

## Profiling online recreational/prescription drugs' customers and overview of drug vending virtual marketplaces

Laura Orsolini<sup>1,2\*</sup>, Giulia Francesconi<sup>1</sup>, Duccio Papanti<sup>1,3</sup>, Arianna Giorgetti<sup>4</sup> and Fabrizio Schifano<sup>5</sup>

<sup>1</sup>United Hospitals, Academic Department of Experimental and Clinical Medicine, Polytechnic University of Marche, Ancona, Italy

<sup>2</sup>School of Life and Medical Sciences, University of Hertfordshire, Hatfield, Herts, England

<sup>3</sup>Medical School of Trieste, Italy

<sup>4</sup>School of Medicine and Surgery, Polytechnic University of Marche, Ancona, Italy

<sup>5</sup>FRCPsych, Chair in Clinical Pharmacology and Therapeutics, School of Life and Medical Sciences, University of Hertfordshire, Hatfield, Herts, England

**Objectives** Internet and social networking sites play a significant role in the marketing and distribution of recreational/prescription drugs without restrictions. We aimed here at reviewing data relating to the profile of the online drug customer and at describing drug vending websites.

**Methods** The PubMed, Google Scholar, and Scopus databases were searched here in order to elicit data on the socio-demographic characteristics of the recreational marketplaces/online pharmacies' customers and the determinants relating to online drug purchasing activities.

**Results** Typical online recreational drugs' customers seem to be Caucasian, men, in their 20s, highly educated, and using the web to impact as minimally as possible on their existing work/professional status. Conversely, people without any health insurance seemed to look at the web as a source of more affordable prescription medicines. Drug vending websites are typically presented here with a "no prescription required" approach, together with aggressive marketing strategies.

**Conclusions** The online availability of recreational/prescriptions drugs remains a public health concern. A more precise understanding of online vending sites' customers may well facilitate the drafting and implementation of proper prevention campaigns aimed at counteracting the increasing levels of online drug acquisition and hence intake activities. Copyright © 2015 John Wiley & Sons, Ltd.

KEY WORDS—drug misuse; prescription drugs; Psychonauts; Internet; online drugs; novel psychoactive substances

### INTRODUCTION

Overall, Internet usage has rapidly increased over the last few years, specifically among youngsters (Rideout, 2001; Gray *et al.*, 2005). According to a recent Eurostat survey (Seybert and Reinecke, 2013), 72% of interviewees and 94% of those aged 16–24 accessed the web regularly on average at least once a week. Most subjects, of any age groups, may use the web as a source of information and knowledge, in particular, regarding health-related issues (CASA (The National Center on Addiction and Substance Abuse at Columbia University), 2006; Dumitru *et al.*, 2007; Seybert and Reinecke, 2013; EMCDDA (European Monitoring

Centre for Drugs and Drug Addiction), 2014). However, Internet and social networking sites play a significant role in drug marketing, sale, and distribution (Advisory Council on the Misuse of Drugs (ACMD), 2010; EMCDDA, 2014), with customers being able to shop with relative anonymity in a 24-h marketplace (Forman *et al.*, 2006). Several studies have demonstrated a positive association between levels of online information seeking activities and online purchasing of drugs (Shim *et al.*, 2001; Kim and Lee, 2008; The Gallup Organization, 2011), with this issue being of particular concern for vulnerable individuals, including children and adolescents (Gerstein and Green, 1993; Volkow, 2011; Office of National Drug Control Policy, 2004; Lenhart *et al.*, 2005). Indeed, the web may contribute to shape a range of changes in drug scenarios (EMCDDA, 2014).

The number of online pharmacies, including those not requiring any prescriptions, has increased

\*Correspondence to: L. Orsolini, Psychiatric Unit and DEGRA Center, United Hospital, Academic Department of Experimental and Clinical Medicine, Polytechnic University of Marche, Ancona, Italy and School of Life and Medical Sciences, University of Hertfordshire, Hatfield, Herts, UK. Via Conca, 71, 60020, Ancona, Italy. Tel: +39 071 5963308/3313; Fax: +39 071 5963313 E-mail: laura.orsolini01@gmail.com

substantially over the past decade (Gallagher and Collaizi, 2000; Forman, 2006; Weiss, 2006; Orizio *et al.*, 2009b; Orizio *et al.*, 2010). Typically, rogue online pharmacies are computerized systems designed to handle business transactions remotely (Gondim and Falcao, 2007). Most online pharmacies provide a "prescription service", but often this does not take into account the possible presence of warnings/contraindications (Weiss, 2006). Typically, interested customers are required to fill in an online medical questionnaire, which is then allegedly assessed by a "cyber-doctor", often a computer program designed to guide patients toward those responses, which are needed to justify a prescription (Orizio *et al.*, 2010). This medication-related rogue business is currently on the rise, and this may be the arguable increase levels of prescription drugs' misuse (Hubbard, 2001; Lineberry and Bostwick, 2004; Bostwick and Lineberry, 2007; CASA, 2009; Levaggi *et al.*, 2009).

Conversely, the availability of recreational/illicit psychoactives has been somehow facilitated by the development of electronic currencies and anonymous transaction infrastructures (Davies *et al.*, 2010; Corazza *et al.*, 2011; Corazza *et al.*, 2012; Forsyth, 2012; Solberg, 2012). To this respect, SilkRoad was the most popular online trading site. Activated in February 2011, it was shut down by the US Federal Bureau of Investigation (Christin, 2012) in October 2013 but soon replaced first by SilkRoad2 (shut down in November 2014) and then by SilkRoad3. Located on the "deep web/dark net", it may therefore be accessible only via a secure and confidential net by encryption of computer Internet protocol (IP) addresses, something which occurs either through the help of a Tor anonymising software or through a Tor-network web proxy (<http://www.tor2web.org>). Concealed purchasing activities have been recently made arguably easier through the recent launch of the beta version of the Grams Darknet Market search engine (<http://grams7enufi7jmdl.onion>). This is a search system similar to Google AdWords®, in which vendors can buy a set of keywords that allow their listings to go on the top of the search results, hence increasing the spread of novel drugs' marketplaces (Reddit.com, 2014).

In recent years, a dramatic increase in online availability of the so-called "legal highs"/novel psychoactive substances (NPS) (Dick and Torrance, 2010; Schmidt *et al.*, 2011; EMCDDA, 2014) has been observed as well. NPS are designed to mimic the effects of class A drugs and, although this is not always the case (Schifano *et al.*, 2015), they are offered as "legal alternatives" to scheduled drugs.

Typically, they are labeled as being "not for human consumption", are cheaper than illegal drugs, and are not identified with the standard methods of analysis.

A large range of social networks (i.e. Facebook, Twitter, and so on), together with blogs and fora such as: Erowid (<http://www.erowid.org>), Bluelight (<http://www.bluelight.nu>), and Tripzine (<http://www.tripzine.com>), are being used to share NPS-related opinions, information, links, and experiences (Gordon *et al.*, 2006; Boyer and Wines, 2008; Barratt, 2012; Thackeray *et al.*, 2013). Contributions to these networks are made by a number of online drug enthusiasts, for example, the "e-Psychonauts" (Schifano *et al.*, 2006; Davey *et al.*, 2012). They are mostly well-educated drug users possessing high levels of pharmaceutical/chemical/psychopharmacological knowledge relating to most recent NPS and keen to experiment with unknown compounds/combinations (Schifano *et al.*, 2006; Davey *et al.*, 2012).

Due to its potential, the web could however represent as well a reliable prevention tool, able to attract the attention of otherwise hard-to-reach NPS/drug misusers (Schifano *et al.*, 2006). Hence, there is the need to better understand both the online drug consumer/customer profile and the online drug markets' characteristics.

The present review aims at (i) profiling the online recreational/prescription drugs' customers; (ii) better understanding the critical determinants behind the decision of going online for drug-related purchase activities; and (iii) providing an overview of both online pharmacies' and recreational drugs' vending sites.

## METHODOLOGY

Both PubMed and Scopus databases were searched by using the following sets of keywords: (online or internet or website or market or source or SilkRoad) and (drug or drugs or pharmaceuticals or medicines or medication or psychoactive substance or illicit drugs or legal high or prescription drugs or non-prescription drug or enhancing drugs or steroids or smart drugs or pharmacies or forum) and (shopping or consumer or buyer or user or availability or intention or purchase or buy or sales or selling or patients) and (characteristics or profile or socio demographic or income or anonymous or youth). Google Scholar was used as well in the attempt to identify further data/studies not covered by PubMed and Scopus.

A range of sources for information were considered, including relevant peer-reviewed papers, official reports, and data from drug vending websites. Selected websites were those providing at least partial data relating to their customers' socio-demographic characteristics (e.g. age, gender, marital status, ethnic group, employment status, health care coverage, level of education, and income) and reasons for purchasing drugs online. Data relating to online customers' features taken from social networking sites/drug online fora or blogs' surveys were included as well. Conversely, both preclinical/animal studies and those without a specific reference to recreational/prescription drugs' online markets were excluded. No language or time restrictions were placed on the electronic search, covering the period up to March 2014; secondary searches were performed using the reference list of identified papers/documents. The search was performed independently by Laura Orsolini (LO) and Arianna Giorgetti (AG), with kappa levels of agreement being 0.8; data were compared and discrepancies were settled, if needed, with the supervision of Fabrizio Schifano (FS). Finally, data were ranked in two macro-categories, for example, those pertaining to customers of the illegal/legal recreational drug markets and those referring to online prescription drugs' customers. For each category, the marketing/advertisement strategies implemented by the vending websites were examined. Data were stratified as well according to the sites' alleged geographical provenance.

With the initial set of keywords, some 5463 studies were identified. Of these, 551 were excluded because of focusing on preclinical/animal research while 3778 did not meet the inclusion criteria. Out of the remaining 1134 studies, 1063 were excluded because they were not consistent with the aims of this review, leaving a total of 71 documents to be considered for inclusion in this review.

## RESULTS

Out of the 71 papers included and reviewed here, 22 were surveys, 5 official reports, 2 case reports, and 11 reviews, while 31 studies were based on a systematic observation of the drug vending sites. Twenty studies were deemed of interest for profiling the recreational drug markets' customers (Table 1), and 51 studies referred to the online pharmacies' customers (Table 2).

