5: Project Planning	<ul style="list-style-type: none"> Students participate in an activity designed to help them identify the different talents of their group members. Groups decide on the medium and theme of their own anti-drug messages, establish a general framework for presentations, and delegate responsibilities. 	Identification with external source of influence (Authority Stars)		Identification
Sessions 6-9: Drug Facts and Project Planning	<ul style="list-style-type: none"> Each of these sessions focus on one specific substance topic: alcohol, marijuana, tobacco, and other illicit drugs. In each session, students discuss prevalence of the substance in our society, reasons why people might choose to use that substance, and possible positive/negative consequences of using the substance. Students participate in games/activities to learn scientific facts about substances. Students complete project planning worksheets to synthesize information and plan projects. They browse the rolling library for project materials. 			
Sessions 10-13: Project Work/ Boosters	<ul style="list-style-type: none"> Students participate in brief "booster" activities to review information they learned about alcohol, marijuana, tobacco, other drugs, and leadership. Students work on their persuasive anti-drug projects. 			
Sessions 14-15: Project Work	<ul style="list-style-type: none"> These sessions will be specifically devoted to group project work. 			
Session 16: Project Rehearsal	<ul style="list-style-type: none"> Groups will share their presentations and hear feedback from facilitators and other groups before presenting to younger students. 			
		Intrinsic Motivation	Central Influence Routes	Internalization
		Internalization of the attitudes and beliefs that they heard from Authority Stars and they will share with younger students	Work on projects and research about substances requires effortful processing; Promotes enduring attitude change	

Table 2

Descriptives for substance use variables across time for experimental and control cohort leaders and peers

	Cohort						Leader						Peers					
	Control			Experimental			Control			Experimental			Control			Experimental		
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
How many days in the last month did you smoke a cigarette																		
Mean	0.10	0.08	0.08	0.08	0.10	0.03	0.13	0.05	0.14	0.27	0.24	0.00	0.09	0.08	0.07	0.05	0.08	0.03
SD	0.55	0.33	0.37	0.45	0.48	0.21	0.46	0.21	0.47	1.08	1.09	0.00	0.57	0.35	0.36	0.21	0.29	0.22
How many days in the last month did you have an alcoholic drink																		
Mean	0.22	0.20	0.49	0.19	0.32	0.26	0.73	0.57	1.23	0.45	0.19	0.26	0.14	0.14	0.37	0.15	0.34	0.26
SD	0.80	0.65	1.16	0.66	0.72	0.64	1.64	1.25	1.60	1.22	0.51	0.56	0.54	0.46	1.03	0.50	0.75	0.66
On the days you drink alcohol, how many drinks do you have																		
Mean	0.47	0.60	0.70	0.42	0.68	0.57	0.45	1.18	1.05	0.45	0.43	0.42	0.47	0.50	0.64	0.42	0.72	0.59
SD	0.92	1.01	1.09	0.86	1.08	0.95	0.74	1.30	1.40	0.74	0.51	0.77	0.95	0.92	1.03	0.88	1.14	0.98
How many days in the last month did you smoke marijuana																		
Mean	0.06	0.04	0.15	0.06	0.06	0.04	0.14	0.23	0.27	0.36	0.10	0.05	0.04	0.01	0.13	0.08	0.05	0.03
SD	0.43	0.41	0.72	0.41	0.31	0.22	0.47	1.07	0.88	1.05	0.44	0.22	0.43	0.09	0.69	0.09	0.28	0.22
How many of your friends use tobacco																		
Mean	0.35	0.45	0.58	0.36	0.51	0.37	0.64	0.55	0.86	0.50	0.32	0.15	0.31	0.44	0.53	0.33	0.54	0.41
SD	0.71	0.69	0.84	0.67	0.79	0.71	1.14	0.80	0.94	0.74	0.56	0.49	0.62	0.67	0.82	0.66	0.82	0.73
How many of your friends drink alcohol																		
Mean	0.32	0.45	0.65	0.34	0.55	0.51	0.55	0.76	1.05	0.41	0.33	0.35	0.28	0.40	0.58	0.33	0.58	0.53
SD	0.70	0.76	0.92	0.74	0.88	0.83	0.96	1.00	0.95	0.67	0.73	0.67	0.65	0.71	0.90	0.76	0.90	0.85
How many of your friends smoke marijuana																		
Mean	0.25	0.39	0.56	0.24	0.46	0.42	0.55	0.67	1.18	0.45	0.62	0.50	0.20	0.35	0.45	0.20	0.44	0.42
SD	0.65	0.82	0.87	0.67	0.82	0.76	1.06	1.28	1.14	1.06	0.97	0.83	0.56	0.72	0.78	0.57	0.80	0.76

