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Change Matters: Binge Drinking and Drugging Victimization over Time in Three College Freshman Cohorts

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ABSTRACT

The “once bitten, twice shy” (OBTS) hypothesis argues that crime victims who change their involvement in risky lifestyle behaviors reduce their likelihood of experiencing repeat victimization. Tests of this hypothesis have yielded weak to mixed results, which may be due to methodological issues. We address these methodological issues by testing the OBTS hypothesis for repeat drugging victimization with survey data from a panel of three freshman cohorts at three large, public universities. Supportive of the OBTS hypothesis, the multivariate results show that, on average, those not drugged at Time 1 or Time 2 and those drugged at Time 1 and Time 2 increased the number of days they binge drank in the past month significantly more than those who were drugged at Time 1 only. Our findings have implications for both victimology theory and drugging prevention programming.

KEYWORDS

Repeat victimization; drugging; binge drinking; once bitten; twice shy hypothesis; college students; freshmen

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Introduction

Interpersonal victimization is a relatively common phenomenon among young adults, and, for some, this is a recurring experience (Kaasa et al., 2016; Morgan & Truman, 2018). Over the 10 years between 2005 and 2014, the prevalence of repeat violent victimization (i.e., rape, sexual assault, robbery, and assault) among persons 18–24 years old was the second highest compared to all other age groups (Oudekerk & Truman, 2017).

One explanation for this relatively high repeat victimization rate among emerging adults – including college students and recent graduates, who comprise nearly 42% of those 18–24 years old – rests in the theoretical perspective that those who routinely engage in certain risky lifestyle behaviors (e.g., frequenting bars or night clubs, binge drinking) are exposed to criminal opportunities (Hindelang et al., 1978; U.S. Department of Education, National Center for Education Statistics, 2018). Research supports the notion that exposure to such opportunities increases young adults' likelihood of experiencing a range of different types of interpersonal victimization (Fisher et al., 1998; Franklin et al., 2012; Lasky et al., 2017). It logically follows that those who continue to engage in the risky lifestyle behaviors that facilitated the initial victimization are at an increased probability of experiencing a subsequent victimization (Tseloni & Pease, 2003; Turanovic & Pratt, 2014). Also plausible is that those who modify their risky lifestyle behaviors post-victimization (e.g., reduce the frequency of engaging in risky behaviors, or stop engaging) reduce their likelihood of experiencing a subsequent victimization. Hindelang et al. (1978) coined this relationship the “once bitten, twice shy” (OBTS) hypothesis (pp. 127–128).

Despite the intuitive appeal of the OBTS hypothesis, the empirical findings of tests of the OBTS hypothesis overall are mixed, with some being not supportive (see e.g., Averdijk, 2011; Bunch et al., 2014; Dugan, 1999; Miethe et al., 1990) and some more recent research producing supportive results (Janssen et al., 2020; Lasky et al., 2018; Turanovic & Pratt, 2014; Vecchio, 2013). Building on these past studies, the current study tests the OBTS hypothesis by examining the relationship between binge drinking and drugging victimization (i.e., administering a drug or alcohol to someone without their knowledge or consent) over time. Swan et al. (2017) reported that 7.8% of students at three large, public universities in the United States had been drugged at some point in their lifetime. Coker et al. (2016b) found that 7.8% of college women had been drugged while in college. Thus, drugging victimization

affects a considerably large percentage of college students, and victims can experience a range of negative outcomes, including sexual victimization and physical illness or injury (Swan et al., 2017).

Binge drinking and drugging victimization survey data were collected annually for 4 years from a probability sample of undergraduates enrolled at three large public universities during their fresh- man and sophomore years. The use of a panel design allows for testing the OBTS hypothesis prospectively, as suggested by Hindelang et al. (1978) to capture change, if any, in risky lifestyle behaviors after an initial victimization, and in victimization status (e.g., victim to nonvictim status) over time. Specific to the focus of the current study, we examine change, if any, in lifestyle behaviors after the initial drugging victimization and change, if any, in drugging victimization status over time.

The current study makes three contributions that address methodological issues that characterize prior tests of the OBTS hypothesis and extends testing of the OBTS hypothesis to drugging – a type of victimization known to be repeatedly experienced (Lasky et al., 2018; Swan et al., 2017), yet, to date, overlooked by criminologists and victimologists. First, our survey included a measure of a risky lifestyle behavior – binge drinking – that research has established as significantly correlated with drugging victimization (Lasky et al., 2017; Warner et al., 2018). Second, our measure of binge drinking captures *subtle* changes, specifically in the number of days the student binge drank in the past month, from college freshman to sophomore years. Third, we test whether there are differences in college students' binge drinking behavior between four drugging victimization status groups – individuals who were either victimized at neither time point, at only one time point (at either Time 1 or Time 2), or at both time points. In the sections that follow, we describe how these contributions address methodological issues with prior tests of the OBTS hypothesis. But first, we argue that tests of the OBTS hypothesis must begin by establishing that lifestyle behavior change occurs, at least for some individuals, after an initial victimization.

Does lifestyle change occur after being victimized?

The basic idea underscoring the OBTS hypothesis is that “Victims should be expected to be motivated to avoid victimization in the future, to undertake preventative measures, and to transform risky lifestyles and routine activities into safer ones where possible” (Averdijk, 2011,

pp. 126–127). Hence, the assumption is that behavioral change is the primary mechanism of lowering risk of subsequent victimization. A logical first step to testing the OBTS hypothesis is to determine whether change in lifestyle behavior occurs after an initial victimization.

At least three empirical studies have shown that victimized individuals make changes to their lifestyle behaviors after being victimized. First, Hindelang et al. (1978) found that almost half of the respondents (46%) in the eight-city National Crime Survey (NCS) indicated personally limiting or changing certain behaviors because of crime. In a second study, using 1995–1998 National Crime Victimization Survey (NCVS; formerly the NCS) panel data, Averdijk (2011) found that the average frequency of going shopping and of spending evenings away from home decreased slightly after experiencing violent victimization. Third, Turanovic and Pratt's (2014) analysis of panel data from the Gang Resistance Education and Training Program (G.R.E.A.T.) reported that youths aged 12 to 15 years old who experienced violent acts during the 6 months prior to the Time 2 interview changed the amount of time they spent in unstructured and unsupervised activities (i.e., risky socializing), their level of drug and alcohol use, their involvement in reported violent behaviors, and their number of violent friends. As an example, for risky socializing, the average residual change score from Time 1 to Time 2 was 5.34 hours per week.