### *Socio-demographic characteristics*

*The recreational cyber markets' customers.* Most of these subjects were reported to be adolescent/young adults (Halpern and Pope, 2001; National Drug Intelligence

Centre, 2002; Boyer *et al.*, 2005; Forman, 2006; Multschler *et al.*, 2007; Schepis *et al.*, 2008; Ivanitskaya *et al.*, 2010; Vardakou *et al.*, 2011; Walsh, 2011; Barratt, 2012; Chiauzzi *et al.*, 2013; Van Hout and Bingham, 2013b; Van Hout and Bingham, 2013a), with some mephedrone users having been suggested to be as young as 12–14 years old (Vardakou *et al.*, 2011).

Typical online drug fora surveys' respondents were reported to be men (Boyer *et al.*, 2005; Gordon *et al.*, 2006; Barratt, 2012; Chiauzzi *et al.*, 2013; Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b), Caucasian, and from a range of countries such as: USA, New Zealand, Australia, and UK (Halpern and Pope, 2001; Vardakou *et al.*, 2011). Most recreational online markets' (including "SilkRoad") customers seemed to be highly educated (Halpern and Pope, 2001; Gordon *et al.*, 2006; Van Hout and Bingham, 2013a; Chiauzzi *et al.*, 2013; Van Hout and Bingham, 2013b) and in an employment (Gordon *et al.*, 2006; Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b). Allegedly, the decision to use online sources to acquire recreational drugs was made to impact as minimally as possible on the existing work/professional status (Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b). Not surprisingly, these subjects seemed to be avid users of the web (Halpern and Pope, 2001; Van Hout and Bingham, 2013b), presenting with a clear sense of "community and sharing" (National Drug Intelligence Centre, 2002; Gordon *et al.*, 2006; Multschler *et al.*, 2007; Walsh, 2011; Davey *et al.*, 2012; Chiauzzi *et al.*, 2013).

*The online pharmacies' customers.* A range of determinants/variables may be taken into account in profiling the "generic online drug consumer" (Atkinson *et al.*, 2009). Gurau (Gurau, 2005) ranked these customers into four categories: consumer A (young, with low revenues, less interested in online service quality, and less sensitive to online risks but concerned about price and online payment security); consumer B (middle-aged, with good purchasing power, and requires privacy and discreetness of delivery); consumer C (middle-aged, high-revenue customer who requires a high service quality, anonymity, extensive levels of online information, and choice); and customer D (old-aged, with low or medium purchasing power, and is attracted by the convenience of online shopping and home delivery but highly concerned about online transaction risks). A similar report, based on a German survey, ranked customers of online pharmacies into four groups, for example, enthusiastic experts, risk-averse traditionalists,

Table 1. Profiling the recreational drug market places' customers

Author (s)	Type of study (sample number) – geographical location	Type of substances	Availability of data on consumers' features	Analysis of reasons for purchasing abusive substances online	Analysis of risks of drug online shopping	Analysis of characteristics of illicit online drug market
(Halpern and Pope, 2001)	Search and analysis of drug selling websites (N.A.) – N.A.	Hallucinogens	<ul style="list-style-type: none"> <li>USA.</li> <li>Well-educated adults and teenagers</li> <li>Avid users of Internet</li> </ul>	<ul style="list-style-type: none"> <li>Novel substances hardly known elsewhere</li> <li>Customers' feedbacks with findings from personal experiences</li> <li>Arranged sales</li> <li>Instructions on how to use it in safer mode</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>Detailed information on dosage, best ways of experimenting and possible side effects, how to grow plants, extract substances, and so on</li> <li>Use of drug terminology, slang</li> <li>Controlled substances openly advertised</li> <li>Sales also via bulletin board discussions</li> </ul>
(National Drug Intelligence Centre, 2002)	Information bulletin (N.A.) – N.A.	Illicit drugs	<ul style="list-style-type: none"> <li>Adolescent and young adults</li> <li>Drug patterns of use</li> </ul>	<ul style="list-style-type: none"> <li>Misinformation on health effects</li> </ul>		<ul style="list-style-type: none"> <li>Advertising on "risk reduction", "safe and responsible" drug use</li> <li>Detailed information on newer drugs</li> <li>Detailed information on dosage, best ways of experimenting and possible side effects, how to grow plants, extract substances, and so on</li> </ul>
(Wax, 2002)	Case report and literature review (2) – USA	Illegal drugs	<ul style="list-style-type: none"> <li>Adolescents: 14-year old oman and 18-years-old man</li> <li>Students</li> </ul>	<ul style="list-style-type: none"> <li>Easily accessible</li> <li>Customers' feedbacks with findings from personal experiences</li> </ul>	<ul style="list-style-type: none"> <li>Marketing strategies to deceive native consumers</li> </ul>	
(Boyer <i>et al.</i> , 2005)	Cross-sectional survey (12) – USA.	Illegal drugs	<ul style="list-style-type: none"> <li>Youth (average age: 17.6)</li> <li>Nine men; three women</li> </ul>	<ul style="list-style-type: none"> <li>Detailed information on dosage, best ways of experimenting and possible side effects</li> <li>Customers' feedbacks with findings from personal experiences</li> <li>Easily accessible</li> <li>Online availability</li> </ul>	N.A.	
(Forman, 2006)	Analysis of websites selling controlled substances (N.A.) – N.A.	Controlled substances	<ul style="list-style-type: none"> <li>Adolescent and young adults</li> </ul>	<ul style="list-style-type: none"> <li>No need of prescription</li> <li>Advertising</li> </ul>	<ul style="list-style-type: none"> <li>Marketing strategies to deceive native consumers</li> </ul>	N.A.
(Gordon <i>et al.</i> , 2006)	Offline community survey (100) – USA	Controlled substances	<ul style="list-style-type: none"> <li>Addictive individuals</li> <li>75 men; 25 women</li> <li>Race: 89 Whites</li> <li>Average age: 31.99</li> <li>48 full-time employed; 30 unemployed</li> <li>Post-high school education (55%)</li> </ul>	<ul style="list-style-type: none"> <li>Use of Internet to either buy drugs or locate a drug dealer</li> <li>Economic reasons (52%)</li> <li>Personal safety and anonymity (44%)</li> </ul>	<ul style="list-style-type: none"> <li>Not necessarily cheaper</li> <li>No availability of the desired drug</li> <li>Legal consequences</li> </ul>	N.A.
(Schifano <i>et al.</i> , 2006)	Search and analysis of drug selling websites (N.A.) – N.A.	Prescription drugs, legal highs and illegal drugs	<ul style="list-style-type: none"> <li>Post-high school education (55%)</li> </ul>	<ul style="list-style-type: none"> <li>Detailed information on dosage, best ways of experimenting and possible side effects</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>10.1% of websites: offer possibility to purchase drug-related items</li> <li>9.1% of websites: detailed information on how to use it, how to synthesize/extract, and so on</li> <li>53.6% of websites: English-speaking countries (40.4% USA)</li> </ul>

(Mutschler <i>et al.</i> , 2007) (Hoover <i>et al.</i> , 2008)	Case report (1) – Germany Search and analysis of drug selling website (N.A.) – N.A.	Psychoactive drugs Salvia divinorum	36 year old N.A.	<ul style="list-style-type: none"> <li>▪ No need of prescription</li> <li>▪ Online availability</li> <li>▪ Economic purpose</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ 58% of websites: offer it</li> <li>▪ 78% of websites: suggests its use</li> <li>▪ Use of medically oriented images</li> <li>▪ Written claims of legality</li> <li>▪ 54% of websites: hosted in USA</li> <li>▪ 47% of websites: purchase of illicit drugs</li> <li>▪ General features</li> </ul>
(Schepis <i>et al.</i> , 2008) (Jones, 2010)	Search and analysis of drug selling website (N.A.) – N.A. Review (N.A.) – N.A.	Controlled stimulants Legal highs	<ul style="list-style-type: none"> <li>▪ Adolescents and young adults</li> </ul> N.A.	<ul style="list-style-type: none"> <li>▪ Ease of access and anonymity</li> <li>▪ Ease of access and anonymity</li> <li>▪ Online availability</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Marketing strategies to deceive naïve consumers</li> <li>▪ Misinformation on health effects</li> </ul>
(Klein <i>et al.</i> , 2010)	Online survey (1214) -	Alcohol and other drugs	<ul style="list-style-type: none"> <li>▪ Average age: 26.2</li> <li>▪ 766 drug users;</li> <li>▪ 448 alcohol users</li> </ul> N.A.	N.A.	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Lack of listed/implicit effects</li> </ul>
(Schmidt <i>et al.</i> , 2011)	Search and analysis of drug selling website (N.A.) – N.A.	Legal highs	N.A.	<ul style="list-style-type: none"> <li>▪ Economic purpose</li> <li>▪ Wide variety of substances</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of safety information</li> <li>▪ Unknown hazardous side-effects</li> </ul>	<ul style="list-style-type: none"> <li>▪ Easy availability</li> </ul>	<ul style="list-style-type: none"> <li>▪ Easy availability</li> </ul>
(Vardakou <i>et al.</i> , 2011)	Review (N.A.) – N.A.	Mephedrone	<ul style="list-style-type: none"> <li>▪ Youth</li> <li>▪ China and UK users</li> <li>▪ Sense of “community” and sharing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Online availability</li> <li>▪ Economic purpose</li> <li>▪ “Legality” limitations</li> <li>▪ No need of prescription</li> <li>▪ Customers’ feedbacks available</li> <li>▪ Sellers’ rating on delivery, quality product, and so on</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Marketing strategy (i.e. “buy 1, get 1 free”)</li> <li>▪ Appearance and features of Silk-Road market</li> <li>▪ Anonymous currency</li> <li>▪ Bitcoins</li> </ul>
(Walsh, 2011)	Review (N.A.) – N.A.	Psychedelic drugs	N.A.	<ul style="list-style-type: none"> <li>▪ Reduced consumer’s perceived risks</li> <li>▪ Anonymity</li> <li>▪ Customers’ feedbacks with findings from personal experiences</li> <li>▪ Detailed information on dosage, best ways of experimenting, and possible side effects</li> <li>▪ Possibility to conduct academic research with illegal drugs</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Open/closed forums</li> <li>▪ Availability of chat, private messages, Internet relay chat, and blog</li> <li>▪ No guaranteed stability of website</li> </ul>
(Barratt, 2012)	Review on Silk-Road (N.A.) – N.A.	Illegal drugs	N.A.	<ul style="list-style-type: none"> <li>▪ Strong identity and group cohesion</li> <li>▪ Strong sense of shared experience</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Appearance and features of Silk-Road market</li> <li>▪ Anonymous currency</li> <li>▪ Bitcoins</li> </ul>
(Davey <i>et al.</i> , 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Illegal drugs	<ul style="list-style-type: none"> <li>▪ Strong identity and group cohesion</li> <li>▪ Strong sense of shared experience</li> </ul>	<ul style="list-style-type: none"> <li>▪ Anonymity</li> <li>▪ Reduced consumer’s perceived risks</li> <li>▪ Anonymity</li> <li>▪ Customers’ feedbacks with findings from personal experiences</li> <li>▪ Detailed information on dosage, best ways of experimenting, and possible side effects</li> <li>▪ Possibility to conduct academic research with illegal drugs</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Open/closed forums</li> <li>▪ Availability of chat, private messages, Internet relay chat, and blog</li> <li>▪ No guaranteed stability of website</li> </ul>
(Chiauzzi <i>et al.</i> , 2013)	Web-based survey (897) – UK, USA, Australia, and Canada	Prescription drugs and illegal drugs	<ul style="list-style-type: none"> <li>▪ Mainly Caucasians, men in their 20s</li> <li>▪ Generally not employed and at least college education</li> <li>▪ Mainly cocaine, heroin, and marijuana/hashish</li> <li>▪ In the 75%: use of prescription drugs (opioids) for not medical use</li> </ul>	<ul style="list-style-type: none"> <li>▪ Detailed information on dosage, best ways of experimenting, and possible side effects</li> <li>▪ Possibility to conduct academic research with illegal drugs</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>▪ Open/closed forums</li> <li>▪ Availability of chat, private messages, Internet relay chat, and blog</li> <li>▪ No guaranteed stability of website</li> </ul>

