Churn, hubs and hybrid fulfilment: link-tracing Telegram drug-market ecologies from London and Warsaw

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Abstract

Purpose

This article examines how drug-market activity on Telegram is organised through digitally mediated but physically grounded practices, and how volatility and partial visibility shape what can be known about these markets

Design and method

The work uses an iterative, three-level link-tracing scrape of public Telegram channels anchored in city-specific entry points (London/UK and Warsaw/Poland) and conducted in two waves (March and May 2024) capturing channel metadata and messages from public channels, and recording private channels encountered via links. This is the basis for a descriptive analysis of channel network and activity, and a closer description of two sales bots.

Findings

Across both entry points, a sizeable, heterogeneous market is observed, but one that is difficult to bound because discovery is highly dependent on a small number of "hub" channels. The network contracted sharply between March and May, especially in London, indicating high churn and the fragility of entry pathways. Private channels comprised a substantial share of the networks. Channel descriptions combined drug advertising with trust/security signalling and, in Warsaw, frequent "roleplay" disclaimers suggestive of platform-facing self-protection. Evidence of cross-platform linking and bot-mediated storefronts indicates hybrid infrastructures with physical fulfilment.

Originality

We characterise Telegram's drug-market network as marked by churn and with volatile key nodes, documenting linkages that blur digital/physical boundaries. We show how small, short-lived channels co-exist with a few high-visibility hubs and bots, and links these patterns to the dynamics of hybridity, volatility, and partial visibility: factors that complicate both inference and intervention in app-mediated drug markets.

Introduction

Information and communications technology have a long history of being used to facilitate the exchange of illicit substances, with it being reputed that the first ever financial transition via networked computers was for a small amount of cannabis in the 1970s (Markoff, 2005). Since then, there has been a steady evolution of new technologies being used, from mobile telephones and pagers (Curtis *et al.*, 2002; Natarajan *et al.*, 1995) to bulletin boards and fringe websites (*United States of America vs Willems et Al.*, 2011) and, since the infamous launch of Silk Road in 2011, the Tor network and what have come be known as anonymous online markets or cryptomarkets (Barratt, 2012; Christin, 2013; Martin, 2014a). The latter has received significant attention from criminologists using an array of different methodologies from the qualitative to the quantitative, but remain hard to use (Kowalski *et al.*, 2019) with frequent site closures, scams, and requiring at least a basic knowledge of cryptocurrencies and cyber security.

It is perhaps unsurprising, then, that there have been developments with other applications and social media to facilitate the exchange of illicit drugs. Within this new media, a wide range of tools have been used by all levels of the drug trade, from the highest levels as demonstrated by the EncroChat affair (Stoykova, 2023) all the way down to 'street' level people who sell drugs using encrypted commercial services such as Signal, Wickr and WhatsApp. Research has uncovered people advertising illicit drugs on Instagram, Facebook and Snapchat (Bakken and Demant, 2019; Demant *et al.*, 2019; Moyle *et al.*, 2019). Barratt et al. (2022) studied a short lived and high-profile automated bot, Televend, that ran on the Telegram instant messaging application and while the bot was offline by the time of publication of the paper, the authors question whether future such services would be adopted more widely than the relatively niche group who seem to have used Televend.

This article explores how drug-market activity on Telegram is organised. Using iterative link-tracing scrapes of public channels based on city-specific entry points, combined with descriptive analyses of channel activity and two sales-bot case descriptions, it characterises the Telegram drug trading as shaped by both rapid churn and a small number of nodes, with linkages that occasional extend across platforms, and that seem to rely on physical delivery. This paper contributes to the literature by providing, to our knowledge, the first scaled description of Telegram's channel ecology, and draws out possible mixed implications for harm reduction while raising questions about how trust is constructed.

An overview of Telegram

Telegram is an instant messaging application that was founded in 2013 (Sutikno *et al.*, 2016). Its founder, who is also known for creating the Russian social networking site VKontakte (VK), created Telegram to provide a more secure and private messaging platform after his social network was seized by the Russian authorities. Telegram is headquartered in Dubai, United Arab Emirates, and has gained global popularity due to its emphasis on security and speed. Telegram offers a range of features that make it stand out from other messaging applications (Gregorio *et al.*, 2017). It uses a unique MTProto protocol which ensures high-speed message delivery while maintaining strong security. The application supports messages, voice calls, video calls, and file

sharing of various formats. Users can also create groups with up to 200,000 members and channels that allow broadcasting to unlimited audiences. One of Telegram's standout features is its support for end-to-end encryption in its "Secret Chats" (Botha *et al.*, 2019). These chats are device-specific and do not leave traces on Telegram's servers. Additionally, Telegram offers a self-destruct timer for messages in secret chats, enhancing privacy further. Regular chats, however, are stored encrypted on Telegram's servers and are accessible from any connected device. As of 2023, Telegram boasts over 1 billion active users worldwide (Telegram, ND). Its user base has grown steadily due to its robust feature set and reputation for strong privacy policies, which have attracted users who are wary of more mainstream messaging applications.

Telegram's open API and support for bots have also made it popular among developers and businesses, enabling the creation of custom tools and integrations. Telegram's user base spans across the globe, with significant adoption in regions like the Middle East, South Asia, and Eastern Europe. Its popularity surged during times of political unrest and protests, where it served as a crucial communication tool for activists and organisers (Wijermars and Lokot, 2022). Despite its legitimate uses, Telegram has been used to facilitate various illegal activities, including drug trafficking, terrorism, and cybercrime (Boersma, 2023). Terrorist organisations have utilised Telegram to spread propaganda, recruit members, and coordinate attacks (Shehabat et al, 2017, Bovet and Grindrod, 2022). The application's channel feature allows these groups to broadcast messages to large audiences without the risk of being easily shut down. Moreover, cybercriminals have exploited Telegram for illicit activities such as selling stolen data, hacking tools, and counterfeit goods (Garkava *et al.*, 2024). The application's anonymity and ease of use make it an attractive option for those looking to conduct illegal transactions. Telegram faces the ongoing challenge of balancing user privacy with the need to prevent criminal misuse, a subject that has become particularly pertinent since the arrest in France of its founder (Loucaides, 2025).

Technology and the drug trade

Digital trust and harm reduction

A recurring pattern can be seen in which new technology alters the physical exchange of goods, prompting changes in market organisation and methods of trust. The first set of research that investigated technology and the drug trade explicitly was in the 1990s, and the adoption of early mobile communication tools, from beepers, pagers and 'cellular' telephones. These allowed people who sell drugs to communicate and coordinate with their customers in previously unknown ways, outside the immediate sight of law enforcement and reshaped offline markets. Technology was framed as a facilitator of drug exchange, rather than the means of exchange (Natarajan *et al.*, 1995), and significant changes in the modalities of drug exchange such as decreases in the open-air street markets and a growth in delivery services was attributed to these developments (Curtis *et al.*, 2002).

The launch of Silk Road in 2011 marked a step-change in digitally mediated drug exchange, when its founder "figured out how to put all the pieces together" (Popper, 2015, p. 72) and set the standard which all cryptomarkets have since broadly followed (Barratt, 2012; Martin, 2014b; Martin *et al.*, 2019). It also marked a step change in

digital drug research and a range of research techniques have been used to study these markets from qualitative text analysis of forums and the markets themselves, interviews with buyers and vendors (Martin *et al.*, 2020), test buys, survey research and the use of the digital traces from the markets and forums connected to them. These methods have investigated why, who and how often people use the markets, stigma reduction for drug users, delivery methods, pricing and identified developing drug trends (for a review of earlier work, see Martin *et al.*, 2019). Trust in these digital spaces, and the implications of these markets for harm reduction, have been two prominent components of that research agenda.

