**Institution:**
Edge Hill University

**Unit of Assessment:**
4 – Psychology, Psychiatry and Neuroscience

**Title of case study:**
Research into cognitive performance impairments related to the use of 'ecstasy' (MDMA) and cannabis effects professional opinions and media debate.

## 1. Summary of the impact

Research into impaired cognitive performance related to drug misuse began at Edge Hill University (EHU) in 1998. It has predominantly concentrated upon impairments related to use of the illegal drug 'ecstasy' (3,4-methylenedioxymethamphetamine: MDMA), although some has focussed upon cannabis related impairments in order to identify which of these drugs was related to a specific performance decrement. The impacts presented arise from contributions to policy development through the Advisory Council on the Misuse of Drugs (ACMD), the consultation response team of the British Psychological Society (BPS), media debate drawing upon our research, and through informing the design of a drug use prevention campaign.

## 2. Underpinning research

The underpinning research was undertaken by Murphy, who joined Edge Hill in September 1998, where he remains as a Professor and Head of Department. The impacts reported flow from the investigation of ecstasy and cannabis related performance impairments upon a range of psychological functions (cognition and mood). These include, the executive processes of working memory [1, 2] and visuospatial working memory functioning [3, 4]. Associated impairments of mood [5] and sleep [6] have also been investigated, together with the beliefs of ecstasy users concerning the risks associated with using this drug, and the precautions they consequently take [7]. In total, this research programme has so far produced between 2000 and 2013, 19 published journal articles, 9 papers presented at international conferences outside the UK, and a further 22 papers presented at scientific conferences within the UK.

This programme of research began at EHU in 1998 with a study of information processing and working memory executive deficits related to ecstasy use, published in 2000, under the supervision of Professor John Fisk and Professor Philip Murphy. Much of the subsequent published research emerged from the doctoral work completed in 2005 by Dr. Michelle Wareing, who was registered at EHU. Collaboration with Wareing continued during her time as a researcher within the Centre for Public Health at Liverpool John Moores University (LJMU) from 2005 to 2010, and continues now with her in another research role at EHU. Murphy, who has been at EHU throughout this period, was Wareing's doctoral Director of Studies, and Fisk was her co-supervisor [1 - 3]. Murphy has further developed the focus upon mood [5] and visuospatial functioning [3, 4] following Wareing's doctoral completion. Murphy also took the lead in the analysis and publication of survey data gathered in the course of Wareing's doctoral research, which was not included in her thesis. This data formed the basis for the study of ecstasy users' perceptions of risks associated with the drug [7]. Murphy's collaboration with Fisk remains ongoing, having continued in Fisk's subsequent posts at LJMU and the University of Central Lancashire where he has been based since 2006. Dr. Cathy Montgomery at LJMU became involved in this work in 2001 and continues to collaborate with both Murphy and Fisk.

This research has identified those areas of psychological functioning vulnerable to ecstasy (MDMA) and cannabis related impairments, and those which are not vulnerable to such impairments. For example, regarding working memory executive functioning, updating processes and visuospatial working memory appear to be vulnerable to ecstasy related impairments, whilst attention shifting and the inhibition of responses do not [1, 3, 4, 6]. Mood disturbances amongst ecstasy users are independent of other drug use, although they are exacerbated by the concomitant use of alcohol with ecstasy [5]. Furthermore, ecstasy users are not naive regarding the cognitive and mood related effects of the drug, but make conscious decisions to accept the risks associated with its use whilst, in some cases, taking precautions to mitigate such risks (e.g. monitoring fluid intake). Systematic efforts have been made to allow for the potentially confounding effects of other drug use, intelligence, and personality, in relating the use of specific drugs to psychological effects.

## 3. References to the research

Output 4 and 5 are returned to REF 2. All items appear in peer reviewed journals and are available on request. All journal impact and 2012 impact factor ranking data from ISI Web of Knowledge: Journal Citation Reports © (2012, sourced November 2013), citation data from Google Scholar (November 2013).

[1] Journal Article: Montgomery, C., Fisk, J.E., Newcombe, R., and Murphy, P.N. (2005). The differential effects of MDMA ("ecstasy") on executive components: shifting, inhibition, updating, and access to semantic memory. Psychopharmacology, 182, 262-276. DOI 10.1007/s00213-005-0065-9 (59 citations, Impact Factor 4.061, 5 Year Impact Factor 4.285, ranked 42/261 in Pharmacology and Pharmacy, 28/135 in Psychiatry, 67/252 in Neurosciences)).

[2] Journal Article: Murphy, P.N., Erwin, P.G., MacIver, L., Fisk, J.E, Larkin, D., Wareing, M., Montgomery, C., Hilton, J., Tames, F.J., Bradley, B., Yanulevitch, K. and Ralley, R. (2011). The relationships of 'ecstasy' (MDMA) and cannabis use to impaired executive inhibition and access to semantic long term memory. Human Psychopharmacology: Clinical and Experimental, 26(7), 460-469. DOI 10.1002/hup.1228 (Impact Factor 2.097, 5 Year Impact Factor 2.721, ranked 33/75 (Psychology)).

