Educational Sessions Facilitate Lasting Increase in MDMA Knowledge in Health Profession Students

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Abstract

The current study tested the effectiveness of the GPF Foundation 3,4-Methylenedioxymethamphetamine (MDMA) educational program on students at a private, higher education healthcare university. Approximately 56 participants completed the program. An 18-item measure of MDMA knowledge was developed and distributed to participants at multiple time points to assess the effectiveness of the educational program. Multilevel models with random intercepts were estimated using restricted maximum likelihood estimation to examine changes between time points. A waitlist control study demonstrated that without intervention, knowledge did not change over time, and with it, knowledge increased significantly and did not decrease at follow-up.

Introduction

- In 2020, approximately 2.6 million people in the United States indicated using MDMA in the past 12 months.[1]
- One study showed that 41.2% of users tested positive for other stimulants and 50% did not test positive for MDMA.[2]
- Studies have shown that withholding information from young adults can be ineffective and counterproductive.[3]
- Some studies have shown that individuals who intend to consume MDMA may unknowingly consume other substances along with or instead of MDMA. In addition to the euphoric effects of MDMA, individuals often report adverse reactions and unintended consequences.[2,4]
- Ecstasy causes physical and psychological impairment, such as decreased serotonin in the brain, associated with depression and sleep disturbance, confusion, anxiety, and paranoia which may last a few hours to several weeks after using the drug.[5]

Methods

- **PARTICIPANTS**: Approximately 56 individuals from a Midwestern interprofessional private university providing higher education to those in health professions.
  Inclusion criteria: must be a current student at RFUMS, between 18 and 30 years of age.
  Exclusion criteria: inability to speak and read English, self-reported cognitive or developmental issues that would preclude questionnaire comprehension.
- **MATERIALS**: An 18-item face-valid measure of MDMA knowledge was created for the study, where items were dichotomously scored. Internal consistency reliability (i.e., Kuder-Richardson 20 (KR-20) for the MDMA knowledge scale was on average was 0.87.
- Example Questions:

- **PROCEDURES:** Using a harm-reduction approach, GPF Foundation's Educational Presentation covers understanding MDMA, the common adulterants, the short-term and long-term side effects, and essential information on how to care for an individual that consumes the drug. The educational program sessions were conducted by one to two research assistants. Email was utilized to contact the participants. Sessions were conducted via the zoom platform. Google form was used to distribute the consent form and surveys.

Methods

- The control group took the first test, then a second test three weeks later (i.e., a waitlist control); at that point, they became the experimental group for the next educational group. Following the intervention, they took the test immediately after and again three weeks post-intervention.
- The educational program was about 60 minutes long; each survey took about 5-10 minutes to complete. Participants participated for about an hour and a half in total.
- Educational groups did not run with less than 10 participants or more than 20 participants. First educational group was conducted on February 8th, 2021, and the last education group was conducted on July 26th, 2021.
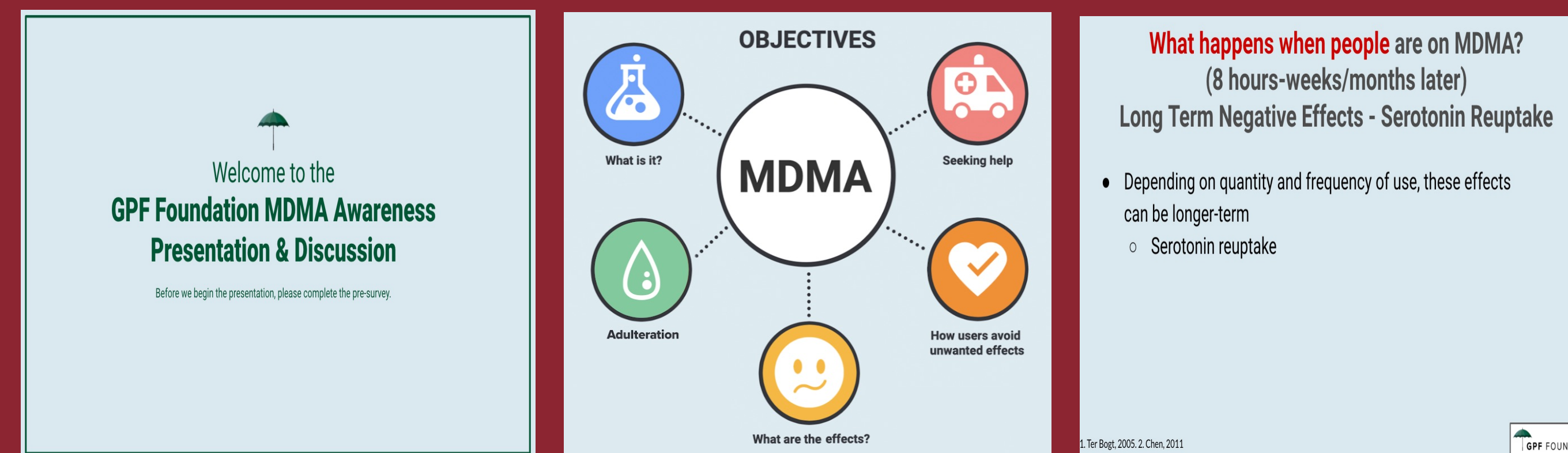
Results

