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Changing Social Norms: the Impact of Normative Feedback Included in Motivational Enhancement Therapy on Cannabis Outcomes among Heavy-Using Adolescents

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Abstract

Introduction—Heavy cannabis use is a problematic behavior, particularly among some adolescents. Adolescents are particularly prone to social influence. As such, injunctive norms (perceptions of others' approval of cannabis use) and descriptive norms (perception of frequency of others' cannabis use) influence cannabis behavior. Given that norms are not always accurate, motivational enhancement therapy aims to reduce cannabis use through normative feedback and correction of normative misconceptions. The purpose of this study was to evaluate the relationships between perceived norms (descriptive and injunctive) and cannabis-related outcomes (use, cannabis-related problems, and cannabis use disorder symptoms) in a heavy cannabis-using adolescent population receiving motivational enhancement therapy.

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Contributors

DW, RR, and RS conceived, designed, and implemented the parent trial. CB and KB conceived the aims of this paper. CB wrote the initial draft of the manuscript and performed statistical analyses. All authors discussed the results and contributed to and have approved the final manuscript.

Conflict of interest

No conflict declared.

Methods—Heavy cannabis-using individuals (n=252, 68% male, mean age 13.38, 59% Caucasian) were recruited from six Seattle high schools for a motivational enhancement therapy-based intervention involving normative feedback.

Results—Participants perceived higher rates of cannabis use among close friends than other same age teens and reported a higher perception of approval for cannabis use from close friends as compared to perceived approval of other same aged peers. Personal approval and the perceived approval of other same age teens were reduced following the intervention but there was no evidence of change in normative perceptions for close friends following the normative feedback interventions. Changes in normative perceptions were related to decreases in cannabis use and -related outcomes.

Conclusions—Results suggest the importance of normative feedback in changing behavior in adolescent cannabis users, but also highlight the ongoing influence of close friends.

Keywords

cannabis; social influence; normative behavior; motivational enhancement therapy

1. Introduction

Cannabis is one of the most common substances of use, second only to alcohol: 8.3% of individuals aged 12 and older report using cannabis in the previous month (Substance Abuse and Mental Health Services Administration, 2016). Among adolescents aged 12–17, 7.0% report cannabis use (Substance Abuse and Mental Health Services Administration, 2016). Indeed, cannabis initiation is most common in adolescence, and the risk of developing a cannabis use disorder is higher among younger initiators than those who begin cannabis use in adulthood (Grant & Dawson, 1998; Volkow, Baler, Compton, & Weiss, 2014). In addition to increasing risk of developing problematic patterns of use, adolescent cannabis use is associated with a host of social, psychological, and physical problems (Volkow et al., 2014) such as decreased academic performance (Washington State Department of Health, 2014), declining neuropsychological functioning (Meier et al., 2012), and mental health problems (Patton et al., 2002). Given the problems associated with heavy cannabis use, it is important to identify factors that may lead to continued use.

Adolescents' behavior is particularly prone to social influence (Brown, 2004). As such, injunctive norms (perception of others' approval of cannabis use) and descriptive norms (perception of frequency of cannabis use by others) are associated with cannabis use (Eisenberg, Toumbourou, Catalano, & Hemphill, 2014; Wu et al., 2015). Normative theories assert that attitudes about the acceptability of a behavior and beliefs about others' behavior influences one's own behavior. Individuals act in accordance with their beliefs about normality, thus personal approval is associated with personal rates of cannabis use (LaBrie, Hummer, & Lac, 2011). Adolescents and young adults are particularly influenced by behavior and beliefs of their close friend group: personal approval and cannabis use frequency are associated with perceived norms of close friends (Buckner, 2013; LaBrie et al., 2011; Walker, Neighbors, Rodriguez, Stephens, & Roffman, 2011).

