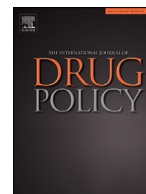




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Research paper

The success rate of online illicit drug transactions during a global pandemic

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ABSTRACT

Background and Aims: In the months following the onset of the COVID-19 pandemic, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA; 2020) observed an increased use of cryptomarkets, which led them to question whether cryptomarkets constituted a more convenient channel via which to distribute illicit drugs without any in-person contact. However, as more countries' borders closed, the likelihood is that cryptomarkets have been negatively impacted. We aim to measure and understand the success rate of transactions on cryptomarkets during the ongoing COVID-19 pandemic, through recourse to self-reported data that documents the outcome of cryptomarket transactions.

Methods: To collect self-reported data on cryptomarket transactions, we launched a platform where participants can enter information about their prior activities on cryptomarkets. The sample consists of 591 valid self-reports that were received between January 1st, 2020 and August 21st, 2020.

Results: The number of unsuccessful transactions increased concurrently with the global spread of the pandemic. Both the international and inter-continental nature of the transactions and the severity of the crisis in the vendor's country are significantly associated with delivery failure.

Conclusions: Drug cryptomarkets may have been disrupted due to the pandemic. The results lead to two opposing explanations for unsuccessful transactions. One explanation for the lower success rate is the inability of drug dealers to deliver on past promises that were made in good faith, while the second points towards opportunistic and abusive behaviour by drug dealers.

Pseudonymous online markets

The online trafficking of illicit drugs takes place via a variety of channels, including social media sites, e-commerce platforms, and even via dark pseudonymous networks known as the 'darkweb' (Barratt & Aldridge, 2016; Tzanetakis, 2018; Tzanetakis et al., 2015). Cryptomarkets, which are a subset of illicit drug trafficking channels on the darkweb, are platforms that operate in many cases under an almost identical model to eBay (Barratt, 2012). Their administrators offer a venue where independent drug dealers and users can transact with one another, in exchange for a commission on each sale. New business models are available to buyers and sellers where sellers can offer same-day delivery for example, or even direct dealing (Childs et al., 2020). The principal benefits of cryptomarkets are the security and anonymity they provide (Aldridge & Décary-Héту, 2014; Tzanetakis, 2018; Van Hout & Bingham, 2013). Indeed, cryptomarket participants never have to meet face-to-face, communicate through encrypted messages, receive their purchases hidden within other mail

packages and pay via pseudonymous cryptocurrencies like Bitcoin (Van Hout & Bingham, 2013; Van Slobbe, 2016). In an underground economy in which any single market can have hundreds of thousands of participants (Justice Department, 2017), cryptomarkets represent an alternative to traditional physical illicit drug markets in terms of sourcing and distributing illicit drugs. Sales on Darkweb markets, which includes cryptomarkets, increased by 70% in 2019 alone and now account for more than USD\$790 million per year, according to a private Blockchain analysis company (Chainalysis, 2020).

Successful illicit drug transactions on cryptomarkets

We still do not understand which factors play a role in the successful delivery of illicit drugs sold on cryptomarkets. Past research has had to rely on the publically available activity feeds that cryptomarket customers share online. Only one study (Stinenbosch, 2019) managed to gain access to the backend server of a cryptomarket, and its master list of transactions, though the author unfortunately did not provide a full

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estimate or predictive model for the success of transactions. Despite the relative dearth of research, prior studies do suggest that the success rate of transactions is bound to be impacted by the level of collaboration and opportunism within cryptomarkets (Munksgaard, 2020). For example, although cryptomarkets have put in place escrow payments to prevent internal fraud, customers can still lie to administrators about not receiving their drugs, in order to demand a refund. Vendors can also act opportunistically by requiring their customers to forgo the escrow service and pay them directly. This enables vendors to claim to have shipped the illicit drugs when, in fact, they have not.