Trust is a central problem in cryptomarkets because actors are pseudonymous, there is no legal enforcement, and there is uncertainty about both product (quality/purity) and eventual delivery (due to potential scams, non-delivery or exit fraud). Building on the "transparency paradox" (Tzanetakis *et al.*, 2016) cryptomarkets 'solve' this by using multiple methods to establish trust such as reputation systems (product/vendor feedbacks and reviews), tools built into the platforms (vendor vetting, dispute resolution, escrow), and through repeated exchange and informal ties that accumulate over time. Munksgaard's (2023) multi-market analysis demonstrates that trust sources are competing and complementary rather than a single mechanism: using transaction value as a proxy for trust, he finds relatively mixed associations for reputation and authentication, but more consistent effects for social ties based on repeat exchange and that subsequent "transactions outside the scope of administrative mediation are generally larger" once trust has been established (Munksgaard, 2023, p. 49). This complements the work of Norbutas et al. (2020) who found that successful repeat transactions with the same seller ("dyadic embeddedness") play a stronger role in establishing trust than reputational information from the markets, though this latter form is important for new participants. In short, personal and repeat interactions matter, even when that interaction is digitally mediated.

Harm reduction questions around cryptomarkets emerged alongside the early empirical work. Among these pieces were questions of consumption, with it being found that initial exposure often led to short-term increased usage but with a lower level of hoarding that in some cases ultimately led to a reduction in consumption (Barratt *et al.*, 2016). Questions of increased availability appear to act as both possible promoters and brakes on harm, with the markets acting as a 'virtual broker' that links suppliers with retail distributors. This can cause increased availability to market participants who would otherwise not be able access offline drugs markets but simultaneously remove violence from middle market drug activity (Aldridge and Décary-Hétu, 2016). This recurrent theme is picked up in the 'gentrification hypothesis' (Martin, 2018, 2023) where "the substitution of offline drug market norms, which are sometimes characterised by violence, intimidation, suspicion, and exploitation, with relative feelings of safety, respect, and courtesy" (Martin, 2023, p. 127) echoing the propositions from over twenty years earlier and the impact of technology on the drug trade in New York city (Curtis *et al.*, 2002).

These cryptomarkets have, however, remained hard to access and use (Kowalski *et al.*, 2019) with regular exit scams, and fear, uncertainty and doubt in their reliability. Moreover, users often prefer more familiar platforms even if they are less secure and have weaker market protections (Horton-Eddison *et al.*, 2021). Moyle et al. (2019) relied on surveys and interviews to find that the use of apps (WhatsApp, Snapchat and

Instagram) are viewed as useful intermediaries between cryptomarkets and traditional street dealing and were used in a variety of different ways, from advertising to networking spaces, making use of encrypted communication channels (see also Demant *et al.*, 2019). Open, unencrypted spaces allow sellers to find customers, while hidden, one-to-one communication are perceived as more secure, particularly if those communication channels are encrypted (Bakken and Demant, 2019). While cryptomarkets remain central to research on digital drug markets, more familiar applications appear to operate through more decentralised and personally/locally embedded forms of exchange. This distinction is important for understanding hybrid online–offline market dynamics, and requires more attention to how the mechanisms function.

Telegram and app-mediated drug exchange

Although work has argued that the choice of platform is relational and situational rather than deliberative (van der Sanden *et al.*, 2022b), Telegram, as described in the previous section, requires specific attention among these encrypted applications, because of its reputation for turning a blind eye to nefarious behaviour and its architecture that is best described as sitting somewhere between private one-to-one messaging application such as WhatsApp or Signal and public forums like X.com (previously Twitter). There has been a limited range of research that has addressed the use of Telegram for the exchange of illicit commodities. Barratt et al. (2022) studied a particular bot, Televend, that ran on Telegram infrastructure with a darknet powered backend, that bridged the gap between the cryptomarket space and social media supply. It found that usage of the service was limited, the products on offer were comparable to that seen to contemporaneous cryptomarkets, and asked whether future such apps might be attractive to those with less knowledge of the darknet markets.

Other investigations based on Telegram have used data capture techniques to study availability of illicit drugs and the characteristics of the markets. During the Covid pandemic, Blankers et al. (2021) studied 3 prominent Dutch language channels that they found through searching for the word “drugs” and found that there had been some movement towards psychedelics from stimulants during the period of lockdown, and classified the material they found to mainly represent a seller’s market. Nali et al. (2024) similarly draw on a set of channels found via simple searches, in this case the phrases “Nicotine,” “Vape,” “Cannabis,” and “Smoke”, discovering 20 channels. Content analysis found an active market in cannabis followed by a more modest amount of nicotine products. They also simulated test buys of vape products to check age restrictions.

Only three other pieces of work were found that directly address drug markets on Telegram and take a qualitative approach. In the Polish setting, Wanke and colleagues (2026) have drawn on qualitative interviews with Polish drug users. Their study shows that Telegram functions as a hybrid environment, acting as a hub for contact and coordination while transactions remain locally embedded and often physically fulfilled. The study also highlights the importance of interpersonal trust mechanisms, such as referrals and “legit checks” in shaping exchange practices. BenBaruch et al. (2025) uses a digital ethnography based in Israel and draws on 20 telegram channels that trade cannabis, and two broad cannabis normalisation processes, normalisation of

usage and of supply. Dewey and Buzzetti (2024) draw on participant observation and in-depth interviews with participants in 4 telegram groups in Argentina and find Telegram facilitates the drug trade, reshaping it in ways that technology has often been seen to, by changing perceptions of risk and by allowing communities to form. They call for more in-depth studies of Telegram specifically.

Telegram therefore provides an important case for examining how digital communication infrastructures intersect with local delivery practices and offline exchange, how trust is established in app-mediated markets, and whether these platforms are changing drug market participation in ways comparable to earlier communication technologies such as pagers and later infrastructures such as cryptomarkets. What remains less developed is an account of Telegram as a broader market ecology, made up of public channels, private spaces, bots, cross-platform links and physical fulfilment arrangements.

Research specification

Significant progress has been made in understanding the illicit drug trade using large scale data collection methods from cryptomarkets, and these have relied on the ability to systematically capture market activity. There has been less progress with the more fractured set of spaces that constitute the social media and app-based illicit trade. This work aims to address that gap, by utilising the architecture of Telegram to implement a link-tracing methodology from a limited number of entry points to provide a picture of the environment that, to our knowledge, is the first that attempts to do this at scale.

Link-tracing methodology has many benefits, the first being that it structures access to a rare and hidden population (Spreen, 1992), and can mimic the real world processes described by one of Wanke et al's interviewees (2026, p. 6): "in my opinion, once you start using that space, let's say, and you join one group like that, it's super easy to end up in ten more. People promote each other and everything. It just spreads." When researchers lack a sampling frame (like a census or registry), starting with a few known seeds is often the only practical way to penetrate hidden, marginalized or highly stigmatized networks. Link-tracing methodology also enables statistical analysis, in spite of having relatively small samples or missing population sizes (see for example Adams et al., 2012) though larger populations can also be studied (Salganik & Heckathorn, 2004).