Crime victims participating in qualitative research also have described behavioral changes after being victimized. Vecchio's (2013) interviews with 36 men on probation and parole revealed that 43% of those victimized (by robbery, shooting, or stolen property) made some lifestyle behavior change, such as by moving away from buying or selling drugs, or by having other people with them when buying or selling drugs in street markets. In Lasky et al.'s (2018) in-person interviews with 51 drugging victims, 62% of them described having made a behavioral change to reduce their risk of a subsequent drugging incident, while 38% made no such changes after their initial drugging victimization.

Collectively, these findings support the key mechanism of the OBTS hypothesis – that victims change their behavior post-incident (see also Janssen et al., 2020). Knowing that behavioral change occurs after the initial victimization calls into question whether the mixed findings from tests of the OBTS hypothesis that lifestyle behavioral change impacts risk for repeat victimization are due to methodological issues. Identifying and explaining these methodological issues and how they can be addressed provides guidance for the current study.

Three methodological issues affecting tests of the “Once bitten, twice shy” hypothesis

Although some recent studies have yielded results that are supportive of the OBTS hypothesis (Lasky et al., 2018; Turanovic & Pratt, 2014; Vecchio, 2013), others have reported mixed results (e.g., Averdijk, 2011; Bunch et al., 2014; Dugan, 1999; Xie & McDowall, 2008). The mixed findings of tests of the OBTS hypothesis may be due to three basic, yet critical, issues: (1) measuring (and testing) lifestyle behaviors that either (a) are not closely related to experiencing a specific type of victimization, or (b) are not inherently risky and are instead proxy measures for risky behaviors; (2) not capturing subtle changes in how often people engage in these lifestyle behaviors, or changes in the ways in which people engage in these behaviors; and (3) not examining the effect of lifestyle behavior changes on repeat victimization risk between single victims and repeat victims.

Measuring risky lifestyle behaviors

A characteristic common across studies that find mixed or weak support for the “once bitten, twice shy” hypothesis is the use of NCVS (or NCS) data. Although the NCVS is a longitudinal design and measures different types of violent and property victimization, some scholars have questioned whether their two behavioral measures – frequency of shopping and number of evenings spent away from home – capture lifestyle behaviors that can be linked to risk for specific types victimization and repeat victimization. For example, using three waves of data from the 1998–1999 NCVS for those aged 18 older, Bunch et al. (2014) found that violent and property victimization did not influence frequency of shopping and spending evenings away from home. They concluded that “any seeming relationships between victimization and subsequent lifestyles are spurious” and instead are the result of existing differences between victims and nonvictims (Bunch et al., 2014, p. 588).

These lifestyle behavior measures may not explain repeat victimization risk for two reasons. First, they are proxy measures for risky lifestyle behaviors. Going out at night or going shopping could leave a person’s home unprotected and therefore more vulnerable to property victimization, and both behaviors could result in a person’s greater exposure to motivated offenders (Averdijk, 2011). However, these behaviors are not inherently risky. As Pratt and Turanovic argue, “Surely, some people leave home at night to do things like

watch the latest episode of *The Bachelor* and eat bonbons at a friend's place – not everyone who goes out after dark does piles of cocaine at a biker bar” (Pratt & Turanovic, 2016, p. 344). Second, these proxy measures may not be strongly related to repeat victimization risk because they are not known to be correlated with the specific type of victimization under study. Frequency of going shopping, for example, may be related to experiencing violent victimization in public places (Averdijk, 2011), but given the known context for drugging victimization, going shopping is most likely not a risk factor for drugging victimization (Lasky et al., 2017).

The importance of using measures of risky lifestyle behaviors that are known predictors of specific types of victimization to test the OBTS hypothesis is illustrated in at least three studies. First, Turanovic and Pratt (2014) found that youths' changes to behaviors that are known risk factors for victimization (e.g., quitting drug or alcohol use) resulted in lower risk for repeat victimization. Second, Averdijk's (2011) study demonstrates the implications of measuring lifestyles that are known predictors of the type of victimization under study. Her findings from the 1995–1998 NCVS panel data showed that having household security devices reduced household victimization risk but reducing the frequency of shopping or spending evenings away from home did not reduce risk of violent or household victimization. This suggests, not surprisingly, crime prevention-specific lifestyle changes reduce victimization risk, and changes in lifestyle behaviors that are not crime prevention-specific do not reduce victimization risk.

Third, Lasky et al.'s (2018) interviews with drugging victims further highlight the importance of capturing lifestyle behaviors that are relevant to the risk of experiencing a specific type of victimization. A majority of the drugging victims described changing a risky lifestyle behavior that researchers have consistently reported is linked to drugging: alcohol use. The victims detailed a range of changes in their drinking behaviors, including quitting drinking alcohol entirely and not attending venues where their drugging victimization happened. The important point to be gleaned from their interviews is that victims described changes in their lifestyle behaviors that they believed were related to their risk of experiencing drugging victimization with the intention of not getting drugged again.

Two key conclusions can be drawn from the studies discussed above that test the OBTS hypothesis: First, tests of the hypothesis that use proxy measures of risky lifestyle behaviors, or

measures of lifestyle behaviors that are not known predictors or correlates of the specific type of victimization under study, *do not show strong support for the hypothesis* (Averdijk, 2011; Bunch et al., 2014; Dugan, 1999; Xie & McDowall, 2008). Second, tests of the hypothesis that use measures of risky lifestyle behaviors that are known predictors or correlates of the specific type of victimization under study *do show support for the hypothesis* (Lasky et al., 2018; Turanovic & Pratt, 2014). In the context of the current study, these two conclusions imply that to test the OBTS hypothesis for drugging victimization, it is essential to consider change in a risky lifestyle behavior that is known to be correlated with risk for drugging victimization – in this case, binge drinking. In the following section, we describe the need to measure *subtle* changes in such risky lifestyle behaviors.

Measuring subtle lifestyle changes

Drawing from their NCS findings discussed above, as well as from evidence from other sources and daily experiences, Hindelang et al. (1978) inferred that for most people, “the behavioral effects of crime . . . appear more as *subtle adjustments* in behavior than as major shifts in what can be called ‘behavioral policies’” (Hindelang et al., 1978, p. 224, emphasis in original). Several researchers have included this line of thinking into their analyses by using subtle measures of lifestyle behavior change rather than measures of more drastic lifestyle changes.

Turanovic and Pratt's (2014) measures of different types of risky lifestyle behaviors represent a good example of the use of lifestyle behavior change measures that capture subtle change to these lifestyle behaviors over time. They examine the effect of change in the *average number of hours per week* the youth spent risky socializing, change in the *number of times* the youth used alcohol or drugs in the previous 6 months, change in the *number of violent acts* the youth reported committing in the previous 6 months, and change in the *proportion of the youth's friends* who they knew had committed violent acts in the previous 6 months. Demonstrating the importance of capturing subtle change, they found that victims who decreased their engagement in these risky activities, but did not necessarily cease their involvement entirely, were less likely to experience repeat victimization.