What we do know is that cryptomarkets are highly embedded in the physical world, both with respect to sourcing illicit drugs and their subsequent delivery. Paquet-Clouston et al. (2018) frame cryptomarkets in this way, insofar as drug dealers have to source their illicit drugs, at some point in the distribution channel, from producers or intermediaries in traditional physical illicit drug markets. Consequently, the same constraints that apply to illicit drug markets, such as the availability of products, for example, must also apply to cryptomarkets. Deliveries of illicit drug packages are also very much embedded in the physical world, insofar as cryptomarket vendors must mail their illicit drugs to their customers, which means that they encounter the same delays and issues that plague all mail packages (Volery, 2015). Given that prior research has found that cryptomarket participants are predominantly located in Western industrialized countries (Van Buskirk et al., 2016), both postal service issues and the level of customs enforcement are likely to impact upon the delivery of packages in these countries.

How cryptomarkets respond to pandemics

The COVID-19 pandemic has impacted many aspects of our social lives, not to mention having unprecedented consequences for the global economy (Barua, 2020). The pandemic has had very different impacts on social groups, and less fortunate groups have had to bear much of the impact of the pandemic. This includes vulnerable populations of drug abusers for example. Still, prior research suggests that recessions ordinarily do not engender a drop in demand for illicit drugs, as drug users are highly stable customers (Caulkins, 2011). Dunlap et al. (2012) show that although many drug users do not change their drug habits during economic crises, some edge cases do induce shifts in illicit drug markets. Their study of New Orleans in the aftermath of Hurricane Katrina shows a rise in drug prices to adjust for the fact that the catastrophe had inevitably led to a shortage of drugs.

In the months that followed the onset of the COVID-19 pandemic, the EMCDDA (2020) observed an increased use of cryptomarkets, which led them to question whether cryptomarkets represented a more convenient channel through which to distribute illicit drugs, due to the fact that no in-person contact was required. However, drug dealers hide illicit drug loads within legitimate international shipments (UNODC, 2020). Hence, if a government closes a country's borders, then cryptomarkets are very well likely to be impacted. Therefore, international drug trafficking may have, in fact, become even more difficult, if not actually impossible even, following various bans on international travel and trade. The impact of COVID-19 on illicit drug markets is highly dependent on the geographic location of the vendor and the buyer, for the simple reason that all countries were not affected in the same way by the pandemic (UNODC, 2020). Conversely, domestic sales of illicit drugs on cryptomarkets may have been less impacted than international sales.

The type of illicit drug that is being transacted may also play a role in terms of how COVID-19 has impacted on cryptomarkets. For example, both the EMCDDA and Europol (2020) report that, while there is little evidence that COVID-19 has impacted cocaine sales, there has been a reduction in the demand for synthetic drugs. The same study also notes that there has been a price increase for most drugs sold on cryptomarkets following the pandemic (EMCDDA & Europol, 2020). While this change may be indirectly due to the pandemic, in the sense that individuals' behaviour changes in response to shortages, the report from the EM-

CDDA and Europol draws attention to the possible stockpiling of herbal cannabis by users, and indicates that the increased price of cocaine and cannabis may derive from a shortage of these drugs (EMCDDA & Europol, 2020). As aforementioned, given that many cryptomarket participants reside in Western industrialized countries, the changes imposed by the pandemic might have impacted upon major actors in drug markets and undermined their competitive advantage. The Netherlands, for example, has been widely documented as an important source for the illicit drugs on cryptomarkets (EMCDDA & Europol, 2019). However, following the COVID-19 breakout, its presence on cryptomarkets appears to have decreased somewhat (EMCDDA & Europol, 2020).

Research aims

Barratt and Aldridge (2020) provide an insightful analysis of the potential impact of the COVID-19 pandemic on drug cryptomarkets. Specifically, the authors identify potential business opportunities for cryptomarket dealers, alongside highlighting the prevailing uncertainty and confusion in this sector. One reason for the lack of clarity over the impact of the COVID-19 pandemic is the sheer dearth of empirical data on cryptomarket participants. The work presented above suffered from a similar limitation, with very little reporting being based on data collected directly from cryptomarket participants.

