Efficacy of the College Drinkers Check-Up for Student Drinkers Living Off Campus

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ABSTRACT. Objective: Students living in off-campus housing consume more alcohol and experience more alcohol-related consequences than those living on campus, yet prevention efforts have not targeted this high-risk group specifically. The present study evaluated the efficacy of a brief, computer-delivered, alcohol intervention (the College Drinkers Check-Up [CDCU]) in reducing alcohol use and related consequences in a sample of college students living off campus. **Method:** Students who lived off campus and reported at least one heavy drinking episode (4+/5+ drinks for females/males in one occasion) in the past 30 days completed the CDCU or assessment only during the first month of the school year ($n = 326$; 61% female). Participants in both conditions completed follow-up assessments at 1, 3, and 6 months. We hypothesized that participants who completed the CDCU would report fewer drinks per week and heavy drinking episodes, lower peak drinking quantities,

and fewer alcohol-related consequences than those in the control group. **Results:** Hierarchical linear modeling was used to examine changes in drinking outcomes across groups from baseline to 1-, 3-, and 6-month follow-ups. Significant effects of time indicated less drinking and fewer consequences at each follow-up relative to baseline. Compared with those in the control group, participants who received the CDCU reported significantly fewer heavy drinking episodes at 1 month, lower peak drinking quantities at 3 months, and fewer alcohol-related consequences at 1 and 3 months. Neither sex nor baseline drinking severity moderated intervention effects. **Conclusions:** The brief, online CDCU reduces heavy drinking and alcohol consequences in the short term among at-risk college students living off campus. (*J. Stud. Alcohol Drugs*, 78, 571–579, 2017)

HEAVY DRINKING—the consumption of four/five or more drinks per occasion for women/men—is prevalent among young adults and has been associated with a range of negative consequences (Hingson & White, 2014). This pattern of drinking peaks among 18- to 24-year-olds, with 43% of college students reporting at least one heavy drinking episode in the past year (Dawson et al., 2004). Associated consequences range from mild (e.g., hangovers) to severe (e.g., regretted sex) (Hingson & White, 2014). Alcohol interventions designed for college students can reduce risky drinking and/or consequences even when targeted to at-risk groups (Carey et al., 2016; Scott-Sheldon et al., 2014).

College students who live off campus drink more heavily and experience more alcohol-related consequences than those living in on-campus housing (Ward & Gryczynski, 2009; Wechsler & Nelson, 2008). This may be partly because

students who live off campus tend to be older and able to purchase alcohol. However, it may also be that living off campus increases access to alcohol, as there are fewer social controls guiding student behavior (Ward & Gryczynski, 2009). This hypothesis is supported by evidence that on-campus students drink less because their alcohol use is subject to the rules imposed by the college resident advisors (Perkins, 2002). However, previous studies have not consistently differentiated between living off campus independently or with parents. This is an important distinction because living with a parent (Dawson et al., 2004; Harford et al., 2002; Miller et al., 2016; Presley et al., 2002) appears to be protective against heavy drinking. Students living off campus without parents have higher odds of heavy episodic drinking and experience more alcohol-related consequences than those living on campus, even when controlling for age (Benz et al., 2017; Ward & Gryczynski, 2009). It is surprising, then, that no studies have evaluated the efficacy of alcohol risk reduction interventions for this at-risk group.

The impact of interventions designed to reduce college student alcohol use has now been summarized in several meta-analyses, and all show that brief alcohol interventions are efficacious when compared with controls (e.g., Carey et al., 2007; Samson & Tanner-Smith, 2015). Although typically associated with smaller effect sizes, computer-delivered interventions are easy to administer and allow students to access the intervention remotely from a variety of devices (Carey et al., 2012), making them ideal for college students living off campus. One example of a theory-based,

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computer-delivered, brief alcohol intervention is the College Drinkers Check-Up (CDCU; Hester et al., 2012). The CDCU is a promising intervention that expands on the most commonly used active ingredient of brief interventions—personalized consumption feedback with normative drinking comparisons (Miller et al., 2013)—by incorporating normative feedback on alcohol-related consequences, a decisional balance exercise, and a change plan. Hester and colleagues (2012) evaluated the efficacy of the CDCU in a randomized controlled trial with heavy-drinking college students. Compared with control participants, CDCU participants reported significantly lower levels of alcohol consumption and alcohol-related problems at 1- and 12-month follow-ups (Hester et al., 2012). Thus, the CDCU appears to be efficacious for college students at high risk for alcohol-related consequences.

