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An Examination of the Most Recent Episode of Molly Use among College Students

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Abstract

Objective—The current study examined event-level characteristics (e.g., contextual factors, risk behaviors) during the most recent episode of Molly use among a sample of college students who reported previously using Molly.

Participants—Participants ($N = 151$; 66.7% female) were drinkers aged 18 to 25. Data were collected from October to November 2014, February to April 2015, and September to November 2015.

Method—Participants completed measures regarding typical Molly use and items related to context and behaviors during their most recent episode of Molly use.

Results—Findings revealed that our sample most commonly reported using Molly earlier in the evening while hanging out with friends or at a party. Additionally, sexual and other drug use behaviors commonly occurred when using Molly.

Conclusions—Findings provide preliminary information in guiding future work exploring Molly use and potential substance-related issues associated with the context of when and how Molly is consumed.

Keywords

Molly use; most recent episode; college students; risky behaviors

The psychoactive substance “Molly” is a powdered form of ecstasy or MDMA alleged to be free of adulterants, and thus may be purer than other MDMA forms (Steinhardt, Moore, & Casella, 2014). Consequently, some users may perceive Molly, compared to other drugs, to

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be relatively safe (Steinhardt et al., 2014). However, recent research suggests that Molly use is associated with many harms (Kahn, Ferraro, & Benveniste, 2012; Linden-Carmichael, Stamates, Sheehan, & Lau-Barraco, 2016; Shelton & Rosini, 2015). For example, a cross-sectional study of college students revealed that Molly users, as compared to non-users, reported more alcohol and other substance use and more experiences with alcohol- and substance-related problems (e.g., blacking out, academic/occupational problems, experiencing withdrawal symptoms; Linden-Carmichael et al., 2016). Moreover, case studies have revealed recreational Molly use has been associated with intracranial hemorrhaging (Kahn et al., 2012) as well as organ failure and death (Shelton & Rosini, 2015). This dearth of literature suggests that Molly use is associated with various harms; thus, research is needed to identify Molly use patterns. Furthermore, certain socio-environmental and cognitive factors are linked with drug use and experiences with negative consequences among college students (see Dennhardt & Murphy, 2013 for a review). In particular, poly-drug use (e.g., LSD, inhalants, cocaine; Strote, Lee, & Wechsler, 2002; Wish, Fitzelle, O'Grady, Hsu, & Arria, 2006) in addition to substance use in social environments (e.g., raves/clubs; Levy, O'Grady, Wish, & Arria, 2005) is linked with MDMA use in college students. However, these findings have not been extended to Molly use specifically. Thus, event-level information on Molly use behavior could be useful in guiding prevention and intervention efforts among college students.

Scant research has examined socio-environmental factors linked with Molly use, such as where/when Molly is used, with whom it is used, and risky behaviors associated with its use. Based on media reports, Molly may be more commonly used at events such as electronic dance music (EDM) festivals, raves, and nightclubs (Mason & McCarthy, 2013). Given the social nature of EDM events and Molly's recent inclusion into pop culture (e.g., "We Can't Stop" by Miley Cyrus), it is plausible that some may use this drug socially. Relatedly, given research suggesting that college students who use Molly engage in heavier drug use than those who do not (Linden-Carmichael et al., 2016) and that EDM festivals/raves themselves are linked with heavier drug use among young adults (Palamar, Griffin-Tomas, & Ompad, 2015), simultaneous substance use may be more likely during Molly use occasions. Furthermore, MDMA can produce feelings of intimacy/euphoria and has been linked with sexual activity (Hittner & Schachne, 2012; McElrath, 2005). Thus, engagement in sexual behavior may be more likely during Molly use occasions. Determining proximal socio-environmental contexts and risk behaviors related to Molly use awaits empirical investigation.