Note: Variable-level missing did not exceed 9% within column

Table 3

Post-Intervention Between Group Comparisons At Time 2 and Time 3

Post-Intervention (Time 2)	Mean Difference	95% CI		t	df*	Hedges' g
		Lower	Upper			
Control Leaders vs Experimental Leaders						
How many days in the last month did you smoke a cigarette	-0.19	-0.67	0.29	-0.81	41.0	-0.24
How many days in the last month did you have an alcoholic drink	0.38	-0.22	0.99	1.29	26.5	0.38
On the days you drink alcohol, how many drinks do you have	0.75	0.14	1.36	2.53	27.5	0.74
How many days in the last month did you smoke marijuana	0.13	-0.37	0.64	0.53	41.0	0.16
How many of your friends use tobacco	0.23	-0.20	0.66	1.08	41.0	0.33
How many of your friends drink alcohol	0.43	-0.12	0.97	1.59	40.0	0.48
How many of your friends smoke marijuana	0.05	-0.66	0.76	0.14	40.0	0.04
Control Peers vs Experimental Peers						
How many days in the last month did you smoke a cigarette	0.01	-0.07	0.08	0.18	265.0	0.02
How many days in the last month did you have an alcoholic drink	-0.20	-0.35	-0.04	-2.54	217.1	-0.31
On the days you drink alcohol, how many drinks do you have	-0.22	-0.47	0.03	-1.73	248.5	-0.21
How many days in the last month did you smoke marijuana	-0.05	-0.10	0.01	-1.75	156.8	-0.21
How many of your friends use tobacco	-0.11	-0.29	0.07	-1.16	249.9	-0.14
How many of your friends drink alcohol	-0.18	-0.38	0.02	-1.80	245.2	-0.22
How many of your friends smoke marijuana	-0.09	-0.27	0.09	-0.97	264.0	-0.12
Post-Intervention (Time 3)						
Control Leaders vs Experimental Leaders						
How many days in the last month did you smoke a cigarette	0.14	-0.07	0.34	1.37	21.0	0.40
How many days in the last month did you have an alcoholic drink	0.96	0.21	1.71	2.64	26.8	0.77
On the days you drink alcohol, how many drinks do you have	0.62	-0.08	1.33	1.80	33.5	0.54
How many days in the last month did you smoke marijuana	0.22	-0.18	0.62	1.14	23.9	0.33
How many of your friends use tobacco	0.71	0.25	1.18	3.12	32.2	0.92
How many of your friends drink alcohol	0.70	0.18	1.21	2.71	40.0	0.83
How many of your friends smoke marijuana	0.68	0.06	1.31	2.20	40.0	0.66
Control Peers vs Experimental Peers						
How many days in the last month did you smoke a cigarette	0.04	-0.04	0.11	0.96	249.0	0.12