The present study evaluates the efficacy of the CDCU in reducing alcohol use and related consequences among at-risk college students who have moved to off-campus housing. Based on previous work (Hester et al., 2012), we hypothesized that participants who received the CDCU would report fewer drinks per week, smaller peak drinking quantities, less frequent heavy drinking, and fewer alcohol-related consequences than those in the assessment-only control group. Because women and high-risk drinkers have been found in some studies to respond differently to computer-delivered interventions (Carey et al., 2012), we also examined sex and baseline drinking severity as moderators of intervention effects.

Method

Participants

Undergraduate students living in off-campus housing received email invitations to participate in a study evaluating the CDCU. The Office of Residential Life sent recruitment emails, including a web link to a brief screening survey, to all 1,482 students living off campus in Fall 2015. Inclusion criteria were (a) 18–24 years of age, (b) registered as living off campus for the 2015–2016 academic year, and (c) at least one heavy drinking episode (4+/5+ drinks for females/males in one occasion) in the past 30 days. Eligible participants provided informed consent and were randomized to condition via computer algorithm. They completed the baseline assessment and all follow-up assessments online from remote locations. All procedures were approved by the university's Institutional Review Board.

Procedures

Consented participants received a link to the baseline survey. Those assigned to the intervention condition completed the CDCU immediately following the baseline assessment.

Participants were invited via email to participate in online follow-up assessments at 1, 3, and 6 months. One email reminder was sent to those who did not complete the baseline or follow-ups within 1 week. Participants received a \$10 Amazon credit for the baseline and each of the follow-up surveys, plus an additional \$10 if all three follow-ups were completed.

Measures

Demographic information. Participants provided information regarding sex, age, race/ethnicity, year in college, and fraternity/sorority affiliation.

Drinking outcomes. All alcohol measures included standard drink equivalents (12 oz. beer; 5 oz. 12% table wine; 12 oz. wine cooler; or 1.25 oz. 80-proof distilled spirits). Participants reported the maximum number of drinks consumed in a single day in the past 30 days (*peak drinking quantity*) and the number of times in the past month they consumed 4+/5+ drinks (for females/males) on one drinking occasion (*heavy drinking frequency*). Using a daily drinking grid that listed the days of one week (Collins et al., 1985), participants filled in the number of drinks that they typically consume and duration of drinking on each day of a typical week in the last month. Daily quantities were summed to calculate the number of drinks participants consume in a typical week (*drinks per week*).

Alcohol-related consequences. The Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler et al., 2005) is a 24-item checklist of problems related to drinking; responses are dichotomous (yes/no) and refer to the past 30 days. An example item includes, "I have woken up in an unexpected place after heavy drinking." The BYAACQ demonstrated adequate reliability in this sample ($\alpha = .80$).

Baseline drinking severity. The Alcohol Use Disorders Identification Test (AUDIT; Allen et al., 1997; Saunders et al., 1993) is a 10-item screen for hazardous alcohol consumption and alcohol problems in the past year. Scores range from 0 to 40. The AUDIT is a valid measure of at-risk drinking by college students (DeMartini & Carey, 2009, 2012).

College Drinkers Check-Up. The CDCU consists of three modules (Look at Your Drinking, Get Feedback, and Consider Your Options) that, together, take approximately 20 minutes to complete. In the Look at Your Drinking module, participants complete a comprehensive assessment of alcohol and other drug use, alcohol-related consequences, the pros and cons of drinking, and risk factors for future problems. This information is used to create their personalized feedback.