The current study sought to extend our knowledge about Molly by examining event-level characteristics of use. We aimed to identify various contextual factors during college students' most recent occasion in which they used Molly to elucidate factors that may contribute to harm. Our first aim was to explore the pattern of use, including the number of hits used, duration, and amount of money spent on Molly. Second, we aimed to determine the social and environmental circumstances surrounding Molly use. Third, we aimed to examine risk behaviors (sexual behavior, other drug use) that may occur during Molly use occasions. Moreover, given differences in use of other forms of MDMA between men and women (Fingeret, Moeller, & Stotts, 2005), sex differences were examined with respect to use patterns and potential characteristics that may partially explain these patterns.

Method

Participants and Procedure

Participants were 151 (66.7% female) young adult (i.e., 18 to 25 years old) undergraduate students recruited from an online research pool at a mid-size public southeastern university¹. Participants who reported lifetime Molly use (i.e., responded positively to, “Have you ever tried Molly?”) were included in the current study. Mean age of participants was 20.26 ($SD = 1.98$) years.

Students volunteered to participate via an online psychology research system associated with the university. All participants provided informed consent, completed the online survey, and were awarded course credit for participating. The study was approved by the university’s human subjects research committee and followed American Psychological Association guidelines (American Psychological Association, 2010).

Measures

Typical Molly use was assessed using an adapted version of the Daily Drinking Questionnaire (Collins, Parks, & Marlatt, 1985). Participants reported the number of Molly ‘hits’ (i.e., the number of times Molly was ingested) that they took on each day during a typical week over the previous three months. The total number of Molly hits reported on an average week was an indicator of one’s typical use. Participants also reported the age they first tried Molly.

Items about context and behavior during the most recent episode of use consisted of the number of hits taken, time of use, and approximate monetary cost of the drug. Participants also answered contextual questions related to most recent use, including the number of other people with whom they used, and the location of use (scored as 0 [*did not use in this location*] or 1 [*used in this location*]). Finally, participants recorded immediate consequences following the most recent episode, including sexual behavior and other substance use. A full list of items and response options can be found in Table 1. (*Insert Table 1 about here*)

Results

Frequencies were used to report sample characteristics (see Table 1). Chi-square analyses were used to determine if endorsement of use and related behaviors varied by sex. Regarding experience with Molly use, the mean age of first high on Molly was 18.45 ($SD = 1.85$) years. Men ($M = 18.56$, $SD = 1.17$) and women ($M = 18.39$, $SD = 2.12$) did not differ on age of first high, $t(144) = .53$, $p = .595$. Among our sample, 32 (21.5%) participants reported engaging in Molly use each week during the past three months. Among participants who engaged in weekly Molly use, participants’ reported a mean of 2.03 ($SD = 1.20$) hits over 1.25 ($SD = 0.45$) days in an average week.

¹The current study was part of a larger study inquiring about substance use in general, which include a total of 1,496 18–25 year olds. Only Molly users were included from this larger sample of college students (10.1%).

Most Recent Episode

Use patterns—The average number of hits during the most recent episode was 1.66 ($SD = 1.46$), and there was no sex difference, $t(146) = -.10, p = .296$. The most frequently reported times for first using Molly were 8:00 PM ($N = 20; 13.2\%$) and 9:00 PM ($N = 20; 13.2\%$); end times were 9:00 PM ($N = 18; 11.9\%$) and 10:00 PM ($N = 11; 7.3\%$). These start and end times were similar across men and women. Regarding cost, the mean amount spent was \$15.64 ($SD = \24.68) and the mode was \$0 ($N = 77; 51.0\%$). No sex difference was found on the amount spent, $t(147) = -.32, p = .748$.

Contextual patterns—Table 1 shows the social context during the most recent episode. Participants most commonly reported using Molly with two to three others. Less common responses were four to nine persons, one person, 10+ persons, and using Molly alone. Chi-square analyses revealed that 98.0% of men reported using Molly with friends, as compared to 86.0% of women, $\chi^2(1, N = 150) = 5.33, p = .021$. Additionally, 21.3% of women reported using Molly with a boyfriend/girlfriend as compared to 6.0% of men, $\chi^2(1, N = 150) = 10.51, p = .001$. No other sex differences were found.