Perceptions of approval and perceptions of others' use are not always accurate (Perkins, 2002; Wolfson, 2000). Over time, treatments have been developed to specifically target perceived norms. In particular, motivational enhancement therapy (MET) incorporates motivational interviewing with personalized normative feedback aimed to correct inaccurate perceptions of normative rates of use (see e.g., Barnett, Sussman, Smith, Rohrbach, & Spruijt-Metz, 2012; Walker et al., 2016). The normative feedback in MET presents descriptive norms of rates of use among other individuals of the same reference group. MET allows for an environment to freely discuss substance use without judgment. Treatment can be effective at changing alcohol use-related normative beliefs (Davis, Houck, Rowell, Benson, & Smith, 2016; Neighbors, Larimer, & Lewis, 2004). Normative interventions have, thus far, been primarily focused on normative populations and have not been regularly extended to heavy-using cannabis populations. Additionally, no known study has evaluated change in perceived norms throughout the course of a MET treatment for cannabis use and use-related outcomes.

The current study evaluated the relationship between close friend and same-aged perceived norms (descriptive and injunctive) on cannabis use and use-related problems among individuals in a MET-based cannabis use intervention study. It was hypothesized that: (a) perceived norms would be related to cannabis use and use-related outcomes cross-sectionally, (b) perceived normative use and approval of cannabis use would decrease following the normative intervention, more so for same-age peers than for close friends, (c) changes in perceptions of norms would predict change in cannabis use and use-related outcomes.

2. Materials and Methods

2.1 Participants

Participants were adolescents self-referring to a cannabis intervention who were recruited to participate in a randomized controlled trial examining the efficacy of repeated MET check-ins for reducing cannabis use. Among the 668 adolescents who were interested in the study, 445 were screened for eligibility. Eligibility criteria included cannabis use on at least 9 of the previous 30 days (see Berghuis, Swift, Roffman, Stephens, & Copeland, 2006), availability throughout the course of the 15-month study, and freshman to junior school status at baseline. Participants with a medical or psychiatric condition that would prevent them from participating and individuals without English comprehension were excluded. A total of 252 individuals were eligible and interested in participation. The current study is based on secondary data analyses. See parent trial for additional information on participant flow (Walker et al., 2016). The final sample ($n=252$) was predominantly male (68%) with a mean age of 15.84 ($SD=0.96$) and a mean cannabis initiation age of 13.38 ($SD=15.05$). The sample was relatively diverse: 59% Caucasian, 20% multiracial, 6% African American, 4% Asian, and 11% other with 10% of the sample identifying as Hispanic or Latino. The sample reported low to moderate symptoms of depression and anxiety, on average, on the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, White, Unsicker, & Hodgkins, 2003) screener and only 4 participants (1.6%) reported currently psychotherapy or counseling (e.g.,

for depression, adjustment). Most participants (84.9%) reported at least one day of alcohol use in the previous two months and 40.2% reported at least one day of other substance use.

2.2 Measures

2.2.1 Perceived Norms—Descriptive and injunctive perceived norms of two reference groups (other same-age teens and close friends) were assessed at baseline and each subsequent follow-up. Participants were asked to report descriptive norms by indicating the percentage of individuals (0.0–1.0) in each reference group that they believe have *ever* used cannabis and that use cannabis *regularly*. These items were averaged together for each reference group to create two scales: descriptive norms of other teens their age (Descriptive – Other Teens) and of close friends (Descriptive – Friends). Injunctive norms were assessed by averaging participants' responses about approval of various levels of cannabis use (trying cannabis once or twice, using cannabis occasionally, using cannabis regularly) by two reference groups: injunctive norms of other teens their age (Injunctive – Other Teens) and of close friends (Injunctive – Friends). Answers were reported on a scale of 1 (strongly disapprove) to 5 (strongly approve). Additionally, participants were asked how much they approve of trying cannabis once or twice, using cannabis occasionally, and using cannabis regularly in order to form a scale of personal approval towards cannabis (Injunctive – Personal Approval). Alpha reliabilities of descriptive norm subscales, injunctive norm subscales, and personal approval scales ranged from 0.65–0.81.

