

CHAPTER 7

The emergence of deep web marketplaces: a health perspective

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Introduction

Deep web marketplaces (DWMs) represent a major change in online drug trading. Although they are currently a limited phenomenon, their operational characteristics offer significant advantages for both buyers and sellers, and it is likely that their importance will grow. The structure of DWMs facilitates communication, exchange and dissemination of information. This provides opportunities for health professionals to engage with users. This chapter discusses some aspects of DWMs from a health perspective and describes harm reduction strategies developed specifically for DWMs.

The internet, drugs and health

The internet has changed many aspects of healthcare. Health professionals have traditionally been considered an undisputed and unique source of knowledge, and the role of patients has been to passively accept medical advice. However, this relationship has been transformed by the democratic access to information and the interactivity provided by the internet. Virtual communities, chats, discussion forums, online social networking services and virtual libraries are tools that change the balance of knowledge between health professionals and the public, empowering patients to become more involved in decisions related to their health. The internet is also a powerful tool for professionals, and clinicians and researchers have increased access to scientific publications, guidelines and professional tools that facilitate research and improve knowledge and abilities. On the other hand, dissemination of inaccurate or inadequate messages can have negative health consequences and is a growing concern, given that it is sometimes difficult to evaluate the quality of information online.

In relation to illegal or recreational drugs, these changes have been even more dramatic. Drug information provided through traditional media has tended to focus on universal prevention, encouraging people to reject any use of illegal psychoactive substances, not differentiating between use, abuse and dependence, and often exaggerating the negative aspects and consequences of drug use. In the age of the internet, however, resources focused on harm reduction, including more information about risks and harms, have gained popularity.

Alexa Internet ⁽¹⁾ is a company that provides web traffic data analysis, classifies websites according to their global popularity and generates a score (Alexa ranking (AR)) that is considered the 'gold standard' for estimating the importance of websites on the internet, with lower AR scores denoting greater popularity. Websites aimed at providing harm reduction information, such as Bluelight ⁽²⁾, Drugs Forum ⁽³⁾ and Erowid ⁽⁴⁾, have higher Alexa rankings (Bluelight, 16 356; Drugs-forum, 19.965; Erowid, 20.670) than official prevention web pages such as the US National Institute of Drug Abuse ⁽⁵⁾ (28 686) or the United Nations Office on Drugs and Crime (UNODC) ⁽⁶⁾ (50 942). It is also important to note that harm reduction websites are generally run by volunteers or small non-governmental organisations with limited technical and economic resources compared with official government prevention websites. It is likely that these virtual communities of individuals using the internet all over the world are having an impact on social perceptions about illicit drugs.

⁽¹⁾ <http://www.alexa.com>

⁽²⁾ <http://www.bluelight.org>

⁽³⁾ <http://www.drugs-forum.com>

⁽⁴⁾ <http://www.erowid.org>

⁽⁵⁾ <http://www.drugabuse.gov/>

⁽⁶⁾ <http://www.unodc.org/>

Online drug trading: from research chemicals to deep web marketplaces

As with any other consumer goods, illicit drugs have been offered online since the internet began. However, until recently, their illegal status has made this business extremely difficult in practice. Purchasing illicit drugs through an internet website or forum on the surface web gives no guarantee about the quality of the product or that the product will actually arrive. Payment and shipping allows the purchaser to be physically identified and there is no possibility of lodging a complaint. Nevertheless, small closed-access websites and forums have always existed where select individuals can purchase illicit drugs by invitation; their impact, however, has been limited.

From the mid-90s to 2003, a limited selection of psychoactive substances were offered online as 'research chemicals'. In general, they were phenethylamine and tryptamine derivatives, coming from discreet websites offering high-purity products. Consumers were, in general, individuals with an interest in psychoactive substances (so-called psychonauts); the phenomenon didn't attract the attention of the media and was of very limited significance. The US Drug Enforcement Administration closed most of these websites in July 2004.