(Continues)

Table 1. (Continued)

Author (s)	Type of study (sample number) – geographical location	Type of substances	Availability of data on consumers' features	Analysis of reasons for purchasing abusive substances online	Analysis of risks of drug online shopping	Analysis of characteristics of illicit online drug market
(Van Hout and Bingham, 2013a)	Online interview study on SilkRoad (20) – N.A.	Illegal drugs	<ul style="list-style-type: none"> <li>▪ 17 men and 3 women</li> <li>▪ Average age: 25 years</li> <li>▪ Mainly in professional employment or tertiary education</li> <li>▪ Mainly computer users</li> </ul>	<ul style="list-style-type: none"> <li>▪ Ease of access once navigating the Tor browser</li> <li>▪ Personal safety and anonymity</li> <li>▪ Reduced consumer's perceived risks</li> <li>▪ Wide selection of substances</li> <li>▪ Good quality of drugs</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>▪ Tor browser</li> <li>▪ Bitcoins for transactions</li> <li>▪ Tester pack of drugs purchased</li> <li>▪ Favorable experiences reported</li> <li>▪ Cyber levels of trust and professionalism between vendors/consumers</li> <li>▪ Consumers' feedback</li> <li>▪ Trip reports, product, and transaction reviews</li> </ul>
(Van Hout and Bingham, 2013b)	A single case study (1) – N.A.	Illegal drugs	<ul style="list-style-type: none"> <li>▪ Men</li> <li>▪ 25 years old</li> <li>▪ Professional employment or tertiary education</li> <li>▪ Preferred drugs: MDMA, 2C-B, mephedrone, and so on</li> </ul>	<ul style="list-style-type: none"> <li>▪ Curiosity</li> <li>▪ Personal safety</li> <li>▪ Drug quality</li> <li>▪ Variety of products</li> <li>▪ Anonymous transactions</li> <li>▪ Ease of product delivery</li> </ul>	N.A.	

N.A., not available; MDMA, N-methyl-D-aspartate; 2C-B, 2,5-dimethoxy-4-bromophenethylamine.

convenience-oriented rationalists, and inexperienced opponents (Wiedmann *et al.*, 2010).

Overall, however, most online pharmacies' customers were here reported to be young, Caucasian (Menon *et al.*, 2002; Pew/Internet, 2005; Pew/Internet, 2009; Inciardi *et al.*, 2010; Cicero and Ellis, 2012; Chiauzzi *et al.*, 2013), and men (Gurau, 2005; Rajamma and Pelton, 2009; Inciardi *et al.*, 2010; Chiauzzi *et al.*, 2013). Conversely, women seemed to be more likely to search the web for health-related information (Kaskowitz *et al.*, 2007; Atkinson *et al.*, 2009; Fittler *et al.*, 2010; Wiedmann *et al.*, 2010; Svorc, 2012; Thackeray *et al.*, 2013). There are variations in gender/age according to the type of drug purchased ((Kaskowitz *et al.*, 2007; Pew/Internet, 2009; Atkinson *et al.*, 2009; Fittler *et al.*, 2010; Fittler *et al.*, 2010; Inciardi *et al.*, 2010; Schnetzler *et al.*, 2010; Wiedmann *et al.*, 2010; Mazer *et al.*, 2012; Thackeray *et al.*, 2013)), with men most typically interested in purchasing sexual performance-enhancing drugs (Trissler, 2000; Jones, 2010; Orizio *et al.*, 2010). Overall, apart from purchasing medicines, subjects may regularly use the web for both social/working purposes and to acquire a range of not health-related items as well (Lenhart *et al.*, 2005; CASA, 2006; Drug Strategy, 2007; Cicero *et al.*, 2008; Ivanitskaya *et al.*, 2010; Cicero *et al.*, 2011; Cicero and Ellis, 2012; McDonald *et al.*, 2012). People without any health insurance seemed to look at the web as a source of more affordable prescription drugs (Fung *et al.*, 2004; Pew/Internet, 2005; Pew/Internet, 2009), including tramadol (Cicero and Ellis, 2012). Conversely, online acquisition of contraceptives was made by female subjects properly covered by health insurance schemes (Kaskowitz *et al.*, 2007). Overall, higher levels of education (Chiauzzi *et al.*, 2013) were here associated with online search of health-related information (Menon *et al.*, 2002; Pew/Internet, 2005; CASA, 2006; Gordon *et al.*, 2006; Kaskowitz *et al.*, 2007; Atkinson *et al.*, 2009; Pew/Internet, 2009; Kishimoto *et al.*, 2009; Rajamma and Pelton, 2009; Wiedmann *et al.*, 2010; Holtgräfe and Zentes, 2012; Mazer *et al.*, 2012; Svorc, 2012; Fittler *et al.*, 2013). Conversely, low literacy levels' subjects were more prone to make a purchase from "rogue Internet pharmacies" (Ivanitskaya *et al.*, 2010).

Several issues were reported to be associated with the choice of the web as a source of medicines' acquisition, including the following (Tables 1–2):

- Lack of trust in health professionals
- Lack of immediate accessibility to both health-related information and prescriptions through the traditional pathway

Table 2. Profiling the online pharmacies' customers

Author (s)	Type of study (sample number) – geographical location	Type of products	Availability of data on online consumers' features	Analysis of reasons for purchasing drug online	Analysis of risks of drug online shopping	Analysis of characteristics of OPs
(Eysenbach, 1999)	Search and analysis of online pharmacies (N.A.) – N.A.	Sildenafil	N.A.	<ul style="list-style-type: none"> <li>Easy to buy despite contraindications</li> </ul>	<ul style="list-style-type: none"> <li>Patient health risks provided by “cyber-doctors” is questionable</li> <li>No list of hazardous side effects</li> </ul>	<ul style="list-style-type: none"> <li>No prescription service</li> </ul>
(Trissler, 2000)	Review (N.A.) – N.A.	Prescription drugs and supplement	N.A.	<ul style="list-style-type: none"> <li>Economic reasons</li> <li>anonymity (especially for sexual-dysfunction products)</li> <li>Trust in health professionals' opinion</li> <li>Benefits of online drug sales</li> </ul>	<ul style="list-style-type: none"> <li>Not necessarily FDA approved</li> <li>Regulatory issues</li> <li>Not an FDA approved ever</li> </ul>	N.A.
(Henney, 2001)	Review (N.A.) – N.A.	Prescription drugs and OTC	N.A.	<ul style="list-style-type: none"> <li>No need of prescription</li> <li>Economic reasons</li> <li>Easily accessible</li> <li>Availability also without a prescription</li> <li>Discounts and promotions</li> </ul>	<ul style="list-style-type: none"> <li>Inappropriate promotion advertisements</li> </ul>	N.A.
(Miller and Nielsen, 2001)	Search and analysis of drug selling websites (N.A.) – N.A.	Hormonal contraceptives	N.A.	<ul style="list-style-type: none"> <li>No need of prescription</li> <li>Economic reasons</li> <li>Easily accessible</li> </ul>	<ul style="list-style-type: none"> <li>Only vague geographical localization issues provided</li> <li>Free samples</li> </ul>	<ul style="list-style-type: none"> <li>Only 35% of OPs: legitimate retailers</li> </ul>
(Bessell <i>et al.</i> , 2002)	Web-based survey (N.A.) – N.A.	Prescription drugs and OTC	N.A.	<ul style="list-style-type: none"> <li>Availability also without a prescription</li> <li>Discounts and promotions</li> </ul>	<ul style="list-style-type: none"> <li>Only 12% of OPs: show quality accreditation</li> <li>19% of OPs: no need of prescription</li> </ul>	<ul style="list-style-type: none"> <li>Only 12% of OPs: show quality accreditation</li> <li>19% of OPs: no need of prescription</li> </ul>
(Menon <i>et al.</i> , 2002)	Retrospective national survey (N.A.) – N.A.	Prescription drugs	<ul style="list-style-type: none"> <li>Internet users</li> <li>Caucasians</li> </ul>	N.A.	N.A.	N.A.
(Bessell <i>et al.</i> , 2003)	Search and analysis of drug selling websites (N.A.) – N.A.	Non-prescription and complementary drugs	N.A.	<ul style="list-style-type: none"> <li>Privacy reassurances</li> <li>Confidentiality</li> <li>Possibility to compare products and prices</li> <li>Pharmaceutical sales</li> </ul>	<ul style="list-style-type: none"> <li>Lack of side effects</li> <li>Misinformation</li> <li>Items offered are not necessarily cheap</li> <li>Inappropriate promotion advertisements</li> </ul>	<ul style="list-style-type: none"> <li>56% of OPs: drug information</li> <li>52% of OPs: data on potential side effects</li> <li>Attributes, concerns of Internet pharmaceutical sales, and marketing strategies</li> </ul>
(Bruckel and Capozzoli, 2003)	Review (N.A.) – N.A.	Prescription drugs and OTC	N.A.	<ul style="list-style-type: none"> <li>Easily accessible</li> <li>Lower transaction</li> <li>Economic reasons</li> <li>Anonymity</li> <li>No geographical limitations</li> <li>24/7 availability</li> </ul>	<ul style="list-style-type: none"> <li>Health risks</li> <li>Use of “cyber-doctors”</li> <li>Not controlled use of prescription drugs</li> <li>Use of “cookies” to collect information about visitors</li> </ul>	<ul style="list-style-type: none"> <li>Classification of OPs</li> <li>Appearance and marketing strategies</li> </ul>
(Fung <i>et al.</i> , 2004)	Search and analysis of drug selling websites (N.A.) – N.A.	Prescription drugs and OTC	N.A.	<ul style="list-style-type: none"> <li>Anonymity</li> <li>Possibility to purchase prescription drugs without a prescription</li> <li>Private safety</li> <li>Anonymity</li> </ul>	<ul style="list-style-type: none"> <li>Patient health risks</li> <li>Lack of information on side effects</li> </ul>	<ul style="list-style-type: none"> <li>Credit card</li> <li>No need of prescription</li> </ul>
(Lineberry and Bostwick, 2004)	Case-series (4)	Psychoactive prescription drugs	<ul style="list-style-type: none"> <li>Three men; one woman</li> <li>Average age: 36 years</li> </ul>	<ul style="list-style-type: none"> <li>Higher income</li> <li>Internet users with &gt;6 years of online experience</li> <li>College/university education</li> </ul>	N.A.	N.A.
(Pew/Internet, 2005)	Offline survey (2200) – U.S.A.	Prescription drugs and OTC	<ul style="list-style-type: none"> <li>Higher income</li> <li>Internet users with &gt;6 years of online experience</li> <li>College/university education</li> </ul>	N.A.	N.A.	N.A.

