BRIEF REPORT

A Preliminary Evaluation of a Web-Based Intervention for College Marijuana Use

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Young adults in college have high rates of marijuana use, abuse, and dependence. Web-based interventions are increasingly popular, but their dissemination exceeds empirical support. One popular but understudied program is The Marijuana eCHECKUP TO GO (e-TOKE) for Universities & Colleges (San Diego State University Research Foundation, 2009). The aim of the present study was to evaluate its short-term effectiveness in changing marijuana involvement and perceived norms in undergraduates. Participants were 317 undergraduates (52% female, 78% White) who reported marijuana use within the month preceding baseline; each was randomly assigned to 1 of 4 conditions formed by crossing e-TOKE versus assessment only, with brief versus extensive baseline assessment (to assess assessment reactivity). Thus, 161 (51%) received eTOKE (77 with extended baseline, 84 with brief baseline), and 156 (49%) received assessment-only control (85 with extended baseline, 71 with brief baseline). 1 month later, all participants reported on marijuana use, problems, abuse and dependence symptoms, and norms. Assessment reactivity analyses yielded no significant differences by assessment condition. Individuals completing the e-TOKE program reported less extreme descriptive norms ($ps < 0.01$) but no decrease in marijuana use frequency, problems, abuse or dependence symptoms, or changes in injunctive norms ($ps > 0.10$). Thus, e-TOKE reduces perceptions of others' use, but this study did not provide evidence for its utility in changing personal use and problem indicators in the short-term. More research with longer follow-ups is indicated, given the possibility that descriptive norms could mediate behavior change.

Keywords: college, marijuana, intervention, computer, web-based

Marijuana use is common among college students; 14% report past-month use (American College Health Association [ACHA], 2012), and one in four users meet criteria for a cannabis use disorder (Caldeira, Arria, O'Grady, Vincent, & Wish, 2008). College use is associated with academic problems, mental health problems and other drug use (Buckner, Ecker, & Cohen, 2010; Kouri, Pope, Yurgelun-Todd, & Gruber, 1995).

Although use is high, perceptions of others' use are even higher. Students estimated that 79% of peers had used in the past month,

and that only 10% had never used (ACHA, 2012). Norm theory suggests that descriptive norms (perceptions of others' behavior) and injunctive norms (perceived approval of certain behaviors), though often inaccurate, serve as social guidelines for behavior (Borsari & Carey, 2003). Consistent with this theory, both types of norms predict marijuana use among current and incoming college students (Kilmer et al., 2006; LaBrie, Hummer, & Lac, 2011; Neighbors, Geisner, & Lee, 2008). Some marijuana interventions address descriptive norm overestimations via personalized feedback (a summary of one's own use, often in comparison with peers' use) or norm correction (accurate prevalence information, often in comparison with the client's overestimates). For example, the Marijuana Check-Up is a multifaceted in-person brief intervention with a feedback component that compares clients with the typical citizen, and with users in treatment (Doyle, Swan, Roffman, & Stephens, 2004); efficacy research shows that this program decreases marijuana use and dependence symptoms in adult frequent users (Stephens, Roffman, Fearer, Williams, & Burke, 2007). Similar brief interventions also consistently decrease use in teenagers and young adults (Bernstein et al., 2009; Lee et al., 2013; Martin, Copeland, & Swift, 2005; Swan et al., 2008).

In recent years, there have been efforts to adapt effective marijuana interventions to Web- or computer-based format, in order to provide low cost and easily disseminated treatment. Three extensive Web- and computer-based marijuana interventions have been created for adults based on principles of Cognitive Behavioral Therapy and Motivational Interviewing. Of these, one Web-based program was found to decrease use and dependence symptoms (Rooke, Copeland, Norberg, & McCambridge, 2011); two other computer-based programs showed similar (Budney et al., 2011) or better (Kay-Lambkin, Baker, Lewin, & Carr, 2008) marijuana use outcomes as therapist-provided intervention. Supplementing individual therapy with use of a Web-based diary program has also been found to decrease use in adults (Tossmann, Jonas, Tensil, Lang, & Strüber, 2011).

