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## INVITED COMMENTARY

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### New Psychoactive Substances and evolving criminal dynamics against the backdrop of the fourth industrial revolution

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The letter by Dr. Napoletano and colleagues offers us a glimpse as to where drug trafficking, and overall criminal activity dynamics, may be headed as the sea-change transformation of our lives unfold. Digital and web-based technologies and applications have dramatically and profoundly changed the way human beings function and interact, and such a revolution has been thoroughly explored and researched from the legal, ethical, moral and anthropological perspectives. Daily activities and interactions in which we routinely engage rely more and more on softwares, devices and applications for an ever more extensive range of tasks: from financial transactions and banking services to research, from information and to travel planning, from entertainment to telemedicine, which has been greatly developed and brought major benefits during the SARS-CoV-2 pandemic, and will be valuable as we strive to manage the new phase of the pandemic as well. The Fourth Industrial Revolution is poised change healthcare at its very core as well. As technology advances, it will enable greater medical breakthroughs and the faster development of innovative treatments and medications. Nonetheless, as Dr. Napoletano and colleagues insightfully point out, the criminal element has found fertile ground as the web has evolved and new avenues have become

available to circumvent surveillance and rely on anonymity in the furtherance of a crime. Cybercrime has been coined to indicate any of the countless criminal acts thus perpetrated. The Dark Net is constituted by overlay networks utilizing the Internet, for which specific software or credentials are necessary to access. It is impervious to outside surveillance and constitutes an almost ideal ecosystem for illegal transactions and services to be exchanged. Some may be surprised to learn that the Internet we all use multiple times every day, which we could refer to as “surface web”, only accounts for 5% of the World Wide Web (1). By far the largest share is constituted by the so-called “Deep Web”, which does not necessarily coincide with illegal activities, but rather encompasses websites that are not indexed in the search engines we all use, including medical records, legal documents, subscription information and the like, and requires special software or credentials to access.

The third level, the Dark Web (i.e. websites that exist on the Dark Net, an overlay that ‘covers’ the internet and enables anonymity), which Dr. Napoletano and colleagues mention in connection with new psychoactive substances trafficking, is beyond unindexed sites, and accounts for a small fraction of the Deep Web (rough estimates place its share at 1-4%, although an accurate quantification is impossible) (1). While merely accessing the Dark Web is not illegal, much of the activities and exchanges that take place on it are indeed illegal. Anonymity while using Dark Web sites is guaranteed through encryption, which is definitely a priority to those pursuing criminal activities. One of the main legal, and even valuable, uses of the Dark Web is by political dissidents living under dictatorial regimes which constrain freedom of information and speech by strict control over internet communications, and by whistleblowers, who would otherwise risk retaliation after divulging sensitive information usually linked to crimes committed by their governments or superiors. Websites on the Dark Web are most commonly encrypted (and thus difficult to track) using the Tor (acronym of The Onion Router, a metaphor for the multiple layers of encryption that make it extremely difficult to control) browser, which most Dark Web users access those sites, though there are other encryption tools and browsers, such as I2P (2). Another key peculiarity in such dark corners of the cybersphere is there are no search engines, since any such kind of indexing would provide a “breadcrumb trail” for investigators. For the illegal substances supply chain and transactions, anonymity is key, both in seeking the drugs and in terms of paying for them. In that respect, cryptocurrencies add a further layer of anonymity. The development over the years of large scale “cybercriminal communities” which thrive on the Dark Web is extremely worrisome, considering that drug trafficking is the single most important illegal activity performed via the dark net. Interventions by law enforcement agencies have been reported as mixed in terms of results (3). As of 2020, 38 identified active dark marketplaces for illegal drugs were identified. When law enforcement agencies successfully shut down marketplaces, a sudden increase in drug listings in coexisting marketplaces has been observed (4). All the complexities herein briefly elaborated on have to be contextualized by taking into the equation the distinguishing traits of new psychoactive substances (NPS). While NPS are extremely dangerous and deadly, due to their elusiveness and unpredictable effects, dark marketplaces do not offer any protection to customers or vendors, hence the danger for users is magnified. Such compounds are extremely attractive to drug dealers and smugglers due to their potency and because a high “street value” can be achieved with relatively small amounts, minimizing the risks involved in transit and trafficking compared with equipotent quantities of drugs such as heroin, especially on Dark Web marketplaces. The high level of potency is the main reason for their lethal potential and their catastrophic impact on public health (5). The new, almost untraceable means of trafficking have given rise to small, independent criminal networks that are not tied to traditional drug trafficking organizations, which makes them considerably harder for law enforcement to monitor (6). In light of the major ongoing evolution of

illicit drugs supply-and-demand avenues and ecosystems, it is of utmost importance to fine-tune our responses for fighting crime while upholding public health. New toxicological and forensic approaches need to take into account in the global challenge to health risks caused by new psychoactive substances and how the changing routes of trafficking require new sets of skills and a broad-ranging, truly multidisciplinary effort (7, 8). The impact that cybercrime can generate on public health is daunting, and represents an existential threat for the very fabric of our societies and the lives of millions. As the enemies and threats to our social peace and well-being now lurk in the ether, almost invisible and untraceable, an extraordinary effort needs to be undertaken to adapt, integrate our skills and take global cooperation and exchange to a whole new level, if we are to prevail.

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