(Continues)

Table 2. (Continued)

Author (s)	Type of study (sample number) – geographical location	Type of products	Availability of data on online consumers' features	Analysis of reasons for purchasing drug online	Analysis of risks of drug online shopping	Analysis of characteristics of OPs
(Gurau, 2005)	Search and analysis of drug selling websites (N.A.) – N.A.	Prescription drugs	<ul style="list-style-type: none"> <li>Mainly weight-loss or sexual performance drugs</li> <li>Classification of online consumers</li> </ul>	N.A.	N.A.	<ul style="list-style-type: none"> <li>Analysis of marketing strategies</li> </ul>
(CASA (The National Center on Addiction and Substance Abuse at Columbia University), 2006) (Forman <i>et al.</i> , 2006)	Report (N.A.) – N.A.	Prescription drugs and OTC	<ul style="list-style-type: none"> <li>Youth</li> <li>College or high school students</li> </ul>	<ul style="list-style-type: none"> <li>No need of prescription</li> </ul>	<ul style="list-style-type: none"> <li>Patient health risks</li> <li>Use of “cyber-doctors”</li> </ul>	<ul style="list-style-type: none"> <li>Extremely high turnover</li> <li>85% of OPs: no need of prescription</li> </ul>
(Weiss, 2006)	Search and analysis of drug selling websites (N.A.) – N.A.	Opioid medications	N.A.	<ul style="list-style-type: none"> <li>Availability of addiction health information</li> </ul>	<ul style="list-style-type: none"> <li>Medication can be counterfeit, contain discontinued or illegal ingredients</li> <li>Health risks</li> <li>Quality of service provided by “cyber-doctors” is questionable</li> <li>Quality and origin of the medications are not controlled</li> <li>Medication can be counterfeit, contain discontinued or illegal ingredients</li> </ul>	<ul style="list-style-type: none"> <li>&gt;50% of OPs: no need of prescription</li> </ul>
(Drug Strategy, 2007)	Review (N.A.) – N.A.	Prescription drugs	N.A.	<ul style="list-style-type: none"> <li>24/7 availability</li> <li>No waste of time</li> <li>Direct mail delivery</li> <li>No geographical limitations</li> <li>Economic purposes</li> </ul>	<ul style="list-style-type: none"> <li>Quality of service provided by “cyber-doctors” is questionable</li> <li>Quality and origin of the medications are not controlled</li> <li>Medication can be counterfeit, contain discontinued or illegal ingredients</li> </ul>	<ul style="list-style-type: none"> <li>Classification of OPs</li> <li>Availability of “cyber-doctors”</li> <li>20% of OPs: no required prescription (mainly in Canada and USA)</li> <li>67% of PS: not approved by FDA</li> <li>28% of PS: contained controlled substances prohibited</li> </ul>
(Kaskowitz <i>et al.</i> , 2007)	Report (N.A.) – N.A.	Prescription drugs	<ul style="list-style-type: none"> <li>Youth</li> <li>Majority of US users prefer their LPs</li> </ul>	<ul style="list-style-type: none"> <li>Availability also without a prescription</li> <li>Safer and easier to obtain than illegal “street drugs”</li> </ul>	<ul style="list-style-type: none"> <li>No interactions with physicians</li> <li>Risks of use of contraindicated drugs</li> </ul>	<ul style="list-style-type: none"> <li>52% of NPWs: delivery with reputable carrier</li> <li>88% of NPWs: credit card payment</li> <li>24% of NPWs: legitimate retailers</li> </ul>
(Cicero <i>et al.</i> , 2008)	Online and offline survey (404) – U.S.A.	Hormonal contraceptives	<ul style="list-style-type: none"> <li>Older, affluent, more educated and, more likely to be insured than other customers</li> <li>Youth</li> <li>Drug abusers</li> </ul>	N.A.	N.A.	N.A.
(Atkinson <i>et al.</i> , 2009)	Search and analysis of drug selling websites (1116) – U.S.A.	Prescription opioids	<ul style="list-style-type: none"> <li>Mainly women (OR = 2.23) with &gt;35 years old</li> <li>College/university education</li> <li>Mainly married (OR = 1.93)</li> </ul>	<ul style="list-style-type: none"> <li>Easily accessible and available</li> <li>No need of prescription</li> </ul>	<ul style="list-style-type: none"> <li>Medication can be counterfeit, contain discontinued or illegal ingredients</li> </ul>	<ul style="list-style-type: none"> <li>Credit card</li> <li>No prescription required</li> </ul>
	National survey (5586) – U.S.A.	Prescription drugs and OTC	N.A.	N.A.	N.A.	N.A.



(Kishimoto <i>et al.</i> , 2009) (Levaggi <i>et al.</i> , 2009)	Web-based survey (40000) - Japan Search and analysis of drug selling websites (N.A.) - N.A.	OTC drugs Amitriptyline Fluoxetine Sildenafil tramadol	N.A. N.A.	<ul style="list-style-type: none"> <li>▪ Economic reasons</li> <li>▪ Waste of time</li> <li>▪ Privacy reassurances</li> <li>▪ Drug quality</li> <li>▪ Price offers</li> <li>▪ No need of prescription</li> <li>▪ Fast delivery</li> <li>▪ Customers' testimonials</li> <li>▪ Lower prices</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>▪ 89% of OPs: declare of drug quality</li> <li>▪ 76% of OPs: traceability of orders</li> <li>▪ 31% of OPs: reassurance that online purchase is legal</li> <li>▪ 40% of OPs: offer free delivery</li> <li>▪ 96.5% of OPs: ask for drug allergies</li> <li>▪ 70.2% of OPs: ask for pregnant or breastfeeding</li> <li>▪ 19.3% of OPs: ask if the drug was based on a medical diagnosis</li> <li>▪ 56.8% of OPs: no geographical location</li> <li>▪ 81.4% of OPs: no required prescription</li> <li>▪ 25% of OPs: no declared side effects</li> </ul>
(Orizio <i>et al.</i> , 2009a)	Cross-sectional study of drug selling websites (N.A.) - N.A.	Prescription drugs	N.A.	<ul style="list-style-type: none"> <li>▪ Availability also without a prescription</li> </ul>	<ul style="list-style-type: none"> <li>▪ Incompleteness of online health questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>▪ 96.5% of OPs: ask for allergies</li> <li>▪ 70.2% of OPs: ask for pregnant or breastfeeding</li> <li>▪ 19.3% of OPs: ask if the drug was based on a medical diagnosis</li> <li>▪ 56.8% of OPs: no geographical location</li> <li>▪ 81.4% of OPs: no required prescription</li> <li>▪ 25% of OPs: no declared side effects</li> </ul>
(Orizio <i>et al.</i> , 2009b)	Search and analysis of drug selling websites (N.A.) - N.A.	Prescription drugs	N.A.	<ul style="list-style-type: none"> <li>▪ Safe use of personal data</li> <li>▪ Short delivery times</li> <li>▪ High drug quality</li> <li>▪ Suggestion "to buy more to pay less"</li> </ul>	<ul style="list-style-type: none"> <li>▪ Patient health risks</li> <li>▪ Not controlled use</li> <li>▪ Not controlled drug quality</li> </ul>	<ul style="list-style-type: none"> <li>▪ 56.8% of OPs: no geographical location</li> <li>▪ 81.4% of OPs: no required prescription</li> <li>▪ 25% of OPs: no declared side effects</li> </ul>
(Pew/ Internet, 2009)	Report (2253) - U.S.A.	Prescription drugs and OTC	<ul style="list-style-type: none"> <li>▪ Mainly Caucasians</li> <li>▪ Women look online for information</li> <li>▪ At least some college education</li> <li>▪ Higher income</li> <li>▪ Higher income and level of education</li> </ul>	<ul style="list-style-type: none"> <li>▪ Private safety</li> <li>▪ Anonymity</li> </ul>	N.A.	N.A.
(Rajamma and Pelton, 2009)	Online survey (700)	Prescription and OTC drugs		<ul style="list-style-type: none"> <li>▪ Consumers' review</li> <li>▪ Medical consultations</li> <li>▪ Economic reasons</li> <li>▪ Alternative delivery choices</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of information on side effects</li> <li>▪ Deceptive advertising</li> </ul>	N.A.
(Raine <i>et al.</i> , 2009)	Search and analysis of drug selling websites (N.A.)	Prescription only analgesics	N.A.	<ul style="list-style-type: none"> <li>▪ 24/7 availability</li> <li>▪ No geographical limitations</li> <li>▪ Anonymity</li> </ul>	<ul style="list-style-type: none"> <li>▪ Health risks</li> <li>▪ Not controlled use</li> </ul>	<ul style="list-style-type: none"> <li>▪ 76% of OPs: no need of prescription</li> <li>▪ 57% of OPs: no geographical location</li> <li>▪ 33% of OPs: no health information/side effects</li> </ul>
(Adams, 2010)	Review (N.A.) - N.A.	Performance enhancing drugs	N.A.	<ul style="list-style-type: none"> <li>▪ Detailed information on experiences, how to use, side effects, and so on.</li> <li>▪ Economic reasons</li> </ul>	<ul style="list-style-type: none"> <li>▪ Not controlled use of prescription drugs</li> <li>▪ Patient health risks</li> </ul>	N.A.
(Fittler <i>et al.</i> , 2010)	Offline community survey (434) - Hungary	Prescription drugs	<ul style="list-style-type: none"> <li>▪ 30-49 year old</li> <li>▪ Mainly women</li> </ul>		<ul style="list-style-type: none"> <li>▪ Medication can be counterfeit, contain discontinued ingredients, or be illegal</li> </ul>	N.A.
(Inciardi <i>et al.</i> , 2010)	Multisite web survey - U.S.A.	Prescription drugs	College survey: 69.6% women, 72.9% Whites, 15.9% Hispanic, 61.2% methylphenidate use, 60.7% amphetamine, 30.8% hydrocodone SKIP: mean age: 35.3, 55% men; 78% Whites, 8.4%			<ul style="list-style-type: none"> <li>▪ 42% of websites: no need of prescription (explicitly)</li> </ul>