Two Web-based programs specifically target college marijuana use. The *Marijuana eCHECKUP TO GO (e-TOKE) for Universities & Colleges* (San Diego State University Research Foundation, 2009) is a brief program that incorporates personalized feedback and descriptive norm correction into an educational intervention. *Marijuana 101* adapts e-TOKE for campus drug offenders (Third Millennium Classrooms, 2007). Despite widespread use of these programs, little efficacy research is available. Elliott and Carey (2012) found that college abstainers completing e-TOKE (compared with assessment only) had less exaggerated descriptive norms, and injunctive norms more approving of abstention at 1-month follow-up, but no differences in use initiation. Lee, Neighbors, Kilmer, and Larimer (2010) developed and tested a similar brief Web-based intervention against assessment only in incoming freshmen. They found no main effects at the 3- or 6-month follow-ups, but small early reductions in use among intervention participants with more readiness to change, and protection against later increases in use among intervention participants with a family history of drug problems. However, effectiveness of such programs has not yet been assessed in current college users.

The purpose of the current study was to evaluate e-TOKE in a group of current college users. We assessed whether e-TOKE reduced use, problems, use disorder symptoms, and descriptive norm overestimates. Effects on injunctive norms were also explored because descriptive and injunctive norms are correlated (e.g., Neighbors, Geisner & Lee, 2008), and because e-TOKE has changed injunctive norms among college abstainers (Elliott & Carey, 2012). One-month outcomes were assessed, as more distal changes had not been found in previous research (Lee et al., 2010).

Method

Design

This randomized controlled study had four conditions. Half of the participants received e-TOKE and half completed assessment only. To assess for assessment reactivity (cf., McCambridge & Kypri, 2011), half of the participants in each condition completed the full assessment at baseline; half completed a brief assessment that did not include any marijuana use assessment. One month after baseline (or intervention, if later), all participants were invited to complete a follow-up survey.

Participants

Past-month marijuana users ($n = 317$; 52% female; 78% White) were recruited from psychology courses at a large private northeastern university. They ranged in age from 18 to 23 ($M = 19.34$, $SD = 1.22$); most were freshmen (42%) or sophomores (26%). They used on an average of 11 days ($SD = 11.8$) in the month prior to baseline. A total of 161 (51%) were assigned to eTOKE (77 with full assessment, 84 with brief assessment), and 156 (49%) were assigned to assessment-only (85 with full assessment, 71 with brief assessment).

Procedure

Students were eligible to sign up via a participant pool Web site if they reported past-month use in a screening survey. Interested participants were randomly assigned to conditions, stratified by gender. All participants received an e-mail directing them to the consent form and baseline survey (demographic and social desirability measures for the brief assessment group; all measures except intervention satisfaction for the full assessment group). Intervention participants also received information on how to access e-TOKE afterward, and a token number to sign into e-TOKE (to monitor participation).

Participants read the informed consent and clicked to the next screen to indicate consent. After assessment, control participants were thanked for their participation, and intervention participants were prompted to complete e-TOKE. Completion of assessment and intervention was monitored twice weekly, with e-mail reminders sent as needed.

One month after baseline (or intervention, if later), all participants received an e-mail invitation for the online follow-up survey. In the follow-up survey, participants reported on marijuana involvement, norms, and intervention satisfaction (as appropriate).

Measures

Participants reported age, year in college, gender, and ethnicity. They completed the 13-item Social Desirability Scale (Reynolds, 1982; *KR-20* = 0.65 in present study).

Participants reported the number of days they used marijuana in the past month. Then, they reported marijuana-related problems in the past month using the 18-item Rutgers Marijuana Problems Inventory (RMPI; White, Labouvie, & Papdaratsakis, 2005; αs = 0.80–0.88 in present study). *DSM–IV* symptoms of marijuana abuse and dependence were assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV items (National Institutes of Health, 2006); internal consistency in the present study was better for dependence (αs = 0.73–0.79) than abuse (αs = 0.45–0.52).