In the Get Feedback module, participants receive gender-specific normative feedback comparing their drinking to that of U.S. adults and students at their university. They also receive normative feedback on their frequency of heavy drinking and the number of consequences they have experi-

enced in comparison to other male/female students at their university. They receive education and feedback on their typical and peak blood alcohol levels, money spent on alcohol in the past year, alcohol calories consumed in the past month, and alcohol-related risk (based on the AUDIT).

In the Consider Your Options module, participants indicate their readiness to change (i.e., *not changing and not interested*, *not changing but open to experimenting*, or *already drinking less*). The language used in the rest of the module is then tailored to their readiness to change. First, participants select from a list and/or self-generate the “good” and “not-so-good” aspects of drinking and rate each aspect’s relative importance on a scale from 0 (*not at all important*) to 10 (*highest level of importance*). Second, they may select or self-generate their “desired effects” of drinking (e.g., to be more sociable) and alternatives to drinking that would achieve these effects (e.g., play sports). Third, participants select or self-generate a list of protective behavioral strategies (e.g., avoid pregameing) that they may use to avoid alcohol-related problems in the future. Finally, they create a “game plan,” in which they indicate the specific change they are going to (or could) make and why/how they would do so.

Data analysis plan

Data were screened for missing values, outliers, and violations of the assumptions of hierarchical linear modeling (HLM) before analysis. We determined outliers as any value 3 *SD* above or below the mean. Outliers ($n = 4$ for heavy drinking frequency; $n = 1$ for drinks per week) were reduced to the highest non-outlying value plus 1, which resulted in outcome distributions within the normal range (skewness values ≤ 1.7 and kurtosis values ≤ 3.1 ; Tabachnick & Fidell, 2013). The multilevel period-period data set included four observations nested within each participant ($n = 326$), resulting in 1,304 survey data points. Data were missing on 222 of those data points (17%). We relied on robust standard errors (Zeger et al., 1988) when Level 1 variances violated the assumption of homogeneity.

Primary analyses were conducted using HLM 7.0 with full maximum likelihood estimation (Raudenbush et al., 2013). HLM requires fewer assumptions than other longitudinal data analysis methods and allows for examination of both within-person (e.g., change in drinking from baseline to 1 month) and between-person (e.g., sex) effects on outcomes (Raudenbush & Bryk, 2002). Fully unconditional HLM models were used to determine intraclass correlations for the four primary outcomes, allowing us to determine if use of multilevel models was appropriate (Raudenbush & Bryk, 2002). Level 1 (within-person) and Level 2 (between-person) variables were then entered into models, consistent with hypotheses (described below). We specified intercept effects as random to allow for between-person differences in baseline levels of outcomes. All slope effects were initially

specified as random; when nonsignificant, they were fixed for parsimony.

In primary HLM models, Level 1 included the effects of time and Level 2 included the treatment condition. Because we were interested in the impact of treatment group on levels of drinking behavior at each follow-up, three time contrasts were created to represent each of the three follow-ups. Specifically, time to first follow-up was coded 0, 1, 0; time to second follow-up was coded 0, 0, 1, 0; and time to third follow-up was coded 0, 0, 0, 1. Treatment group was included as a predictor of the intercept (representing baseline levels of the outcome) and each of the three time contrasts (representing the difference between the control and treatment group on change in the outcome between baseline and that time point). In models predicting alcohol consequences, we also controlled for baseline drinks per week. Between-group (condition) effect sizes from HLM models were calculated using the formula $r = \sqrt{t^2 / (t^2 + df)}$ (Rosenthal & Rosnow, 1991). Effects of $r = .1-.23$ are considered small, $r = .24-.36$ are medium, and $r > .37$ are large (Cohen, 1988). In a subsequent set of exploratory models, we then tested sex and baseline AUDIT scores as moderators of treatment effects at each follow-up. Thirteen participants did not have data on the AUDIT and, therefore, could not be included in models testing the Group $\times$ AUDIT interaction.