(Continues)

Table 2. (Continued)

Author (s)	Type of study (sample number) – geographical location	Type of products	Availability of data on online consumers' features	Analysis of reasons for purchasing drug online	Analysis of risks of drug online shopping	Analysis of characteristics of OPs
(Ivanitskaya <i>et al.</i> , 2010)	College survey (1866) – SKIP (4008) – OTP system (N.A.) – NSDUH (67870) – MTF (15132) – Web-based survey (1914) – U.S.A.	Prescription drugs	black/African American, 6% Hispanic, hydrocodone most frequently acquired online OTP system: mean age 31.9; 59% men; 94.5% Whites RADARS: mainly hydrocodone via internet ▪ IT skills ▪ 77% <22 years old ▪ 90% undergraduate degree (44% health-related field) ▪ 73% women	▪ Economic reasons ▪ Trust in health professionals' opinion ▪ Privacy reassurances ▪ Privacy policy ▪ Anonymous delivery ▪ Lower costs	▪ Items offered are not necessarily cheap ▪ Quality and origin of the medications are not controlled ▪ No list of hazardous side effects ▪ Risks of using contraindicated drugs	N.A.
(Orizio <i>et al.</i> , 2010)	Search and analysis of drug selling websites (N.A.) – N.A.	Prescription drugs	N.A.	▪ Trust in health professionals' opinion ▪ Privacy reassurances ▪ Privacy policy ▪ Anonymous delivery ▪ Lower costs	▪ 33.5% of OPs: no list of side-effects ▪ 22.3% of OPs: need of prescription with control for any kind of medical information ▪ 41.9% of OPs: requested medical questionnaire	N.A.
(Schmetzler <i>et al.</i> , 2010)	Search and analysis of drug selling websites (11899) – Switzerland	Phosphodiesterase type 5 inhibitors	▪ Patients with ED ▪ Mainly men aged 18–50	▪ Economic reasons ▪ Trust in health professionals' opinion	▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Lack of information on side effects ▪ Patient health risks	N.A.
(Wiedmann <i>et al.</i> , 2010)	Offline survey (152) – Germany	Prescription drugs	▪ IT skills	▪ Direct access to scientific materials, online medical doctors, chat rooms, and counseling ▪ No need of prescription	▪ Inappropriate promotion advertisements ▪ Less descriptions of side effects ▪ Patient health risks ▪ Use of “cyber-doctors”	▪ Same marketing strategies and appearance
(Cordaro <i>et al.</i> , 2011)	Search and analysis of drug selling websites (N.A.) – N.A.	Performance enhancing drugs	N.A.	▪ Anonymity ▪ Private safety ▪ Trust in health professionals' opinion	▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Patient health risks ▪ Lack of information on side effects	▪ No need of prescription ▪ Appearance and marketing strategies ▪ 90% of OPs: offer illegal “generic Viagra”
(Orizio <i>et al.</i> , 2011)	Review (N.A.) – N.A.	Prescription drugs	N.A.	▪ Economic reasons ▪ Anonymity	▪ Patient health risks ▪ Lack of information on side effects	N.A.
(Campbell <i>et al.</i> , 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Sildenafil	N.A.	▪ Economic reasons ▪ Anonymity	▪ Patient health risks ▪ Lack of information on side effects	N.A.
(Cicero and Ellis, 2012)	Web-based survey (445) – U.S.A.	Tramadol	▪ Woman, Whites, and younger than traditional users	▪ Economic purposes ▪ A way to purchase without medical insurance ▪ Anonymity ▪ Trust in health professionals' opinion	▪ Patient health risks ▪ Lack of information on side effects ▪ Patient health risk	N.A.
(Holtgräfe and Zentes, 2012)	National wide web-based survey	OTC	▪ Three fourths of the Internet users look	▪ Trust in health professionals' opinion	N.A.	N.A.

(Khan <i>et al.</i> , 2012)	and face-to-face interviews (573) – Germany Cross-sectional study (N.A.) – N.A.	Anti-obesity drugs	for health-related information ▪ Ability to search online ▪ Only vague geographical localization issues are provided	▪ Availability of online drug information N.A.	▪ No prescription required ▪ Economic reasons ▪ Easily accessible	▪ Medication can be counterfeit, contain discontinued or illegal ingredients
▪ Lack of information on side effects (Levaggi <i>et al.</i> , 2012)	▪ Prescription not needed					
(Liang <i>et al.</i> , 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Fluoxetine	N.A.	▪ Economic reasons	▪ Items offered not necessarily cheap ▪ Lack of transparency ▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Deceptive advertising N.A.	▪ Only vague geographical localization issues are provided ▪ Also illicit OPs ▪ No need of prescription
(Mazer <i>et al.</i> , 2012)	Prospective, cross-sectional survey (1657) – U.S.A.	Prescription drugs	▪ Average age: 39 ▪ College or more education ▪ Internet users ▪ Youths	▪ Anonymity ▪ No prescription required ▪ Economic reasons		N.A.
(McDonald <i>et al.</i> , 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Performance-enhancing drugs	▪ No need of prescription ▪ Benefits on muscle enhancing and so on ▪ Anonymity	▪ No need of prescription ▪ Benefits on muscle enhancing and so on ▪ Anonymity ▪ No prescription required ▪ Economic reasons ▪ Easily accessible	▪ Deceptive advertising ▪ Lack of adequate drug information ▪ Patient health risks ▪ Lack of information on side effects ▪ Patient health risks ▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Risks related to online purchase	▪ One third of OPs: no need of prescription ▪ Classification of OPs ▪ No need of prescription
(Sugitara <i>et al.</i> , 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Slimming drugs	N.A.			N.A.
(Svorc, 2012)	Survey (82) – Czech Republic	Prescription drugs	▪ Mainly men, have higher income and higher education	▪ Easily accessible		
(Yeğenoğlu, 2012)	Search and analysis of drug selling websites (N.A.) – N.A.	Prescription drugs	N.A.	▪ Determinants of online purchase		N.A.
(Bachhuber and Cunningham, 2013)	Search and analysis of drug selling websites (N.A.) – N.A.	Buprenorphine	N.A.	▪ No need of prescription	▪ Not necessarily cheaper ▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Deceptive advertising ▪ Patient health risks ▪ Medication can be counterfeit, contain discontinued or illegal ingredients ▪ Hazardous health risks ▪ Medication can be counterfeit, contain discontinued or illegal ingredients	▪ Only vague geographical localization issues are provided ▪ Masked dominion ▪ Prescription not needed ▪ Advise provided re: legal and safe use
(Brennan <i>et al.</i> , 2013)	Search and analysis of drug selling websites (N.A.) – N.A.	Performance enhancing drugs	N.A.	▪ Economic reasons		
(Fittler <i>et al.</i> , 2013)	Offline hospital survey (422) – Hungary	Prescription drugs	▪ Mainly men (OR = 1.36) ▪ College or university diploma (OR = 1.38)	▪ Lower prices (42.10% of respondents)		N.A.

(Continues)

Table 2. (Continued)

Author (s)	Type of study (sample number) – geographical location	Type of products	Availability of data on online consumers' features	Analysis of reasons for purchasing drug online	Analysis of risks of drug online shopping	Analysis of characteristics of OPs
(Gelatti <i>et al.</i> , 2013)	Search and analysis of drug selling websites (N.A.) – N.A.	Fluoxetine	N.A.	<ul style="list-style-type: none"> <li>Affordability</li> <li>Good quality/drug safety</li> <li>Privacy protection</li> </ul>	<ul style="list-style-type: none"> <li>70.6% report adverse effects</li> </ul>	<ul style="list-style-type: none"> <li>Extreme dynamism and changeability</li> <li>“Aggressive” marketing strategies</li> <li>Variability in domain registration, company base, and manufacturer's location (mostly India)</li> <li>Only vague geographical localization issues are provided</li> </ul>
(Thackeray <i>et al.</i> , 2013)	Survey (1745) – U.S.A.	Prescription drugs	<ul style="list-style-type: none"> <li>&gt;35 years old and married; prefer OPs</li> <li>Mainly women and younger people prefer use of social-network</li> </ul>	N.A.	<ul style="list-style-type: none"> <li>Health questionnaire are not ever available</li> <li>Poor traceability</li> <li>Low drug quality</li> </ul>	N.A.