Participants estimated descriptive norms corresponding to norms addressed in the intervention; they estimated the percent of college students who use marijuana (a) more and (b) less than themselves, and (c) the percent of college students who do not use at all in a typical month. They also estimated the percent of college students who have used (d) in the last month and (e) in their lifetime. For injunctive norms, participants reported whether they believed their close friends would approve, disapprove, or not care if they (a) abstained, (b) experimented, (c) used occasionally, and (d) used regularly.

Finally, intervention participants reported on time and attention devoted to e-TOKE. They also reported satisfaction and utility of various sections.

Intervention

e-TOKE (San Diego State University Research Foundation, 2009) is a self-paced, Web-based marijuana educational program designed to prompt self-reflection and consideration of decreased use. The program assesses marijuana use, pros and cons, perceived norms, alcohol and cigarette use, substance-related expenses, other valued activities, and readiness to change. Participants receive feedback (e.g., on norms, annual expense of substance use), health information, campus resource information, and tips to decrease use (e.g., set a limit, hide paraphernalia). Participation typically takes 20 min (R. J. Moyer III, personal communication, May 2, 2013); thorough review of all material may take 45 min (D. Van Sickle, personal communication, May 1, 2013).

Results

Due to non-normal data, nonlinear transformations were used. Analyses were conducted on both sets of data; when discrepant, analyses reflect transformed data.

Of the 149 intervention participants who responded to the question on e-TOKE participation, only 84 (56%) remembered completing it; these participants reported on satisfaction (see Table 1). Participants gave highest utility ratings to feedback on norms and money spent on use. They liked the online format and found it easy to use. However, participants indicated that they were not likely to recommend the program to peers.

Of the 161 participants assigned to e-TOKE, participation was confirmed for 158 (98.1%). Two of three noncompleters were in the full assessment condition. Noncompleters did not differ on age, gender, year in school, use frequency, marijuana problems, abuse or dependence symptoms, norms, or social desirability ($ps > 0.05$), but did differ in ethnicity ($p < .01$). Two of the three noncompleters were Hispanic/Latino; one was African American. Of the 317 baseline participants, 312 (98.4%) completed the follow-up. Of those who did not, three were in the e-TOKE condition, and two were in the control. Completers and noncompleters did not differ on any baseline variables.

Conditions did not differ by demographics, social desirability, or marijuana use at baseline, indicating successful randomization ($ps \geq 0.05$). We found no main effects of assessment condition (or interactions with e-TOKE exposure) on marijuana outcomes ($ps > 0.10$); so, assessment conditions were collapsed to maximize power to detect intervention effects.

See Table 2 for (intent-to-treat) intervention by gender ANOVA results for continuous (transformed) outcomes, using collapsed intervention and control groups. Intervention participants reported less exaggerated descriptive norms than controls at follow-up. They thought fewer peers used more than they did, $F(1, 299) = 24.13$, $p < .0001$, and more peers used less, $F(1, 300) = 14.66$, $p < .001$. They estimated more abstainers, $F(1, 300) = 31.38$, $p < .0001$, and fewer past month, $F(1, 300) = 31.10$, $p < .0001$ and lifetime, $F(1, 300) = 25.84$, $p < .0001$ users. There were no intervention effects for marijuana use frequency, problems, abuse, or dependence symptoms, $ps > 0.40$. Men used more frequently,

Table 1
Participant Satisfaction With E-TOKE Intervention

Intervention satisfaction ratings ($n = 84$)	
Time	Minutes
About how much time did the program take you (in minutes)?	22.30 (11.42)
Attention	1 = *Minimal*; 3 = *Some*; 5 = *A lot*
How much attention did you give the program?	3.48 (0.90)
Usefulness	0 = *Not at all useful*; 4 = *Very useful*
The feedback about how your use compares to that of other students.	2.24 (1.23)
The feedback about how much money you spend on marijuana, alcohol, and tobacco.	2.27 (1.24)
Thinking about other things that are important to you, and other ways to spend your time.	1.72 (1.23)
Considering ways to begin decreasing your marijuana use.	1.28 (1.16)
Campus resources (e.g., phone numbers to call).	1.08 (1.26)
Satisfaction	0 = *I strongly disagree*; 4 = *I strongly agree*
This program was an appropriate length (not too time-consuming).	2.20 (1.12)
The program was easy to use.	3.34 (0.75)
It was useful that the program was available online.	3.42 (0.86)
I would recommend this program to my friends who use marijuana.	1.67 (1.27)