One of the benefits of cryptomarkets is their ability to generate real-time information on the state of cryptomarkets. Due to their open nature, researchers have the ability to reach out to their participants and survey them about both their opinions and activities. For this research, we build on previous research by focusing on one significant factor, namely the success rate of transactions on cryptomarkets. More precisely, our aim is to measure and understand the success rate of transactions on cryptomarkets during the COVID-19 pandemic. We do so through recourse to self-reported data that documents the outcomes of cryptomarket transactions. To be clear, we do not claim that our data allows us to precisely predict how cryptomarket participants adapt during crises such as a pandemic; rather, it helps us to understand both how illicit markets cope with external stresses, and whether these can impact upon illicit markets that are harder to capture than simply looking at the number of participants, volume of sales, or the price of illicit drugs.

Methods

In order to collect self-reported data on cryptomarket transactions, we launched the DrugRoutes.com website (that was also available on the darkweb)¹. DrugRoutes is an online platform that crowdsources cryptomarket participants for information about their prior transactions on cryptomarkets. Visitors to the website are invited to anonymously provide information about a purchase or sale they have made on cryptomarkets. They are asked to provide the specific type of illicit drug they bought, the quantity, the amount of money they paid, the date of the transaction, the country of origin and destination of the illicit drug, and whether or not the illicit drugs were actually received. In an effort to encourage the darkweb community to participate in this survey each time they engage in a trade, the results are shared publicly on the website along with a map detailing the success rates of each country. The community is therefore able to see the safest – and riskiest – routes for drug transactions. Each entry to the website is moderated by the research team, both to ensure the quality of the data and to eliminate any potential spam. Entries are classified as spam – and not analyzed in this paper, or presented on the website – if the transaction price varies too significantly from the advertised price for the same drug, shipped from the same country. DrugRoutes is not the only online platform collecting drug-related data. Statistics Canada, for example, launched StatsCannabis to crowdsource the price of cannabis in Canada

¹ See Fig. 1 in Annex for a visual representation of the website.

Table 1
Bivariate analyses of independent categorical variables for both successful and unsuccessful transactions.

Variables	Unsuccessful	Successful	Group comparisons
Origin of the buyer			Chi2=16.260**; Cramer's V = 0.166
United States	26% (40)	74% (111)	
France	31% (18)	69% (40)	
Germany	17% (8)	83% (38)	
United Kingdom	24% (11)	76% (35)	
Canada	13% (5)	87% (33)	
Other	35% (86)	65% (157)	
Origin of vendor			Chi2 = 20.540***; Cramer's V = 0.186
United States	21% (27)	79% (103)	
Netherlands	44% (42)	56% (54)	
Germany	29% (22)	71% (55)	
United Kingdom	36% (26)	64% (46)	
Canada	18% (6)	82% (28)	
Other	24% (44)	76% (138)	
International nature of the transaction			Chi2 = 61.749***; Cramer's V = 0.323
Yes	42% (130)	58% (178)	
No	13% (37)	87% (246)	
Intra-continentiality of the transaction			Chi2 = 41.447***; Cramer's V = 0.265
Yes	21% (95)	79% (349)	
No	49% (72)	51% (75)	
Type of drug			Chi2 = 3.067
Cannabis	28% (45)	72% (117)	
Cocaine	32% (29)	68% (61)	
LSD	19% (11)	81% (46)	
Other	29% (82)	71% (200)	

N = 591.

** $p < .005$.

*** $p < .001$.

following its legalization². This is another example of a website being used in lieu of more traditional research methods, and yet yielding significant results.

The consent form and all the contact information are available on the website. Consent from the participant is assumed upon the submission of an answer. The information gathered is strictly confidential, as no identifying information is collected and is impossible to associate submissions to specific users. No sociodemographic information is of course collected. It is possible for a participant to submit more than one entry, though the research team monitors rapid successive submissions to eliminate possible spams. The survey platform was advertised by the research team on approximately 140 Darkweb platform by public messages posted on forums and by messages sent privately to individual users.