2.2.2 Cannabis Use—Frequency of cannabis use was assessed with the Global Appraisal of Individual Needs (GAIN; Dennis, Titus, White, Unsicker, & Hodgkins, 2003). The GAIN asks participants to report the number of days out of the past 60 in which they used cannabis. The GAIN is a reliable and valid measure of cannabis use, and has been shown to be comparable to other validated scales of substance use frequency (Dennis, Funk, Godley, Godley, & Waldron, 2004).

2.2.3 Cannabis Problems—Cannabis-related problems were assessed with the Marijuana Problems Index (MPI; Johnson & White, 1995), a 23-item measure which was adapted for a cannabis-using population from the Rutgers Alcohol Problem Index (White & LaBouvie, 1989). Participants rate on a scale of 0 (never) to 4 (more than 10 times) the frequency in which they experience 23 different problems associated with cannabis use. A MPI score was created as the mean of the items. Cronbach's alpha scores indicated good to excellent reliability across time points ($\alpha=0.86\text{--}0.94$).

2.2.4 Cannabis Use Disorder Symptoms—The symptoms of cannabis use disorder were assessed with the GAIN (Dennis et al., 2003). The GAIN has been found to be a valid and reliable measure of symptoms of marijuana abuse and dependence (Dennis, White, Titus, & Unsicker, 2008). A total symptom scale was created by adding together the total number of symptoms endorsed.

2.3 Procedures

Participants were recruited from six high schools in the Seattle, Washington area. Research staff engaged students in classroom and lunchroom presentations on cannabis, during which

time participants who were interested in learning about the research study could anonymously ask for more information. The study was not proposed as a treatment study, but instead a study to explore ones cannabis use. Parental consent was not required, as per Internal Review Board approval, and no notice was provided to parent regarding involvement in the study. Eligible and interested participants were randomly assigned (based on blocking variables of grade, school, and gender) to one of two conditions: a motivational check-in condition (MCI, n=128) or an assessment-only check-in (ACI, n=124).

Participants in both conditions received two 50-minute sessions of MET over the first two weeks post-baseline. The intervention was performed by four bachelor's and master's-level clinicians who were trained and regularly supervised by the clinical director, who is a licensed clinical psychologist trained in MET. All sessions were audiorecorded. The clinical director reviewed a subsample of sessions for fidelity. Additionally, a subsample of audiorecordings were rated by independent, trained coders using the Motivational Interviewing Treatment Integrity (MITI) coding indices (Moyers & Martin, 2010) with an average MITI adherence score of 97.8%. This MET intervention has been described and evaluated in previous trials (Walker, Stephens, et al., 2011; Walker, Roffman, Stephens, Wakana, & Berghuis, 2006). Session 1 involved the use of motivational interviewing principles and skills designed to build rapport with the participant and discuss the participant's cannabis use, including how it may or may not fit with their goals and values. During this session, change talk was elicited through an open discussion of pros and cons of cannabis use. Participants completed questionnaires regarding cannabis use, money spent on cannabis, risk factors (i.e., symptoms of cannabis use disorder), and normative perceptions at baseline. This information was collated and entered into a personalized feedback report (PFR), which was reviewed in Session 2. Feedback sections included level of use, use at school, cannabis use disorder symptoms, life goals, and social support as it related to cannabis. One section of the PFR was dedicated to giving normative feedback. Specifically, the participants' age of first use of cannabis was compared with national rates of cannabis use for that age group (i.e., if a participant reported first use of cannabis at age 13, national norms for the percentage of U.S. 13 year olds who had used cannabis was provided, Substance Abuse and Mental Health Services Administration, 2011) and participants' frequency of cannabis use was compared with county rates of youth use compared to teens their age (Washington State Department of Health and Office of the Superintendent of Public Instruction, 2011). Cannabis initiation data was represented pictorially: we presented the percentage of youth who had tried cannabis at the age the participant indicated using for the first time (e.g., if 10% of youth that age had used, one out of ten people in a chart were presented in color to represent 10%). For the frequency of marijuana use feedback, a pie chart was displayed showing the percentage of students who used cannabis at different levels (percentage who had not used cannabis, those who used 1–2 days, 3–4 days, 6–9 days and 10+ days in the past 60): an arrow was directed at the piece of the pie chart representing the participants' use (e.g., the 10+ days of use). The participants' reactions to the information was elicited and reflected by the counselor. Session 2 also included a discussion of the participants' strengths, life goals, and how cannabis use and cannabis reduction may impact life goals.