$F(1, 292) = 13.43$, $p < .001$, and reported more problems, $F(1, 213) = 13.99$, $p < .001$, and dependence symptoms, $F(1, 180) = 11.91$, $p < .001$ than women; no other gender effects reached significance. Condition by gender interactions were significant for problems and abuse. Men did not differ in self-reported problems across conditions; the gap for females was marginally significant ($p = .07$). Men in the e-TOKE condition reported *more* abuse symptoms at follow-up than those in the control condition; the opposite was true for women. Chi-square tests indicated that injunctive norms did not differ by condition, at baseline or follow-up, $ps > 0.10$.

Groups with full baseline assessment were then compared using condition by time by gender ANOVAs (see Table 3), with results interpreted for condition by time, gender by time, and condition by gender by time. The conditions changed differentially over time for three of the descriptive norms items but no other variables. Intervention participants reduced their estimates of the number of peers using more than them, yet control participants did not, $F(1, 308) = 6.45$, $p < .05$. Intervention participants increased their estimates of the number of abstainers whereas control participants did not, $F(1, 308) = 5.76$, $p < .05$. Finally, e-TOKE participants decreased their estimates of recent users whereas control individuals did not, $F(1, 308) = 4.42$, $p < .05$. Time by gender analyses, as well as condition by time by gender analyses, were nonsignificant.

Social desirability was associated with fewer reported problems, abuse, and dependence symptoms. However, the ANOVA results

Table 2
Differences in Marijuana Involvement and Norms by Intervention Condition and Gender: Means and Standard Deviations

	Intervention			Gender			Interaction
	e-TOKE (n = 161)	Control (n = 156)	p value	Male (n = 148)	Female (n = 163)	p value	p value
Days used in past month	10.47 (9.94)	10.81 (11.35)	0.8240	13.26 (11.66)	8.51 (9.21)	0.0003	0.4728
MJ problems	6.72 (7.18)	7.26 (7.47)	0.7751	8.75 (8.53)	5.45 (5.68)	0.0002	0.0256
MJ abuse symptoms	0.73 (0.86)	0.73 (0.89)	0.9897	0.80 (0.92)	0.68 (0.83)	0.2981	0.0403
MJ dependence symptoms	1.82 (1.84)	2.02 (1.88)	0.4869	2.02 (1.99)	1.87 (1.75)	0.0007	0.3286
Descriptive Norms items							
% Uses more than you	28.17 (19.82)	42.20 (24.94)	<0.0001	31.53 (23.04)	38.06 (23.70)	0.0097	0.3498
% Uses less than you	62.33 (24.80)	50.54 (25.81)	0.0002	60.54 (26.77)	52.86 (24.85)	0.0132	0.9434
% Don't use in typical month	50.89 (23.13)	37.10 (20.31)	<0.0001	44.85 (24.24)	43.72 (21.26)	0.8157	0.9029
% Used in past month	45.20 (22.58)	58.16 (19.57)	<0.0001	51.38 (23.56)	51.25 (19.95)	0.7838	0.5483
% Used in lifetime	62.05 (23.77)	74.98 (20.21)	<0.0001	67.66 (24.31)	68.53 (21.53)	0.8055	0.3943

Note. Significance tests were conducted on transformed data; however, for ease of interpretation, nontransformed means and standard deviations are presented in this table. As these were primary analyses, alpha levels are corrected for inflated error. We used an error rate of $(0.05/8)$ $\alpha = .00625$ for marijuana involvement analyses (intervention and gender effects for use, problems, abuse, and dependence), $(0.05/10)$ $\alpha = .005$ for descriptive norms (two main effects for five outcomes), and $(0.05/8)$ $\alpha = .00625$ for injunctive norms (two main effects for four outcomes). Intervention by gender interactions were assessed on an exploratory basis at $p < .05$. Partial η^2 is assessed (in text) for all gender or gender by intervention results significant at $p < .05$.

did not change when social desirability was included as a covariate, $ps > 0.10$.