The sample in this study comprises 591 valid submissions received between January 1st, 2020 to August 21st, 2020, which, on average, is equivalent to three submissions every day. A further 250 submissions were deemed to be invalid during that time frame. The sum total of this sample's transactions amounts to USD\$1.3 million (more than USD\$6,000 per day). As a comparison, all darkweb transactions were estimated to have generated over USD \$700 million in sales in 2019 (Chainanalysis, 2020). In order to analyse the sample, Chi-2 analyses were conducted to investigate the association of different variables with the success or failure of the transaction. Then, a logistic regression analysis was performed. The logistic regression aims to estimate the probabilities of an event occurring based on a series of covariates, in this case, the failure of a cryptomarket transaction as explained by the average daily COVID-19 mortality rate for the buyer's country, the vendor's country and an interaction effect (buyer x vendor), the value of the transaction in USD, whether the transaction is international, whether the transac-

tion is inter-continental, the origin of the buyer, the origin of the vendor and the drug type.

Each government reacted differently to the pandemic and adopted different measures, at different times, to combat the pandemic. Measuring the intensity of the pandemic in multiple countries across time is a significant challenge. Indeed, the high number of coronavirus deaths poses challenges to the healthcare system, economic development, supply chain, education, and travel pattern of the people (Evans, 2020). One method to model the impact of the pandemic is through the mortality rate due to COVID-19 in each country (see for example Chowdhury et al., 2020; Middelburg & Rosendaal, 2020). A substantial number of studies published in high quality peer-reviewed journals have used mortality rate to account for the severity of the pandemic in their publication (see for example Ammar et al., 2020; Le & Nguyen, 2021; Rahman et al., 2020). Ammar et al. (2020) find a correlation between the level of distancing measures and the number of COVID-19 related deaths, without being able to identify a causal relationship. Le and Nguyen (2021) in their paper published in Economics & Human Biology claim that "given the shortage of testing capability in the early days, mortality rate is currently the best measure of the severity of the pandemic". As we want to test the impact of Covid-19 and the related social distancing measures on cryptomarkets, we consider mortality rate as the best measure of the impact of the pandemic. Future research should, however, continue to investigate the relationship between the impact of the pandemic at the national level to provide more evidence of the reliability of mortality rates. We use the Johns Hopkins (2020) data to account for the mortality rate for each day as the researchers of this institution and from around the world rely on this data for its COVID-19 Testing Insights Initiative in supporting the public and policymakers to understand and make decisions about the pandemic related matters.

The categorical variables are presented in Table 1 in relation to the status of the transaction (success or failure), while the continuous variables are presented in Table 2.

² <https://surveys-enquetes.statcan.gc.ca/cannabis>

Table 2
Mean test of independent continuous variables for both successful and unsuccessful transactions.

Mean (SD)	Unsuccessful	Successful	T(dI)
Average Daily Death Rate for the vendor country ¹	2.44 (3.22)	1.53 (2.61)	-3.26 (255.92)**
Average Daily Death Rate for the buyer country ¹	2 (3.31)	1.51 (2.85)	-1.69 (268.25)*
Buyer multiplied by vendor Death Ratio	9.79 (21.11)	7.56 (21.78)	-1.15 (312.77)
Transaction worth (USD)	4363.78\$ (26758.19)	1560.02\$ (5479.57)	-1.343 (171.51)***

N = 591.

* $p < .10$.

** $p < .001$.

*** $p < .000$.

¹ For the week of the transaction (3 days before and after).