Results

Preliminary analyses

Sample characteristics. Participant flow is depicted in Figure 1. Of those who met eligibility criteria, 381 (80%) consented to participate. Although the link to the baseline survey was delivered immediately after participants provided consent, 13% of control participants and 16% of intervention participants did not provide any baseline data, $\chi^2(1) = 0.34$, $p = .56$. Thus, the final sample consisted of 326 off-campus students (61% female, 66% White) of approximately 21 years ($M = 20.97$, $SD = 0.85$). They were predominantly fourth-year students (83%) who had just begun their first year living off campus (85%). All participants reported living off campus either alone or with friends, teammates, acquaintances, and/or a partner; none reported living with family. Those who consented ($n = 381$) and those who were eligible but did not consent ($n = 96$) did not differ in terms of age or birth sex ($p \geq .12$).

Equivalency of groups at baseline. Intervention and control groups did not differ at baseline in age, $t(326) = 0.93$, $p = .35$; sex, $\chi^2(1) = 0.07$, $p = .79$; year in school, $\chi^2(1) = 1.10$, $p = .78$; or race, $\chi^2(1) = 2.090$, $p = .84$. They were equivalent on all four main drinking outcomes (Table 1; $p > .05$).

Follow-up and attrition. Figure 1 depicts attrition rates across the three follow-ups. Among those who provided baseline data, control participants (81%) were more likely

FIGURE 1. Participant flow chart. ORL = Office of Residential Life.

TABLE 1. Descriptive statistics

Variable	Control (<i>n</i> = 166)		Intervention (<i>n</i> = 160)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Drinks per week				
Baseline	11.32	7.90	11.04	6.65
1 month	10.44	7.78	8.76	6.12
3 month	8.86	6.93	7.72	6.62
6 month	9.53	7.90	8.94	7.50
Peak drinking quantity				
Baseline	7.23	3.69	7.28	3.37
1 month	6.84	3.38	6.23	3.63
3 month	6.51	3.73	5.56	3.99
6 month	6.50	4.06	6.19	3.48
Heavy drinking frequency				
Baseline	4.00	2.88	4.03	3.09
1 month	3.51	2.68	2.93	2.61
3 month	2.82	3.13	2.76	3.06
6 month	3.64	3.12	3.27	3.07
Alcohol-related consequences				
Baseline	4.95	3.67	5.13	3.56
1 month	4.05	3.23	3.16	3.16
3 month	3.57	3.55	2.63	3.08
6 month	3.96	3.35	3.79	3.20

than intervention participants (68%) to complete the 3-month follow-up, $\chi^2(1) = 7.54, p = .01$. Retention rates did not differ across groups at the 1-month (85% control; 81% intervention), $\chi^2(1) = 0.79, p = .37$, or 6-month follow-ups (81% control; 73% intervention), $\chi^2(1) = 2.66, p = .10$. There were no significant differences on sex or race/ethnicity between those who responded to at least one follow-up and those who did not ($p > .32$). However, those who provided follow-up data reported fewer alcohol-related consequences than those who did not: 1 month, $t(308) = 2.31, p = .02$; 3 month, $t(308) = 2.50, p = .01$; 6 month, $t(308) = 2.29, p = .02$.

Primary outcomes

See Table 1 for descriptive statistics for drinking outcomes. Intraclass correlations indicated that 58%, 55%, 62%, and 56% of the variance in drinks per week, peak drinking quantity, heavy drinking frequency, and alcohol-related consequences, respectively, occurred between as opposed to within individuals. Results of the full models are described below and presented in Table 2.

Drinks per week. Participants in both groups reduced the number of drinks they consumed per week from baseline to 1-, 3-, and 6-month follow-ups. Reductions in drinks per week did not differ by group at any follow-up.