- A multilevel model was estimated using the lme4 package (v 1.27-1) in the R software environment in order to examine changes in knowledge in MDMA over session, accounting for the nesting within person. Sessions were dummy coded, such that initial session three weeks prior to the educational session (i.e., Session 0) corresponded to the intercept of the following model, immediately before (Session 1), immediately after (Session 2), and three-weeks post session (Session 3) were all compared to the intercept.

$$\text{mdma.items}_i \sim N\left(\mu, \sigma^2\right)$$
$$\mu = \alpha_{j[i]} + \beta_1(\text{session}_1) + \beta_2(\text{session}_2) + \beta_3(\text{session}_3)$$
$$\alpha_j \sim N\left(\mu_{\alpha_j}, \sigma^2_{\alpha_j}\right), \text{ for person } j = 1,\ldots,J$$

- Results were estimated using Restricted Maximum Likelihood (REML) estimation, as this more accurately estimates variance components/random effects.
- Overall, the model was statistically significant and a large effect size was obtained, $F(3, 117.43) = 55.72$, $p < .001$, $R^2_{sp} = .49$.
- The random effect of person was statistically significant using a likelihood ratio test, $\chi^2(df = 1) = 9.57$, $p = .002$.
- Using a Tukey correction, baseline session and session immediately before the educational group did not differ significantly, $t = 0.93$, $p = 78$.
- Knowledge immediately post-session did not differ from the assessment three weeks later, $t = 1.75$, $p = .29$.

Table 1. Model Coefficients (SE)

	Model 1
Three Weeks Before	10.53***
	(0.45)
vs Immediately Before	0.53
	(0.56)
vs Immediately After	5.80***
	(0.57)
vs Three Weeks After	4.81***
	(0.59)
Random Intercept SD	1.54
Residual SD	3.05
AIC	1294.2
BIC	1315.2
Log.Lik.	-641.110
REMLcrit	1282.22
+ p < 0.1, * p < 0.05, ** p < 0.01, *** p < 0.001	

Results

- The fit model can be expressed as follows:

$$\widehat{\text{mdma.items}}_i \sim N\left(\mu, \sigma^2\right)$$
$$\mu = 10.53\alpha_{j[i]} + 0.53\beta_1(\text{session}_1) + 5.8\beta_2(\text{session}_2) + 4.81\beta_3(\text{session}_3)$$
$$\alpha_j \sim N(0, 1.54), \text{ for person } j = 1,\ldots,J$$

- The intraclass correlation (ICC; ρ) was found to be .20. In other words, approximately 20% of variance in MDMA knowledge was attributable to the effect of person.