Lasky et al.'s (2018) interviews with drugging victims also revealed that these individuals change their lifestyle behaviors post-victimization. In their interviews, victims described a range of

behavioral changes ranging from transitional (e.g., stopped behavior and then resumed) to moderate (e.g., subtly changed behavior) to major (quit behavior totally). Supportive of Hindelang et al.'s (1978) inference concerning subtle lifestyle behavioral change by victims, Lasky et al. reported that of those victims who made lifestyle behavioral changes, the largest percent (44%) made moderate changes (e.g., in drinking behaviors, in social group), whereas a smaller percent (22%) made major changes (e.g., quit alcohol or drug use, left friend group) or transitional changes (e.g., 34% stopped drinking/drug use, but then resumed). Further, Lasky and colleagues found that none of the drugging victims who made a moderate behavioral change post-victimization experienced repeat victimization, whereas many who made either major or transitional behavioral changes were drugged again (43% and 100%, respectively).

The evidence in general – and in Lasky et al.'s (2018) qualitative drugging victimization research, in particular – suggests that the OBTS hypothesis may be best tested using measures of subtle lifestyle changes as suggested by Hindelang et al. (1978). Further, the few studies that have used subtle lifestyle measures have found support for the OBTS hypothesis.

Examining between-group differences

In an analysis of panel data from the NCVS, Bunch et al. (2014) argue that tests of the OBTS hypothesis should examine differences between victims and nonvictims. They explain that studies that test the hypothesis by measuring within-individual changes in lifestyle behaviors “may fail to detect ongoing risk behaviors” because their measures of change are “subject to floor and ceiling effects” (Bunch et al., 2014, pp. 576–577). This problem is important to address in OBTS research, given that “if one goes out every night” (or binge drinks every day), “then it is impossible to go out more frequently” (Bunch et al., 2014, p. 577). Likewise, if a person never binge drinks, they cannot reduce the number of days they spend binge drinking. To address this problem, Bunch et al. (2014) examined the differences in risky lifestyle behavior change between victims and nonvictims across time. Using propensity score matching, they found that baseline victimization risk (rather than the experience of being victimized) explained the differences in the frequency of risky behaviors *between victims and nonvictims*.

Other studies that have examined the behavioral differences between victims and

nonvictims have used cross-sectional data and are therefore unable to determine whether a *change* in behaviors over time differs between victims and nonvictims (Ferraro, 1995; Rountree & Land, 1996; Skogan, 1987). Although Lasky et al.'s (2018) study advanced our understanding of the lifestyle changes that drugging victims make following victimization, their interviews were with victims only, and it is therefore not possible to draw comparisons to nonvictims. The present study addresses these issues by using longitudinal data to test the OBTS hypothesis by comparing the average change in binge-drinking behavior over time between drugging victimization status groups.

The college party culture and binge drinking: opportunities for initial and repeat drugging victimization

Given that one of the key methodological issues for testing the OBTS hypothesis is using measures of risky lifestyle behaviors that are known correlates or predictors of the type of victimization under study, it is imperative that we consider the social context in which risk for drugging among college students is high: the college party culture, and in particular, binge drinking. For many college students, engaging in risky lifestyle behaviors, such as consuming alcohol and/or illicit drugs, are integral to college life. For some, “getting wasted” and drinking to get drunk are commonplace activities (Vander Ven, 2011; Warner et al., 2018; Weiss, 2013). Based on data from Monitoring the Future, “the binge-drinking rate among college students has hovered above 40% for two decades” (McMurtrie, 2014, n.p.) with some students having higher rates or odds than others. Freshmen have higher rates of binge drinking compared to other undergraduates (Harford et al., 2002), and those who are fraternity or sorority members are more likely to binge drink compared to nonmembers (Wechsler et al., 1995). Males and Whites also have higher rates of collegiate binge drinking than their respective counterparts (Warner et al., 2018). Intercollegiate athletes also are a high-risk group for binge drinking compared to other students (Nelson & Wechsler, 2001).

Although few estimates of drugging victimization are available, two recent studies of sexual victimization among college students provide estimates of the extent to which college students experience drugging. Using data from the Primarily White Institutions-College Sexual Assault study and the Historically Black College and University-College Sexual Assault

study, Warner et al. (2018) reported that 5% and 4% of women at PWIs and HBCUs, respectively, reported drugging victimization (i.e., suspected or knew that someone gave them a drug without their knowledge or consent) since entering college. Across both types of schools, the most frequently reported mode by which the substance was assumed to have been administered was via the victim's drink (which may or may not have been an alcoholic beverage), 75.8% at PWIs and 37.8% at HBCUs.

Swan et al. (2017) reported that the percentage of students who were drugged (i.e., suspected or knew that someone put a drug in their drink without their knowledge) since the beginning of the Fall term of the school year was 6.0%, 7.2%, and 10.8% at three universities, respectively. For some victims, being drugged was a repeat occurrence, with 20.5% of drugging victims reporting being repeatedly drugged, experiencing a total of 539 incidents. Overall, 81.4% of the drugging victims experienced at least one negative outcome, which included 12.1% who experienced unwanted sexual touching, 5.4% who reported forced sexual intercourse, and 1.9% who were physically hurt by being hit, slapped, or beat up. In stark contrast to these negative experiences, 14% of students reported that they enjoyed being drugged. Gender differences were evident here: male victims were much more likely to report they enjoyed being drugged, while female victims were more likely to report bad experiences such as unwanted sex, blacking out, and getting sick.

Research suggests that college freshmen in particular are vulnerable because many of their lifestyle behaviors are socially centered around the party scene, which can be characterized by consumption of large quantities of alcohol (which freshmen students do with greater frequency compared to other students), exposure to risks (such as being drugged), and harmful outcomes including physical injury or assault (Harford et al., 2002; Lasky et al., 2017; Single et al., 2019; Sweeney, 2011). As noted earlier, Lasky et al. (2017) reported that freshmen had the highest rate of drugging since the beginning of the Fall term of the current academic year (7.6%), compared to seniors (6.9%), juniors (5.5%) and sophomores, who had the lowest rate of drugging (4.7%). Freshman may also be less likely to change their drinking behaviors during this year due to social pressures and perceptions of peer drinking behavior (Borsari & Carey, 2001).