Peak drinking quantity. Participants in both groups reduced their peak drinking quantities from baseline to 1-, 3-, and 6-month follow-ups. Reductions in peak drinking quantity did not differ by group at 1- or 6-month follow-ups. However, at 3-month follow-up, participants in the intervention condition reported significantly greater decreases in peak drinking quantity than those in the control ($p = .03$).

Heavy drinking frequency. Participants in both groups reported less frequent heavy drinking from baseline to 1- and 3-month follow-ups. Relative to the control group, participation in the intervention was associated with greater reduction in heavy drinking frequency at 1-month ($p = .03$) but not 3- or 6-month follow-ups.

Alcohol-related consequences. Participants in both groups reported decreases in alcohol-related consequences from baseline to 1-, 3-, and 6-month follow-ups. Relative to the control group, participation in the intervention was associated with significantly fewer alcohol-related consequences at 1- and 3-month follow-ups ($p \leq .02$). The groups were not significantly different at 6-month follow-up. Effect sizes were small (Table 2).

Moderated effects

Sex and AUDIT scores were examined as moderators of intervention effects at each follow-up. Sex did not significantly interact with condition on any outcome at any follow-up ($p \geq .08$).¹ Only one significant Group $\times$ AUDIT interaction emerged. Specifically, baseline AUDIT score moderated the effect of treatment group on alcohol-related consequences at 1-month follow-up, $B = 0.27, SE = 0.12, t(307) = 2.27, p = .02$. To test the nature of this interaction, we probed the group effect on alcohol-related consequences at high and low levels of baseline AUDIT scores (1 *SD* above and below the mean, respectively) (Aiken & West, 1991). In the context of high baseline AUDIT scores, the intervention and control groups did not differ in alcohol-related consequences at 1-month follow-up, $B = 0.07, SE = 0.59, t(307) = 0.12, p = .91$. In the context of low baseline AUDIT scores, however, participation in the intervention condition was associated with significantly fewer consequences, $B = -1.72, SE = 0.46, t(307) = -3.74, p < .001$.

Discussion

This study is the first to evaluate the efficacy of an online alcohol prevention program in a sample of college students living off campus, who are at greater risk for heavy drinking and alcohol-related consequences than their on-campus peers (Ward & Gryczynski, 2009). Against a backdrop of overall reductions in drinking, participants who received the CDCU reported greater short-term (≤ 3 -month) reductions in peak drinking quantity, heavy drinking frequency, and alcohol-related consequences than those in the control group. These between-group differences dissipated by the 6-month follow-up in the spring semester. Collectively, data suggest that the CDCU facilitates reductions in heavy drinking and

¹A marginal Group $\times$ Sex interaction in the prediction of drinks per week suggested a trend for women, but not men, in the intervention condition to report decreases in drinks per week from baseline to 1-month follow-up ($p = .08$).

