

Citation for published version:

Pierluigi Simonato, Grancesco S. Bersani, Rita Santacroce, Eduarco Cinosi, Fabrizio Schifano, Giuseppe Bersani, Giovanni Martinotti, and Ornella Corazza, 'Can mobile phone technology support a rapid sharing of information on novel psychoactive substances among health and other professionals internationally?', *Human Psychopharmacology: Clinical & Experimental*, Vol. 32 (3), e2580, May 2017.

DOI:

<https://doi.org/10.1002/hup.2580>

Document Version:

This is the Accepted Manuscript version.

The version in the University of Hertfordshire Research Archive may differ from the final published version. **Users should always cite the published version of record.**

Copyright and Reuse:

Copyright © 2017 John Wiley & Sons, Ltd.

This Manuscript version may be used for non-commercial purposes in accordance with [Wiley Terms and Conditions for Self-Archiving](#)

Enquiries

If you believe this document infringes copyright, please contact the Research & Scholarly Communications Team at rsc@herts.ac.uk

Can mobile phone technology support a rapid sharing of information on Novel Psychoactive Substances among health and other professionals internationally?

*Pierluigi Simonato (1), Francesco S. Bersani (1,2), Rita Santacroce (1,3), Eduardo Cinosi (1,3),
Fabrizio Schifano (1), Giuseppe Bersani (2), Giovanni Martinotti (1,3), Ornella Corazza (1,2)*

1. Novel Psychoactive Substance Unit, Centre for Clinical & Health Research Services, University of Hertfordshire, Hatfield, United Kingdom

2. Department of Medico-Surgical Sciences and Biotechnologies, Sapienza University of Rome, Rome, Italy

3. Department of Neuroscience, Imaging and Clinical Sciences, Gabriele D'Annunzio University, Chieti, Italy

Running head: SMAIL: the first mobile app on NPS

Key words: Novel Psychoactive Substances, eHealth, Public Health, Mobile Phone Application

Corresponding Author:

Dr. Ornella Corazza

Reader in Substance Addictions and Behaviours, Centre for Clinical & Health Research Services,

University of Hertfordshire

College Lane Campus, Hatfield, Herts AL109AB, UK.

Email: o.corazza@herts.ac.uk

ABSTRACT

Background: The diffusion of Novel Psychoactive Substances (NPSs), combined with the ability of the Internet to act as an online marketplace, has led to unprecedented challenges for governments, health agencies, and substance misuse services. Despite increasing research, there is a paucity of reliable information available to professionals working in the field. **The paper will present the pilot results of the first mobile application (SMAIL) for rapid information-sharing on NPSs among health professionals.** **Methods:** The development of SMAIL was divided into two parts: (a) the creation of the application for registered users, enabling them to send an SMS/email with the name or “street-name” of an NPS and receive within seconds emails/SMS with the information, when available; (b) the development of a database to support the incoming requests. **Results:** 122 professionals based in 22 countries used the service over the pilot period of 16 months (from May 2012 to September 2013). 557 enquires were made. Users received rapid information on NPSs, and 61% of them rated the service as excellent. **Conclusions:** This is the right time to use mobile phone technologies for rapid information-sharing and prevention activities on NPSs.

1. INTRODUCTION

Over the last decade, the diffusion of new recreational drug trends involving Novel Psychoactive Substances (NPSs), also misleadingly known as “legal highs”, “herbal highs” or “smart drugs” (Corazza, Demetrovics, van den Brink, & Schifano, 2013), has emerged as a prominent issue for the fields of drug policy, research and public health (EMCDDA, 2015; Schifano, Orsolini, Duccio Papanti, & Corkery, 2015). The galaxy of NPSs is very complex, and it includes a range of very different molecules such as phenethylamines and novel stimulants, synthetic cannabinoids, cathinone derivatives, synthetic opiates/opioids, tryptamine derivatives, phencyclidine-like dissociatives, piperazines, GABA-A/GABA-B receptor agonists, certain medications, psychoactive plants/herbs and the so-called “performance and image-enhancing drugs” (PIEDs) (Bersani, Coviello, et al., 2015; Corazza, et al., 2014; Gray, Bressington, Hughes, & Ivanecka, 2016; Schifano, et al., 2015).