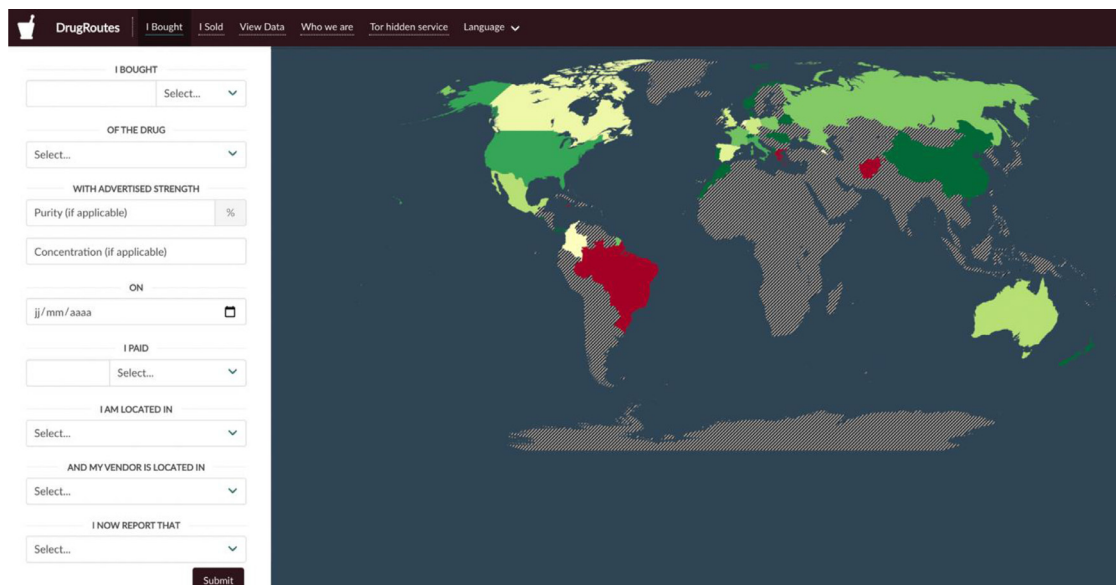


Fig. 1. Screenshot of the Drugroutes.coms.

Results

The dependent variable that is observed in this study is the failure rate of transactions. 65% of the transactions amongst our sample were received without any issue, while a further 6% were received, but were impacted by a particular issue (for example, the package did not contain the right quantity of the drug). Both cases were coded as 0. The unsuccessful transactions represent 29% of the sample and were coded as 1.

There is a total of **69 different countries represented in the list of buyers**. In order to streamline the analysis, we considered only the top five countries. These account for more than 61% of all the transactions (United States ($n = 151$), France ($n = 58$), Germany ($n = 55$), United Kingdom ($n = 46$), and Canada ($n = 38$)). There is a total of **59 different countries represented in the list of vendors**. Just as we did for the origin of the buyer, we considered only the top five countries that combined account for 59% of all transactions (United States ($n = 130$), Netherlands ($n = 96$), Germany ($n = 77$), United Kingdom ($n = 72$), and Canada ($n = 34$)). Almost half of the transactions in the sample are domestic, that is, occur within the same country ($n = 283$), whereas the other half are **international** ($n = 308$). There was also an interesting distinction to be drawn between the international nature of a transaction and the fact that it was completed **within one continent** ($n = 444$). Specifically, the success rate of transactions has more to do with continentality than it does the international nature of a transaction. The most reported **illicit drug types** in the

transactions are cannabis ($n = 162$), followed by cocaine ($n = 90$) and LSD ($n = 57$). In fact, these three illicit drugs account for more than 52% of the sample, which is why only these were considered in the analysis.

The pandemic did not impact upon different countries at the same time and with the same level of intensity. To account for geographical-based differences in impact, we took into account the **severity of the loss of human life in each vendor and buyer country, at the time of the transaction**. The data on each country was provided by the [Johns Hopkins \(2020\)](#), for each week of the period under examination. The **relation between the mortality ratio of the vendor country and that of the buyer** was also calculated in order to understand if their combined impact was significant. Finally, given the abnormal distribution of the transaction prices, we subsequently calculated the **log₁₀ of transaction worth (USD)**. In most cases, the largest transactions (more than USD\$5,000) are international (84%).

Fig. 2 presents the evolution of unsuccessful transactions over time. The trend is positive, thus suggesting that as the pandemic spread across the globe, so did the issues associated with delivering illicit drugs through cryptomarkets. The red vertical line indicates the point at which most Western countries imposed their first national lockdowns. One can discern a sharp increase in delivery issues just after the introduction of such measures, albeit many of the fluctuations appear not to be correlated with that specific event.