Participants then received check-in sessions at three points in the study: 4, 7, and 10 months post-baseline. Follow-up assessments were administered at 6, 9, 12, and 15 months. Participants were compensated at follow-up and check-in sessions for their time in the form of gift cards. For more information on study design, please see the main outcome paper (Walker et al., 2016). This study utilizes baseline and 6-month data only because the 6-month follow-up was the first follow-up assessment point after the end of MET sessions.

2.4 Analysis Plans

Preliminary analyses of variance (ANOVA) comparing variables of interest at baseline between conditions revealed no significant differences between the MCI and ACI conditions (all $ps > .05$). Given that both conditions received the MET sessions, which utilized normative feedback, and lack of differences in both baseline (BL) norm levels and change in perceived norms, conditions are collapsed for analyses. We first present descriptive statistics of norm variables and cannabis use outcome variables. Differences in norm means between reference groups were evaluated using ANOVA. In analyses of injunctive norms, where there are three reference groups, we utilized ANOVA with planned comparisons utilizing Bonferroni correction and F -statistics are presented in two-group comparisons of descriptive norms. Bivariate correlations then evaluated relationships between variables cross-sectionally at BL and 6-month time points. We then present F -statistics evaluating change in variables over time. Change variables were computed for each norm variable by subtracting the baseline value from the 6-month value. We focused on 6-month outcomes because they were the most proximal follow-up periods following the MET intervention. These change scores were simultaneously entered into a regression equation predicting cannabis outcome variables (use, problems, and symptoms), controlling for BL levels of the cannabis variables in order to evaluate prediction of change.

3. Results

3.1 Descriptive Statistics

Descriptive statistics for variables of interest are reported in Table 1. Participants reported using cannabis 36.8 days out of the previous 60 days at baseline, and reported experiencing a mean of 1.61 on the problems scale and reported 3.69 use disorder symptoms. Notably, injunctive norms significantly differed between referent groups at both time points (BL $F=27.13$, $p<.01$; 6mo $F=35.01$, $p<.01$). Ratings of personal approval and friends' approval of cannabis use were significantly higher than ratings of other teens' approval. Injunctive norms of close friends and personal approval were not significantly different. Descriptive norm ratings of close friends also were significantly higher than other teens at both time points (BL $F=193.16$, $p<.01$; 6mo $F=263.81$, $p<.01$).

3.2 Correlations with Cannabis-Related Outcomes

At baseline, injunctive norms were not related to baseline rates of use, problems, or symptoms (Table 2). At the 6-month time point, friend and personal approval injunctive norms were associated with use ($r_s=.15$ and $.19$, respectively). At both baseline and 6-month time points, other teen descriptive norms were correlated with use ($r_s=.13$ at baseline and $.14$

at follow-up), while friend descriptive norms were associated with use ($r_s=.28$ and $.33$), problems ($r_s=.14$ and $.15$), and symptoms ($r_s=.14$ and $.17$).

3.3 Change over Time

Several norms scales significantly decreased over time (Table 1). Participants reported a reduction in injunctive norms of other teens over time ($F=11.17$, $p<.01$), injunctive personal approval norms ($F=13.53$, $p<.01$), and descriptive norms of other teens ($F=16.87$, $p<.01$). Additionally, rates of use ($F=21.61$, $p<.01$), problems ($F=16.11$, $p<.01$), and use disorder symptoms ($F=17.19$, $p<.01$) significantly reduced over time. Notably, no significant reductions were noted in injunctive norms of close friends ($F=1.29$, $p=.26$) and descriptive norms of close friends ($F=.39$, $p=.53$).