N.A., not available; OPs, online pharmacies; LPs, local pharmacies; NPWs, non-prescription websites; OTC, over-the-counter drugs; SKIP, survey of key informants' patient program; OTP, opioid treatment program; NSDUH, national survey of drug use and health; MTF, monitoring the future; PS, pharmaceutical shipments analyzed; FDA, Federal Drug Administration; ED, eating disorders; IT, information technology.

- Ease of shopping online; availability of comparative shopping
- Perceived credibility of the web; fast and/or free delivery with traceability of the package
- Availability at work/home of an Internet high-speed connection
- Regular drug/medicines' use; need of multiple medications
- Anonymity; avoidance of embarrassment; privacy protection
- More affordable costs; availability of “special offers” on a range of products.

Conversely, the perceived potential limitations relating to online medicines' acquisition activities might include the following (Tables 1–2):

- Fear of extra costs; fear of non-delivery
- Fear that products can be counterfeit/not approved/illegal and/or that there is the possibility to be traced by the authorities in doing the purchase itself
- Lack of availability from the web the advice from a “real world” health professional.

*Appearance.* Although some drug vending websites presented an appearance, which was fairly stable overtime (Kaskowitz *et al.*, 2007; Orizio *et al.*, 2010; Bachhuber and Cunningham, 2013), most of them presented with high levels of fluidity in their layouts and frequent changes in their names, IP, and postal addresses (Lineberry and Bostwick, 2004; CASA, 2006). Further, some of these sites could go offline, disappear for a certain period, and when back online offer a different range of drugs/products, hence overall decreasing the possibility of being identified and closed down (CASA, 2006).

When comparing a range of drug vending websites, high levels of similarities between them were here identified, including homepage appearance, site organization, available products, and purchase conditions, so that one could argue that just a few owners are behind a large number of vending websites (Cordaro *et al.*, 2011). Most often, the “no prescription” websites appeared as just virtual interfaces (CASA, 2006; Levaggi *et al.*, 2009; Orizio *et al.*, 2011; Bachhuber and Cunningham, 2013), not providing their customers with any elements suggesting the possession of a retailer legitimacy status, such as the owners'/directors' names or a landline telephone number (Bessell *et al.*, 2002). Some “rogue” sites provided logos of either professional/governmental agencies and/or main credit card circuits (Liang *et al.*, 2013), with most having “.com” extensions and being written

in English (CASA, 2006), although the indications provided regarding geographical data were lacking or unclear.

Although popular websites such as “SilkRoad” presented with a professional appearance and offered for sale a variety of items (e.g. books and digital currency), their clear focus was on drugs (Christin, 2012). The acquisition procedure was slightly more complicated than that typical of the online pharmacies (Barratt, 2012; Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b). Indeed, SilkRoad appeared only accessible through an anonymising network, aimed at masking the user’s tracks. To mask even further the clients’ tracks, “bitcoins”, and not credit/debit cards, were the only accepted payment method (Barratt, 2012; Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b).

*Prescription service characteristics.* A “no prescription required” approach to purchase from online pharmacies was here often identified (Levaggi *et al.*, 2009) with customers being asked just to complete a questionnaire/telephone interview, which did involve the interaction with a “cyber-doctor” (National Drug Intelligence Centre, 2002; Fung *et al.*, 2004; Weiss, 2006) but not with a licensed healthcare professional (CASA, 2006; Drug Strategy, 2007; Orizio *et al.*, 2009b; Orizio *et al.*, 2010). Questionnaires typically focussed on a range of issues, including current/previous medical history (90–100%), history of drug allergies (70–90%), pregnancy/breastfeeding status (70%), consumer’s General Practitioner (GP) being aware of plan to purchase drugs online (52%), previous history of surgical intervention (40%), confirmation of a diagnosis having been made by a physician (19.3%), and name/address/telephone number of the customer’s GP (less than 20% of cases) (Orizio *et al.*, 2009a). In some instances, specific medication side effects/drug interactions were not reported (National Drug Intelligence Centre, 2002; Schepis *et al.*, 2008; Levaggi *et al.*, 2009; Orizio *et al.*, 2009b; Orizio *et al.*, 2010; Cordaro *et al.*, 2011).

*Marketing strategies.* Most drug vending websites presented with aggressive marketing strategies (Bessell *et al.*, 2002; National Drug Intelligence Centre, 2002; CASA, 2006; Forman *et al.*, 2006; Levaggi *et al.*, 2009; Rajamma and Pelton, 2009; Orizio *et al.*, 2009b; Orizio *et al.*, 2010; Cordaro *et al.*, 2011; Fittler *et al.*, 2013; Gelatti *et al.*, 2013; Liang *et al.*, 2013; Van Hout and Bingham, 2013b), including (i) special offer sales/discounts and provision of free drug samples, with promotions made through

unsolicited emails/advertisements (Pew/Internet, 2005; Gordon *et al.*, 2006; Levaggi *et al.*, 2009; Pew/Internet, 2009; Fittler *et al.*, 2013); (ii) free/fast delivery; (iii) availability of consumers’ reviews; and (iv) guarantee of privacy protection.

*Requirements for drug acquisition and products’ availability.* In being supported by both users’ feedbacks/reviews/ratings and the creation of a personal account, the relationship between vendors and consumers has been described as based on alleged cyber levels of trust and professionalism (Cordaro *et al.*, 2011; Barratt, 2012; Van Hout and Bingham, 2013b). Most cyber pharmacies required credit card/Western Union/MoneyGram’s payments (National Drug Intelligence Centre, 2002; Cordaro *et al.*, 2011; Mazer *et al.*, 2012). Some websites used popular/renowned professional carriers offering to deliver internationally/overseas, although the exact amount of shipping costs was often not known until the end of the transaction (Levaggi *et al.*, 2012).

Virtually, any psychoactive/non psychoactive molecule was being made available for online purchase, including NPS, classified drugs (i.e. marijuana, Lysergic acid diethylamide, gamma hydroxy butyrate, 2C- psychedelic phenethylamines, psilocybin, and ketamine) and prescription drugs (i.e. psychotropic medicines, opiates/opioids, performance/image enhancing drugs, and so on) (Bessell *et al.*, 2002; National Drug Intelligence Centre, 2002; Pew/Internet, 2005; Forman *et al.*, 2006; Orizio *et al.*, 2009b; Inciardi *et al.*, 2010; Orizio *et al.*, 2010; Cordaro *et al.*, 2011; Barratt *et al.*, 2013; Brennan *et al.*, 2013; Van Hout and Bingham, 2013b). Where analytical confirmation of the drugs purchased online was carried out, the drug quality was reported as poor, with drugs likely to be contaminated, counterfeit, or inherently ineffective (National Drug Intelligence Centre, 2002; Cordaro *et al.*, 2011; Gelatti *et al.*, 2013). In other instances, some of the ordered medicinal products were either not approved by the country regulatory agencies or had been withdrawn from the market because of safety concerns (Weiss, 2006; Kaskowitz *et al.*, 2007).

## DISCUSSION

The present paper represents one of very few attempts at profiling the recreational/prescription drug vending websites customers. Furthermore, elements have been here provided relating to a better understanding of both the characteristics of the vending websites and the determinants to choose the online market for drug acquisition activities. Overall, it seemed that vending sites

are taking advantage of recent technical developments, such as availability of both electronic currencies and anonymous retail transaction infrastructures (Corazza *et al.*, 2011; Corazza *et al.*, 2012; Davey *et al.*, 2012; Forsyth, 2012; Solberg, 2012). The relatively high levels of information technology skills involved (e.g. access to anonymising softwares) in some classified drug purchasing activities may suggest that customers are young and possess both high educational levels and ease of access to the web. On the other hand, because it is possible to identify a range of related vending websites by simply searching on popular engines for the name of the index NPS/"legal high"/prescription drug, one could argue that the potential consumers could belong to different classes of ages, education, and social status.

Youngsters may be attracted by novel/unexpected effects of somehow unknown drugs (Schifano *et al.*, 2006), but access to these molecules is now arguably made easier by the increasing number of drug vending websites (Vardakou *et al.*, 2011; Walsh, 2011; EMCDDA, 2014), with the possibility of acquiring recreational drugs/medicines from countries with markedly different drug laws (Bessell *et al.*, 2002; National Drug Intelligence Centre, 2002; Drug Strategy, 2007; Orizio *et al.*, 2011; Brennan *et al.*, 2013; EMCDDA, 2014).

Controversially, the illegal vending marketplaces presented with an appearance closely resembling that typical of other, legitimate, and very popular conventional marketplaces (Barratt, 2012; Christin, 2012; Van Hout and Bingham, 2013b; Van Hout and Bingham, 2013a; Reddit.com, 2014). The illegal marketplaces/websites offering most recent NPS seemed to develop in close association with the findings emerging from specialized fora/blog communities' threads (Barratt, 2012; Christin, 2012; Van Hout and Bingham, 2013a; Van Hout and Bingham, 2013b), which offer the possibility to share drug intake information. Provision of support for and being supported by other people seem, however, to further encourage online purchase and eventual intake of drugs/medications (Halpern and Pope, 2001; Adams, 2010; Sugiura *et al.*, 2012; Chiauzzi *et al.*, 2013; Van Hout and Bingham, 2013b). This participatory culture and sense of belonging to a (virtual) group may be particularly relevant for those involved in relatively idiosyncratic/unusual psychedelic drug use and/or for those who are located in remote locations (Walsh, 2011).

A number of limitations of the present review are here identified, including the possibility that the

vending sites' customers may have not provided realistic data about their age, educational status, and even previous drug intake history. From this point of view, most of the studies here identified were based only on search and analysis of websites. Hence, these studies presented with a methodological approach, which was possibly problematic to appropriately identify a range of accurate information about participant demographic characteristics. Furthermore, no attempt was made here to purchase any of the drugs on offer, and hence, no chemical testing was available here to comment on the quality of the items being provided to customers. Moreover, the finding that most studies indicated here that younger men are those who are more commonly purchasing drugs online may be indicative of multiple factors. These may include both a selection bias in the samples analyzed (e.g. web surveys may selectively attract younger men as opposed to adults and/or women) and the fact that younger men are indeed more likely to consume drugs than any other groups of subjects.