Figure 1. Mean MDMA Knowledge by Session with 95% Confidence Intervals
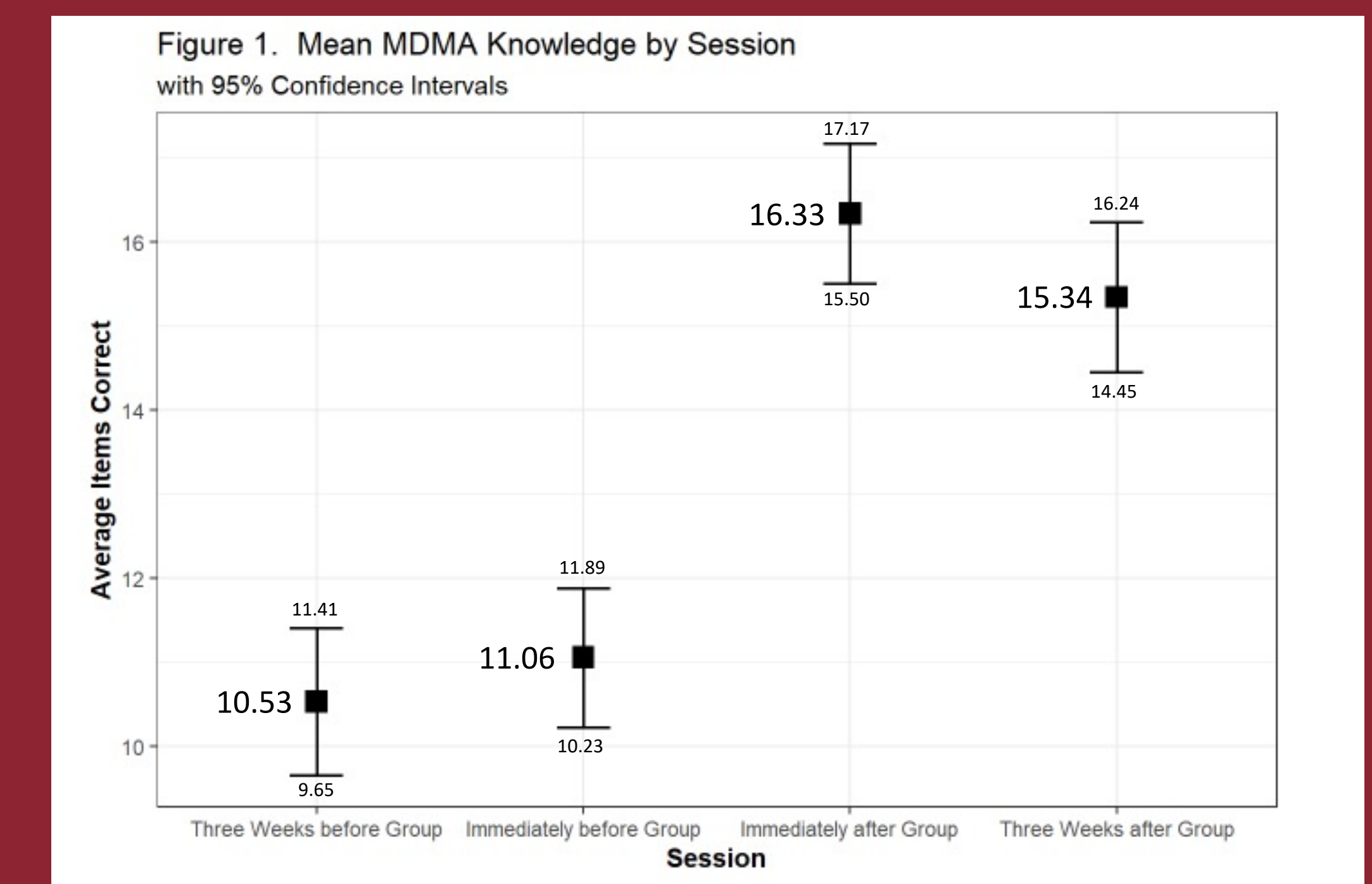
Discussion & Conclusion

- Educational group sessions can significantly increase students' knowledge of MDMA in a lasting manner.
- Online delivery of the educational program is a feasible option, as we learned during the current pandemic.
- Students gain lasting knowledge, and it is not simply retained immediately after the session because there is no difference three weeks later.
- This program can be delivered by a small number of individuals to larger groups of populations.
- Evaluation of larger delivery in an in-person setting is necessary.
- Program impact on MDMA usage should also be evaluated.

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