Within-groups effect sizes were calculated for the participants completing full baseline assessment (see Table 4). Control participants showed mostly minimal to small changes, but reported more problems at follow-up (small-to-medium effect). e-TOKE participants evidenced minimal to small effects for marijuana use frequency, problems, abuse and dependence symptoms, but medium changes in the desired direction for all descriptive norms. Between-groups effects corrected for baseline were minimal/small for marijuana involvement, but of medium magnitude in the desired direction for descriptive norms. Between-groups effects for the full sample were similar, and indicated minimal/small effects for injunctive norms ($\varphi s \le 0.10$).

For significant gender or gender by intervention effects, partial η^2 was calculated (see Cohen, 1973; Kennedy, 1970) to determine relative contributions of gender and intervention (cf. Levine & Hullett, 2002). Gender accounted for more variance than intervention for frequency (gender: partial $\eta^2 = 0.04$; condition: partial $\eta^2 = 0.0002$), problems (gender: partial $\eta^2 = 0.06$; condition: partial $\eta^2 = 0.0004$), abuse (gender: partial $\eta^2 = 0.005$; condition:

partial $\eta^2 = 0.00006$), and dependence symptoms (gender: partial $\eta^2 = 0.06$; condition: partial $\eta^2 = 0.003$). Intervention accounted for more variance for perceived percent of peers using more (gender: partial $\eta^2 = 0.02$; condition: partial $\eta^2 = 0.07$) and less (gender: partial $\eta^2 = 0.02$; condition: partial $\eta^2 = 0.05$) than the respondent.

Discussion

Students liked the online format of e-TOKE, found it easy to use, and found the feedback to be moderately useful. e-TOKE also led to changes in descriptive norms at 1-month follow-up. However, students were not eager to recommend the program to friends, and exposure to e-TOKE did not change marijuana use, problems, abuse or dependence symptoms, or injunctive norms 1 month later.

The lack of change in marijuana involvement is disappointing given the efficacy of similar programs for college drinking (Carey, Scott-Sheldon, Elliott, Bolles, & Carey, 2009), and the success of other more intensive computerized marijuana interventions for adults (Budney et al., 2011; Kay-Lambkin et al., 2008; Rooke et

Table 3
ANOVA Results for Condition, Time, and Gender in Conditions Completing Full Assessment

	Baseline		Follow-up		Interaction p value		
	e-TOKE (n = 77)	Control (n = 85)	e-TOKE (n = 76)	Control (n = 85)	Condition × Time	Time × Gender	Condition × Time × Gender
Days used in past month	10.97 (10.11)	11.14 (13.16)	10.01 (9.59)	10.90 (11.25)	0.7353	0.9764	0.5490
MJ problems	6.55 (6.12)	5.72 (5.36)	7.57 (8.20)	7.17 (7.79)	0.8067	0.2092	0.5397
MJ abuse symptoms	0.81 (0.81)	0.85 (0.96)	0.77 (0.82)	0.76 (0.89)	0.6377	0.7769	0.7699
MJ dependence symptoms	2.18 (1.80)	2.14 (1.76)	1.94 (1.73)	1.96 (1.85)	0.9646	0.9084	0.6985
Descriptive Norms items							
% Uses more than you	41.65 (22.62)	42.25 (24.58)	27.71 (18.66)	40.98 (23.71)	0.0116	0.2516	0.2682
% Uses less than you	50.82 (25.23)	49.01 (26.27)	61.19 (24.87)	50.98 (25.56)	0.1482	0.0963	0.6208
% Don't use in typical month	40.03 (22.26)	36.99 (20.63)	50.37 (22.20)	36.31 (21.37)	0.0170	0.5805	0.3925
% Used in past month	57.52 (20.49)	58.85 (19.57)	46.84 (22.49)	57.70 (20.22)	0.0363	0.2806	0.8739
% Used in lifetime	75.92 (19.36)	77.89 (19.29)	63.99 (23.22)	74.26 (20.49)	0.0683	0.7905	0.6318