The distribution of reported locations during the most recent episode is shown in Table 1. Most participants reported Molly use in only one of the location scenarios. A smaller percentage of participants reported Molly use in two, three, four, and five locations. The most common location reported when taking Molly was “while hanging out with friends” and “at a party.” “Music concerts/festivals” were also reported as a Molly use location, and fewer participants reported Molly use “at a rave.” Men and women did not differ on the number of Molly use locations, $t(146) = -.87, p = .384$. No sex difference was found for any location.

Risk behaviors—Regarding sexual behavior during the most recent episode of use, 60.3% reported engaging in at least one sexual behavior. The distribution of engagement in various sex behaviors can be found in Table 1. “Kissing” was the most common behavior reported. Next most common responses were touching above the waist, touching below the waist, vaginal sex, oral sex, and anal sex. Chi-square analyses revealed that 56.0% of women reported “kissing,” as compared to 34.0% of men, $\chi^2(1, N = 150) = 6.46, p = .011$. Men and women did not differ in the number of sexual behaviors they engaged in, $t(148) = -1.49, p = .138$. No sex difference was found for any other sexual behavior.

Only 37 (24.5%) reported using Molly without other substances during their most recent episode; thus, 75.5% of our sample indicated using at least one other drug. The most commonly reported other drug used was alcohol, followed by marijuana, cigarettes, “LSD, acid, or other hallucinogens,” “Xanax, Valium or other anti-anxiety medications to get high (not prescribed),” and “Other.” Men and women did not differ in the number of drugs they used, $t(112) = .250, p = .803$. No other sex differences were found for drug use.

Discussion

The present study sought to address gaps in our understanding of Molly use behaviors among college students by examining event-level characteristics of the most recent episode

of Molly. Specifically, we were interested in identifying contextual factors and risk behaviors associated with Molly use, and if these varied by sex.

For use patterns, one to two hits was typically reported during the most recent episode, and about half of participants did not pay for Molly. Also, the most recent episode typically occurred between 8:00 PM and 10:00 PM. Regarding socio-environmental factors, most participants indicated that they were with friends and used Molly in one location, which was typically while hanging out with friends or during a party. Similar to research on college drinking (Collins et al., 1985; Ham & Hope, 2003), our findings suggest social contexts of use may be influential. Thus, this relationship should be further explored, particularly by examining the directionality of social influence and Molly use. For instance, based on Social Learning Theory (Bandura & Walters, 1977), this relationship could be due to socialization (i.e., environmental aspects influence one's use) or selection (i.e., one seeks out peers who use Molly) effects, or an interplay of these processes. Given that these effects have demonstrated their importance in studies of other substance use (McCabe et al., 2005), they may be applicable to Molly use as well.

Regarding risk behaviors during the most recent episode, over half of our sample reported engaging in at least one sexual behavior, with about 25% engaging in vaginal sex. This may be because MDMA-like substances producing feelings of intimacy/euphoria (Hittner & Schachne, 2012; McElrath, 2005). Future research may want to consider exploring the impact of Molly use on risky sex (e.g., hookups, condom use). Additionally, Molly was commonly used in combination with other substances (typically alcohol and/or marijuana). Simultaneous polysubstance use in general is associated with increased risks among college students (McCabe, Cranford, Morales, & Young, 2006). Efforts aimed at reducing Molly use among college students may also want to educate about the harms from using combinations of multiple drugs. Finally, sex did not play a key role in our study suggesting that most findings are applicable to both men and women.

Overall, findings from the present study may suggest that initial perceptions about Molly use among college students may not be entirely accurate. Specifically, the notion that Molly may be commonly used at EDM festivals, raves, and nightclubs (Mason & McCarthy, 2013) was not supported. In fact, our sample most commonly reported using Molly while hanging out with friends and during a party. This information may be useful for researchers interested in studying Molly use across multiple contexts. Furthermore, Molly use was more common earlier in the evening, which may indicate it's used for pregaming (i.e., using substances before a primary social event). Students report pregaming with alcohol in order to become more sociable (Read, Merrill, & Bytschkow, 2010) and to reach greater intoxication (Pedersen, LaBrie, & Kilmer, 2009). Given that alcohol was commonly consumed during the most recent episode, future research should explore Molly as a pregaming drug and its impact on substance-related harms.