Both the growing number of NPSs and the rapidity with which they appear on the illicit drug market have led to unprecedented challenges for government organisations, health agencies, and substance misuse services (Bersani, et al., 2013; Cinosi, et al., 2015; Gray, et al., 2016). Moreover, these new products, often marketed as alternatives to other more common illicit drugs, are becoming increasingly available (Bersani, Imperatori, Prilutskaya, Kuliev, & Corazza, 2015; Gray, et al., 2016; Valeriani, et al., 2015). With the Internet acting as an online marketplace, NPSs are often sold as ‘mystical incenses’, ‘plant chemicals’ and ‘bath salts’ (Bersani, et al., 2016; Gray, et al., 2016; Meyer, 2016). They are often sold at discounted prices and easy to purchase, and are perceived as “safer” than classic psychoactives. Nevertheless, NPSs can represent a serious threat for both physical and mental health (Santacroce et al., 2015). NPSs are often unknown to health professionals, as they are not properly documented in scientific literature (Bersani, et al., 2014; Bersani, et al., 2013; Meyer, 2016); it is thus becoming clear that reliable and easily accessible information on the topic is necessary, especially among health and other professionals (e.g. police, social workers) working in the field.

Mobile phones are nowadays one of the easiest way to communicate. Interventions based on short message service (SMS) and smartphone-based technology (i.e. the so-called “apps”) have been extensively used in health research in the fields of mental health, addiction, weight loss/management, parenting, sexual health, diabetes, oncology and Human Immunodeficiency Virus (HIV) (Anthes, 2016; Bigelow, Carta, & Lefever, 2008; Brendryen, Drozd, & Kraft, 2008; Fjeldsoe, Miller, & Marshall, 2010; Gerber, Stolley, Thompson, Sharp, & Fitzgibbon, 2009; Kim & Kim, 2008; Kypri & Lee, 2009; Nasi, Cucciniello, & Guerrazzi, 2015; Whittaker, McRobbie, Bullen, Rodgers, & Gu, 2016; Ybarra & Bull, 2007). Overall, it is recognized that health-related mobile tools can have a crucial role to play, since they can improve communication and enhance the integration of care processes.

In this context, the first mobile app on NPSs, SMAIL (an acronym which combines “Sms” and “eMAIL”), was launched in May 2012 as a result of the EU-funded “ReDNet project” (Corazza, Assi, et al., 2013) to help health and other professionals to keep up-to-date and receive a rapid response on their enquires on NPSs, especially in absence of relevant information on Medline or other scientific databases.

2. METHODS

The development of SMAIL was divided into two parts: (a) the creation of the application for registered users, enabling them to send an SMS/email with the name or “street-name” of an NPS and receive within seconds emails/SMS with the information on the nature and the risks of the drug, when available; (b) the development of a database to support the incoming requests linked with technical factsheets created by the researchers. Ethical approval for this study was granted by the School of Pharmacy Ethics Committee, University of Hertfordshire, Hatfield, United Kingdom (November 2013; PHAEC/10-42).

To promote the pilot research, a snowball sampling was used (i.e. an invitation to join SMAIL was disseminated among researchers working in the field, while encouraging them to further disseminate it among their acquaintances). Registrations to the SMAIL service occurred online via a dedicated website. Registered users could use a mobile device, or an email address, to send the name or the “street-name” (e.g.

“Pink Panther”, “Black Mamba”) of a specific NPS to the system, which was available on a 24/7 basis. If the drug name matched with the stored list of drug names in the SMAIL database, information about the drug was automatically sent back to the mobile phone or to the email address within 10 seconds. If the name was misspelled by the user (e.g “Canfeamine” rather than “Camfetamine”), the system suggested the plausible correct name and sent the relevant information. If the system was not able to find a matched name in the database, the user received an SMS/email declining the request of information.