Table 4

Effect Sizes for E-TOKE and Control: Between-Group and Within-Group Effects

	Sample: Conditions receiving full assessment (n = 162)			Sample: All participants (n = 312)
	Within effect: e-TOKE (n = 77)	Within effect: Control (n = 85)	Between effect (corrected for baseline values)	Between effect (uncorrected for baseline)
Days used in past month	d = 0.09	d = 0.02	d = 0.08	d = 0.03
MJ problems	d = −0.16	d = −0.27	d = 0.10	d = 0.07
MJ abuse symptoms	d = 0.05	d = 0.09	d = −0.04	d = 0.00
MJ dependence symptoms	d = 0.13	d = 0.10	d = 0.03	d = 0.11
Descriptive norms items				
% Uses more than you	d = 0.61	d = 0.05	d = 0.56	d = 0.62
% Uses less than you	d = 0.41	d = 0.07	d = 0.33	d = 0.46
% Don't use in typical month	d = 0.46	d = −0.03	d = 0.49	d = 0.63
% Used in past month	d = 0.52	d = 0.06	d = 0.46	d = 0.61
% Used in lifetime	d = 0.61	d = 0.19	d = 0.42	d = 0.58
Injunctive norms items				
Abstention				φ = 0.06
Experimentation				φ = 0.03
Occasional use				φ = 0.05
Regular use				φ = 0.10

Note. For continuous data, Cohen's *d* values are interpreted using guidelines for small ($d < 0.20$), medium ($d = 0.50$), and large effects ($d > 0.80$; Lipsey & Wilson, 2001). For categorical variables, Cramer's phi (φ) values are interpreted using guidelines for small ($\varphi = 0.10$), medium ($\varphi = 0.30$), or large effects ($\varphi = 0.50$; Cohen, 1988). For all presented effects, positive effects indicate change in the expected (preferred) direction (e.g., fewer problems).

al., 2011). However, Web-based marijuana interventions have also not changed incoming college students' use or college abstainers' initiation (Elliott & Carey, 2012; Lee et al., 2010). It is possible that brief Web-based interventions are less effective for marijuana than alcohol among college students, perhaps due to recent marijuana legalization debates, or membership in social groups that normalize use. Marijuana has also been subject to fear tactics in intervention efforts of the past (e.g., the movie *Reefer Madness*), which may foster skepticism of interventions designed to decrease use. However, given that this is the first test of a widely used program in current student users, more research is indicated.

In contrast, the intervention did change descriptive norms. It seems feasible that changes in norms may mediate later changes in use, as marijuana descriptive norms correlate with personal use (e.g., Kilmer et al., 2006). Mediation by norms has precedent in college drinking interventions (e.g., Neighbors, Larimer, & Lewis, 2004).

The present study has several strengths. It is the first controlled test of e-TOKE in current college users. It is important to determine if this intervention is effective, as it is widely used. The design was strong: a randomized controlled study that evaluated intervention effectiveness, assessment reactivity, and gender effects. Compliance was excellent. Effect sizes were calculated to determine magnitude of effects.

The current study is not without limitations. First, the 1-month follow-up was brief. It is possible that changes in use could have emerged over time, perhaps in response to changed norms. Second, as this was an effectiveness (not efficacy) test (cf., Kazdin, 2003), participants chose the setting of intervention completion, as in real world use. Such tests do not control the environment or ensure optimal intervention dose. However, given the widespread use of this program, effectiveness was deemed most important. Third, it is unclear how well psychology student volunteers resemble specific populations who may be targeted for such interventions, such as mandated or help-seeking students. Yet, our participants were

regular users. Fourth, self-report measures have inherent limitations. Social desirability results indicated that presentation biases occurred but did not alter results. Fifth, a substantial minority of participants did not remember completing e-TOKE, which may have contributed to the lack of effect for use. However, norms did change despite low recall. Although the current study provides an important first step in evaluating this type of intervention among college users, continued research is needed, including (a) studies with longer follow-ups that assess for mediation by norms; (b) efficacy studies to test the effects under optimal conditions; and (c) evaluation of effects in treatment-seeking, mandated, and/or high-risk populations.

In conclusion, e-TOKE was effective in correcting students' misperceptions about marijuana use. However, it did not succeed in achieving its primary purpose, to reduce use. Yet, this nascent area of study would benefit from continued research.