Our study has several limitations. The sample consisted of college students who were primarily Caucasian and female, which may limit generalizability. The use of self-reported Molly use may have been underreported due to social desirability, although this type of data is generally valid (Simons, Wills, Emery, & Marks, 2015). Our study was cross-sectional,

limiting our ability to make any causal conclusions. Future research may use longitudinal or ecological momentary assessments which may provide more conclusive evidence regarding socio-environmental factors and risky behaviors during Molly use.

This was the first study to explore characteristics of the most recent episode of Molly use among college students. Our findings indicate that Molly is most commonly used earlier in the evening, often during a social gathering. Sexual and other drug use behaviors commonly occurred when using Molly, and sex did not play a significant role in our study outcomes. These findings provide preliminary information in guiding future work that may continue to explore Molly use and potential substance-related issues associated with the context of when/how it is consumed.

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Biographies

Amy L. Stamates is a fourth year doctoral student at Old Dominion University. Her program of research aims to understand antecedents of risky substance use behaviors among emerging adults. In particular, Amy is interested in how facets of impulsivity relate to the etiology of alcohol-related harms.

Ashley N. Linden-Carmichael is a doctoral candidate at Old Dominion University who received funding by a Ruth L. Kirschstein pre-doctoral fellowship (F31 AA023118). Ashley's program of research focuses on using advanced statistical and methodological techniques to identify influential and underlying psychosocial predictors of high-risk drinking among young adults.

Brynn Sheehan is a fifth year doctoral candidate in the Experimental Psychology doctoral program at Old Dominion University. Her research interests primarily concern using advanced methodological techniques to investigate health behaviors. Specifically, Brynn is interested in understanding the social influences and individual-level protective factors of aggressive behavior and substance use.

Peter D. Preonas is a second year doctoral student in the Virginia Consortium Program in Clinical Psychology. His research interests include examining how mood, personality, and contextual factors relate to alcohol use, prevention, and treatment outcomes.

Cathy Lau-Barraco, Ph.D., is an Associate Professor in the Department of Psychology at Old Dominion University. Her research focuses on psychosocial determinants and consequences of alcohol use and brief interventions with at-risk populations.

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Table 1
Sex Differences in Demographic Variables and Characteristics of Most Recent Episode of Molly Use

Variable	Men		Women		Total		df	χ^2
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
Demographics								
<i>Race</i>								
Caucasian	31 (62.0%)	66 (66.0%)	97 (64.2%)					
African American	11 (22.0%)	17 (17.0%)	28 (18.5%)					
Asian	1 (2.0%)	5 (5.0%)	6 (4.0%)					
American Indian	0 (0.0%)	1 (1.0%)	1 (0.7%)					
Biracial	3 (6.0%)	7 (7.0%)	11 (7.3%)					
Other	4 (8.0%)	4 (4.0%)	8 (5.3%)					
<i>Class Standing</i>								
Freshman	15 (30.0%)	32 (32.0%)	47 (31.1%)					
Sophomore	7 (14.0%)	25 (25.0%)	32 (21.2%)					
Junior	10 (20.0%)	16 (16.0%)	26 (17.2%)					
Senior	18 (36.0%)	25 (25.0%)	43 (28.5%)					
N/A	0 (0.0%)	2 (2.0%)	2 (1.3%)					
<i>Relationship Status</i>								
Single	35 (70.0%)	54 (54.0%)	89 (58.9%)					
In a relationship	12 (24.0%)	32 (32.0%)	44 (29.1%)					
Living with someone	2 (4.0%)	11 (11.0%)	13 (8.6%)					
Married	1 (2.0%)	3 (3.0%)	4 (2.6%)					
<i>Employment</i>								
Employed	23 (46.0%)	60 (60.0%)	84 (55.6%)					
Unemployed	27 (54.0%)	40 (40.0%)	67 (44.4%)					
<i>Current residence</i>								
Off-campus housing	24 (48.0%)	46 (46.0%)	70 (46.4%)					
On-campus housing	20 (40.0%)	42 (42.0%)	63 (41.7%)					
Parent/relative home	6 (12.0%)	11 (11.0%)	17 (11.3%)					