The SMAIL database included factsheets on 57 NPSs known by the researchers at the time of this pilot study (i.e. from May 2012 to September 2013). These included groups of new phenethylamines, tryptamines, piperazines, synthetic cannabinoids and cathinones, ketamine-like compounds and plant-based substances. Information on NPSs emerged from multilingual reviews of the available peer-reviewed literature, as well as from ‘non-conventional, fugitive and ephemeral publications (also known as ‘grey literature’) (Alberani, De Castro Pietrangeli, & Mazza, 1990), which consisted in government reports, preliminary documents, technical documentations and anecdotal reports from media or the Internet. Information sheets included key points about each substance, such as legal status, diffusion, chemical characteristics, and pharmacological/toxicological effects. The content was presented in a friendly “question and answer” format with thumbnail photos. During the study period, the developers of the app had regular access to the tool and kept constantly updated the information on the substances.

3. RESULTS

Overall, 122 users registered to SMAIL internationally, 52% males and 48% females, with an average age of 36.96 ± 9.3 years. SMAIL users were mostly health professionals (37%), workers in the drug/addiction field (25%) and researchers (24%). 557 searches have been performed until September 2013, mainly via SMS (94.6%) and from smartphone devices. Full details on the research outcomes are illustrated in Table 1.

Although registered health professionals were from 22 different countries, the searches were mainly performed from six countries, and mostly from the UK (78.6%). The most searched substances were

mephedrone (53.7%), methylenedioxypropylvalerone (MDPV; 4.8%), substituted benzofurans (6-APB; 4.7%), 5,6-methylenedioxy-2-aminoindane (MDAI; 4.3%) and methoxetamine (3.8%).

Despite the fact that the database included the majority of the NPSs discussed in scientific papers, regulatory reports and media sources, SMAIL was not able to capture 53.7% of requests. This was mainly due to 4 reasons: (i) searched products were unknown to the researchers and therefore were not contained in the database (47.5%); for example, users searched for ‘doob’, ‘ocean snow’ and ‘TMA6’ nicknames, which were not mentioned in any scientific/governmental/media-related source; (ii) healthcare professionals searched for “classic” drugs (12.4%) like ‘cocaine’, ‘heroin’, ‘MDMA’, ‘methadone’, or ‘ecstasy’ (12.4%), which were not included in the SMAIL database; (iii) users made typing errors (12.4%); (iv) the searched substance was not recognised at the first time, but the research team was able to identify the compound and to add updated factsheets right after the warning (12.0%); for example, in May 2013 several queries explored a compound called ‘Black Mamba’, which was then studied, identified and classified by the team as a synthetic cannabinoid (AM-2201); (v) errors in the recognition algorithm of the system: the SMAIL service failed recognising correctly a NPS (11.4%), even if the users searched properly the compound.

4. DISCUSSION

To the best of our knowledge, this is the first pilot study on the use of mobile-based technology for NPSs. Although the presented results are preliminary and not totally satisfactory, they support the idea that mobile tools could successfully be used for the rapid dissemination of NPS-related information and may play an important role in supporting preventive public health interventions in the field of substance abuse.

During this pilot study, SMAIL gave healthcare professionals the opportunity to access reliable and balanced information on NPSs on a 24/7 basis, and also allowed researchers to monitor/enlighten new trends of drug misuse. Sharing information about NPSs via mobile-based tools can help to fulfil the existing gap between the spread of NPSs in clinical settings and the temporary lack of scientific evidence about these compounds in the scientific literature.

Our results also suggested that registered users, mainly health professionals, were not familiar with the definition of NPSs, as they often asked information on classic, rather than ‘novel’, compounds. Such poor level of knowledge on NPSs also emerged from previous studies in the field. 57% of health professionals in the UK seeing patients with NPS-related problems rated their level of knowledge in the field as ‘poor’ or ‘basic’ (Corazza, Assi, et al., 2013). Similarly, in Italy 1 out of 4 health professionals did not even know if their patients were using NPSs (Simonato, et al., 2013). Given the high impact on physical and mental health, the misuse of NPSs should be regularly included in the patients’ anamnesis, and healthcare professionals should be able to identify rapidly these compounds in order to avoid errors in the assessment phase.