3.4 Multiple Regression Analyses

Regression analyses revealed that change in other teen injunctive norms was not associated with change in cannabis outcomes ($p>.05$), while changes in friend injunctive norms were associated with significant reductions in use, problems, and symptoms (Table 3; $\beta=0.12$, 0.16 , and 0.14 , respectively). Personal approval injunctive norms were associated with a reduction in problems ($\beta=0.14$). Changes in both descriptive norms of other teens and close friends were associated with reductions in use ($\beta=.12$ and $.17$), while other teen descriptive norms were also associated with reductions in problems ($\beta=.14$).

4. Discussion and Conclusions

The current study evaluated the relationship between perceived descriptive norms, injunctive norms, personal approval, and cannabis use and related outcomes among heavy cannabis-using adolescents participating in a motivational enhancement therapy-based intervention. Participants reported greater personal approval of cannabis and greater perceived approval from close friends as compared to the perceived approval of other teens their age. Similarly, participants reported more cannabis use by close friends than other teens their age. Perceived injunctive and descriptive norms for other same aged peers significantly decreased following the intervention. Changes in injunctive norms of close friends, personal approval, and descriptive norms of close friend and other teens were associated with reductions in cannabis-related outcomes. Results suggest that perceptions of others' cannabis use and approval of use may have been impacted by the normative feedback in motivational enhancement therapy, and that this change in motives was associated with change in behavior.

Descriptive norms for teen use in the county of study were presented to participants during the normative feedback portion of the intervention. Interestingly, participants reported believing that 55% of teens their aged used cannabis at baseline. However, only 18% of teens surveyed in the county reported cannabis use in the past month (Washington State Department of Health and Office of the Superintendent of Public Instruction, 2011). Although the perceived cannabis use of other same-age teens reduced following the intervention, this decrease did not approach the average from the county survey.

While the perceived injunctive and descriptive norms for other teens changed over time, norms surrounding close friends did not. The normative feedback in MET is aimed at correcting normative misconceptions of other teens' use but cannot target an individual's friend network. Thus, close friends norms are not expected to be as likely to change as a result of MET interventions. Friend norms may be less malleable in part, because we have more opportunities to collect "data" on the behavior of those who are close to us, rather than "the average person our age". Given that individuals' behavior is associated with the behavior of their salient friend group, the peer groups of adolescents eligible for the present study likely have higher rates of cannabis use than other teens.

Despite the fact that reductions in perceived norms surrounding friend groups did not meet statistical significance, any change in close friend norms was associated with use and problematic cannabis-related outcomes. These findings indicate the ongoing importance of close friend behavior that may need to be targeted with different types of interventions. Nevertheless, personal approval of cannabis was reduced following the intervention, and changes in the normative perceptions of other same age teens predicted cannabis use and problems beyond the effect of close friends. Other aspects of MET, which allow for a reflection on both the positive and negative aspects of their own cannabis use, may partially overcome the influence of close friend norms. However, close friends' use and perception of approval may remain particularly impactful in a heavy-using population because behavior is less aligned with norms.

Several limitations should be noted. This was a heavy-using adolescent sample, voluntarily participating in a study to explore their cannabis use. As such, results may not generalize to other populations (e.g., court-mandated populations, older or lighter cannabis users). Since both conditions received normative feedback and MET, a definitive causal link between the intervention and the change in perceived norms cannot be established. Although we hypothesize that norms influenced behavior, as is consistent with longitudinal models (Eisenberg et al., 2014), it is possible that the two constructs changed together or that perceived norms changed as a result of behavior change. However, change occurred specifically in the norms targeted by the intervention (other teens) and not those that were not targeted (close friend norms). Additionally, it appears less likely that personal behavior influences how we perceive others as opposed to our perceptions of others' behavior influencing our behavior. Thus, it seems probable that change in norms may have affected subsequent changes in behavior. Given that the study sample consisted of heavy cannabis users at baseline, changes in norms and attitudes may be attributed to regression to the mean; however, given that significant reductions were not observed for the close friend reference group, regression to the mean is an insufficient explanation for observed changes. An additional limitation is that norms and cannabis-related variables were assessed via self-report measures, which could decrease the reliability of the information. We are unaware of any objective measure of normative beliefs, thus were constrained to self-report. However, regarding cannabis-related variables, previous studies have indicated that self-reported substance use is valid and reliable when confidentiality is ensured (Del Boca & Darkes, 2003).