References

American College Health Association. (2012). *American College Health Association –National College Health Assessment II: Reference Group Executive Summary Fall 2011.* Hanover, MD: American College Health Association.

Bernstein, E., Edwards, E., Dorfman, D., Heeren, T., Bliss, C., & Bernstein, J. (2009). Screening and brief intervention to reduce marijuana use among youth and young adults in a pediatric emergency department. *Academic Emergency Medicine, 16,* 1174–1185. doi:10.1111/j.1553-2712.2009.00490.x

Borsari, B., & Carey, K. B. (2003). Descriptive and injunctive norms in college drinking: A meta-analytic integration. *Journal of Studies on Alcohol, 64,* 331–341.

Buckner, J. D., Ecker, A. H., & Cohen, A. S. (2010). Mental health problems and interest in marijuana treatment among marijuana-using college students. *Addictive Behaviors, 35,* 826–833. doi:10.1016/j.addbeh.2010.04.001

Budney, A. J., Fearer, S., Walker, D. D., Stanger, C., Thostenson, J., Grabinski, M., & Bickel, W. K. (2011). An initial trial of a computerized

behavioral intervention for cannabis use disorder. *Drug and Alcohol Dependence, 115,* 74–79. doi:10.1016/j.drugalcdep.2010.10.014

Caldeira, K. M., Arria, A. M., O'Grady, K. E., Vincent, K. B., & Wish, E. D. (2008). The occurrence of cannabis use disorders and other cannabis-related problems among first-year college students. *Addictive Behaviors, 33,* 397–411. doi:10.1016/j.addbeh.2007.10.001

Carey, K. B., Scott-Sheldon, L. A. J., Elliott, J. C., Bolles, J. R., & Carey, M. P. (2009). Computer-delivered interventions to reduce college student drinking: A meta-analysis. *Addiction, 104,* 1807–1819. doi: 10.1111/j.1360-0443.2009.02691.x

Cohen, J. (1973). Eta-squared and partial eta-squared in fixed factor ANOVA designs. *Educational and Psychological Measurement, 33,* 107–112. doi:10.1177/001316447303300111

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd edition). Hillsdale, NY: Erlbaum.

Doyle, A., Swan, M., Roffman, R., & Stephens, R. (2003). The marijuana check-up: A brief intervention tailored for individuals in the contemplation stage. *Journal of Social Work Practice in the Addictions, 3,* 53–71. doi:10.1300/J160v03n04_04

Elliott, J. C., & Carey, K. B. (2012). Correcting exaggerated marijuana use norms among college abstainers: A preliminary test of a preventive intervention. *Journal of Studies on Alcohol and Drugs, 73,* 976–980.

Kay-Lambkin, F. J., Baker, A. L., Lewin, T. J., & Carr, V. J. (2009). Computer-based psychological treatment for comorbid depression and problematic alcohol and/or cannabis use: A randomized controlled trial of clinical efficacy. *Addiction, 104,* 378–388. doi:10.1111/j.1360-0443.2008.02444.x

Kazdin, A. E. (2003). *Research design in clinical psychology* (4th ed.). Boston, MA: Allyn & Bacon.

Kennedy, J. J. (1970). The eta coefficient in complex ANOVA designs. *Educational and Psychological Measurement, 30,* 885–889. doi: 10.1177/001316447003000409

Kilmer, J. R., Walker, D. D., Lee, C. M., Palmer, R. S., Mallett, K. A., Fabiano, P., & Larimer, M. E. (2006). Misperceptions of college student marijuana use: Implications for prevention. *Journal of Studies on Alcohol, 67,* 277–281.