Major limitations of this pilot study include: (i) the use of the tool by a small (n=122) number of users, mainly from Italy and UK, thus our findings lack of a broader international dimension and should be further validated in larger cohorts; (ii) its observational nature, which requires future studies inclusive of more specific efficacy endpoints; and (iii) a large number (more than half) of unmet requests from users, which required constant updates of the attached database, which can be challenging especially in light of the speed at which NPSs appear on the illicit drug market and the availability of limited resources. Finally, it is worth considering that at the time of its development (2012), SMS were still considered a diffuse and effective method of communication. However, given the ever-changing scenario of both mobile technology and NPSs, future applications should include instant-messaging systems (e.g. WhatsApp, Viber) and constantly updated databases in order to face the NPS challenge in a more informed way at the global level. Potentially, such a service could be connected with larger databases such as those developed over the years by the European Monitoring Centre for Drugs and Drug Addiction through their Early Warning Systems (EWS), or by the United Nation Office on Drugs and Crime through their Early Warning Advisory (EWA), which collect information on the global appearance of new substances.

Overall, there is a rapidly growing interest among governments, researchers and health professionals in the delivery of interventions for substance use problems via mobile technologies and this is the right time to support the development of innovative solutions in the field of NPSs such as SMAIL.

ACKNOWLEDGEMENTS

Authors wish to thank all the ReDNet partners for their support at the initial stages of the SMAIL development, the European Commission for co-funding the project (EU Grant Number: 20091216) and TMC Messaging and Wizney LTD Multimedia Solutions for supporting its technological development.

CONFLICTS OF INTEREST

None

REFERENCES

- Alberani, V., De Castro Pietrangeli, P., & Mazza, A. M. (1990). The use of grey literature in health sciences: a preliminary survey. *Bull Med Libr Assoc*, 78(4), 358-363.
- Anthes, E. (2016). Mental health: There's an app for that. *Nature*, 532(7597), 20-23.
- Bersani, F. S., Corazza, O., Albano, G., Valeriani, G., Santacroce, R., Bolzan Mariotti Posocco, F., et al. (2014). 25C-NBOMe: preliminary data on pharmacology, psychoactive effects, and toxicity of a new potent and dangerous hallucinogenic drug. *Biomed Res Int*, 2014, 734749.
- Bersani, F. S., Corazza, O., Simonato, P., Mylokosta, A., Levari, E., Lovaste, R., et al. (2013). Drops of madness? Recreational misuse of tropicamide collyrium; early warning alerts from Russia and Italy. *Gen Hosp Psychiatry*, 35(5), 571-573.
- Bersani, F. S., Coviello, M., Imperatori, C., Francesconi, M., Hough, C. M., Valeriani, G., et al. (2015). Adverse Psychiatric Effects Associated with Herbal Weight-Loss Products. *Biomed Res Int*, 2015, 120679.
- Bersani, F. S., Imperatori, C., Prilutskaya, M., Kuliev, R., & Corazza, O. (2015). Injecting eye-drops: a mini-review on the non-clinical use of tropicamide. *Hum Psychopharmacol*, 30(4), 262-264.
- Bersani, F. S., Santacroce, R., Coviello, M., Imperatori, C., Francesconi, M., Vicinanza, R., et al. (2016). Cannabis: a self-medication drug for weight management? The never ending story. *Drug Test Anal*, 8(2), 177-179.
- Bigelow, K. M., Carta, J. J., & Lefever, J. B. (2008). Txt u ltr: using cellular phone technology to enhance a parenting intervention for families at risk for neglect. *Child Maltreat*, 13(4), 362-367.
- Brendryen, H., Drozd, F., & Kraft, P. (2008). A digital smoking cessation program delivered through internet and cell phone without nicotine replacement (happy ending): randomized controlled trial. *J Med Internet Res*, 10(5), e51.
- Cinosi, E., Martinotti, G., Simonato, P., Singh, D., Demetrovics, Z., Roman-Urrestarazu, A., et al. (2015). Following "the Roots" of Kratom (*Mitragyna speciosa*): The Evolution of an Enhancer from a Traditional Use to Increase Work and Productivity in Southeast Asia to a Recreational Psychoactive Drug in Western Countries. *Biomed Res Int*, 2015, 968786.
- Corazza, O., Assi, S., Simonato, P., Corkery, J., Bersani, F. S., Demetrovics, Z., et al. (2013). Promoting innovation and excellence to face the rapid diffusion of novel psychoactive substances in the EU: the outcomes of the ReDNet project. *Hum Psychopharmacol*, 28(4), 317-323.
- Corazza, O., Demetrovics, Z., van den Brink, W., & Schifano, F. (2013). 'Legal highs' an inappropriate term for 'Novel Psychoactive Drugs' in drug prevention and scientific debate. *Int J Drug Policy*, 24(1), 82-83.
- Corazza, O., Valeriani, G., Bersani, F. S., Corkery, J., Martinotti, G., Bersani, G., et al. (2014). "Spice," "kryptonite," "black mamba": an overview of brand names and marketing strategies of novel psychoactive substances on the web. *J Psychoactive Drugs*, 46(4), 287-294.
- EMCDDA. (2015). European Drug Report 2015: Trends and Developments.
- Fjeldsoe, B. S., Miller, Y. D., & Marshall, A. L. (2010). MobileMums: a randomized controlled trial of an SMS-based physical activity intervention. *Ann Behav Med*, 39(2), 101-111.