However, link-tracing may create some biases, such as an emphasis on the most visible or popular actors (Spreen, 1992). Actors that are connected to one another are also more likely to share traits and have a high degree of homophily (Hâncean et al., 2021; Heckathorn, 2002). This limits the information that can be gathered from a network. Actors that are loosely connected to others may also be more difficult to discover (van Meter, 1990). These limitations are important in the present study, where the method is designed to map a visible Telegram ecology rather than provide a complete census of app-mediated drug exchange

Method

Research settings

Previous research has highlighted the value of comparing different national contexts in order to understand how cultural, political and policy environments shape drug use and drug markets (Burris, 2017; Hughes and Stevens, 2010). The United Kingdom and Poland provide a useful contrast in this respect, reflecting differing approaches to drug policy, enforcement and broader socio-cultural contexts (e.g., Los, 2026). While the analysis is anchored in city-specific entry points, these locations are embedded in distinct national and local drug market contexts. Research indicates that app-mediated drug markets vary across countries, with social media and encrypted messaging platforms playing different roles depending on local practices and enforcement environments (van der Sanden et al., 2022). In Poland and parts of Central-Eastern Europe, Telegram has become a prominent infrastructure for drug distribution, enabling rapid ordering and coordination of delivery (Wanke et al., 2026; Poland Watch, 2025). In contrast, in the United Kingdom, drug supply has more commonly been associated with a broader mix of platforms, including social media and encrypted messaging apps, rather than Telegram specifically (Moyle et al., 2019).

These differences may reflect broader patterns of platform adoption and use, and require further research. Telegram has wider uptake in parts of Eastern Europe, where its channel and bot functionalities support large-scale coordination, while in the United Kingdom, drug supply has developed across more familiar social media and messaging platforms. As a result, platform choice may appear to be shaped not only by technical affordances but also by locally embedded communication practices and market structures. Beyond differences in platform use, the two settings also reflect differing local drug-market and policy environments. The UK context has historically been characterised by comparatively visible retail drug markets and widespread use of mixed social media and encrypted messaging platforms for supply (Moyle et al., 2019), whereas recent work in Poland and Central-Eastern Europe suggests Telegram has become more centralised as an infrastructure for coordinating local delivery-based exchange (Wanke et al., 2026). These differences further support the interpretation of Telegram markets as hybrid systems shaped by locally embedded offline practices as well as digital affordances.

Secondly, as will be described in the following subsection, the selection of the United Kingdom (London) and Poland (Warsaw) was also guided by methodological considerations. The study employs a link-tracing approach, which requires identifiable starting points into otherwise hidden networks. These cities were selected because initial Telegram channels could be identified through informal conversations with users, providing practical starting points for the link-tracing process. As such, London and Warsaw function both as analytically contrasting cases and as empirically grounded entry points for exploring Telegram-based drug market networks. The informal scoping conversations were conducted by members of the research team with recreational drug users in broadly informal social settings in early 2024. One member is Polish, with various connections to people knowledgeable on drug policy in both – Poland and Britain. Participants were not necessarily Telegram drug-market users themselves, but were aware of Telegram's role within local drug-market environments and helped identify terminology, slang and plausible entry pathways into relevant channels. London was also selected pragmatically because members of the research team were based in the United Kingdom and familiar with local terminology and platform usage patterns.

Seed channel discovery

The work began with informal scoping conversations with recreational drug users in London and Warsaw in early 2024. These discussions were not treated as a data for analysis, but were used to identify plausible entry points into Telegram-based drug markets and to inform the selection of initial search terms and seed channels. They were also useful in familiarising the researcher with locally used terminology, including slang terms (e.g., “kryształ”, a colloquial term for mephedrone) which supported more effective navigation of in-app searches. Neither the researchers nor participants engaged in purchasing activity. The purpose of these conversations was therefore to ground the link-tracing approach in realistic pathways through which users might encounter such markets, rather than to generate qualitative data.

In both cases, in-app search with terms for standard names and common slang version of popular illicit drugs was attempted to find a selection of channels that advertise products (such as “cannabis”, “weed”, “ice”, “MD”, “coke”, “snow”, “ket”, “keta” combined with “Warsaw” or “London”, depending on location). This yielded no results, presumably due to limitations on the search terms (in contrast to the approach used by Nali et al., 2024 and others). The terms “Plug London” and “Plug Warsaw” (or with subdistricts of those cities), however, allowed the discovery of 25 channels that were visibly advertising illicit drugs, 17 from the London based searches and 8 from Warsaw. Plug is a particular slang term for *person who sells drugs* in internet circles. This search was not exhaustive and allowed us to begin the exploration of this area: the aim was not to represent all Telegram drug activity but anchor the research in a link tracing exploration based on easily discoverable entry points. The impact of this choice on the resulting network composition cannot be directly assessed within the scope of this study.

Data collection

Once the initial channels were identified, the Telegram API and a custom Python tool were used to harvest all available messages and available channel metadata (title, biography, stated start date, subscriber count at time of collection) for these public channels. Throughout, automated data collection was restricted to public channels accessible without deception or intrusion, and we did not interact with sellers or customers. No purchase attempts were made. For private channels uncovered by the crawl, we recorded link presence but did not join them.

We implemented an iterative three-level crawl: starting from the 25 seeds (level 1), we parsed posts for mention or invite links to other channels (level 2), then repeated for links found at level 2 to produce a level 3 set. API rate limits, however, meant we stopped at three levels in this exploratory phase. We repeated the entire process twice: 16th to the 18th March 2024 (‘the March scrape’) and 29th to the 31st May 2024 (‘the May scrape’), using the same set of seed channels on both occasions. This resulted in a dataset of approximately 3 million messages, 1.8 million in the March scrape, 1.2million in the May scrape. As this was exploratory work, the data collection was repeated after an interval to allow comparison of network change over time.

Despite the large number of messages that were retrieved, message content was not treated as the primary unit of analysis and we distinguish between message-level data

and channel-level metadata. Message-level data were used mainly for descriptive purposes and to identify links between channels during the crawl. The substantive analysis, by contrast, was conducted at the channel level using titles and biographies/descriptions ("about" fields). We adopted this approach because titles and descriptions function as relatively stable, publicly visible forms of channel self-presentation and therefore allow more consistent comparison across channels than individual posts. Message content was substantially more heterogeneous, including multiple languages, mixed scripts, emojis, forwarded material, reposts, and highly uneven posting practices, which limited the reliability of systematic interpretation at scale within this exploratory design. For this reason, channel metadata provided the more appropriate basis for categorisation, while message-level data were retained as contextual and descriptive material rather than as the main source for thematic analysis. No large-scale language processing of message content was attempted, as the multilingual and inconsistent nature of the data limited the feasibility of systematic analysis within the scope of this exploratory study.

Analysis

The analysis followed a mixed-methods approach, combining quantitative and qualitative components. Quantitative descriptive analyses were conducted on the sample of channels and their metadata. Initially this focuses on all channels, and describes the number, repetition and public/private splits of the channels, as well as identifying key node channels. Due to ethical and technical considerations, the quantitative aspect of the work then focuses on the public channels and includes analysis of the number of subscribers to each channel and their age.

The qualitative analysis was conducted in an exploratory and descriptive manner, reflecting the brevity and structure of the available text. From the 433 entries containing usable title and "about" fields, all entries were first briefly reviewed to identify notable features within the dataset (and is where the two bots were discovered and specifically visited due to their unique nature within the data and further investigated). Following the initial scan, a sample of 100 entries was selected using simple random sampling. Each entry was assigned a random number (using a random number generator in Excel), and the sample was drawn by selecting those with the lowest values, ensuring that all entries had an equal probability of inclusion. No stratification by country or collection was applied.

The sample entries were then manually reviewed and grouped based on identifiable features, such as commonly referenced drug types (e.g., cannabis, cocaine, mephedrone) as well as presence of similar service characteristics (e.g., drugs, resell goods, vapes, counterfeits etc.). Given the short and often highly standardised nature of channel titles and descriptions, this approach allowed for a consistent identification of recurring patterns without the need for a formal coding framework or codebook. Coding was undertaken by members of the research team, with London-based entries reviewed by one researcher and Warsaw-based entries by a bilingual researcher. No formal intercoder reliability testing was conducted, as the analysis focused on straightforward categorisation of observable features rather than detailed interpretive coding. However, groupings and interpretations were discussed within the research team to support consistency.