Research has established a strong link between students' participation in risky lifestyle behaviors that characterize the college party culture and interpersonal victimization, including

being drugged (Fisher et al., 1998; Franklin et al., 2012; Mustaine & Tewksbury, 1998; Warner et al., 2018; Weiss & Dilks, 2016). Lasky et al. (2017) found that binge drinking, especially among freshmen sorority members, created a “perfect storm” for experiencing drugging victimization; students with these three characteristics have the highest rates of drugging compared to their counterparts who do not engage in binge drinking, are not Greek sorority members, and are not freshmen. Their qualitative research further suggests that drugging victims often make moderate lifestyle changes, which include changing their drinking behaviors following their victimization (Lasky et al., 2018). In light of these findings, the current study tests the OBTS hypothesis by examining the change in binge drinking over time across four groups of college students, defined by their drugging victimization status (i.e., victim or nonvictim) in their freshman and sophomore years. The following section describes the specific research questions of the current study, and how our analytical strategy allows us to address the methodological issues with prior tests of the OBTS hypothesis.

The current study

Together, these prior studies underscore the importance of the link between binge drinking and drugging victimization in college student samples. Some victims change their risky lifestyle behaviors and appear to lessen their risk of repeat drugging, while other victims do not change their risky lifestyle behaviors and are more likely to experience recurrent victimization (Lasky et al., 2018; Turanovic & Pratt, 2014). This relationship between changes in risky lifestyle behaviors and repeat victimization, however, has not been empirically tested for drugging among an at-risk population, college students – in particular, freshmen undergraduates. Hence, the next logical step in the study of drugging victimization is to empirically test the effect of lifestyle behavior change – the key mechanism of the OBTS hypothesis – among the high-risk population of freshmen.

Additionally, this study is the first test of the OBTS hypothesis that addresses all three of the aforementioned methodological issues. Although Bunch et al. (2014) examine the effect of risky lifestyle behavior changes between victims and nonvictims, their study is limited by the use of proxy measures of risky lifestyle behaviors that are not necessarily relevant to specific types of victimization. While Turanovic and Pratt (2014) use measures of subtle changes in risky lifestyle behaviors that are known to be related to the type of victimization under

study, they test the effect of within-individual lifestyle behavior change – rather than between-individual lifestyle behavior change – on repeat victimization.

We analyze data from a four-year study of a sample of the 2010, 2011, and 2012 freshmen cohorts to answer the following questions: (1) Does drugging victimization status remain stable or change from Time 1 (freshman year) to Time 2 (sophomore year)?; and (2) independent of any drugging experiences they may have had, do students make changes in the range number of days they spend binge drinking in the past month from Time 1 to Time 2? The central question that directly addresses the OBTS hypothesis is: (3) Do students change the number of days on which they binge drink at Time 2 after being drugged at Time 1, and if so, are there differences in the average change in binge drinking between the drugging victimization status groups?

Methods

The current study is part of a larger panel study of interpersonal violence among college students at three large, public, four-year universities; one of these universities is located in the Midwest and the other two universities are located in the Southeast. Swan et al. (2017) and Lasky et al. (2017) previously used the cross-sectional data in their studies of drugging victimization. In the current study, we analyze data from the Time 1 and Time 2 surveys completed by students in three cohorts: those who were freshman undergraduates in 2010, in 2011, and in 2012. A total of 4,187 students are included in our analyses. Each year of the panel study, the Institutional Review Board at each of the universities approved the research protocol and granted a waiver of written consent. The project was granted a certificate of confidentiality from The National Institute of Child Health and Human Development each year of the study. The following sections describe the methodology of the larger panel study (for a detailed description see Coker et al., 2016aa).

Sampling design

Each school's respective Registrar's office provided contact information for a stratified random sample of 18- to 24-year-old matriculating students selected from their annual data for the Spring term. The sample for each year at each school included equal proportions of males and females invited to participate in the survey. In 2010, equal proportions of freshmen,

sophomores, juniors, and seniors were invited to participate in the survey, with 4,000 students invited at two schools and 8,000 invited at one school. In the following years (2011 and 2012), all those who had participated in the survey the previous year were invited to participate again.

Identical recruitment protocol, online survey administration method, and incentives for participation were used at all three universities. The overall response rate was 49.38% in 2010, 48.70% in 2011, 57.46% in 2012, and 55.78% in 2013. The analytic sample for the current study includes the Time 1 and Time 2 data for all respondents who completed a survey in both their freshman and sophomore years. The response rate at Time 2 for those who had completed a Time 1 survey was 48.53% in 2011, 43.52% in 2012, and 47.57% in 2013. As shown in Table 1, the sample ($N = 4172$) was 66% female, 18% minority or multi-racial, 12% nonheterosexual, 20% Greek members, and 5% athletes. The median parents' education of the sample was a college graduate.

Data collection

Data were collected annually at each university during the Spring term. Surveys were available for approximately two to four weeks during each data collection period. Although items were added to the survey each year and there were some slight variations in question wording across years, a core set of demographic items and interpersonal victimization items were asked on the survey all 4 years.

Measures

In the following sections, we describe the within-subjects factor, between-subjects factor, and covariates that are included in the current study. Variable names and their respective coding, value labels, and descriptive statistics for all measures are shown in Table 1.

Within-subjects factor: binge drinking

Binge drinking was measured with a single survey item that asked respondents how many days in the past month they engaged in binge drinking; it is a repeated measure having been asked at both Time 1 and Time 2. The binge-drinking item was modeled after the Behavioral Risk Factor Surveillance System sponsored by the Centers for Disease Control and Prevention

(National Survey on Drug Use and Health, 2018). Thus, binge drinking is defined as four or more drinks for women within a couple of hours or more than 5 drinks for men within a couple of hours in the 2010 survey; the survey item was revised to define binge drinking as 5 or more drinks in a row within a couple of hours in subsequent years' surveys. The ordinal responses – also similar to those used by the Youth Risk Behavior Surveillance System (YRBSS) (“Questionnaires,” 2018) – were recoded to the median of the range (e.g., 1.5 = “1–2 days”). Each response category is coded as the midpoint of the range of number of days to make the interpretation of the findings more substantively meaningful (see e.g., Pasta, 2009; Personal communication with Dr. Heather Bush, August 27, 2019). The within-subjects factor, *binge drinking*, has two levels – the number of days the respondent reports binge drinking in the past month at Time 1 (*Time 1 binge drinking*) and the number of days the respondent reports binge drinking in the past month at Time 2 (*Time 2 binge drinking*).

Table 1. Variable name, coding, value label, and descriptive statistics.