Overall, this study substantiated the relationships between perceived norms and cannabis-related outcomes in a previously unstudied population of heavier using adolescents. Perceived norms changed following MET with normative feedback, and such changes were associated with reductions in cannabis use, problems, and symptoms. Results highlight the potential efficacy of normative feedback in conjunction with non-judgmental environments in promoting change and suggest future avenues of research among this population.

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References

- Barnett E, Sussman S, Smith C, Rohrbach La, Spruijt-Metz D. Motivational Interviewing for adolescent substance use: a review of the literature. *Addictive Behaviors*. 2012; 37(12):1325–34. <http://doi.org/10.1016/j.addbeh.2012.07.001>. [PubMed: 22958865]
- Berghuis, J., Swift, W., Roffman, RA., Stephens, RS., Copeland, J. Cannabis Dependence: It's Nature, Consequences and Treatment. United Kingdom: Cambridge University Press; 2006. The Teen Cannabis Check-Up: Exploring strategies for reaching young cannabis users; p. 275-296.
- Brown, BB. Handbook of Adolescent Psychology. John Wiley & Sons, Inc; 2004. Adolescents' Relationships with Peers; p. 363-394. <http://doi.org/10.1002/9780471726746.ch12>
- Buckner JD. College cannabis use: The unique roles of social norms, motives, and expectancies. *Journal of Studies on Alcohol and Drugs*. 2013; 74(5):720–726. [PubMed: 23948531]
- Davis JP, Houck JM, Rowell LN, Benson JG, Smith DC. Brief Motivational Interviewing and Normative Feedback for Adolescents: Change Language and Alcohol Use Outcomes. *Journal of Substance Abuse Treatment*. 2016; 65:66–73. <http://doi.org/10.1016/j.jsat.2015.10.004>. [PubMed: 26710670]
- Del Boca FK, Darkes J. The validity of self-reports of alcohol consumption: state of the science and challenges for research. *Addiction*. 2003; 98:1–12. <http://doi.org/10.1046/j.1359-6357.2003.00586.x>.
- Dennis ML, Funk R, Godley SH, Godley MD, Waldron H. Cross-validation of the alcohol and cannabis use measures in the Global Appraisal of Individual Needs (GAIN) and Timeline Followback (TLFB; Form 90) among adolescents in substance abuse treatment. *Addiction (Abingdon, England)*. 2004; 99(Suppl 2):120–8. <http://doi.org/10.1111/j.1360-0443.2004.00859.x>.
- Dennis, ML., Titus, JC., White, M., Unsicker, J., Hodgkins, D. Global Appraisal of Individual Needs (GAIN): Administration guide for the GAIN and related measures(version 5). Bloomington, IL: Chestnut Health Systems; 2003.
- Dennis, ML., White, M., Titus, JC., Unsicker, MS. Global Appraisal of Individual Needs: Administration Guide for the GAIN and Related Measures (Version 5). Bloomington, IL: 2008.
- Eisenberg ME, Toumbourou JW, Catalano RF, Hemphill SA. Social Norms in the Development of Adolescent Substance Use: A Longitudinal Analysis of the International Youth Development Study. *Journal of Youth and Adolescence*. 2014; 43(9):1486–1497. <http://doi.org/10.1007/s10964-014-0111-1>. [PubMed: 24633850]
- Grant BF, Dawson DA. Age of onset of drug use and its association with DSM-IV drug abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey. *Journal of Substance Abuse*. 1998; 10(2):163–173. [http://doi.org/10.1016/s0899-3289\(99\)80131-x](http://doi.org/10.1016/s0899-3289(99)80131-x). [PubMed: 9854701]
- Johnson V, White HR. The relationship between work-specific and generalized stress and alcohol and marijuana use among recent entrants to the labor force. *Journal of Drug Issues*. 1995; 25(2):237–251.