- Gerber, B. S., Stolley, M. R., Thompson, A. L., Sharp, L. K., & Fitzgibbon, M. L. (2009). Mobile phone text messaging to promote healthy behaviors and weight loss maintenance: a feasibility study. *Health Informatics J*, 15(1), 17-25.
- Gray, R., Bressington, D., Hughes, E., & Ivanecka, A. (2016). A systematic review of the effects of novel psychoactive substances 'legal highs' on people with severe mental illness. *J Psychiatr Ment Health Nurs*, 23(5), 267-281.
- Kim, S. I., & Kim, H. S. (2008). Effectiveness of mobile and internet intervention in patients with obese type 2 diabetes. *Int J Med Inform*, 77(6), 399-404.
- Kypri, K., & Lee, N. (2009). New technologies in the prevention and treatment of substance use problems. *Drug Alcohol Rev*, 28(1), 1-2.
- Meyer, M. R. (2016). New psychoactive substances: an overview on recent publications on their toxicodynamics and toxicokinetics. *Arch Toxicol*, 90(10), 2421-2444.
- Nasi, G., Cucciniello, M., & Guerrazzi, C. (2015). The role of mobile technologies in health care processes: the case of cancer supportive care. *J Med Internet Res*, 17(2), e26.
- Santacroce R, Corazza O, Martinotti G, Bersani FS, Valeriani G, Di Giannantonio M. (2015). Psyclones: a roller coaster of life? Hidden synthetic cannabinoids and stimulants in apparently harmless products. *Human Psychopharmacology*, 30(4):265-271.
- Schifano, F., Orsolini, L., Duccio Papanti, G., & Corkery, J. M. (2015). Novel psychoactive substances of interest for psychiatry. *World Psychiatry*, 14(1), 15-26.
- Simonato, P., Corazza, O., Santonastaso, P., Corkery, J., Deluca, P., Davey, Z., et al. (2013). Novel psychoactive substances as a novel challenge for health professionals: results from an Italian survey. *Hum Psychopharmacol*, 28(4), 324-331.
- Valeriani, G., Corazza, O., Bersani, F. S., Melcore, C., Metastasio, A., Bersani, G., et al. (2015). Olanzapine as the ideal "trip terminator"? Analysis of online reports relating to antipsychotics' use and misuse following occurrence of novel psychoactive substance-related psychotic symptoms. *Hum Psychopharmacol*, 30(4), 249-254.
- Whittaker, R., McRobbie, H., Bullen, C., Rodgers, A., & Gu, Y. (2016). Mobile phone-based interventions for smoking cessation. *Cochrane Database Syst Rev*, 4, CD006611.
- Ybarra, M. L., & Bull, S. S. (2007). Current trends in Internet- and cell phone-based HIV prevention and intervention programs. *Curr HIV/AIDS Rep*, 4(4), 201-207.