The phenomenon re-emerged around 2007 in the form of 'legal highs', with visually attractive websites employing well-known marketing strategies such as special offers and discounts ('product of the week', 'buy 3 pay for 2', etc.) and offering a wide variety of drugs (synthetic cannabinoids, cathinone derivatives, pyrovalerones, NBOMe series, methoxetamine, etc.) marketed as herbal blends, incense, fertilisers, and so on. The main purpose of this market was to sell non-controlled substances. Most of the substances had not been studied in animals and there was a lack of data about human toxicology or psychoactivity from basic science studies. In many cases, product samples contained a mixture of different substances and, sometimes, products with identical labels contained different active substances (Caudevilla et al., 2013). There was high availability of these substances, some of which have much potential for harm (Johnson et al., 2013).

DWMs represent a significant change in the online drug trade. Relations between vendors and consumers are largely based on trust and professionalism, and are supported by user feedback and resolution models (Van Hout and Bingham, 2013). Forums linked to these markets provide user advice, 'trip reports', and product

and transaction reviews. Some of these markets sell only psychoactive substances and support or integrate a harm reduction philosophy. In other cases, DWMs offer not only drugs but also counterfeit goods, stolen credit cards or weapons. However, offering child pornography, services of 'murder for hire', traffic of persons or human organs are strictly forbidden activities in these kinds of markets.

DWMs can also provide a virtual setting for harm reduction. The structure of DWMs allows the creation of virtual communities that share information, knowledge and experiences. For many individuals, it is not a matter simply of 'buying drugs', but a question of belonging to a community that shares similar interests. The implications of these aspects for prevention deserve further and more detailed research. Feedback from other users, posts in forums and control by site administrators allow users to be relatively well informed about the quality of products. Many vendors state that their products have been 'lab-tested' and offer information about purity. Users can leave their opinions about the quality of products and experiences with vendors. Many vendors communicate directly with users in forums, announce when a new batch of a substance is available, provide and share advice about safer use and openly discuss quality, purity, adulterants and advertisements. This system is imperfect, but it offers users more reliable information than that provided in the traditional street drug dealing system. So, in general, DWMs provide some advantages for both buyers and sellers compared with street-level distribution.

Technical difficulties in accessing and operating DWMs and the fact that a real postal address must be provided to receive the product are currently the main drawbacks for many users. There is no clear estimate about the market share of DWMs in relation to the whole global trade in illicit drugs, but it is likely to be very limited at present. Nevertheless, there are signs that suggest there may be increased interest in the future.

'Ask a Drug Expert Physician about Drugs and Health'

Internet forums are online discussion sites where people can hold conversations in the form of posted messages. Their structure is hierarchical: a forum can contain different sub-forums dedicated to different themes covering several topics or threads. In forums, administrators manage the technical running of the site and can give privileges to some users. Moderators are

users or employees of the forum who have been granted access to the posts and threads of all members for the purpose of moderating discussions and managing day-to-day affairs in the forum. The characteristics of organisation, structure, classification of information, democratic participation and simplicity of use make these online forums very popular, and they are often used as sources of information and sites where discussion can take place.

Online drugs forums have been used for scientific, medical and prevention research in different ways. Analysing information contained in them is a simple way to obtain some data (patterns of use of emerging drugs, motivations, harm, etc.) that would be very difficult to collect using other methods (Lefèvre and Simioni, 1999; Kjellgren et al., 2013; Månsson, 2014). The use of internet forums to recruit participants for studies can be very helpful when the subject of the study has a low prevalence or when it involves hard-to-reach populations (González et al., 2013; Caudevilla-Gálligo et al., 2014). The role of internet-based treatments using forums, chats or mobile phone applications has also recently been studied in fields such as smoking cessation (Civljak et al., 2013), social anxiety disorder (Schulz et al., 2014) and anxiety and depressive disorders (Schulz et al., 2014). Online drug forums can also be an environment where strategies for risk and harm reduction can be provided to drug users.