Type of Analysis	Coding and Value Label	All Respondents (N = 4172)		Drugging Victims ^c (n = 429)	
		Mean ^a	SD	Mean ^a	SD
<i>Variable Name</i>					
Bivariate Analyses	0 = not drugged at Time 1, 1 = drugged at Time 1	0.06	0.25	0.62	0.60
<i>drugging victimization status at Time 1</i>	0 = not drugged at Time 2, 1 = drugged at Time 2	0.06	0.24	0.48	0.49
<i>drugging victimization status at Time 2</i>					
Repeated Measures ANCOVA Model Between-Subjects Factor	0 = Not Drugged at Time 1 or Time 2, 1 = Drugged at Time 1 Only, 2 = Drugged at Time 2 Only, 3 = Drugged at Time 1 and Time 2	0.00	0.61	1.00	0.77
<i>drugging victimization status group</i>					
<i>Within-Subjects Factor</i>					
level 1: <i>binge drinking at Time 1</i>	0 = 0 days, 1.50 = 1–2 days, 5.50 = 3–9 days,	2.51	4.13	5.16	5.91
level 2: <i>binge drinking at Time 2</i>	14.50 = 10–19 days, 25.50 = 20–31 days	3.29	5.20	5.55	6.59
	0 = 0 days, 1.50 = 1–2 days, 5.50 = 3–9 days, 14.50 = 10–19 days, 25.50 = 20–31 days				
<i>Covariates</i>					
<i>female</i>	0 = male, 1 = female	0.66	0.47	0.82	0.38
<i>minority or multi-racial</i>	0 = white, 1 = minority or multi-racial	0.18	0.38	0.16	0.36
<i>nonheterosexual</i>	0 = heterosexual (only attracted to the opposite sex), 1 = nonheterosexual	0.12	0.32	0.17	0.38
<i>parents' education</i>	0 = some schooling, 1 = high school graduate or GED, 2 = vocational school, 3 = some college, 4 = college graduate, 5 = master's degree, 6 = doctorate or professional degree	4.00	1.41	4.00	1.34
<i>Greek member</i>	0 = non-Greek member, 1 = Greek member	0.20	0.40	0.33	0.47
<i>athlete</i>	0 = non-athlete, 1 = athlete team member	0.05	0.21	0.07	0.26
<i>2010 cohort</i> ^b	0 = all other cohorts, 1 = 2010 cohort	0.50	0.50	0.48	0.50
<i>2011 cohort</i>	0 = all other cohorts, 1 = 2011 cohort	0.28	0.45	0.29	0.45
<i>2012 cohort</i>	0 = all other cohorts, 1 = 2012 cohort	0.22	0.42	0.23	0.42

^aThe mode is reported for *drugging victimization category* and the median is reported for *parents' education*; ^b 2010 cohort is used as the reference group in analyses; ^c Drugging Victims refers to all those who were drugged at Time 1 only, at Time 2 only, or at Time 1 and Time 2.

Between-subjects factor: drugging victimization

Drugging victimization is assessed with a single survey item at Time 1 and Time 2 and was previously validated by Swan et al. (2017): “Since the beginning of the [previous year] Fall term: How many times do you suspect or know that someone put a drug into your drink when you were unaware?” In 2012 and 2013, the question was phrased “Since the beginning of the [previous year] Fall term . . . WITHOUT your knowledge” (Swan et al., 2017, emphasis in original). The between-subjects factor, *drugging victimization*, is an indicator of whether a student indicated having not been drugged or having been drugged at Time 1 or at Time 2. It is worth mentioning, albeit briefly, demographic characteristics of drugging victims. As shown in Table 1, drugging victims were 82% female, 16% minority or multi-racial, and 17% nonheterosexual. Thirty-three percent of victims were Greek members and 7% were athletes. The median parents’ education of drugging victims was college graduate.

Four drugging victimization status groups were created from the student’s respective Time 1 and Time 2 response: (1) not drugged at Time 1 or Time 2 (“Not Drugged at Time 1 or Time 2”), (2) drugged one or more times at Time 1 but not drugged at Time 2 (“Drugged at Time 1 Only”), (3) drugged one or more times at Time 2 but not at Time 1 (“Drugged at Time 2 Only”), and (4) drugged at both Time 1 and Time 2 (“Drugged at Time 1 and Time 2”).

Covariates

Eight covariates are included in the model because they are all well established correlates or predictors of interpersonal victimization. The first four of these covariates are demographic measures. *Female* is measured with the question, “What is your sex?” *Minority or multi-racial* is measured with the question “How would you describe yourself? (Choose one or more).” *Nonheterosexual* is measured with the question “People are different in their sexual attraction to other people. Which best describes your feelings?” This variable was coded such that males and females who reported being only attracted to females and males, respectively, are coded heterosexual and all other combinations of sex and sexual attraction (e.g., “mostly attracted to [males/females],” “equally attracted to females and males”) are coded nonheterosexual. *Parents’ education* is measured with the question “What is the highest level of schooling your mother or father has completed (select whichever is higher)?” and was coded such that higher values indicate higher levels of schooling.

Two covariates are measures of exposure to party culture (Cashin et al., 1998; Chauvin, 2012; Ford, 2007). *Greek member* at Time 1 is measured with an item that asked respondents whether they are a member of a fraternity or sorority or neither. *Athlete* at Time 1 is measured with an item that asked respondents if they are an athletic team member or not.

We control for two dichotomous variables that indicate the cohort to which the respondent belonged, *2011 cohort* and *2012 cohort*, with the 2010 cohort as the reference group.

Analytical strategy

We employ three analytical procedures to first examine the conditions needed to test the OBTS hypothesis and second, to test the OBTS hypothesis. To answer Research Question 1, “we estimate a logit model regressing a dichotomized measure of binge drinking (did not engage in binge drinking in the past month = 0; engaged in binge drinking in the past month = 1) on a dichotomized drugging victimization measure (not a victim = 0; victim = 1) for the respective time point, controlling for *female, minority/multi-racial, nonheterosexual, parents’ education, Greek member, athlete, 2011 cohort, and 2012 cohort*. These analyses are needed to establish that a relationship exists at each time period between the risky behavior – binge drinking – and drugging victimization.

Second, because change over time is central to testing the OBTS hypothesis, to determine if any change occurred among students between Time 1 and Time 2 (Research Question 2), we examine the bivariate relationship between the Time 1 and Time 2 values for each of the repeated measures. Thus, we present crosstabulation tables to show the bivariate relationship between drugging victimization at Time 1 and Time 2, and between binge drinking at Time 1 and Time 2. The crosstabulation tables show the change, if there was any, in the range number of days in binge drinking and in drugging victimization status (nonvictim/victim) from Time 1 to Time 2.

To answer Research Question 3, the central question to testing the OBTS hypothesis, we estimate a repeated measures ANCOVA model, which allows testing the OBTS hypothesis by comparing the marginal means at Time 1 and Time 2 across the four drugging victimization status groups for statistical differences, while controlling for *female, minority/multi-racial, nonheterosexual, parents’ education, Greek member, athlete, 2011 cohort, and 2012*

cohort. Also, from these marginal means of the number of day spent binge drinking, we calculate the percent change in binge drinking from Time 1 to Time 2 for each drugging victimization group so to compare their direction (increase or decrease) and magnitude across the groups. Especially noteworthy are the results of the contrast test for the repeated measures ANCOVA model, which shows whether the average change in the number of days binge drinking from Time 1 to Time 2 differs between the drugging victimization status groups, with Drugged at Time 1 Only as the reference group.