- LaBrie JW, Hummer JF, Lac A. Comparing injunctive marijuana use norms of salient reference groups among college student marijuana users and nonusers. *Addictive Behaviors*. 2011; 36(7):717–720. <http://doi.org/10.1016/j.addbeh.2011.02.004>. [PubMed: 21397405]
- Meier, MH., Caspi, A., Ambler, A., Harrington, H., Houts, R., Keefe, RSE., Moffitt, TE. Persistent cannabis users show neuropsychological decline from childhood to midlife. *Proceedings of the National Academy of Sciences*. 2012. <http://doi.org/10.1073/pnas.1206820109>
- Moyers T, Martin T. Revised Global Scales: Motivational Interviewing Treatment Integrity 3.1.1 (MITI 3.1.1). University of New Mexico. 2010 Jan.1:1–29. Retrieved from http://www.motivationalinterview.org/Documents/miti3_1.pdf.
- Neighbors C, Larimer ME, Lewis MA. Targeting Misperceptions of Descriptive Drinking Norms : Efficacy of a Computer-Delivered Personalized Normative Feedback Intervention. 2004; 72(3): 434–447. <http://doi.org/10.1037/0022-006X.72.3.434>.
- Patton GC, Coffey C, Carlin JB, Degenhardt L, Hall W, Patton GC, Hall W. Cannabis use and mental health in young people: cohort study. *BMJ: British Medical Journal*. 2002; 325:1195–1198. [PubMed: 12446533]
- Perkins, HW. Social norms and the prevention of alcohol misuse in collegiate contexts; *Journal of Studies on Alcohol, Supplement*. 2002. p. 164–172. <http://doi.org/10.15288/jsas.2002.s14.164>
- Substance Abuse and Mental Health Services Administration. The National Survey on Drug Use and Health 2010. National Survey on Drug Use and Health, 2009 and 2010. Rockville, MD: 2011.
- Substance Abuse and Mental Health Services Administration. The National Survey on Drug Use and Health 2015. Rockville, MD: 2016.
- Volkow ND, Baler RD, Compton WM, Weiss SRB. Adverse health effects of marijuana use. *New England Journal of Medicine*. 2014; 370:2219–2227. [PubMed: 24897085]
- Walker DD, Neighbors C, Rodriguez LM, Stephens RS, Roffman RA. Social norms and self-efficacy among heavy using adolescent marijuana smokers. *Psychology of Addictive Behaviors*. 2011; 25(4):727–32. <http://doi.org/10.1037/a0024958>. [PubMed: 21842969]
- Walker DD, Roffman RA, Stephens RS, Wakana K, Berghuis J. Motivational Enhancement Therapy for adolescent marijuana users: A preliminary randomized controlled trial. *Journal of Consulting and Clinical Psychology*. 2006; 74(3):628–632. [PubMed: 16822119]
- Walker DD, Stephens R, Roffman R, DeMarce J, Lozano B, Towe S, Berg B. Randomized controlled trial of motivational enhancement therapy with nontreatment-seeking adolescent cannabis users: A further test of the teen marijuana check-up. *Psychology of Addictive Behaviors*. 2011; 25(3):474–484. <http://doi.org/10.1037/a0024076>. [PubMed: 21688877]
- Walker DD, Stephens RS, Blevins CE, Banes KE, Matthews L, Roffman RA. Augmenting brief interventions for adolescent marijuana users: The impact of motivational checkins. *Journal of Consulting and Clinical Psychology*. 2016; 84(11):983–992. [PubMed: 27762569]
- Washington State Department of Health and Office of the Superintendent of Public Instruction. Washington State Healthy Youth Survey 2010 Analytic Report. 2011
- White HR, LaBouvie EW. Towards the assessment of alcohol problem drinking. *Journal of Studies on Alcohol*. 1989; 50(1):30–37. [PubMed: 2927120]
- Wolfson S. Students' estimates of the prevalence of drug use: evidence for a false consensus effect. *Psychology of Addictive Behaviors : Journal of the Society of Psychologists in Addictive Behaviors*. 2000; 14(3):295–298. [PubMed: 10998955]
- Wu L-T, Swartz MS, Brady KT, Hoyle RH, NIDA AAPI Workgroup, A. P; Ajzen I, Workgroup, N. A. Perceived cannabis use norms and cannabis use among adolescents in the United States. *Journal of Psychiatric Research*. 2015; 64:79–87. <http://doi.org/10.1016/j.jpsychires.2015.02.022>. [PubMed: 25795093]