Post-Intervention (Time 2)	95% CI					<i>t</i>	<i>df</i> *	Hedges' <i>g</i>
	Mean Difference	Lower	Upper					
How many days in the last month did you have an alcoholic drink	0.10	-0.11	0.32			0.95	217.4	0.12
On the days you drink alcohol, how many drinks do you have	0.05	-0.20	0.30			0.37	247.0	0.05
How many days in the last month did you smoke marijuana	0.09	-0.03	0.22			1.45	152.0	0.18
How many of your friends use tobacco	0.13	-0.07	0.32			1.30	250.2	0.16
How many of your friends drink alcohol	0.05	-0.17	0.27			0.44	249.0	0.06
How many of your friends smoke marijuana	0.05	-0.14	0.24			0.54	250.0	0.07

Note: bold lettering indicates *t*-test *p* value $p < .05$

* decimal values indicate a *t*-test assumed unequal variances after significant Levene's test

Table 4

Post-Intervention Within Group Comparisons from Time 1 to Time 3

		95% CI					
		Mean Difference	Lower	Upper	<i>t</i>	Hedges' <i>g</i>	
Experimental Leaders							
How many days in the last month did you smoke a cigarette		-0.25	-0.77	0.27	-1.00	19	-0.34
How many days in the last month did you have an alcoholic drink		-0.26	-0.88	0.36	-0.89	18	-0.19
On the days you drink alcohol, how many drinks do you have		-0.11	-0.33	0.12	-1.00	18	-0.04
How many days in the last month did you smoke marijuana		-0.20	-0.53	0.13	-1.29	19	-0.39
How many of your friends use tobacco		-0.30	-0.57	-0.03	-2.35	19	-0.54
How many of your friends drink alcohol		0.00	-0.40	0.40	0.00	19	-0.09
How many of your friends smoke marijuana		0.20	-0.13	0.53	1.29	19	0.05
Control Leaders							
How many days in the last month did you smoke a cigarette		0.00	-0.14	0.14	0.00	21	0.02
How many days in the last month did you have an alcoholic drink		0.52	-0.38	1.43	1.21	20	0.30
On the days you drink alcohol, how many drinks do you have		0.62	0.13	1.11	2.65	20	0.53
How many days in the last month did you smoke marijuana		0.19	-0.12	0.50	1.28	20	0.18
How many of your friends use tobacco		0.29	-0.10	0.67	1.55	20	0.21
How many of your friends drink alcohol		0.57	0.00	1.14	2.10	20	0.51
How many of your friends smoke marijuana		0.76	0.23	1.30	2.96	20	0.56
Experimental Peers							
How many days in the last month did you smoke a cigarette		0.00	-0.05	0.05	0.00	119	-0.09
How many days in the last month did you have an alcoholic drink		0.17	0.04	0.29	2.65	119	0.19
On the days you drink alcohol, how many drinks do you have		0.23	0.06	0.41	2.69	119	0.18
How many days in the last month did you smoke marijuana		0.03	-0.01	0.07	1.64	121	-0.3
How many of your friends use tobacco		0.12	-0.02	0.25	1.66	120	0.12
How many of your friends drink alcohol		0.28	0.15	0.42	4.16	119	0.25
How many of your friends smoke marijuana		0.27	0.13	0.40	3.88	119	0.33
Control Peers							
How many days in the last month did you smoke a cigarette		-0.03	-0.14	0.08	-0.58	127	-0.04
How many days in the last month did you have an alcoholic drink		0.21	0.05	0.37	2.58	123	0.28

	95% CI			<i>t</i>	<i>df</i> [*]	Hedges' <i>g</i>
	Mean Difference	Lower	Upper			
On the days you drink alcohol, how many drinks do you have	0.21	0.03	0.39	2.34	123	0.17
How many days in the last month did you smoke marijuana	0.04	-0.09	0.17	0.64	122	0.16
How many of your friends use tobacco	0.25	0.13	0.37	4.09	129	0.30
How many of your friends drink alcohol	0.31	0.17	0.45	4.52	128	0.30
How many of your friends smoke marijuana	0.29	0.18	0.40	5.20	129	0.37

Note: bold lettering indicates a *p* value < .05

* decimal values indicate *t*-test assumed unequal variances after significant Levene's test