Most DWMs have associated forums, usually administrated or moderated by the same staff who run the marketplace. Nine of the eleven popular DWMs operating in February 2015 had an associated forum. At this time, the forums in Evolution (7) and Agora (8) were the most popular, with thousands of registered users and hundreds of new posts and messages every day. Forums in DWMs have a similar structure to those in the surface web: there is a general section for discussion about the market, and also sub-sections where users can discuss the quality of products, reviews of vendors, security, packaging, legal aspects, bitcoin, and so on. In most forums, there is also a sub-section dedicated to 'drug safety' where users discuss topics directly related to drugs and health (patterns of use, intoxication, adulterants, dosage, etc.).

The author of this chapter has been running threads (entitled 'Ask a Drug Expert Physician about Drugs and Health') in DWM forums providing information and advice to drug users from a risk reduction perspective. This service started in April 2013 in the original Silk Road

TABLE 7.1

Summary of activity in an online health service for deep web drug users

Market	Dates	Number of questions (public)	Number of questions (private)	Total visits
Silk Road	Apr. to Oct. 2013	321	67	36 438
Silk Road 2.0	Dec. 2013 to Nov. 2014	352	103	52 725
Evolution	Dec. 2014 to Feb. 2015	258	45	47 244 (1)

(1) Thread active; data up to 2/2/15.

forum (9) and moved to the Silk Road 2.0 forum (10) when Silk Road was closed by the FBI. Silk Road 2.0 was shut down in November 2014 and, since then, its forum has not been accessible. For this reason, the service was moved to Evolution (11).

Most DWM users remain anonymous and do not give any clues about their identity in the real world. The author uses the nickname 'DoctorX' in the deep web, but, in order to gain credibility, DoctorX's real identity has been revealed, with a link in the forum profile to a professional web page with complete information about his profession and skills. The service is free of charge, but supported by anonymous and volunteer donations in bitcoins.

'Ask a Drug Expert Physician about Drugs and Health' (threads in Silk Road, Silk Road 2.0 and Evolution during a 22-month period) had received 136 407 visits on 3 February 2015 and 1 146 questions had been answered, 931 in the public forum, accessible to any visitor, and 215 as private messages from people who, for whatever reason, wanted to ask their questions privately. Data are summarised in Table 7.1.

Although a structured qualitative analysis has not been performed, the general impression is that the reception of this service in the community has been very positive. All the threads received many messages from users expressing support, appreciation and gratitude. Some users have offered collaboration, for example editing in English, gathering similar answers to create a 'Frequently Asked Questions' section or referring users to DoctorX's thread when questions about health are asked in different posts or forums. Some vendors have also asked questions aimed at improving safety of the products

(9) The original forum was closed by the FBI in October 2013. A complete backup can be downloaded from http://antilop.cc/sr/download/stexo_sr_forum.zip

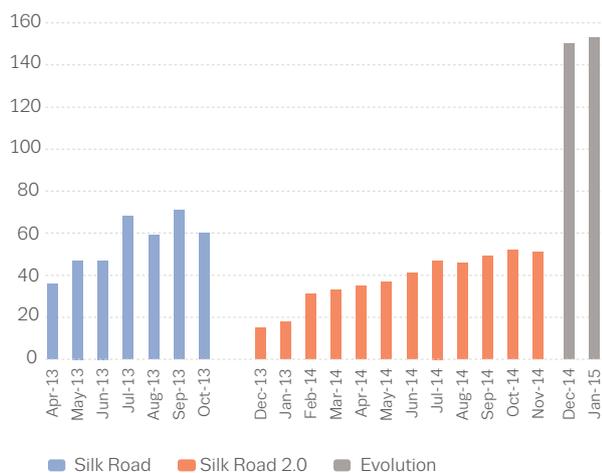
(10) The forum was closed by the FBI/Europol in November 2014. No copies have been found.

(11) 'Ask a Drug Expert Physician about Drugs and Health', Evolution forum, <http://i25c62nvu4cgeqyz.onion/viewtopic.php?id=35190> (available only through Tor).