TABLE 2. Summary of hierarchical linear models for main effects

Fixed effect	Main effects				Effect size <i>r</i>
	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	
Drinks per week					
Baseline					
Intercept	11.32	0.61	18.52	<.001	
Group effect	-0.28	0.81	-0.34	.73	
1 month					
Intercept	-1.06	0.40	-2.64	.01	
Group effect	-1.28	0.67	-1.92	.06	.16
3 months					
Intercept	-2.65	0.53	-5.00	<.001	
Group effect	-0.54	0.81	-0.67	.50	.04
6 months					
Intercept	-1.81	0.55	-3.30	.001	
Group effect	-0.41	0.85	-0.48	.63	.03
Peak drinking quantity					
Baseline					
Intercept	7.23	0.28	26.20	<.001	
Group effect	0.06	0.39	0.14	.89	
1 month					
Intercept	-0.52	0.24	-2.14	.03	
Group effect	-0.61	0.35	-1.73	.09	.14
3 months					
Intercept	-0.92	0.28	-3.25	.001	
Group effect	-0.91	0.42	-2.18	.03	.12
6 months					
Intercept	-0.82	0.29	-2.78	.01	
Group effect	-0.46	0.43	-1.07	.29	.06
Heavy drinking frequency					
Baseline					
Intercept	4.01	0.23	17.76	<.001	
Group effect	0.02	0.33	0.07	.95	
1 month					
Intercept	-0.41	0.17	-2.39	.02	
Group effect	-0.56	0.25	-2.23	.03	.12
3 month					
Intercept	-1.12	0.21	-5.43	<.001	
Group effect	0.03	0.31	0.11	.92	.01
6 month					
Intercept	-0.25	0.23	-1.07	.29	
Group effect	-0.35	0.36	-0.99	.32	.06
Alcohol consequences					
Baseline					
Drinks per week (covariate)	0.13	0.02	6.47	<.001	
Intercept	4.79	0.29	16.30	<.001	
Group effect	0.17	0.41	0.41	.69	
1 month					
Intercept	-0.72	0.25	-2.84	.01	
Group effect	-0.85	0.36	-2.35	.02	.13
3 months					
Intercept	-0.92	0.25	-3.62	<.001	
Group effect	-1.02	0.40	-2.56	.01	.14
6 months					
Intercept	-0.64	0.28	-2.30	.02	
Group effect	-0.29	0.42	-0.70	.49	.04

Notes: Because we coded group such that 0 = *control* and 1 = *intervention*, the intercept at each time point represents the effect for the control group, and the group effect represents the difference observed for the treatment group. The model for alcohol consequences controlled for drinks per week at baseline. Effect sizes represent between-group effects (.10–.23 small, .24–.36 medium, ≥.37 large). **Bold font** represents significant group effects.

alcohol-related consequences among off-campus students in the short term, with effects fading over time.

Despite lack of significant treatment effect on typical drinking quantity, the CDCU reduced risky drinking in the forms of heavy drinking frequency and peak drinking quan-

tity at 1 and 3 months after baseline, respectively. These reductions were paralleled by decreases in alcohol-related consequences at 1- and 3-month follow-ups. This pattern of results was somewhat surprising, as a prior review suggested that computer-delivered interventions reduce typical and

peak drinking quantities and are less consistent in decreasing frequency of heavy drinking or alcohol-related consequences (Carey et al., 2009). That being said, the CDCU places greater emphasis on alcohol-related consequences and alternative strategies to heavy drinking than many personalized feedback interventions (see Miller et al., 2013). Specifically, participants receive normative feedback on consequences (e.g., you have experienced more consequences than 86% of female students at this university), they spend time generating a personalized list of substance-free alternatives to drinking, and they are asked to create a specific change plan. Given previous research, it is possible that this emphasis on consequences (Merrill et al., 2013), alternatives to drinking (Murphy et al., 2012), and protective behavioral strategies (Barnett et al., 2007; Weaver et al., 2014) contributed in part to the CDCU's efficacy in decreasing heavy drinking and alcohol-related consequences.

We were surprised to find that control participants also reported decreases in drinking and alcohol-related consequences. Although these participants did not receive an intervention, they were asked to monitor their drinking behaviors on each survey. Consistent with the idea of assessment reactivity (Clifford & Davis, 2012; Walters et al., 2009), completion of these assessments may have increased participants' awareness of their behaviors, leading to reductions in drinking in the absence of a targeted alcohol intervention. Because the majority of participants in this study were seniors, it is also possible that decreases in alcohol use and consequences were partly attributable to the tendency for college students to "mature out" of drinking during the transition out of college (Merrill & Carey, 2016). Last, because the final (6-month) assessment took place in the second semester, it is possible that external factors (e.g., changes in class schedule) contributed to decreases in drinking and related consequences among participants in both groups.