Finally, there is a need to carry out further studies in this field. Indeed, a more precise understanding of the e-Psychonauts and more in general of the online vending sites' customers may well facilitate the drafting and implementation of proper non-judgmental, prevention, campaigns. These should be aimed at counteracting the increasing levels of online drug acquisition and hence intake activities, something which can be associated with both near misses and fatalities (Schifano *et al.*, 2015).

## CONFLICT OF INTEREST

No conflicts of interest are declared here that may have influenced the interpretation of the present data. FS is both a Core Member of the Advisory Council on the Misuse of Drugs, UK and of the Specialist Advisory Group (Psychiatry) for the European Medicines Agency.

## ACKNOWLEDGEMENTS

The European Commission-funded EU-MADNESS project (2014–2016; contract no.: JUST2013/DPIP/AG/4823) resources were used to assist with the preparation of this review.

## REFERENCES

- Adams JU. 2010. An Op-Ed concerning steroids and the law: how the Internet has changed illegal drug trade and its prosecution. *Physiol Behav* **100**(3): 205–207.

- Advisory Council on the Misuse of Drugs (ACMD). 2010. *Annual Report. Accounting Year 2009–2010*. ACMD: London.
- Atkinson NL, Saperstein SL, Pleis J. 2009. Using the internet for health-related activities: findings from a national probability sample. *J Med Internet Res* **11**(1): e4.
- Bachhuber MA, Cunningham CO. 2013. Availability of buprenorphine on the Internet for purchase without a prescription. *Drug Alcohol Depend* **130**(1–3): 238–240.
- Barratt MJ. 2012. Silk road: eBay for drugs. *Addiction* **107**(3): 683.
- Barratt MJ, Cakic V, Lenton S. 2013. Patterns of synthetic cannabinoid use in Australia. *Drug Alcohol Rev* **32**(3): 141–146.
- Bessell TL, Silagy CA, Anderson JN, Hiller JE, Sansom LN. 2002. Quality of global e-pharmacies: can we safeguard consumers? *Eur J Clin Pharmacol* **58**(9): 567–572.
- Bessell TL, Anderson JN, Silagy CA, Sansom LN, Hiller JE. 2003. Surfing, self-medication and safety: buying non-prescription and complementary medicines via the Internet. *Qual Saf Health Care* **12**(2): 88–92.
- Bostwick JM, Lineberry TW. 2007. Do cheap internet drugs threaten the safety of the doctor-patient relationship? *Expert Opin Drug Saf* **6**(1): 9–13.
- Boyer EW, Wines JD, Jr. 2008. Impact of internet pharmacy regulation on opioid analgesic availability. *J Stud Alcohol Drugs* **69**(5): 703–708.
- Boyer EW, Shannon M, Hibberd PL. 2005. The Internet and psychoactive substance use among innovative drug users. *Pediatrics* **115**(2): 302–305.
- Brennan BP, Kanayama G, Pope HG, Jr. 2013. Performance-enhancing drugs on the web: a growing public-health issue. *Am J Addict* **22**(2): 158–161.
- Bruckel K, Capozzoli EA. 2003. Internet pharmaceutical sales: attributes, concerns, and future forecast. *J Hosp Mark Public Relations* **15**(1): 61–76.
- Campbell N, Clark JP, Stecher VJ, Goldstein I. 2012. Internet-ordered viagra (sildenafil citrate) is rarely genuine. *J Sex Med* **9**(11): 2943–2951.
- CASA (The National Center on Addiction and Substance Abuse at Columbia University). 2006. "You've got drugs!": Prescription drug pushers on the Internet. 2006 Update. A CASA White Paper. CASA: New York (available at: <http://www.casacolumbia.org/addiction-research/reports/youve-got-drugs-prescription-drug-pushers-internet-2006>).
- CASA (The National Center on Addiction and Substance Abuse at Columbia University). 2009. National survey of American attitudes on substance abuse XIV: teens and parents. CASA: New York (available at: <http://www.casacolumbia.org/addiction-research/reports/national-survey-american-attitudes-substance-abuse-teens-parents-2009>).
- Chiauzzi E, Dasmahapatra P, Lobo K, Barratt MJ. 2013. Participatory research with an online drug forum: a survey of user characteristics, information sharing, and harm reduction views. *Subst Use Misuse* **48**(8): 661–670.
- Christin N. 2012. Traveling the Silk Road: a measurement analysis of a large anonymous online marketplace. *Proceedings of the 22nd International conference on World Wide Web*: 213–224.
- Cicero TJ, Ellis MS. 2012. Health outcomes in patients using non-prescription online pharmacies to purchase prescription drugs. *J Med Internet Res* **14**(6): e174.
- Cicero TJ, Shores CN, Paradis AG, Ellis MS. 2008. Source of drugs for prescription opioid analgesic abusers: a role for the Internet? *Pain Med* **9**(6): 718–723.
- Cicero TJ, Kurtz SP, Surratt HL, et al. 2011. Multiple determinants of specific modes of prescription opioid diversion. *J Drug Issues* **41**(2): 283–304.
- Corazza O, Schifano F, Farre M, et al. 2011. Designer drugs on the internet: a phenomenon out-of-control? The emergence of hallucinogenic drug Bromo-Dragonfly. *Curr Clin Pharmacol* **6**(2): 125–129.
- Corazza O, Schifano F, Simonato P, et al. 2012. Phenomenon of new drugs on the Internet: the case of ketamine derivative methoxetamine. *Hum Psychopharmacol* **27**(2): 145–149.
- Cordaro FG, Lombardo S, Cosentino M. 2011. Selling androgenic anabolic steroids by the pound: identification and analysis of popular websites on the Internet. *Scand J Med Sci Sports* **21**(6): e247–e259.
- Davey Z, Schifano F, Corazza O, De Luca P, Psychonaut Web Mapping Group. 2012. e-Psychonauts: conducting research in online drug forum communities. *J Ment Health* **21**(4): 386–394.
- Davies S, Wood DM, Smith G, et al. 2010. Purchasing 'legal highs' on the Internet—is there consistency in what you get? *Q J Med* **103**(7): 489–493.
- Dick D, Torrance C. 2010. *MixMag Drugs Survey*, MixMag, Development Hell: London.
- Drug Strategy. 2007. The Internet and adolescent non-medical use of prescription drugs. Law School University: Harvard (available at: <http://www.law.harvard.edu/programs/criminal-justice/kinsida.pdf>).
- Dumitru R, Burkle T, Potapov S, Lauren B, Wiese B, Prokosch HU. 2007. Use and perception of Internet for health related purposes in Germany: results of a national survey. *Int J Public Health* **52**: 275–285.
- EMCDDA (European Monitoring Centre for Drugs and Drug Addiction). 2014. *European Drug Report 2014: Trends and Developments*. EMCDDA: Lisbon.
- Eysenbach G. 1999. Online prescribing of sildenafil (Viagra) on the world wide web. *J Med Internet Res* **1**(2): e10.
- Fittler A, Bosze G, Botz L. 2010. Attitude of patients and customers toward on-line purchase of drugs—a Hungarian survey by community pharmacies. *Orv Hetil* **151**(48): 1983–1990.
- Fittler A, Lankò E, Brachmann B, Botz L. 2013. Behaviour analysis of patients who purchase medicines on the internet: can hospital pharmacists facilitate online medication safety? *Eur J Hosp Pharm* **20**: 8–12.
- Forman RF. 2006. Narcotics on the net: the availability of web sites selling controlled substances. *Psychiatr Serv* **57**(1): 24–26.
- Forman RF, Woody GE, McLellan T, Lynch KG. 2006. The availability of web sites offering to sell opioid medications without prescriptions. *Am J Psychiatry* **163**(7): 1233–1238.
- Forsyth AJM. 2012. Virtually a drug scare: mephedrone and the impact of the internet on drug news transmission. *Int J Drug Policy* **23**(3): 198–209.
- Fung CH, Woo HE, Asch SM. 2004. Controversies and legal issues of prescribing and dispensing medications using the Internet. *Mayo Clin Proc* **79**(2): 188–194.
- Gallagher J, Collaizi J. 2000. Issues in internet pharmacy practice. *Ann Pharmacother* **34**(12): 1438–1445.
- Gelatti U, Pedrazzani R, Marcantoni C, et al. 2013. 'You've got m@il: fluoxetine coming soon!': accessibility and quality of a prescription drug sold on the web. *Int J Drug Policy* **24**(5): 392–401.
- Gerstein DR, Green LW. 1993. *Preventing Drug Abuse: What Do We Know?* National Academy Press: Washington, DC.
- Gondim APS, Falcao CB. 2007. Evaluation of Brazilian online pharmacies. *Rev Saude Publica* **41**(2): 297–300.
- Gordon SM, Forman RF, Siatkowski C. 2006. Knowledge and use of the Internet as a source of controlled substances. *J Subst Abuse Treat* **30**(3): 271–274.
- Gray NJ, Klein JD, Noyce PR, Sesselberg TS, Cantrill JA. 2005. Health information-seeking behaviour in adolescence: the place of the Internet. *Soc Sci Med* **60**(14): 1467–1478.
- Gurau C. 2005. Pharmaceutical marketing on the internet: marketing techniques and customer profile. *J Consum Market* **22**(7): 421–428.
- Halpern JH, Pope HG, Jr. 2001. Hallucinogens on the Internet: a vast new source of underground drug information. *Am J Psychiatry* **158**(3): 481–483.
- Henney JE. 2001. Cyberpharmacies and the role of the US Food and Drug Administration. *J Med Internet Res* **3**(1): e3.
- Holtgräfe C, Zentes J. 2012. Multifaceted determinants of online non-prescription drug information seeking and the impact on consumers' use of purchase channels. *Health Informatics J* **18**(2): 95–110.
- Hoover V, Marlowe DB, Patapis NS, Festinger DS, Forman RF. 2008. Internet access to Salvia divinorum: implications for policy, prevention, and treatment. *J Subst Abuse Treat* **35**(1): 22–27.
- Hubbard WK. 2001. Statement before the subcommittee on oversight and investigations. Committee on Energy and Commerce: U.S., House of Representatives (available at: [www.fda.gov/oc/2001/drugimport0607.html](http://www.fda.gov/oc/2001/drugimport0607.html)).
- Inciardi JA, Surratt HL, Cicero TJ, Rosenblum A, et al. 2010. Prescription drugs purchased through the internet: who are the end users? *Drug Alcohol Depend* **110**(1–2): 21–29.