[3] Journal Article: Wareing, M., Fisk, J.E., Murphy, P.N. and Montgomery, C. (2005). Visuo-spatial working memory deficits in current and former users of MDMA ('ecstasy'). Human Psychopharmacology: Clinical and Experimental, 20, 115-123. DOI 10.1002/hup.670 (Impact Factor 2.097, 5 Year Impact Factor 2.721)

[4] Journal Article: Murphy, P.N., Bruno, R., Wareing, M., Ryland, I., Fisk, J.E., and Montgomery, C. (2012). The effects of ecstasy (MDMA) on visuospatial memory performance: Findings from a systematic review with meta-analysis. Human Psychopharmacology: Clinical and Experimental, 27(2), 113-138. DOI 10.1002/hup.1270 (Impact Factor 2.097, 5-Year impact factor 2.721)

[5] Journal Article: Fisk, J.E., Murphy, P.N., Montgomery C., & Hadjiefthyvoulou, F. (2011). Modelling the adverse effects associated with ecstasy use. Addiction, 106, 798-805. DOI 10.1111/j.1360-0443.2010.03272.x (Impact Factor 4.746, 5 Year Impact Factor 5.021, ranked 20/135 in Psychiatry (Science), 2/16 in Substance Abuse (Science), 1/30 in Substance Abuse (Social Science)).

[6] Journal Article: Montgomery, C., Fisk, J.E., Wareing, M., and Murphy, P.N. (2007). Self-reported sleep quality and cognitive performance in ecstasy users. Human Psychopharmacology: Clinical and Experimental, 22, 537-548. DOI 10.1002/hup.879 (Impact Factor 2.097, 5-Year Impact Factor 2.721)

[7] Journal Article: Murphy, P.N., Wareing, M. and Fisk, J.E. (2006). Users' perceptions of the risks and effects of taking MDMA (Ecstasy). Journal of Psychopharmacology, 20, 447-455. DOI 10.1177/0269881106063270 (Impact Factor 3.374, 5-Year impact factor 3.441, ranked 46/193 (Clinical Neurology), 96/252 (Neurosciences), 63/261 (Pharmacology & Pharmacy), 36/135 (Psychiatry)).

[8] Journal Article: Murphy, P., Wareing, M, Fisk, JE, Montgomery, C. (2009). Executive Working Memory Deficits in Abstinent Ecstasy/MDMA Users: A Critical Review. Neuropsychobiology, 60, 159-175. DOI 10.1159/000253552 (Impact Factor 2.371, 5 Year 2.668, ranked 62/135 (Psychiatry), 31/75 (Psychology)).

## 4. Details of the impact

The four examples of impact cited concern contributions to the decision by the UK government to maintain the Class A status of ecstasy in 2009; the British Psychological Society (BPS) submission to a Department for Education (DfE) consultation in 2011; the media debates concerning the dangers of ecstasy; and the development of a drug misuse support service on Merseyside since 2008. All impacts occurred between January 2008 and July 2013.

At an open meeting of the Advisory Council on the Misuse of Drugs (ACMD) on Friday 19th September 2008, the Council presented its recommendations regarding the legal classification of 'ecstasy' (MDMA). The preliminary findings presented cited 12 studies from this research programme. The scientific basis for these recommendations came from a meta-analysis of empirical findings concerning the effects of ecstasy [Other Source 1], conducted by the Peninsula Technology Assessment Group of the Peninsula Medical School. The published systematic review cited 11 studies from this programme of research overall [e.g. Outputs 1, 3, 6, Section 3], with 8 of these citations having direct EHU authorship. These studies emphasised harms arising from ecstasy use, and contributed to six of the meta-analyses reported. These findings were incorporated into the ACMD report [Other Source 2] submitted to the Home Office. Despite the overall ACMD recommendation for the legal status of ecstasy to be changed to Class B, sufficient evidence was presented concerning the dangers of the drug for the Home Office to maintain its Class A status, with the aim of minimising drug related harms to the public.

In August 2011 the DfE launched a review of personal, social, health and economics (PSHE) education in schools [Other Source 3]. The BPS contribution to this consultation cited 14 published research studies in the substance misuse section of its submission, including 3 studies from our research highlighting the dangers to cognitive functioning and mood stability arising from ecstasy and cannabis use, respectively [see Outputs 2, 5, 8, Section 3]. These citations helped to underpin the BPS recommendation that consideration be given to making education regarding the dangers of substance misuse a compulsory element within PSHE education. The BPS consultation submission was published on the society's web site [Other Source 4], and a formal response was published by the DfE in March 2013 [Other Source 5]. This response stated that cited evidence was being considered by Ofsted with the aim of revising PSHE teaching practice. The current beneficiaries of this impact are the DfE and Ofsted policy makers, with further benefits following to the teachers developing and delivering the PHSE curriculum, and ultimately the children they teach.