Results

Relationship between binge drinking and drugging victimization status at each time point

A previous analysis from the larger panel study showed that binge drinking is a significant predictor of drugging victimization (Lasky et al., 2017). Our analysis further supports this finding. Regressing each dichotomized binge drinking measure on its respective drugging victimization measure, while controlling for the covariates, supports binge drinking as a risky lifestyle behavior that is a significant predictor of drugging at each time point (Time 1: $\beta = 1.68$, $p = .000$; Time 2: $\beta = 1.44$, $p = .000$). At each time point, students who binge drank in the past month were significantly more likely to experience drugging victimization than those who did not binge drink in the past month.

Research question 1: does drugging victimization change over time?

Table 2 shows the bivariate relationship between *drugging victimization at Time 1* and *drugging victimization at Time 2*. Each cell of the crosstabulation table represents one of the four drugging victimization status groups that comprise the between-subjects factor, *drugging victimization*, included in our repeated measures ANCOVA model. Across both years, of all the students in the sample, 10.28% of students were drugged at least once, with 6.42% being drugged at Time 1 and 6.18% being drugged at Time 2. Drugging victimization status significantly varies across Time 1 and Time 2 – a necessary element to continue our test of the OBTS hypothesis ($\chi^2 = 444.58$, $p = .000$).

Two groups (92.04% of all respondents) did not change drugging victimization status over time (see bolded percentages). First, of those who were not drugged at Time 1, a large

percentage, 95.88%, were not drugged at Time 2 (Not Drugged at Time 1 or Time 2 group). Second, of those who were drugged at Time 1, 36.19% were drugged again at Time 2 (Drugged at Time 1 and Time 2 group). Those in the two remaining groups, 7.96% of all respondents, did change drugging victimization status. First, of those who were not drugged at Time 1, 4.12% were drugged at Time 2 (Drugged at Time 1 Only group). Second, of those who were drugged at Time 1, 63.81% were *not* drugged at Time 2 (Drugged at Time 1 Only group).

Research question 2: do students change their binge-drinking behavior over time?

Table 3 shows the bivariate relationship between *binge drinking at Time 1* and *binge drinking at Time 2* (see bolded percentages for those who did not change the range in the number of days they binge drank from Time 1 to Time 2). The number of days spent binge drinking significantly varies across Time 1 and Time 2 ($\chi^2 = 1944.39, p = .000$). Among all students, 49.04% and 56.38% binge drank on one or more days in the past month at Time 1 and at Time 2, respectively. Over time, a majority of students, 56.28% ($n = 2348$), did not change the range in the number of days they binge drank in the past month from Time 1 to Time 2. However, 43.72% ($n = 1824$) of the sample did change the range in the number of days they binge drank from Time 1 to Time 2, (decreased: $n = 685, 16.42%$; increased: $n = 1139; 27.30%$).

Research question 3: do students change the number of days on which they binge drink at Time 2 after being drugged at Time 1, and if so, are there differences in the change in binge drinking between the drugging victimization status groups?

Figure 1 displays the repeated measure ANCOVA. The average number of days spent binge drinking in the past month at each time period and its 95% confidence interval are presented in the figure. Each line connects these two averages across Time 1 and Time 2 and corresponds to one of the four drugging victimization groups: Not drugged at Time 1 or Time 2, Drugged at Time 1 Only, Drugged at Time 2 Only, and Drugged Time 1 and Time 2. Above each group's line is the percentage change in the average number of days spent binge drinking in the past month from Time 1 to Time 2 ($[(\text{Time 2} - \text{Time 1}) / \text{Time 1}] \times 100$),

where bolded percentage change indicates a significant change from Time 1 to Time 2 ($p < .05$).

Table 2. Change in drugging victimization status from Time 1 to Time 2.

Drugging Victimization Status at Time 1	Drugging Victimization Status at Time 2 (% within row)		Total (Column %)
	Not drugged n (%)	Drugged n (%)	
Not drugged	3743 (95.87)	161 (4.12)	2904 (93.60)
Drugged	171 (63.81)	97 (36.19)	268 (6.40)
Total (Row %)	3914 (93.82)	258 (6.18)	4172 (100.0)

$\chi^2 = 444.58$; $df = 1$; $p = .000$; $N = 4172$.

Table 3. Change in the range number of days binge drinking in past month from Time 1 to Time 2.

Binge Drinking at Time 1	Binge Drinking at Time 2 (% within row)					Total (Column %)
	0 days n (%)	1–2 days n (%)	3–9 days n (%)	10–19 days n (%)	20–31 days n (%)	
0 days	1529 (71.92)	398 (18.72)	154 (7.24)	38 (1.79)	7 (0.33)	2126 (51.43)
1–2 days	194 (22.85)	325 (38.28)	243 (28.62)	72 (8.48)	15 (1.77)	849 (20.34)
3–9 days	81 (8.57)	262 (27.72)	408 (43.17)	159 (16.83)	35 (3.70)	945 (22.65)
10–19 days	12 (5.45)	29 (13.18)	82 (37.27)	79 (35.91)	18 (8.18)	220 (5.27)
20–31 days	4 (12.50)	4 (12.50)	6 (18.75)	11 (34.38)	7 (21.88)	32 (0.76)
Total (Row %)	1820 (43.62)	1018 (24.40)	893 (21.40)	359 (8.60)	82 (1.97)	4172 (100.00)

$\chi^2 = 1944.39$; $df = 16$; $p = .000$; $N = 4172$.

The test of between-subjects effects indicates that there is a significant difference between the drugging victimization groups on the repeated measure of binge drinking ($F = 79.50$, $df = 3$, 4160 , $p = .000$, $\eta^2 = .054$), with those in the Drugged at Time 1 and Time 2 group scoring highest on the repeated measure of binge drinking (Time 1 marginal $\bar{x} = 6.53$, $SE = 0.40$; Time 2 marginal $\bar{x} = 7.71$, $SE = 0.49$). Those in the Drugged at Time 1 Only group spent the second greatest number of days binge drinking, on average (Time 1 marginal $\bar{x} = 5.13$, $SE = 0.30$; Time 2 marginal $\bar{x} = 5.44$, $SE = 0.37$), followed by those in the Drugged at Time 2 Only group (Time 1 marginal $\bar{x} = 4.02$, $SE = 0.31$; Time 2 marginal $\bar{x} = 4.98$, $SE = 0.38$). Those in the Not Drugged at Time 1 or Time 2 group binge drank the fewest number of

days per month, on average, relative to all other drugging victimization status groups (Time 1 marginal \bar{x} = 2.22, SE = 0.06; Time 2 marginal \bar{x} = 3.01, SE = 0.08), The estimated marginal means for each group, at each time point, are presented in Table 4.