Variable	Men		Women		Total		df	χ^2
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)		
<i>Greek Life</i>								
Yes	14 (28.0%)	14 (14.0%)	28 (18.5%)					
No	36 (72.0%)	86 (86.0%)	123 (81.5%)					
Most Recent Episode								
<i>Where were you when you took Molly?</i>								
Hanging with friends	17 (34.0%)	41 (41.0%)	59 (39.1%)	1	0.69			
Party	24 (48.0%)	32 (32.0%)	56 (37.1%)	1	3.65			
Music Concert/Festival	8 (16.0%)	22 (22.0%)	30 (19.9%)	1	0.75			
Club/Bar/Lounge	8 (16.0%)	15 (15.0%)	23 (15.2%)	1	0.03			
Rave	5 (10.0%)	13 (13.0%)	18 (11.9%)	1	0.28			
Spending time by myself	1 (2.0%)	2 (2.0%)	3 (2.0%)	n/a	n/a			
Other	0 (0.0%)	14 (14.0%)	14 (9.3%)	n/a	n/a			
<i>Who did you use Molly with?</i>								
Friends	49 (98.0%)	86 (86.0%)	135 (89.4%)	1	5.33*			
Acquaintances	6 (12.0%)	18 (18.0%)	24 (15.9%)	1	0.89			
Boyfriend/girlfriend	3 (6.0%)	30 (30.0%)	34 (22.5%)	1	10.51***			
Spouse	0 (0.0%)	1 (1.0%)	1 (0.7%)	n/a	n/a			
People I don't know	0 (0.0%)	6 (6.0%)	6 (4.0%)	n/a	n/a			
<i>Did you also use any of the following substances?</i>								
Alcohol	30 (60.0%)	54 (54.0%)	84 (55.6%)	1	0.49			
Marijuana	29 (58.0%)	52 (52.0%)	81 (53.6%)	1	0.49			
Cigarettes	14 (28.0%)	34 (34.0%)	48 (31.8%)	1	0.55			
LSD/Hallucinogens	7 (14.0%)	4 (4.0%)	11 (7.3%)	n/a	n/a			
Xanax/Valium	2 (4.0%)	3 (3.0%)	5 (3.3%)	n/a	n/a			
Cocaine	1 (2.0%)	2 (2.0%)	3 (2.0%)	n/a	n/a			
Dabs	0 (0.0%)	1 (1.0%)	1 (0.7%)	n/a	n/a			
Methamphetamine	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a	n/a			
Ketamine	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a	n/a			
Gamma hydroxybutyrate	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a	n/a			

Variable	Men		Women		Total		χ^2
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	
Roofies	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a
Synthetic Marijuana	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a
Opiates	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	n/a
<i>Did you engage in any of the following behaviors?</i>							
Kissing	17 (34.0%)	56 (56.0%)	74 (49.0%)	1	6.46**		
Touching above waist	18 (36.0%)	43 (43.0%)	62 (41.1%)	1	0.68		
Touching below waist	14 (28.0%)	35 (35.0%)	50 (33.1%)	1	0.74		
Oral sex	8 (16.0%)	23 (23.0%)	32 (21.2%)	1	0.1		
Vaginal sex	8 (16.0%)	27 (27.0%)	63 (23.8%)	1	2.26		
Anal sex	3 (6.0%)	1 (1.0%)	4 (2.6%)	n/a	n/a		

Note. Chi-square statistics reported for comparisons made between sexes. In instances where expected counts were below 5 in each group, results were marked "n/a", as estimates cannot be accurately calculated.

* $p < .05$;

** $p < .01$;

*** $p < .001$