(7) <http://i25c62nvu4cgeqyz.onion>

(8) <http://lacbzxobeprrsrfx.onion>

FIGURE 7.1

Number of questions answered by month

they are selling. The attitude of DWM administrators and moderators has also been very collaborative: the thread has always been highlighted, and technical or general support has been offered in all cases. The popularity of the thread has increased, as shown in Figure 7.1, where the number of questions answered each month in the three markets during a 22-month period is presented.

Questions in the thread have been categorised using a qualitative analysis technique that involves coding the posts and collating them into meaningful and distinct themes. The main themes that emerged are summarised in the box below.

Themes of frequently asked questions in an online health service for deep web drug users

- Drug effects, patterns of use, dosage
- Adverse effects
- Medical contraindications
- Pharmacological interactions with prescription drugs
- Pharmacological interactions with other illicit drugs
- Patterns for detoxification
- Therapeutic use of cannabis
- Neurotoxicity
- Long-term effects of drugs
- Urine detection of drugs
- Use of drugs during pregnancy and lactation

In order to better understand the nature and characteristics of questions asked in the 'Ask a Drug Expert Physician about Drugs and Health', some examples are shown in the box on p.73. Case 1 is particularly notable. The questioner asked about long-lasting symptoms that he attributed to opiate abstinence. However, fever, profuse sweating, enlargement of the lymph nodes and pain during the night suggested the need for a complete medical evaluation. A week later, the user posted in the forum that he had this done after reading the answer and that blood test results had revealed that he was suffering from leukaemia (Ormsby, 2014).

A drug information and counselling service in a DWM forum provided by a professional physician who specialises in drugs and harm reduction is an opportunity to reach drug users where they are. This 'virtual outreach' technique is perceived as reliable, effective and able to provide useful information and skills to drug users, although many aspects deserve further and deeper evaluation. It also has its own limitations and disadvantages, as messages in an internet forum provide very limited information compared with a real, face-to-face interview and intervention. It is important to remember that many drug users are reluctant to ask their questions of traditional health services because they feel they will be judged, or are afraid of professionals' moral prejudices. In many parts of the world, services aimed at drug users are simply non-existent.

Testing drugs purchased through deep web marketplaces: the International Drug Testing Service (IDTS)

Drug checking services are useful tools for reducing numbers of drug-related incidents, monitoring new substances or patterns of use, and providing information and assessment to drug users. In Spain, the non-governmental organisation Energy Control has been offering its drug-checking service since 1999 as part of an integrated harm reduction service for recreational drug users. Recreational users, who do not usually seek help or advice from substance abuse organisations, can test their drugs at checking points (in clubs, raves, etc.) or in Energy Control's offices in Spain. This service is supported and financed by the Spanish Government Delegation to the National Plan on Drugs and the regional authorities. It is part of the EU Early Warning System operated by the EMCDDA and Europol. Between 2010 and 2013, a total of 8 348 samples were analysed.

Some sample questions from an online health service for deep web drug users

CASE 1: Silk Road original forum, private message, 15 September 2013

After several years of using injected and smoked daily heroin I decided to quit this spring. I live in an Eastern Europe country where detoxification programs are unavailable. Doctors do not pay attention to heroin users and see them as scum, vicious people and not as ill persons. So I bought some methadone on Silk Road and read in some online books how to do this.

After several weeks I managed to detox completely methadone. I had read that it is normal to have abstinence symptoms during weeks, but it is two months since I finished and I have pain in all my body, changes of mood, sometimes diarrhea. This has not been improving and it is getting worse. In the last two weeks pain is extreme in the night and fever and sweating are extreme. Even I have some swollen nodes down my armpits and neck.

I have gone to the hospital but they discharged me even without doing tests and saying that this was abstinence from heroin (they didn't know that I had used methadone and I didn't say, but in fact I did not have the time to explain ...). I don't like to take more opiates but I can't continue with this pain. I am thinking about taking methadone again, maybe 5–10 mg/daily. Will this be enough to quit these symptoms? Maybe oxycodone or codeine are better options? Thank you in advance.