The third impact area concerns contributions to the media debate concerning the risks of the drug ecstasy. Two major contributions will be noted here. The first occurred on Friday 19th September 2008, when Murphy appeared on both BBC Breakfast television, and on the Radio 4 Today programme. Both interviews involved 'head to head' debate with Prof Colin Blakemore, a former Director of the Medical Research Council, and coincided with the open meeting of the ACMD on this topic described above [see also Other Sources 1 and 2]. The second contribution occurred on Thursday 27th September 2012 with Murphy's appearance on the Channel 4 programme 'Drugs Live- the Ecstasy Trial' where he faced Professor David Nutt (formerly Chair of the ACMD) in a discussion about the dangers of this drug. This programme, broadcast in two parts on successive nights, averaged 1.6 million viewers and claimed 41% of the 16-34 year old viewing audience [Factual Statement 1]. Murphy's invitations to participate in these debates arose, directly from his record of research publication (Section 3 above), with his contributions to these debates drawing upon the findings of this research programme. On these occasions there was direct impact upon the content of the public debate by virtue of Murphy's invitation, and also upon the general public who were beneficiaries of the specific information they received with regard to the dangers associated with ecstasy. A post-broadcast survey by the production company highlighted that viewers had learned of the dangers of experimenting with ecstasy [Factual Statement 1]. The impact claimed here is distinct from claiming impact upon changes in the behaviour of the general public, which would be very difficult to link with one research programme.

The final example of impact arises from a report produced by the Centre for Public Health at LJMU in June 2007 into the perceptions held by young people on Merseyside aged 18 to 25 years of their treatment needs for drug related problems [14]. Wareing was the lead author for this report which drew upon the findings published as part of this research programme concerning ecstasy users' beliefs regarding the risks and benefits of using the drug, and the precautions they took when using it [Output 7, Section 3]. The manager of the national addiction charity Addaction for Liverpool acknowledges the role of this report in the development of a specialist service for 18 to 25 year olds, and has submitted a brief written statement to this effect. In some cases this service

cares for clients under the age of 18 years. Our research particularly contributed to a publicity campaign about the risks of ecstasy use, and also to the responses Addaction counsellors were able to make to individuals who approached them for help with ecstasy related problems [Factual Statement 2]. Statistical data from Addaction on service uptake within the relevant age range shows a marked increase throughout this assessment period, with client numbers being 134 for 2008, 278 for 2009, 412 for 2010, 420 for 2011, and 433 for 2012 [Other Source 7]. The beneficiaries of this impact may be identified as both the staff and clientele of Addaction on Merseyside, as well as the broader population of ecstasy users who will have been better informed regarding the drug.

**5. Sources to corroborate the impact**

**Factual Statements** (all available on request)

[Factual Statement 1] Renegade Pictures (2013). Personal Communication. London: Renegade Pictures – provides viewing figures for *Drugs Live,* viewer survey information, website and social media reaction

[Factual Statement 2] Addaction (2013) Personal communication. Liverpool: Addaction. – addresses influence on services provided to young people.

**Other Sources** (all available on request)

[Other Source 1] Rogers G, Elston J, Garside R, Roome C, Taylor R, Younger P, Zawada A, Somerville M. (2009). The harmful health effects of recreational ecstasy: a systematic review of observational evidence. *Health Technology Assessment 13,* Part 6.

[Other Source 2] Advisory Council on the Misuse of Drugs (2009). *MDMA ('ecstasy'): a review of its harms and classification under the Misuse of Drugs Act 1971*. London: Crown Copyright.

[Other Source 3] Department for Education (2011). Review of Personal, Social, Health and Economics (PSHE) Education.

http://www.education.gov.uk/consultations/index.cfm?action=consultationDetails&consultationId=1759&external=no&menu=1

Accessed October 2011.

[Other Source 4] British Psychological Society (2012). http://apps.bps.org.uk/_publicationfiles/consultation-responses/Review%20of%20PSHE%20Education%20-%20BPS%20response.pdf

Accessed November 2013.

[Other Source 5] Department for Education (2013). Consultation on PSHE Education. March 2013. Crown Copyright.

[Other Source 6] Wareing, M., Sumnall, H., and Mcveigh, J. (2007). Young People and Substance Misuse: Characteristics, Needs and Perception of Treatment Services of Drug Users Aged 18 to 25 in Liverpool. Liverpool John Moores University, Centre for Public Health.

[Other Source 7] Addaction (2012). *Annual Report 2012*. Available from the Merseyside Youth Association.