Consistent with previous trials of the CDCU (Hester et al., 2012), sex did not moderate intervention effects on alcohol-related outcomes. We also did not find strong evidence of moderation by baseline drinking severity, despite Hester and colleagues' (2012) finding that the CDCU elicited greater decreases in drinking among participants who were heavier drinkers at baseline. Given the discrepancy in these findings, future studies should clarify the role of baseline drinking severity as a moderator of CDCU outcomes. Overall, our lack of moderation findings suggests that the CDCU may be equally effective for men and women as well as individuals with and without a history of hazardous drinking.

Clinical implications

This study represents the first attempt to evaluate an online alcohol prevention program in a sample consisting exclusively of college students who have moved off campus. This population is not commonly the target of alcohol

prevention, despite the fact that the majority of students screened for this study reported a heavy drinking episode. On average, our sample reported four heavy drinking episodes and five alcohol-related problems in the past 30 days. Together with previous research (Benz et al., 2017; Ward & Gryczynski, 2009), these data support the conclusion that off-campus students are a high-risk group of young adults. Our findings also confirm that computer-delivered interventions are feasible within this population. Although the CDCU demonstrated only short-term effects, its brevity and efficiency suggest that it may be a first step in alcohol treatment on college campuses, consistent with stepped care (Borsari et al., 2012; Sobell & Sobell, 2000). Moreover, because the intervention can be delivered entirely through email, dissemination would be a relatively small burden for health providers and/or residential services.

Limitations and future directions

We acknowledge the limitations of this study. First, nearly all participants were seniors, potentially limiting the generalizability to younger students. Second, participants were incentivized to participate in the intervention and provide follow-up data; it may be difficult to achieve broad participation without an incentive. Third, the timing of intervention delivery could have limited its efficacy, as students were already living off campus when exposed to the CDCU. Specifically, these students may have already been exposed to the off-campus factors that influence risky drinking practices; thus, effects may have been stronger or better sustained if the intervention had been administered before the students moved off campus. Fourth, attrition occurred at multiple time points during this study, particularly at the 3- and 6-month follow-ups in the intervention condition. It is possible that the use of only one follow-up reminder was insufficient to retain participants or that the \$10 compensation was not sufficiently attractive to participants. However, the reason for differential attrition at the 3-month follow-up is unclear. Although consistent with evidence that intervention participants in eHealth trials are less likely than control participants to provide follow-up data (Murray et al., 2013), it is possible that intervention participants thought the follow-up surveys would be more burdensome than they were, due to the length of the baseline session. Although it is unlikely that our analyses were influenced by selective attrition, those who did not complete follow-ups reported more alcohol-related consequences at baseline; thus, it may be challenging to retain the individuals who most need online alcohol prevention interventions.

Despite these limitations, the current study sheds light on avenues for future research. Studies determining why off-campus students are a high-risk population are needed to elucidate the specific determinants of drinking that may inform alcohol interventions. Establishing whether the re-

lationship is causal between risky drinking and choice of residence during college and determining the relationship's directionality may be particularly useful. In addition, studies comparing intervention efficacy for on- and off-campus students would provide valuable information on the relative efficacy of prevention and interventions programs for students in different residential environments (Wechsler & Nelson, 2008; Weitzman et al., 2003). Differential intervention effects for on- versus off-campus students may indicate different mechanisms of change that could then be targeted specifically in tailored interventions. Given the short-term nature of the efficacy of the CDCU and short-term effects of brief computerized interventions in general (Carey et al., 2012), future studies may also examine the extent to which supplemental forms of intervention (e.g., phone calls, texts) may sustain drinking reductions achieved by online interventions over time.

Conclusions

This study provides an independent replication of the feasibility and efficacy of the CDCU (Hester et al., 2012) in a sample of off-campus college students. As a group, college students living off campus engage in more risky drinking practices and experience more alcohol-related consequences than their on-campus peers. The present study showed that a brief, online intervention is more effective than assessment alone in reducing heavy drinking and alcohol-related consequences among off-campus students in the short term, irrespective of sex or baseline drinking severity. Although short-term effects can be achieved with a single-session online intervention, future studies are needed to improve the maintenance of intervention effects over time.

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