Throughout the analysis, the seed channels found in Warsaw and London are considered separately with comparisons between the patterns seen from both locations. Similarly, the March and May scrapes are considered separately, and again comparisons between the data are made. There was no overlap between the two sets of seed channel data captures, with no channel appearing in the Warsaw-based data also appearing in the London-based list.

Ethics

Because this study relied exclusively on publicly accessible Telegram channels and involved no interaction with users, deception, or entry into private spaces, it was treated as low-risk internet research using public online data; accordingly, formal ethics approval was not required under our institutional procedures (see also Martin and Christin, 2016; Stommel and van der Veen, 2021).

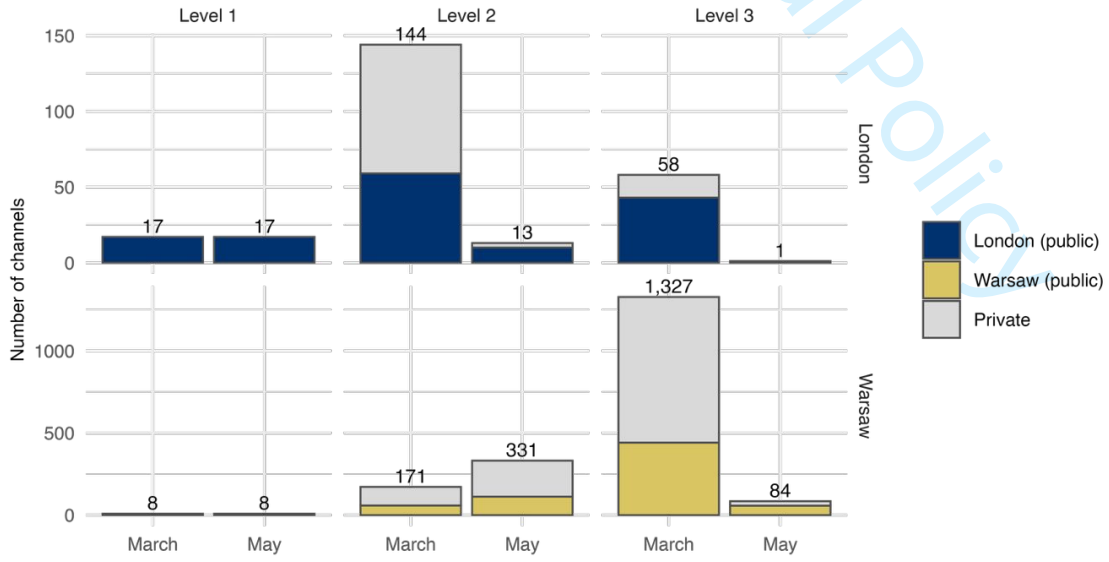
Results

Scale of the data and networks

A total of 1,729 different channels were discovered during the data collection, 197 from the London seeds and 1,532 from Warsaw. There were also substantial differences between the two scrape occasions with 1,539 in March, and 428 in the May data (with 238 channels found in both scrapes). There were no common channels found between the London and Warsaw data collections, showing that the discovered networks were distinct. Once the initial seed channels are removed from the analysis, just 11 channels (i.e. 6%) were found in both scrapes in London. In Warsaw, 205 (13%) were found at both time points. These results indicate a reduction in the size of the networks in both locations and with a slightly greater stability within the Warsaw seeded version.

A more detailed breakdown of the channels by location, data collection instance and by the crawl is presented in Figure 1 and shows the variation both between country and between the data collection timeframes.

Figure 1: Channels captured by level, time and country, split by public or private



Across both countries and scrape waves, the level 1 seeds are public by definition, but beyond the seeds, private channels make up a substantial share of the network, especially where the sample is large. In Warsaw, two-thirds of level 2 and level 3 channels are private channels in both waves. London shows a similar pattern at level 2 in March (59% private), but with much smaller overall volumes. By May, the London network contraction is stark (level 2 falls from 144 to 13 channels and level 3 from 58 to 1), and the remaining channels are mostly public. Warsaw retains a larger downstream set but still shows a pronounced drop at level 3 (from 1,327 in March to 84 in May) alongside a shift toward more public channels (68% public in May vs 33% public in March). Overall, the second scrape recovered markedly fewer downstream channels, which suggests that the seed channels supported greater observable network expansion at the time of the initial collection than at the later scrape.

Network expansion in both settings was highly dependent on a small number of "key node" channels that contained large lists of outbound links. In the London March scrape, one seed channel alone contained 117 links, and only four level 2 channels contributed substantial additional links to level 3. By May, however, that seed channel's chat history had been completely deleted, and only two channels in the London sample still contained any meaningful set of links, sharply reducing downstream discovery.

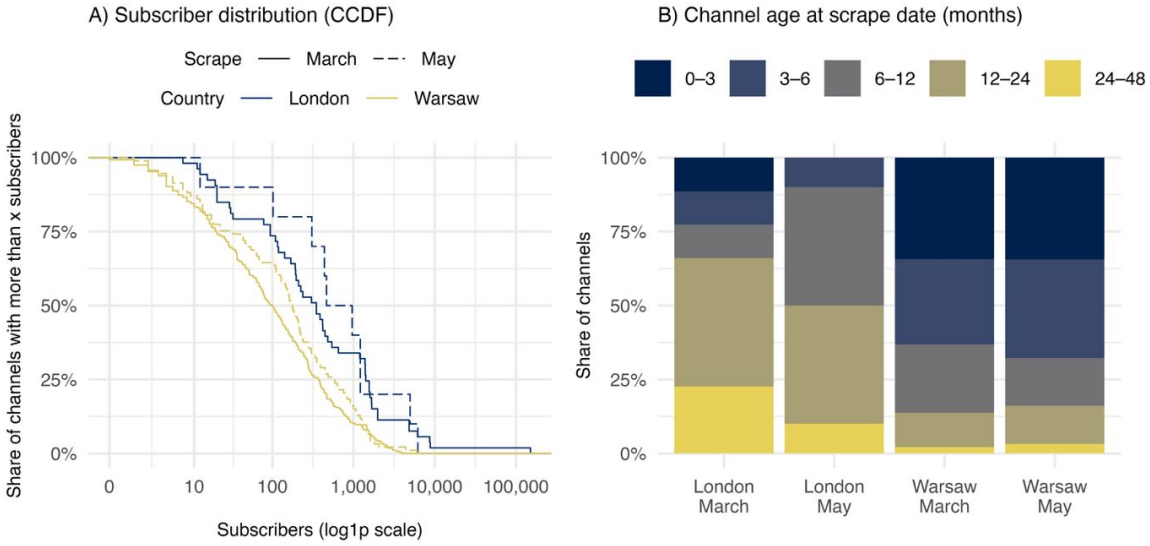
A similar but more pronounced pattern was observed in the Warsaw data. In March, three of the seed channels contained outbound links, including one with 155 links. These seeds generated extensive downstream discovery: ten Level 2 channels contained more than 50 links each, and four Level 2 channels contained several hundred links (572, 485, 314, and 248 respectively). By May, this linking infrastructure had largely collapsed. Only one channel still contained outbound links, while most others appeared to have been purged or closed, and only a single Level 2 channel retained a substantial set of further channel links (59).

Public channel descriptives

Information and metadata were only retrievable from the public channels. This included the number of subscribers to the channels, the start date of the channel, their titles and their self-descriptions (the "about" field).