CASE 2: Silk Road original forum, 14 April 2013

Hey doctor thanks so much for offering your advice! I have type 1 diabetes and I am wondering if there is any information connected to MDMA and its effect on blood sugar? I have never done MDMA but am interested in exploring it. Would I have enough control over myself to realize 'I need to test' or should a trip

sitter be there to remind me? Secondly, I have tripped in the past on LSD and mushrooms but that was before my diagnosis ... now that I know I have to monitor my sugar levels to avoid issues I'm afraid I might become afraid or paranoid of my glucometer or my insulin injections under the influence ... any recommendations on how to deal with this?

CASE 3: Silk Road 2.0 forum, 3 January 2014

I have a question about amphetamine usage. I am in the age bracket of 20–40 and in good health. I use pure amphetamine between 15–70mg, depending on what I am using it for. Is 70mg of pure amphetamine safe to use in one go? I have low tolerance and I do not go on 'binges.' Sometimes I may have a small top up, but I never go for more than 12–16 hours at a time. Also, how frequently can I use it without causing harm to myself? I don't normally use it more than once a fortnight, but sometimes I do and I was wondering if it is damaging to use it weekly, or even more than that? Thanks for your time and effort.

CASE 4: Evolution forum, 12 December 2014

When taking NBomes my girlfriend gets red splotches on her face, legs, neck, back, an stomach (vasoconstriction.) It usually happens toward the end of the trip and gets worse when we stay up and trip all night. Usually redosing once. The tabs are no more than 1200ug each. Is there a reason this happens to her and not me? Is there any way to help with this? I know it is not life threatening unless it gets really bad and she gets stuck in her pants or something. (...) But for real. She is also anemic, does this have anything to do with it? Now that I think about it, it has happened with MDMA, and it happened on M1 as well I think (which was sent to me as MDMA.)

At the end of 2012 and during 2013, the Energy Control team was aware of the growing popularity of DWMs through information provided by recreational drug users. An exploratory search of the available markets at that time (Silk Road, Black Market Reloaded and Sheep) prompted the development of the IDTS provided by Energy Control and focusing on DWMs.

During the first quarter of 2014, a specific protocol with objectives, procedures, methods and techniques was

elaborated using TEDI (Transnational European Drug Information: TEDI, 2014) guidelines as a reference. All samples were analysed by gas chromatography–mass spectrometry. The fee for a simple analysis was EUR 50 (to be paid in bitcoins). All funds raised were put back into running the project.

A one-year pilot project started in April 2014; drug users who purchase drugs in DWMs were the target population. Several threads in the main DWM forums

were opened offering general information about the IDTS with links to a specific IDTS page on Energy Control's website⁽¹²⁾. An email address for users to contact the service for detailed information about the process was made available. After submitting samples for analysis, users receive a detailed report with drug test results and specific and individualised harm reduction information. Users were encouraged to engage with Energy Control experts by emails or in DWM forums in order to resolve their questions.

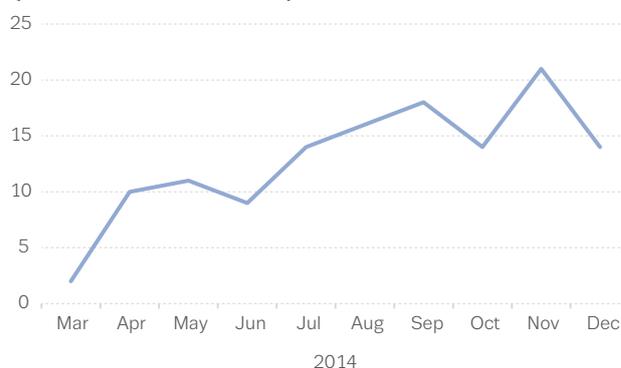
It is worth mentioning that this service is aimed at end-users and that IDTS does not accept samples from vendors. During the whole process, the service emphasises that a test result is representative of the analysed sample only and cannot be considered a quality control for any product or vendor. The use of the test results in DWMs as a 'guarantee of quality' for products or vendors is forbidden. Both DWMs and DWM forums are periodically monitored to check that test results have not been used in this way, but so far no instances of this have been found.

