Effects of ±3,4-Methylenedioxymethamphetamine (MDMA) Administration on Social Emotional Processing in Humans

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INTRODUCTION

Ecstasy users report that the drug produces feelings of increased empathy and sociability [1]. Such 'empathogenic' effects are thought to motivate recreational use of ecstasy [2]. In addition, the rationale for the proposed use of MDMA as an adjunct to psychotherapy centers on these effects [3]. Controlled studies confirm that MDMA administration produces prosocial feelings in humans [e.g. 4], and the drug alters rodent behavior in a way that is consistent with increased sociability [5]. However, there is as yet no evidence that controlled MDMA administration increases behaviors relevant to sociability and empathy in humans. In the present study, we examined the effects of MDMA (0.75mg/kg; 1.5mg/kg) on the identification of others' emotional expressions, and on feelings associated with the 'empathogenic' profile. We also employed an active control drug, the psychostimulant methamphetamine (20mg), to assess whether these social effects are specific to MDMA, or generalize to other stimulants.

METHODS

We recruited male and female healthy volunteers (N = 21) who had used ecstasy on at least two occasions. All candidates underwent comprehensive medical and psychiatric screening. The design was within-subjects and double-blind. Across four laboratory sessions, participants received MDMA (0.75mg/kg; 1.5mg/kg), methamphetamine (20mg) and placebo, in randomized order. During peak drug effects, participants undertook 1) a Facial Emotion Recognition task, in which they identified others' emotional states based on pictures of facial affect [6]; 2) the Reading the Mind in the Eyes task, which requires participants to identify complex emotions based on pictures of the eye region [7]; and 3) the Diagnostic Analysis of Nonverbal Accuracy [DANVA-2, 8] Adult Paralanguage test, which requires identification of emotions based on vocal cues. Cardiovascular and subjective state measures were obtained repeatedly throughout sessions. The main subjective measures were Visual Analog Scale [VAS, 9] 'sociable', 'playful', 'loving' and 'lonely' ratings, and the Profile of Mood States [POMS, 10] 'Friendliness' subscale.

RESULTS

Participants were 24.4 (S.D. = 4.9) years old, and 12 were male. Previous ecstasy use was light to moderate; they had used the drug on average 15.0 times (S.D. =23.1). Compared to placebo, MDMA (1.5mg/kg) decreased accurate identification of fear from facial cues. MDMA (1.5mg/kg) significantly increased ratings of feeling 'loving' relative to placebo, and 'friendly' compared to both placebo and MDMA (0.75mg/kg). MDMA (0.75mg/kg) increased 'loneliness' relative to placebo and methamphetamine (20mg). Both MDMA (1.5mg/kg) and methamphetamine (20mg) increased 'playfulness' compared to placebo; MDMA (1.5mg/kg) also increased 'playfulness' ratings relative to MDMA (0.75mg/kg). Methamphetamine (20mg) significantly increased ratings of 'sociability' compared to placebo.

DISCUSSION

MDMA produced the expected 'empathogenic' mood profile. However, it did not improve identification of others' emotions, as might be expected in states of increased empathy. Instead, it *reduced* identification of fear, a threat-related facial emotional signal, perhaps suggesting that MDMA increases social approach behavior by reducing the extent to which others' negative emotional states are recognized.

CONCLUSIONS

These findings have implications in terms of both recreational ecstasy use and ongoing trials of MDMA in psychotherapy. Many individuals report using ecstasy for heightened interpersonal connection [2]; such expectations may be altered by the knowledge that MDMA may subtly decrease interpersonal competence. When used therapeutically, alterations in social emotional processing such as reduced fear recognition may contribute to possible benefits of this drug. Should MDMA prove to be effective in psychotherapy, information on the socioemotional and cognitive mechanisms underlying this efficacy will help

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clinical researchers to design treatments that optimize the drug's potential therapeutic effects.

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DECLARATION OF CONFLICTS

The authors have no conflicts to declare.

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