Panel A in figure 2 displays the distribution of the number subscribers to each public channel on a log scale (to accommodate the highly right-skewed distribution in channel sizes). While there are some minor differences between the London and Warsaw data, the overall pattern is clear: the majority of channels have few subscribers with a median below 500 subscribers for each country and time. There were a small number that were dominant, with many thousand. In the case of London, the largest channel in the March scrape had over 75,000 subscribers. However, this was not discovered within the network in the May scrape (though may have still existed but simply wasn't picked up from the initial seed channels). In the Warsaw-based data, the top percentile of channels had over 3,500 subscribers in each time point, with a 75th percentile at a substantially lower level, 371 in March and 582 in May, showing a heavily skewed distribution

Figure 2: Subscriber complementary cumulative distribution and channel age in months



Panel B of Figure 2 gives the age in months of the channels, based on the time of the data collection and metadata within the channel that indicated when it began. The age profiles suggest quite different temporal dynamics in the two settings. In Warsaw, the distribution is consistently weighted toward newer channels in both March and May: a sizeable share of channels are under a year old, and the proportion older than 12 months remains comparatively small. That stability in the shape of the age distribution across waves is consistent with a network that is continuously replenished with high turnover at the node level, but with a steady inflow of new channels that keeps the overall ecosystem "young" over time. In other words, network churn and refreshment appears to be an ongoing feature of the Warsaw network rather than a one-off shock between scrapes.

In London, the March snapshot contains a much larger share of older channels (12–24 and 24–48 months), implying a more mature visible network at that time point. By May, that older backbone largely disappears from the observed data, leaving a much smaller set and shifting the composition toward younger channels, with only a handful of older channels persisting. This reduction in size, to just 14 downstream public channels means any conclusion about channel activity at the later time point is unreliable due to the small sample size. Interpreted in terms of churn and stability, this pattern points to a more temporally fragile network with reliance on a limited set of longer-lived channels at baseline, followed by substantial attrition once those nodes are no longer observable. The overall effect is that the London network looks less stable over time, either because key channels are removed/renamed/privatised or because the pathways that made them discoverable no longer operate.

Channel content

Channel titles and descriptions indicate the broad category of products that are advertised within each channel. However, there is no obligation for these to be complete, and therefore were not reliably recorded. Information was missing for the majority of channels, with 433 channels with a title (370 from Warsaw and 63 from the

UK) and 281 with an 'about' description (236 and 45 respectively). From the populated entries, 100 were selected at random to be qualitatively coded by the research team (79 from Warsaw, 21 from the UK), with one researcher concentrating on the London based channels and a bilingual member working on those from Warsaw.

Product types

Of the 100 entries that were coded, the majority were quite clearly advertising the sale of drugs, with the majority (96) offering (in descending order of frequency) cannabis of various forms (82), cocaine (79), MDMA related products (75), various psychedelics (75) and other illicit drugs (69). The majority offered a wide mix, and these numbers are best approximations. While channels identifiably offered at least one drug-type, slang term and emoji use often meant that it was not entirely clear the full range of products on offer. It was almost universal that these products would be described as of high quality, delivery in short order and physical exchange of products unproblematic. Alongside drugs, 2 entries were offering guns, a number of channels were promoting counterfeit money (5), others offered to resell stolen goods (aka fencing, 2), and one instance each of counterfeit perfumes and bypassing SIM registrations.

The entries also do not seem to be constrained to a particular region, with London-seed based channels appearing to be advertising the ability to supply products to Somerset, the North-East of England and one even seeming to imply they operated in California. Similarly, Warsaw-seeded channels covered the whole of Poland, with one appearing to also operate in neighbouring Germany. Descriptions also frequently referenced delivery and mobility (e.g. "same-day delivery", "nationwide shipping", or location-specific drop-offs), indicating that transactions were often coordinated via Telegram but fulfilled through offline exchange.

Trust and security signals

In addition to product listings, channel descriptions frequently included trust and security signals, such as claims of being "verified" or references to scam reporting. On the one hand, many channels claim that their sellers are 'verified', 'long term', with "chargers ready and smart whips on the go" (i.e. charged phones and good cars). This is seen regularly in both the locations. Some, particularly in the Warsaw data, explicitly state in their descriptions that users can report fraudulent behaviour to the moderators, presenting themselves as regulated and trustworthy marketplaces.

Although there were no 'legit checks' as noted by Wanke et al. (2026) in the titles or the about pages, this could simply be a symptom of the way the data was captured. Wanke et al.'s analysis focuses on pinned message in sometimes closed groups and reported by users, whereas our data draws on public groups and the data capture method does not indicate which messages were pinned to the top of a channel. What was present within the Warsaw data, however, was a different form of "security" pursued through legal and platform-oriented self-protection: several channels describe themselves as "just roleplay" presumably to create plausible deniability of illegal content and reduce the risk of bans or legal consequences. Such wording could serve to shield administrators from responsibility and to avoid or delay Telegram moderation and seems to have become a common ritual in Polish underground Telegram culture.

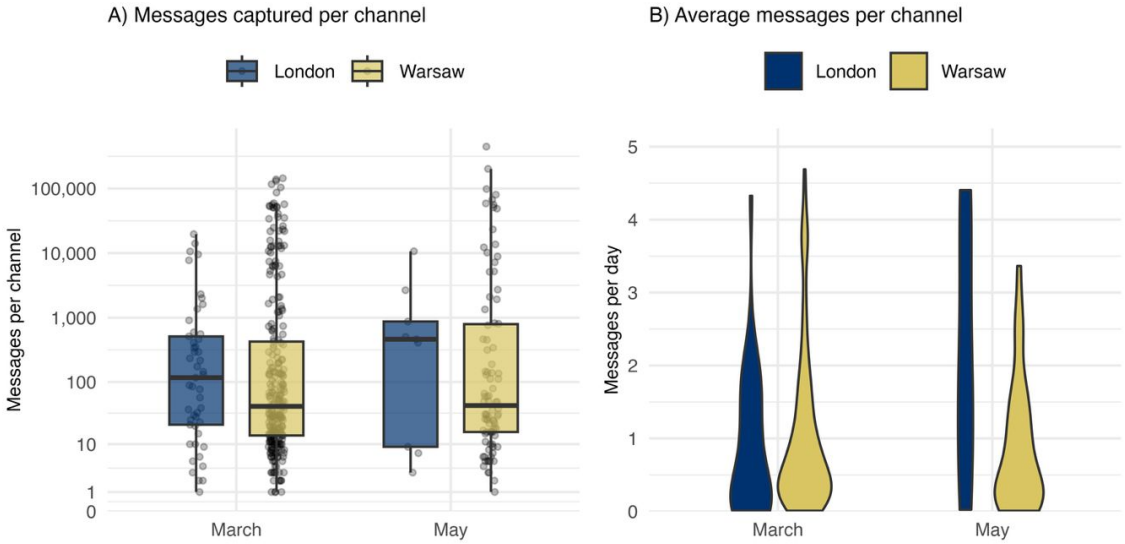
While this strategy does not offer genuine protection when there is clear evidence of real transactions, it may nonetheless complicate enforcement and provide a superficial legal pretext, or at least be perceived as doing so.

These elements suggest that trust is built through how sellers present themselves, the claims they make about reliability, and shared platform-specific practices, rather than through formal verification systems. This includes recurring features such as “verified” claims, references to scam reporting, and, in the Polish context, “roleplay” disclaimers.