To be able to observe which factors are associated with the failure of cryptomarket transactions, we proceeded to conduct a logistic regres-

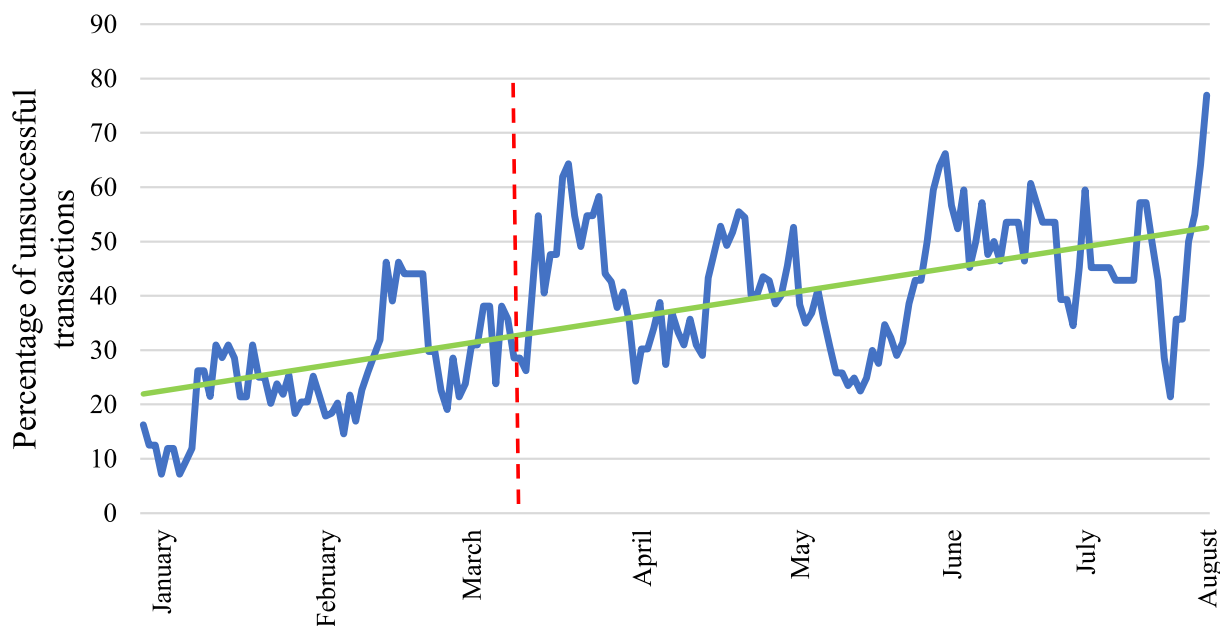


Fig. 2. Evolution of the share of unsuccessful illicit drug transactions on cryptomarkets.

Table 3

Summary of regression analyses for variables predicting online drug market transactions' failure.

Variables	B	SE B	Exp(B)
<i>Average daily mortality rate for</i>			
buyer's country	0.05	0.05	1.06
vendor's country	0.14	0.06	1.15**
buyer x vendor	-0.01	0.01	0.99
Log10 of transaction worth (USD)	-0.01	0.13	0.99
If the transaction is international	1.11	0.31	3.02***
If the transaction is inter-continental	0.63	0.26	1.88**
<i>Origin of buyer</i>			
France	-0.10	0.36	0.91
Canada	-0.92	0.57	0.40
United Kingdom	-0.60	0.50	0.55
Germany	-0.43	0.41	0.65
USA	-0.01	0.32	0.99
<i>Origin of vendor</i>			
USA	0.11	0.36	1.12
Netherlands	0.39	0.33	1.48
United Kingdom	0.59	0.39	1.81
Germany	0.37	0.34	1.45
Canada	0.12	0.58	1.13
<i>Illicit drug type</i>			
Cannabis	0.07	0.26	1.08
Cocaine	0.30	0.30	1.35
LSD	-0.65	0.40	0.52
-2 log likelihood	606.024		
Nagelkerke R2	0.219		
% of correct classification			
Unsuccessful	28.7		
Successful	91.3		

N = 591.

** p < .05.

*** p < .001.

sion analysis to explain the failure of transactions. The results of the logistic regression are in Table 3.