Kouri, E., Pope, H. G., Yurgelun-Todd, D., & Gruber, S. (1995). Attributes of heavy vs. occasional marijuana smokers in a college population. *Biological Psychiatry, 38,* 475–481. doi:10.1016/0006-3223(94)00325-W

LaBrie, J. W., Hummer, J. F., & Lac, A. (2011). Comparing injunctive marijuana use norms of salient reference groups among college student marijuana users and nonusers. *Addictive Behaviors, 36,* 717–720. doi:10.1016/j.addbeh.2011.02.004

Lee, C. M., Kilmer, J. R., Neighbors, C., Atkins, D. C., Zheng, C., Walker, D. D., & Larimer, M. E. (2013). Indicated prevention for college student marijuana use: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 81,* 702–709. doi:10.1037/a0033285

Lee, C. M., Neighbors, C., Kilmer, J. R., & Larimer, M. E. (2010). A brief, Web-based personalized feedback selective intervention for college student marijuana use: A randomized clinical trial. *Psychology of Addictive Behaviors, 24,* 265–273. doi:10.1037/a0018859

Levine, T. R., & Hullett, C. R. (2002). Eta squared, partial eta squared, and misreporting of effect size in communication research. *Human Communication Research, 28,* 612–625. doi:10.1111/j.1468-2958.2002.tb00828.x

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. Thousand Oaks, CA: Sage.

Martin, G., Copeland, J., & Swift, W. (2005). The adolescent cannabis check-up: Feasibility of a brief intervention for young cannabis users. *Journal of Substance Abuse Treatment, 29,* 207–213. doi:10.1016/j.jsat.2005.06.005

McCambridge, J., & Kypri, K. (2011). Can simply answering research questions change behavior? Systematic review and meta analyses of brief alcohol intervention trials. *PLoS ONE, 6,* e23748. doi:10.1371/journal.pone.0023748

National Institutes of Health. (2006). *Alcohol use and alcohol use disorders in the United States: Main findings from the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions (NESARC): 3.2.4 DSM–IV Drug and Nicotine Use Disorders*. Retrieved October 14, 2010, from http://pubs.niaaa.nih.gov/publications/NESARC_DRM/NESARCDRM.htm#TOC20

Neighbors, C., Geisner, I. M., & Lee, C. M. (2008). Perceived marijuana norms and social expectancies among entering college student marijuana users. *Psychology of Addictive Behaviors, 22,* 433–438. doi:10.1037/0893-164X.22.3.433

Neighbors, C., Larimer, M. E., & Lewis, M. A. (2004). Targeting misperceptions of descriptive drinking norms: Efficacy of a computer-delivered personalized normative feedback intervention. *Journal of Consulting and Clinical Psychology, 72,* 434–447. doi:10.1037/0022-006X.72.3.434

Reynolds, W. M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne Social Desirability Scale. *Journal of Clinical Psychology, 38,* 119–125. doi:10.1002/1097-4679(198201)38:1<119::AID-JCLP2270380118>3.0.CO;2-I

Rooke, S., Copeland, J., Norberg, M., & McCambridge, J. (2011, November). *Randomised controlled trial of a Web-based intervention for cannabis use*. Poster presented at the Association for Behavioral and Cognitive Therapies, Toronto, Ontario, Canada.

San Diego State University Research Foundation. (2009). *Marijuana eCHECKUP TO GO (e-TOKE) for universities & colleges*. Retrieved from http://www.echeckuptogo.com/usa/programs/coll_mj.php

Stephens, R. S., Roffman, R. A., Fearer, S. A., Williams, C., & Burke, R. S. (2007). The Marijuana Check-Up: Promoting change in ambivalent marijuana users. *Addiction, 102,* 947–957. doi:10.1111/j.1360-0443.2007.01821.x

Swan, M., Schwartz, S., Berg, B., Walker, D., Stephens, R., & Roffman, R. (2008). The teen marijuana check-up: An in-school protocol for eliciting voluntary self-assessment of marijuana use. *Journal of Social Work Practice in the Addictions, 8,* 284–302.

Third Millennium Classrooms. (2007). *Marijuana intervention course*. Retrieved from https://3rdmilclassrooms.com/website/COLMarijuana.aspx

Tossmann, H.-P., Jonas, B., Tensil, M.-D., Lang, P., & Strüber, E. (2011). A controlled trial of an internet-based intervention program for cannabis users. *Cyberpsychology, Behavior, and Social Networking, 14,* 673–679.

White, H. R., LaBouvie, E. W., & Papadaratsakis, V. (2005). Changes in substance use during the transition to adulthood: A comparison of college students and their noncollege age peers. *Journal of Drug Issues, 35,* 281–305.