- Ivanitskaya L, Brookins-Fisher JO, Boyle I, Vibbert D, Erofeev D, Fulton L. 2010. Dirt cheap and without prescription: how susceptible are young US consumers to purchasing drugs from rogue internet pharmacies? *J Med Internet Res* **12**(2): e11.
- Jones AL. 2010. Legal 'highs' available through the Internet—implications and solutions? *QJM* **103**(7): 535–536.
- Kaskowitz AP, Carlson N, Nichols M, Edelman A, Jensen J. 2007. Online availability of hormonal contraceptives without a health care examination: effect of knowledge and health care screening. *Contraception* **76**(4): 273–277.
- Khan MH, Tanimoto T, Nakanishi Y, Yoshida N, Tsuboi H, Kimura K. 2012. Public health concerns for anti-obesity medicines imported for personal use through the internet: a cross-sectional study. *BMJ Open* **2**(3): e000854.
- Kim J, Lee H-H. 2008. Consumer product search and purchase behaviour using various retail channels: the role of perceived retail usefulness. *Int J Consum Stud* **32**: 619–627.
- Kishimoto K, Yoshida T, Fukushima N. 2009. Factors related to purchasing over-the-counter medications online. *Yakugaku Zasshi* **129**(9): 1127–1136.
- Klein B, White A, Kavanagh D, et al. 2010. Content and functionality of alcohol and other drug websites: results of an online survey. *J Med Internet Res* **12**(5): e51.
- Lenhart A, Madden M, Hitlin P. 2005. *Teens and Technology: Youth are Leading the Transition to a Fully Wired and Mobile Nation*. Pew Internet and American Life Project: Washington, DC.
- Levaggi R, Orizio G, Domenighini S, et al. 2009. Marketing and pricing strategies of online pharmacies. *Health Policy* **92**(2–3): 187–196.
- Levaggi R, Marcantoni C, Filippucci L, Gelatti U. 2012. Not a good buy: value for money of prescription drugs sold on the Internet. *Health Policy* **106**(3): 241–245.
- Liang BA, Mackey TK, Lovett KM. 2012. Suspect online sellers and contraceptive access. *Contraception* **86**(5): 551–556.
- Liang BA, Mackey TK, Archer-Hayes AN, Shinn LM. 2013. Illicit online marketing of lorcaserin before DEA scheduling. *Obesity* **21**(5): 861–864.
- Lineberry TW, Bostwick JM. 2004. Taking the physician out of "physician shopping": a case series of clinical problems associated with Internet purchases of medication. *Mayo Clin Proc* **79**(8): 1031–1034.
- Mazer M, DeRoos F, Shofer F, et al. 2012. Medications from the web: use of online pharmacies by emergency department patients. *J Emerg Med* **42**(2): 227–232.
- McDonald CL, Marlowe DB, Patapis NS, Festinger DS, Forman RF. 2012. Nonprescription steroids on the Internet. *Subst Use Misuse* **47**(3): 329–341.
- Menon AM, Deshpande AD, Perri M, Zinkhan GM. 2002. Trust in online prescription drug information among internet users: the impact on information search behaviour after exposure to direct-to-consumer advertising. *Health Mark Q* **20**(1): 17–35.
- Miller L, Nielsen C. 2001. Internet availability of contraceptives. *Obstet Gynecol* **97**(1): 121–126.
- Multschler J, Diehl A, Kiefer F. 2007. Beschaffung psychotroper Substanzen über das Internet. *Nervenarzt* **78**: 818–820.
- National Drug Intelligence Centre. 2002. Information bulletin: drugs, youth, and the Internet. U.S. Department of Justice: Johnstown, PA (available at: <http://www.justice.gov/archive/ndic/pubs2/2161/2161p.pdf>).
- Office of National Drug Control Policy. 2004. Reducing prescription drug abuse. The White House: Washington, DC (available at: <http://www.state.gov/documents/organization/30228.pdf>).
- Orizio G, Shulz P, Domenighini S, et al. 2009a. Online consultations in cyberpharmacies: completeness and patient safety. *Telemed J E Health* **15**(10): 1022–1025.
- Orizio G, Shulz P, Domenighini S, Caimi L, Rosati C, Rubinelli S. 2009b. Cyberdrugs: a cross-sectional study of online pharmacies and the enhancement of peripheral thinking in consumers. *Pharmacoepidemiol Drug Saf* **19**(9): 970–976.
- Orizio G, Rubinelli S, Schultz PJ, et al. 2010. "Save 30% if you buy today". Online pharmacies and the enhancement of peripheral thinking in consumers. *Pharmacoepidemiol Drug Saf* **19**(9): 970–976.
- Orizio G, Merla A, Schultz PJ, Gelatti U. 2011. Quality of online pharmacies and websites selling prescription drugs: a systematic review. *J Med Internet Res* **13**(3): e74.
- Pew/Internet. 2005. Prescription drugs online. Pew Internet & American Life Project: Washington, DC (available at: [http://www.pewinternet.org/trends/User\\_Demo\\_05.18.05.htm](http://www.pewinternet.org/trends/User_Demo_05.18.05.htm)).
- Pew/Internet. 2009. The social life of health information: Americans' pursuit of health takes place within a widening network of both online and offline sources. Pew Internet & American Life Project: Washington, DC (available at: <http://www.pewinternet.org/2009/06/11/prescription-or-over-the-counter-drugs/>).
- Raine C, Wedd DJ, Maxwell SR. 2009. The availability of prescription-only analgesics purchased from the Internet in the UK. *Br J Clin Pharmacol* **67**(2): 250–254.
- Rajamma RK, Pelton LE. 2009. An empirical investigation of consumers' procurement of pharmaceutical products via online retail channels. *Psychol Market* **26**(10): 865–887.
- Reddit.com. Available at: [http://www.reddit.com/r/onions/comments/22z3qe/grams\\_beta\\_version/](http://www.reddit.com/r/onions/comments/22z3qe/grams_beta_version/) (accessed on 14th of April, 2014).
- Rideout V. 2001. *Generation Rx.com. How Young People Use the Internet for Health Information*. Kaiser Family Foundation: Menlo Park, CA.
- Schepis TS, Marlowe DB, Forman RF. 2008. The availability and portrayal of stimulants over the Internet. *J Adolesc Health* **42**(5): 458–465.
- Schifano F, Deluca P, Baldacchino A, et al. 2006. Drugs on the web; the Psychonaut 2002 EU project. *Prog Neuro-psychopharmacol Biol Psychiatry* **30**(4): 640–646.
- Schifano F, Orsolini L, Papanti GD, Corkery J. 2015. Novel psychoactive substances of interest for psychiatry. *World Psychiatry* in press.
- Schmidt MM, Sharma A, Schifano F, Feinmann C. 2011. "Legal highs" on the net—evaluation of UK-based websites, products and product information. *Forensic Sci Int* **206**(1–3): 92–97.
- Schnetzler G, Banks I, Kirby M, Zou KH, Symonds T. 2010. Characteristics, behaviours, and attitudes of men bypassing the healthcare system when obtaining phosphodiesterase type 5 inhibitors. *J Sex Med* **7**(3): 1237–1246.
- Seybert H, Reinecke P. 2013. Eurostat. Internet use statistics – individuals. Statistics in focus 29/2013. (available at: [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/Internet\\_use\\_statistics\\_-\\_individuals](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Internet_use_statistics_-_individuals)).
- Shim S, Mary AE, Lotz SL, Warrington P. 2001. An online prepurchase intentions model: the role of intention to search: best overall paper award—the sixth triennial AMS/ACRA retailing conference, 2000. *J Retailing* **77**(3): 397–416.
- Solberg U. 2012. Websites as a source of new drugs/legal highs. *Recreational Drugs European Network. RedNet News* **8**: 3.
- Sugiura L, Pope C, Webber C. 2012. Buying unlicensed slimming drugs from the Web: a virtual ethnography. *Proceeding of the 3rd Annual ACM Web Science Conference*: 284–287.
- Svorc J. 2012. Consumer's intentions to shop medications on-line: a survey from Czech Republic market. *J Syst Integr* **3**(2): 3–28.
- Thackeray R, Crookston BT, West JH. 2013. Correlates of health-related social media use among adults. *J Med Internet Res* **15**(1): e21.
- The Gallup Organization. Eurobarometer 330. Young attitudes on drugs. European Commission, July 2011.
- Trissler RJ. 2000. Drug and supplement sales on the web: novel marketing method or potential time bomb? *J Am Diet Assoc* **100**(4): 418.
- Van Hout MC, Bingham T. 2013a. 'Surfing the Silk Road': a study of users' experiences. *Int J Drug Policy* **24**(6): 524–529.
- Van Hout MC, Bingham T. 2013b. 'Silk Road', the virtual drug marketplace: a single case study of user experiences. *Int J Drug Policy* **24**(5): 385–391.
- Vardakou I, Pistos C, Spiliopoulou Ch. 2011. Drugs for youth via Internet and the example of mephedrone. *Toxicol Lett* **201**(3): 191–195.
- Volkow N. 2011. National Institute on Drug Abuse Research Report Series. Prescription drug abuse and addiction. NIH Pub Number 11-4881, published July 2011, revised October 2011 (available at: <http://www.drugabuse.gov/publications/research-reports/prescription-drugs>).
- Walsh C. 2011. Drugs, the Internet and change. *J Psychoactive Drugs* **43**(1): 55–63.



- Wax PM. 2002. Just a click away: recreational drug sites on the Internet. *Pediatrics* **109**(6): e96.
- Weiss AM. 2006. Buying prescription drugs on the Internet: promises and pitfalls. *Cleve Clin J Med* **73**(3): 282–288.
- Wiedmann K-P, Hennigs N, Pankalla L, Kassubek M, Seegebarth B, Reeh M-O. 2010. Online distribution of pharmaceuticals: investigating relations of consumers' value perception, online shopping attitudes and behaviour in an e-pharmacy context. *Journal of Customer Behaviour* **9**(2): 175–199.
- Yeğenoğlu S. 2012. An evaluation of the community pharmacy web sites before and after the online pharmacy prohibition. *Hacettepe University Journal of the faculty of Pharmacy* **32**(2): 109–118.