Highlights

- Perceived norms of close friends versus other same-aged teens significantly differed
- Norms changed over time after engagement in motivational enhancement therapy
- Changes in norms were associated with changes in cannabis outcomes

Table 1

Descriptive Statistics and Change over Time of Perceived Norms and Cannabis Variables,

	Baseline		6M		Change over time	
	<i>Mean</i>	<i>SD</i>	<i>Mean</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Injunctive – Other Teens	4.59 <i>a,b</i>	1.19	4.25 <i>a,b</i>	1.10	11.17	<0.01
Injunctive - Friends	5.26	1.26	5.13	1.30	1.29	0.26
Injunctive – Personal Approval	5.30	1.17	4.91	1.18	13.53	<0.01
Descriptive – Other Teens (%)	54.46 <i>a</i>	18.57	47.22 <i>a</i>	20.46	16.88	<0.01
Descriptive – Friends (%)	77.84	19.21	76.75	19.19	0.39	0.53
Cannabis Use (Days)	36.80	14.82	29.62	20.27	21.61	<0.01
Cannabis Problems (MPI, <i>M</i>)	1.61	0.46	1.41	0.62	16.11	<0.01
Cannabis Use Disorder Symptoms (#)	3.69	2.62	2.65	2.76	17.19	<0.01

^a mean is significantly different from value of Friends reference group^b mean is significantly different from value of Personal Approval reference group

Table 2

Bivariate correlations

BL	BL Use	BL MPI	BL Symptoms
Injunctive – Other Teens	–0.04	–0.02	0.03
Injunctive – Friends	0.07	–0.10	–0.11
Injunctive- Personal Approval	0.11	–0.10	–0.10
Descriptive – Teens	.13 [*]	0.02	0.04
Descriptive – Friends	.28 ^{**}	.14 [*]	.14 [*]
6M	6M Use	6M MPI	6M Symptoms
Injunctive – Other Teens	–0.03	0.06	0.06
Injunctive – Friends	.15 [*]	0.09	0.08
Injunctive-Personal Approval	.19 ^{**}	0.10	0.03
Descriptive – Other Teens	.14 [*]	0.08	0.05
Descriptive – Friends	.33 ^{**}	.15 [*]	.17 ^{**}

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

Table 3

Change Scores Predicting Outcomes Controlling for Outcomes at Baseline

	6m Use		6m MPI		6m Symptoms	
	Beta	Sig	Beta	Sig	Beta	Sig
Injunctive – Other Teens	-0.08	0.17	0.05	0.39	0.02	0.68
Injunctive - Friends	0.12	0.05	0.16	0.01	0.14	0.02
Injunctive – Personal Approval	0.11	0.07	0.14	0.02	0.06	0.27
Descriptive – Other Teens	0.12	0.04	0.14	0.02	0.03	0.63
Descriptive - Friends	0.17	0.00	0.05	0.39	-0.02	0.70

Bold values represent statistical significance