Message analysis

Although the message analysis was limited by the language barriers and format of the captured data, descriptives are shown in Figure 3 and tell a familiar story. Across both panels, the London sample shows clear temporal change between March and May, consistent with higher churn and selective survival of channels over time. In May, the London channels exhibit higher message volumes per channel and a greater share of channels posting at higher average rates, suggesting that less active or short-lived channels observed in March were no longer present (or no longer observable) by the second scrape. The result is a May snapshot that is disproportionately composed of more active, regularly posting channels. In contrast, Warsaw shows comparatively stable distributions across the two collection waves for both messages captured per channel and average posting frequency, indicating greater persistence (or a more consistently observable subset) over time. Overall, these patterns align with a temporally volatile London network versus a more stable Polish network across the study period.

Figure 3: Message sent per channel and by channel per day

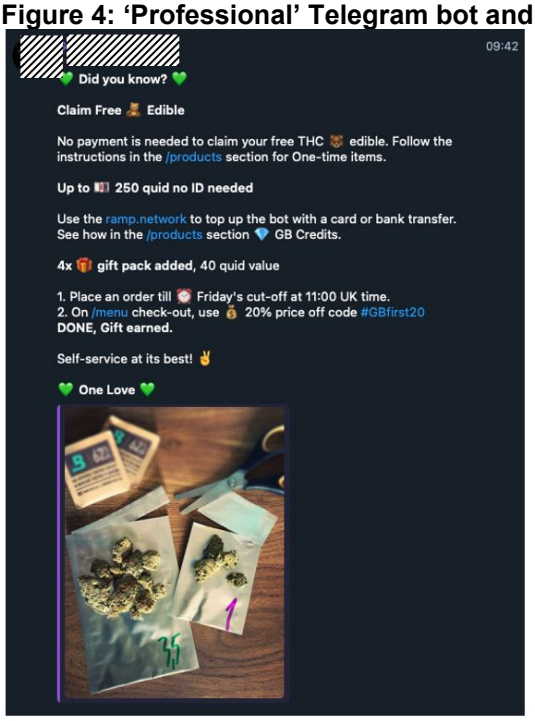


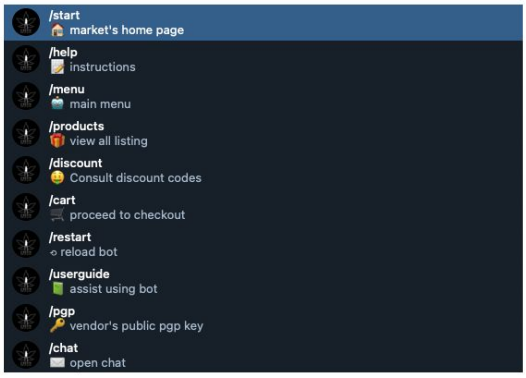
Bots

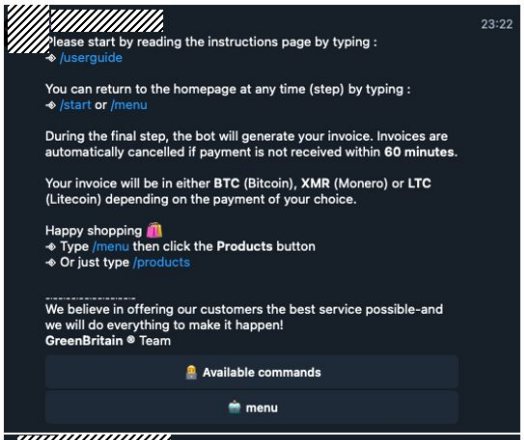
Two bot-driven channels were identified during the initial screening of the titles and about fields data and deserve specific attention due to the visual similarity to the Televend tool as described by Barratt et al. (2022), though seemingly without the darknet powered backend cryptomarket. Both used automated options that present

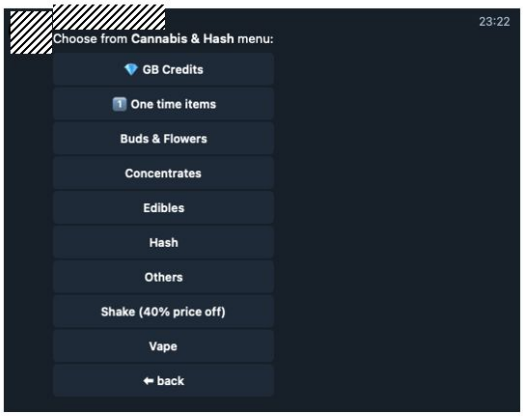
users with a menu of products that can be chosen, an ability to add delivery details and arrange payment methods. The first sold only cannabis and related products and used a variety of cryptocurrencies to allow payment. It linked quite clearly to an active Instagram account where pictures of the products were advertised with clear branding (suppressed here) in real world settings, and this subsequently linked to a Clearnet website.

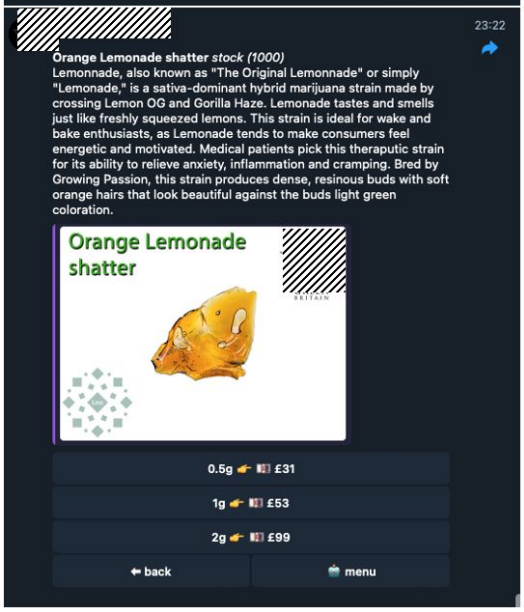
Figure 4: 'Professional' Telegram bot and related Instagram