Our model controls for the severity of the crisis in the countries involved in the transaction, the price of the illicit drugs, the international and inter-continental nature of the transactions, the origin of the participants, as well as the type of illicit drugs sold. The results suggest that the failure rate of transactions is not dependent on the type of drugs, the country of origin of the participants, or the price of the transaction.

However, the international nature of the transactions is significant. There are greater risks in shipping drugs internationally, even if it is to other countries on the same continent. Finally, the variable that is of most interest for this research is the severity of the crisis, which was measured by the number of COVID-19 related mortalities within the involved countries at the time of the transaction. The results show that the average daily mortality rate in the vendor's country is associated with the failure of the transaction, while the severity of the pan-

dem in the buyer's country does not seem to impact upon the delivery status.

Discussion

The main aim of this paper was to measure and understand the success rate of transactions on drug cryptomarkets during a pandemic. Our results suggest that the intensity of the pandemic in each country, as determined by the number of mortalities at the time of a transaction, as well as the international and inter-continental nature of the transaction may play a role in the success rate of cryptomarket transactions. Although this study is unable to determine the causes of this impact, it does lead to two opposing hypotheses pertaining to whether the apparent increase in unsuccessful transactions is due to either the inability of drug dealers to deliver on past promises that were made in good faith, or the opportunistic and abusive behaviour of drug dealers who are taking advantage of the pandemic to steal from their customers.

Previous research suggests that the former, rather than the latter, is the likely source of the problem. Indeed, given that cryptomarkets are highly connected to physical markets (Paquet-Clouston et al., 2018), online vendors may have had a harder time, during the pandemic, delivering their drugs via the mail. Indeed, borders were harder to cross, and mail packages were delayed in favor of the delivery of essential goods. Hence, vendors may have simply been unable to fulfill their orders, which, in turn, leads to a higher failure rate. Moreover, the pandemic has also had a disruptive impact on the physical illicit drug market, causing both shortages of illicit drugs and an increase in the prices of some drugs (EMCDDA-Europol, 2020). In light of social distancing measures, the supply chain and logistics of drug trafficking underwent profound disruption, particularly at the distribution level (EMCDDA, 2020). Should this hypothesis turn out to be true, then we would expect the success rate of transactions to return to normal once the pandemic has subsided.

The alternative hypothesis is that COVID-19 engendered a change in the behaviour of cryptomarkets participants. COVID-19 impacted upon many national economies and led to many people losing their jobs (Barua, 2020). Europol noted that the prevailing instability created a volatile environment for criminal activities across the supply chain (EMCDDA-Europol, 2020). Because of that, the level of violence increased among certain actors in the chain, thus leading to abnormal and potentially opportunistic behaviour. Actors in the online market may also have been affected by these changes. For example, vendors may have engaged in fake sales on cryptomarkets to compensate for their lost revenues from other sources. In difficult times, vendors may be more willing to compromise the reputation they have built up over the previous months in order to secure payments from buyers. This is somewhat supported by the data, which points toward the fact that the level of unsuccessful transactions are higher among vendors residing in countries that are most affected by the pandemic. Based on Morselli et al.'s (2017) findings, we should not expect a wave of violence related to cryptomarket failed transactions, should these materialize in big numbers. Indeed, cryptomarket participants are more likely to negotiate, perhaps threaten but most likely to ostracize opportunistic partners that steal from them.

Our results also show that some variables are not associated with the success or failure of transactions, which is in contrast to what previous research has found. The results suggest that the failure rate of transactions is not correlated with the type of drugs sold. This is the exact opposite of previous findings, which show that certain drugs such as cannabis are not as easy as LSD to hide within mail packages given both its volume and smell (Décary-Héту et al., 2016). The country of origin of the participants is also not a significant factor that contributes to the success or failure of transactions, which means that differences in countries' regulations and border enforcement do not impact on cryptomarket transactions in the way that prior research suggests it does (Demant et al., 2018). The price of transactions – and by proxy the size

of the package – also does not appear to impact upon the failure rate of transactions. Once again, this finding is in contradiction to previous hypotheses, which posit that it may be more difficult to hide large quantities of drugs (Décary-Héту et al., 2016). However, anecdotal evidence suggests that, in fact, large purchases are being shipped in multiple smaller packages to ensure their successful delivery. The report from the EMCDDA and Europol (2020) also states that they observed an increase in the number of sales of smaller quantities and a decrease in the sales of larger quantities during the pandemic, which we did not capture in our sample.