Between April and December 2014, a total of 342 users contacted IDTS asking for information about submitting samples for analysis. A total of 129 samples were analysed over this period, as shown in Figure 7.2.

Users are asked about the type of substance they believe they have purchased. In 120 of 129 samples (93%), the main result of the analysis was consistent with the information provided by the user. In the remaining 9, the sample contained another drug, a mixture of substances was detected or it was not possible to determine the composition of the sample with the analytical techniques employed. The main results of the drug testing are shown in Table 7.2.

Cocaine was the substance most frequently submitted for analysis. Purity levels were high, although more than

FIGURE 7.2
Samples submitted for analysis by the Energy Control International Drug Testing Service (March–December 2014)



50% of samples were adulterated. Levamisole was the adulterant most frequently detected, in 43% (23 out of 54) of samples. Other adulterants detected in cocaine samples were phenacetin in 9% (5 out of 54), caffeine (1 sample) and lidocaine (1 sample). MDMA samples (in both pill and crystallised forms) showed high levels of purity, and no adulterants or other active ingredients were detected.

Other samples analysed were MDA and methamphetamine ($n = 3$), 2C-E, alprazolam, mephedrone, 2C-B, butyrfentanyl, synthetic cannabinoids ($n = 2$), clonazepam, DOB, DOET, DOM, DON, DXM, kratom, mescaline, methylone, midazolam, modafinil and pentobarbital ($n = 1$).

Results for MDMA pills, showing very high dosages of MDMA that can lead to significant adverse or toxic effects, are similar to those reported by other harm reduction groups offering drug testing programmes (TEDI, 2014). The high frequency of non-adulterated cocaine samples is also notable, although levamisole contamination seems to be a widespread problem, as reported in the rest of the global drug market.

TABLE 7.2

Test results for samples analysed by the Energy Control International Drug Testing Service⁽¹⁾

Sample	<i>n</i>	Only main compound detected	Purity ($m \pm SD$)	Range
Cocaine	54	48.1% (26/54)	$70.3 \pm 19.9\%$	5–99%
MDMA (crystal)	9	100% (9/9)	$91.1 \pm 8.0\%$	78–99%
MDMA (pills)	8	100% (8/8)	142.1 ± 40.2 mg	94–188 mg
Amphetamine (speed)	8	37.5% (3/8)	$51.6 \pm 34.6\%$	10–98%
LSD	8	100% (8/8)	129.7 ± 12.1 μ g	107–140 μ g
Cannabis resin	5	100% (5/5)	THC: $16.5 \pm 7.5\%$ CBD: $3.4 \pm 1.5\%$	THC: 9.1–16.4% CBD: 1.6–5.3%
Ketamine	5	40% (2/5)	$71.3 \pm 38.4\%$	27–95%

(1) Samples analysed between April and December 2014. Categories with $n < 5$ samples not included.

(12) <http://energycontrol.org/noticias/528-international.html>

Another interesting aspect is the low frequency of ‘legal highs’ in samples submitted for analysis. Although these substances are widely offered in DWMs, demand for and sales of these drugs are limited (Caudevilla, 2014). It is possible that users of ‘legal highs’ choose to buy them outside DWMs, owing to their easy availability via the surface web. An alternative explanation is that, in the free-market conditions provided by DWMs, users prefer ‘established’ drugs to substitutes.

The data from IDTS support the hypothesis that substance purity is much higher in DWMs than in the global illicit drug markets. However, results from IDTS are not necessarily representative of the market as a whole and there are methodological biases derived from sample selection.

Conclusion

It seems likely that DWMs will continue to exist in the future and that their importance will probably increase. At the time of writing, there are at least 10 fully operative active markets with similar characteristics to Silk Road. DWMs are developing, and are now available using software other than Tor, such as I2P, or as open decentralised markets, such as OpenBazaar. DWMs seem to be a rapidly evolving, complex phenomenon with the potential to bring about major changes in drug markets. This new reality requires harm reduction strategies to be adapted if they are to successfully meet their objectives.

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