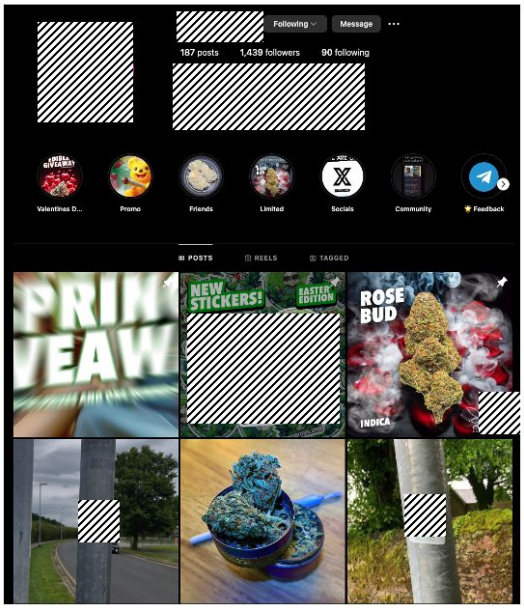






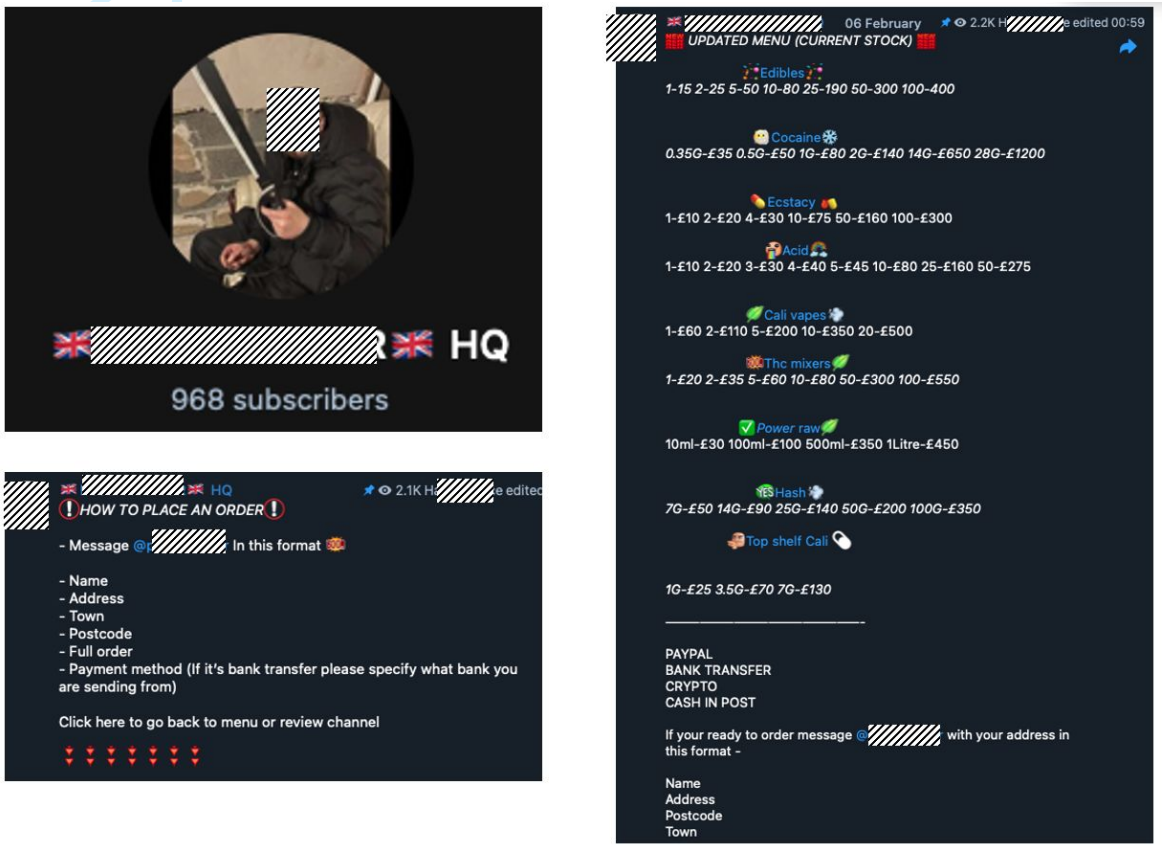






The second was less polished and appeared to act as a semi-automated shop for one person selling drugs. The presumably deliberate mimicry of the more professional bot is striking, though whether this is deliberate or due to the platform architecture limitations is unknown. This service accepted a range of payment options, including PayPal, bank transfer and cash in the post.

Figure 5: Semi-automated channel



Discussion

This study provides an exploratory picture of a subset of the Telegram drug-trading ecosystem via a link-tracing methodology based on two set of separate entry points (London and Warsaw), and two windows of observation (mid-March and end of May 2024). Across both settings, the findings indicate a busy, networked market where channels that advertise illicit drugs are interwoven with other illicit services, with networks and services operating on national, perhaps even international scale. The markets and networks rely on platform structures to make the ecosystem scalable, but the size and temporal nature of the network makes it difficult to map comprehensively. The difference between the data collection moments, particularly the sharp diminution observed in London between March and May, highlight how “what the network looks like” and how easy it is to traverse, depends on entry points, and the volatility of key channels and their linkages.

A first implication is that Telegram supports a sizable marketplace for illicit drugs in different countries, at least as visible through public channels and link-based discovery. Even in an exploratory crawl limited to three link-tracing levels and

constrained by API rate limits, the number of unique channels discovered is substantial, as is the total messages retrieved. This supports the broad claim that Telegram does function as an important venue for drug market activity, though not by necessarily replacing cryptomarkets and other online trading avenues, but by providing an infrastructure that can be used for advertising, customer acquisition, and transaction coordination. Chainalysis (2026) finds that cryptomarkets are resilient in face of competition from Telegram and that they continue to host large number of listings and sales. As sales have not drastically decreased since the rise of Telegram, it is probable that further sales from traditional markets have shifted online, to Telegram, rather than cannibalizing sales from cryptomarkets.

However, the study also shows that the question "How big is the telegram drug market?" is hard to answer. Network discovery was uneven and driven by a limited number of central nodes containing many links to downstream channels, with the ability to automatically capture them collapsing when those central nodes were deleted, purged or no longer captured by the methodological approach. Because the link-tracing method relies on these nodes and what is most networked at any one moment, counts of channels, message, potential vendors and potential customers are better thought of 'what is discoverable' rather than a complete picture of what is there. The inability to capture private channels at scale without manually joining each one similarly limits the discovery process. Given the distributed nature of Telegram, it is much harder to compare the size and scope of illicit transactions it facilitates compared to cryptomarkets where sales are concentrated in a small number of platforms. Cryptomarkets are structured as international platforms hosting vendors from multiple countries simultaneously, even though much fulfilment remains regional or domestic because of shipping risks and customs enforcement.

While extending the coverage to more hidden Telegram channels would be beneficial for research, it may not be all that necessary. Zbindin et al. (2022) has shown that private hacking forums are not all that different from public hacking forums, and that this notion of 'private club' where different and more elite illicit activities may incur is not in practice very common. This is understood easily enough by the fact that people who sell drugs are likely to want to reach a somewhat large population to increase their sales. They therefore need to go outside of their own personal network, and to seek to be discovered. This behavior helps us researchers discover new channels. To increase the coverage of future research, it will be important to conduct initial ethnographic research on Telegram to identify the current key terms being used by people who sell drugs. Interviews with people who use Telegram to buy drugs may also be useful here. Using traditional search engines such as Google and Yandex will always be relevant, though foreign search engines may censor Telegram hits less than Google who has been cleaning up its search results to help with advertisers. Finally, searching in Meta's Ad Library could also prove useful. People who sell drugs have been advertising using social media (Dabaghi-Pacheco & Garland, 2026) and they provide in their ads links to their Telegram channels. As Meta is now forced to publish in a searchable website all the ads it serves, new seeds can be discovered easily enough by searching for strings like 't.me/*'. While no method will achieve higher results than a proper netnography where researchers are involved in this community

on a day-to-day basis, they should offer good enough alternatives for researchers unable to do so.

Telegram's apparent "scale" is moreover partly an artefact of its digital–physical hybridity: channels function as public-facing storefronts for what then become material exchanges. In the coded sample of channel descriptions, most entries clearly advertised drug sales (often with a mixed inventory), but descriptions also routinely pointed beyond the platform, toward delivery, mobility, and offline exchange routines. This matters for interpretation because the Telegram layer is not simply "the market"; it is the advertising and routing layer that sits alongside more traditional offline supply and delivery methods, more like pagers and drug supply in the 90s (Curtis *et al.*, 2002) than cryptomarkets in the 2010s. Unlike cryptomarkets, which operate as more self-contained transactional platforms, Telegram appears to function through a combination of advertising, communication, coordination and transactional exchange that remains closely tied to offline fulfilment practices.