Limitations

Unfortunately, this study is limited first by the small size of its sample. This sample is not representative of all cryptomarket transactions, and given the lack of sociodemographic data, prevents us from posing hypotheses as to whether and how our sample may be biased. Our sample is also self-selected, albeit the broad advertisement of the survey means that all market participants, no matter their origin or particular type of illicit trade, were invited to participate in the survey. Given that the results of the survey represent only a small fraction of the activities of cryptomarkets during the current pandemic, the impact of the variables presented in our model might be different from their normal state. Therefore, future research should continue to examine the relationship between transaction success and types of drugs, origin of the participants, the international nature of transactions, and the value of transactions.

Another significant limit of this paper is the use of the John Hopkins mortality rate (Johns Hopkins, 2020). This mortality rate is based on national definitions of what a COVID-19 related death is, and disparities in testing and definitions could under- and overestimate the COVID-19 mortality rate in any country (Corrao et al., 2021). Since both outcomes are possible, it is not possible unfortunately to state whether the use of the Johns Hopkins (2020) data is more likely to create spurious relationships, or make it harder to detect significant relationships in our model. Still, past research in high-impact factor journals (Ahmad et al., 2020; Alcendor, 2020; Hashim et al., 2020; Mattiuzzi et al., 2021; Yli et al., 2020; Zhang & Schwartz, 2020) use the numbers from Johns Hopkins (2020) with no explanation for their use, while Friedman et al. (2021) defend the use of this dataset by explaining that it is the most commonly used dataset to evaluate COVID-19 pandemic states, it covers all States in the world, its data are available publicly and their quality were deemed acceptable.

Conclusion

While cryptomarkets have grown in recent years, their future is entirely dependent on a high success rate in order to increase their pool of participants. It has been shown in previous research that a rise in failed transactions is most likely accompanied by a rise in disputes as well as a potential loss of trust between vendor and buyer (Kamphausen & Werse, 2019). In this respect, our results suggest that cryptomarkets may not represent the perfect alternative to sourcing drugs from physical markets during periods of external stresses. Future research should model how other types of stresses (e.g., police interventions) impact upon the success rate of transactions, as well as considering whether transaction success rates do indeed play a role in the long-term expansion of cryptomarkets. In addition to this, future research should also model how short- and long-term criminal trajectories are modified by illicit drug vendors in times of pandemics and systemic external stresses. Qualitative interviews with cryptomarket drug dealers and buyers might also be useful to better understand the increase in unsuccessful transactions during the pandemic. Despite its limitation, the research design is innovative. The data source used was of great advantage since it represents drug transactions as reported by users of cryptomarkets. Unlike the official data offered in the various reports of large organizations

(e.g. UNODC; law agencies official data) or by studies on the analysis of posts made in these markets (e.g. Demant et al., 2018), our results demonstrate a rich, different and even potentially more reliable reality of the behavior of cryptomarket users.

The DrugRoutes website is still online and continuing to collect samples, which means that future research will present larger samples that allow us to expand upon the preliminary conclusions outlined above. While several studies have attempted to predict the general impact of the pandemic and the attendant lockdowns on the drug distribution network, they have come to wholly different conclusions. It is important to pay attention to the strategies and measures upon which these predictions are grounded, insofar as the market may adapt in a multitude of ways (Giommoni, 2020). We are not claiming to be able to predict how the market will adapt; rather, this article merely hopes to contribute towards a better understanding of drug cryptomarkets, particularly during a pandemic.

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Ethical statement

The research has been approved by the Comité d'éthique de la recherche (Société et culture) de l'Université de Montréal. Project no. CERC-2019-045-P.

Declarations of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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