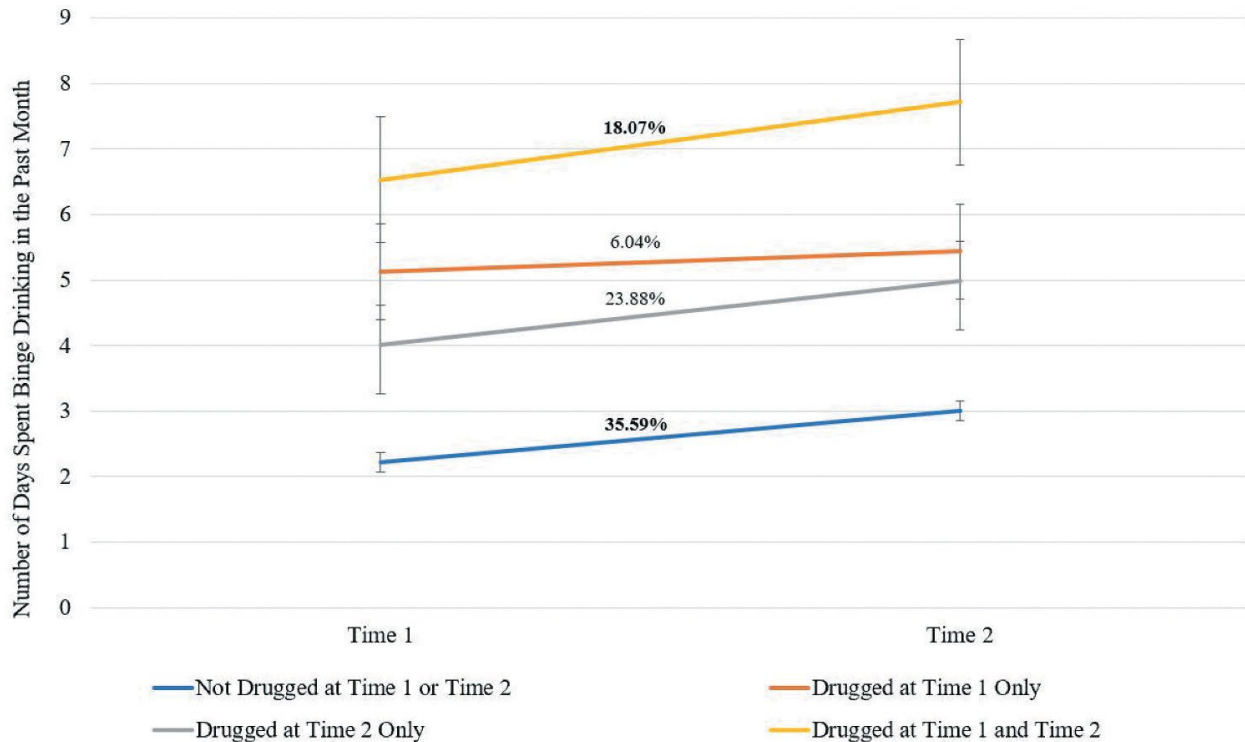


Figure 1. Estimated marginal means at Time 1 and Time 2 by drugging victimization group. percent change in number of days spent binge drinking from Time 1 to Time 2 is indicated above each group line. The percent change was calculated as follows (let T1 represent the estimated marginal mean for the group at Time 1, let T2 represent the estimated marginal mean for the group at Time 2): $((T2 - T1)/T1) \times 100$. Bolded percent change values indicate that the respective group's percent change in number of days spent binge drinking from Time 1 to Time 2 significantly differs from that of the Drugged at Time 1 Only group, controlling for all covariates.

We use a simple contrast test to compare the marginal means between each drugging victimization group and the Drugged at Time 1 Only group. The full results of the simple contrast test are reported in Table 4. The bolded percentage change values in Figure 1 indicate the groups for which binge drinking from Time 1 to Time 2 significantly differed from the Drugged at Time 1 Only group. The results of the simple contrast test show that there was no significant difference in the marginal means of binge drinking for the Drugged at Time 1 Only group and the Drugged at Time 2 Only group ($p = .056$). However, the marginal means for binge drinking for

the Drugged at Time 1 Only group was significantly different from the Drugged at Time 1 and Time 2 group ($p = .000$) and the Drugged at Time 2 Only group ($p = .000$). This subtle difference shows that that degrees of change in the same direction can differentiate those in the Drugged at Time 1 Only group from those who were drugged at both time points or not drugged at either time point.

Table 4. Estimated marginal means of binge drinking at Time 1 and Time 2, by drugging victimization group and contrast test results.

Estimated Marginal Means	Mean (SE)	95% CI Lower	95% CI Upper
Time 1			
Not Drugged at Time 1 or Time 2	2.22 (.06)	2.10	2.35
Drugged at Time 1 Only	5.13 (.30)	4.53	5.72
Drugged at Time 2 Only	4.02 (.31)	3.41	4.62
Drugged at Time 1 and Time 2	6.53 (.40)	5.75	7.31
Time 2			
Not Drugged at Time 1 or Time 2	3.01 (.08)	2.85	3.16
Drugged at Time 1 Only	5.44 (.37)	4.71	6.16
Drugged at Time 2 Only	4.98 (.38)	4.23	5.73
Drugged at Time 1 and Time 2	7.71 (.49)	6.75	8.68
Contrast Test ^a	Contrast estimate (SE)	95% CI Lower	95% CI Upper
Not Drugged at Time 1 or Time 2	-2.67 (.29)***	-3.24	-2.09
Drugged at Time 2 Only	-0.78 (.41)	-1.59	0.02
Drugged at Time 1 and Time 2	1.83 (.47)***	0.91	2.77

^aDrugged at Time 1 Only is the comparison group; * $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$; Overall test: $F = 79.50$, $df = 3, 4160$, $p = .000$.

As for percent change in number of days spent binge drinking, all groups increased the number of binge drinking days in the past month from Time 1 to Time 2, but three groups changed by substantially more than those in the Drugged at Time 1 Only group: (1) Not drugged at Time 1 or Time 2 (35.59% increase), (2) Drugged at Time 2 Only (23.88% increase), and (3) Drugged at Time 1 and Time 2 (18.07% increase). On average, those in the Drugged at Time 1 Only group changed the number of days they spent binge drinking from Time 1 to Time 2 by 6.04% and were subsequently not drugged during their sophomore year. These findings generally support the OBTS hypothesis because those who were drugged at Time 1, but not repeatedly drugged, did not increase their binge drinking as much as all other students.