A central theme across the results is the temporal nature of the networks and channels, and this would be reflected in any end user experience of using these methods to purchase drugs. The large reduction in channels in the London downstream channels, within just 2 months, show that a meaningful portion of the Telegram drug activity is transient and what may appear a busy market environment at one time point may seem barren a short time later. The channel-age distributions support this interpretation: in Warsaw, the ecosystem remains consistently "young" (a steady supply of newer channels and relatively fewer older channels), whereas the London snapshot in March appears more mature but then loses much of its older "backbone" by May. Taken together, these patterns are consistent with high churn: channels might emerge, rebrand, migrate, or become private, producing a network whose edges and nodes are unstable even over short intervals. Cryptomarkets also have demonstrated a high level of churn with most markets remaining online for only a number of months (Soska & Christin, 2015). While recent empirical analysis is limited, past research suggests that many Tor hidden services are relatively short-lived and subject to substantial churn (Owen & Savage, 2016), although some major cryptomarkets have persisted online for several years. The same agility that was necessary to remain up-to-date with cryptomarkets is also necessary for following people who sell drugs through Telegram.

This matters methodically and substantively. Methodologically, it suggests that any one collection of Telegram data risks taking a snapshot picture of a limited fragment of an environment that is constantly evolving and any conclusions need to be treated with nuance, and an awareness of their temporal nature. Substantively, the churn can be interpreted as adaption and safety: channels operators might use deletion, pruning and new identities as ways to limit exposure and risk from law enforcement and platform intervention. That Telegram's in-app search function did not find channels in the manner that previous works have (Nali et al., 2024), and at the time of writing the term "plug" (used so effectively in 2024) seems not to produce any results, further underlines that discoverability is not fixed. If search strategies and naming conventions shift, then entry points are not just transient because channels disappear; they are transient because the "map" itself, and thus how a newcomer finds the first doorway, changes over time. This can be understood as a feature of the digital hybridity: just because the communication strategy mediated by the app has disappeared, it makes

no claim that the physical exchange is not there anymore, or ever was. Fortunately for researchers, discoverability of cryptomarkets is made easier with aggregators. As the URLs of cryptomarkets tend to change regularly, it is necessary to have trusted directories of cryptomarkets and their current domain name. There is also much fewer cryptomarkets to keep track of than there are Telegram channels.

The qualitative analysis of the channel titles and about sections echoes one of the dominant themes of digital drug exchange – that of trust and legitimacy (Tzanetakis *et al.*, 2016). The channels' attempt to establish their legitimacy is a constant, with numerous mentions of the quality of their products, the speed of the delivery, their reputation, that sellers are verified, and even offering reporting methods for those who have suffered financial loss due to fraudulent exchanges. Without being able to observe the relations between vendors and buyers – either in the real-world post app mediation or via the conversations within the apps in the private channels - the nature of these relationships cannot be untangled. It is fair to assume that the dynamic described by Norbutas *et al.* (2020) are relevant: i.e. that establish personal connections are primary and that other signals of trust are weaker. This bias is likely more pronounced in this setting, as the presence of third parties is more limited than in the cryptomarket space, and it is only after trying to purchase that the legitimacy can be fully established, or as Wanke et al. (2026, p. 7) put it "trust is established through personal referral and reputation in order to reduce risk. In this respect, technologically enabled invitation and referral systems reproduce the same trust-based gatekeeping mechanisms described for offline closed markets." The lack of the third party seems to be addressed by the professional bot, with its wider reach into a digital space and it's active Instagram channel with real world picture of stickers bearing it's branding placed in real world settings, and it's Clearnet companion website.

There is a further subtext to the legitimacy that the channels are trying to thread, seen particularly in the Polish data. While they seem to be trying to establish trust, the channels are simultaneously trying to evade trying to evade censure, by either law enforcement or the app moderators. Claims that these channels are 'role-playing', i.e. pretending to be advertising drug exchange methods, demonstrates the complexity of negotiating the digital vs physical boundaries: sellers are trying to demonstrate legitimacy and trust while also attempting to evade censure through plausible deniability.

The findings speak to debates about whether online drug markets reduce or reshape harms associated with offline dealing. Traditional claims around cryptomarkets include reduced exposure to street violence, more predictable transaction processes, and "gentrification" effects where reputational mechanisms displace some forms of coercion. This study cannot directly address similar claims because the data capture was restricted to public channels, did not observe private negotiations, and did not include systematic content analysis of messages or outcomes. Nonetheless, there are signals pointing in mixed directions.

On the one hand, the presence of more "professional" bot-like channels and semi-automated storefronts suggests a move toward standardised retail interfaces that may reduce some interpersonal risks by organising ordering and payment into familiar modes. Similarly, the presence of reporting mechanisms for scams in some channels

may dilute the presence of rogue operators. On the other hand, there are clear overlaps and departure points into different criminal enterprises, such as fencing, illicit goods, unregistered SIM cards. This multi-crime advertising may increase exposure to victimisation or entice users into additional offending. Couple with the temporal nature of the networks, these connections may be more prevalent were different entry nodes at different time points taken.

Telegram drug markets also appear strongly hybrid: channel titles and descriptions commonly imply physical exchange (e.g., coded references to offline drop-offs or "smart" exchanges), meaning that while advertising and coordination are digital, delivery often remains physical. This hybrid character complicates any claim that Telegram markets simply remove violence and cannot be made: offline delivery and disputes can still carry conventional risks, even if the initial contact is mediated by a platform.

Limitations

This work suffers from several limitations. Primary among these are methodological, and particularly focus on what was missed from the analysis. Private channels have not been touched, partially due to ethical concerns and partly due to the need to join each manually. This limited the available evidence, and with such a large proportion of the possible data being discussed in these hidden groups, the picture available remains only partial.

Alongside this, the work has focused predominantly on the channel metadata - there are approximately 3 million messages that have been collected with a similar number of image and video files. More careful incorporation of these factors could shed more light on identifying product categories and pricing, detecting fraud signals, and assessing harm-reduction practices (e.g., safety messaging, verification norms, dispute resolution). Future work could combine multilingual approaches with targeted human coding, focus on structurally comparable message types (e.g., listings), and incorporate image analysis where feasible.

This work also began with a limited number of seed channels, or entry nodes, collected in short relatively unstructured conversations in a broadly informal setting. To some extent these mimic the likely real-world experiences of an end-user of Telegram who is attempting to purchase illicit substance, and therefore this work represents a solid impression. However, a more comprehensive picture of the market space could be arrived at by taking a more measured, controlled, regular method based on a larger set of entry nodes. Technical limitations and API limits also stopped further exploration

Conclusion

Overall, the evidence is consistent with Telegram supporting a substantial and connected component of contemporary drug-markets, but one that is difficult to measure because it is temporally volatile and partially hidden behind private channels. Entry points and hub channels appear to structure what is visible at any given time, and the London–Warsaw contrast suggests that network stability varies across settings and/or depends heavily on which pathways are available at any one time. These findings motivate a research agenda that treats Telegram drug markets as

adaptive, hybrid online–offline systems where churn, discoverability, and crime-type crossovers are not peripheral features but core characteristics of how the markets operate.

Moving forward, the migration of users to Telegram may not stop there, and could continue on to other platforms like Signal. This poses significant challenges for future research as the continued "exodus" will likely fragment digital drug markets, forcing researchers to monitor multiple, decentralized networks. Furthermore, the enhanced end-to-end encryption and strict privacy protocols of these alternative apps may severely restrict automated data scraping that makes our analyses possible. This suggests that while online, arm-chair style criminology will continue to be valuable, there will continue to be a very strong need for qualitative, in-person research with people who sell drugs, and people who use drugs. Online tools may only carry research so far, and traditional methods of collecting data should not be discarded.

Coupling online data collection with more traditional qualitative and ethnographic approaches may also help explain temporal changes in online drug-market activity. Greater attention to local market dynamics, interpersonal relationships and offline organisational structures could provide insight into why particular channels, networks or communication practices emerge, disappear or shift over time. Just as the online illicit trade of drugs is constrained and bound by the physical world, research on illicit drug markets should keep at least one leg in physical and direct interactions.

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