Discussion

We test the OBTS hypothesis by analyzing survey data on binge-drinking behavior and drugging victimization collected from students at three large, public universities across two time points. We begin by conducting bivariate analyses to examine whether binge-drinking behavior and drugging victimization status change over time, then estimate a repeated

measures ANCOVA model to test whether binge-drinking change over time significantly differs between the four drugging victimization status groups. Our findings show that a considerable percentage of respondents (7.96%) change drugging victimization status from Time 1 to Time 2 (i.e., from victim to nonvictim or from nonvictim to victim). We also find that the number of days binge drinking is dynamic, with 43.72% of respondents changing the number of days on which they binge drank from Time 1 to Time 2. Our logistic regression findings showed that binge drinking is a significant predictor of drugging victimization at each time point, controlling for the covariates listed in Table 1. Collectively, these findings indicate that change in both drugging victimization status and binge-drinking behavior occurred from Time 1 to Time 2, and that there is a positive relationship between the two. Each of these findings supports the conditions needed to test the OBTS hypothesis.

Overall, our repeated measures ANCOVA results are generally supportive of the OBTS hypothesis. Examining our results at the group level, we found that every group increased the number of days binge drinking from Time 1 to Time 2. This finding suggests that, at these colleges, increasing binge drinking from freshman to sophomore year may well be the norm. However, relative to their peers, those in the Drugged at Time 1 Only group showed less of an increase in the number of days on which they binge drank from Time 1 to Time 2 as they transitioned from freshman to sophomore year. To put this finding into perspective, the rate at which this group increased their binge drinking (6.04%) was one-third of the increase in binge drinking for the group drugged at both time points (18.07%), one-fourth of the increase for those Drugged at Time 2 Only (23.88%), and almost one-sixth of the increase for students who were not drugged (35.59%). Thus, although students Drugged at Time 1 Only did not decrease their days of binge-drinking subsequent to being drugged, these findings support the OBTS hypothesis, because these students increased their binge drinking significantly less than other groups. OBTS suggests that they may have done so as a result of having been drugged to reduce their risk of being drugged again. Of course, we do not know with 100% certainty why these students did not increase their binge drinking as much as the other groups. However, these results, together with Lasky et al.'s (2018) qualitative findings that some drugged individuals do reduce risky behaviors as a result of being drugged, suggest that OBTS is a reasonable explanation for these findings.

Most people who were drugged at Time 1 (64%) were not repeat victims. How do we understand the 36% of people who were drugged again? These individuals binge drank on significantly more days than any other group, at both time points. Even though they reported considerably more days of binge drinking during their freshman year (Time 1) relative to their peers, and had already been drugged, they increased their days of binge drinking in their sophomore year (Time 2) by over 18%. We do not know exactly why OBTS did not seem to apply to these students, but we can speculate that perhaps these students were among the minority of victims (primarily male) who enjoyed being drugged, as Swan et al. (2017) found. In the Swan et al. study, some male participants described being drugged for “laughs” or “to ‘spice up’ my night” (p. 260). If being drugged was not aversive for these students, they likely had little motivation to make any behavioral changes in response.

Ultimately, our collective findings show that change matters, but to see that change matters it is imperative to measure change in relevant risky lifestyle behaviors that are related to the specific type of victimization under study, to capture subtle changes in those behaviors, and to test between-group changes. Future OBTS research could examine other possible lifestyle behaviors and test whether there are differences between groups who do and do not change their risky lifestyle behaviors after they are victimized. For example, in Lasky et al.’s (2018) interviews with drugging victims, some victims continued to binge drink after being drugged but tried to reduce their risk of revictimization in other ways, such as no longer associating with the person who drugged them or no longer drinking in the place they were drugged. This line of research could also help explain why those Drugged at Time 1 Only and those Drugged at Time 2 Only were drugged at different time points, despite there being no cross-sectional difference in the number of days on which the students in those two groups binge drank at either time point.

Another possible explanation for why some individuals reduce risky behaviors after victimization, while others do not, is differences in levels of self-control (Turanovic & Pratt, 2014). Our data included a measure of self-control (Grasmick et al., 1993) for the 2012–2013 cohort. Unfortunately, because the measure of self-control was not included on the previous surveys (2010 and 2011), we were not able to control for self-control in our main results. However, we did estimate a repeated measures ANCOVA model for the 2012–2013 cohort with low self-control added as a covariate, and found that those in

the Drugged at Time 1 Only group and those in the Drugged at Time 1 and Time 2 group both increased the number of days of binge drinking, and that the Drugged at Time 1 Only group binge drank on significantly fewer days at both time points from those Drugged at Time 1 and Time 2 ($p \leq .05$). Beyond self-control, other lifestyle behaviors (e.g., involvement in Greek life, being an athlete) may also explain why only some Time 1 drugging victims change how often they binge drink; the current study tested for such effects, but small cell sizes precluded any meaningful interpretation of results.

Future tests of the effect of lifestyle change on drugging victimization should also aim to measure subtle changes in binge-drinking behavior, as well as changes in other related behaviors (e.g., number of days/nights partying, amount of time spent partying, number of parties attended) and situational context of those behaviors (e.g., who individuals party with, including friends, acquaintances, and strangers, and the location where they are drinking, including bars, clubs, tailgates, and residences). Although the measure of number of days spent binge drinking used in the current study is not as precise as it could be because it is limited to ranges of days, it is nonetheless more precise than simply measuring whether the respondent did or did not binge drink. Further, from 1993 to 2019, the YRBSS survey – a national survey of youth health behaviors – has used the same reference period (30 days) and response categories that are nearly identical to those used in our measure (“Questionnaires,” 2018).

Our findings also reinforce our claim (echoing Bunch et al., 2014) that researchers testing the OBTS hypothesis should examine between-group differences in change in lifestyle rather than within- individual changes only. This method of analysis contributes to our understanding of repeat victimization because it can show differences in lifestyle behavior change between nonvictims, single-incident victims, and repeat victims.

Understanding how lifestyle behavioral changes can reduce risk for victimization is important not only for developing and testing victimology theory, but also for informing practitioners who provide awareness, risk reduction education, and services for victims. In the context of the current study, services providers and educators should consider drugging victimization as a risk associated with binge drinking and should consider ways to discuss this risk with students and other at-risk groups (e.g., college freshmen). The message from our findings is quite clear: change in binge-drinking matters for experiencing repeat drugging

victimization among college freshmen cohorts.

Disclosure statement

No potential conflict of interest was reported by the authors.

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