

## Essay

# The Baltic and Nordic responses to the first Taliban poppy ban: Implications for Europe & synthetic opioids today

Jonathan P. Caulkins <sup>a,\*</sup>, Amund Tallaksen <sup>b</sup>, Jirka Taylor <sup>c</sup>, Beau Kilmer <sup>d</sup>, Peter Reuter <sup>e</sup><sup>a</sup> Carnegie Mellon University Heinz College, 5000 Forbes Ave., Pittsburgh PA 15213, USA<sup>b</sup> The Council of State Governments Justice Center, 22 Cortland St., Floor 22, New York, NY 10007, USA<sup>c</sup> Johns Hopkins Bloomberg School of Public Health, 615 N Wolfe St, Baltimore, MD 21205, USA<sup>d</sup> RAND Drug Policy Research Center, 1776 Main St., Santa Monica, CA 90401, USA<sup>e</sup> University of Maryland, 7251 Preinkert Drive, College Park, MD 20742, USA

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## ABSTRACT

The 2000–2001 and the 2022–2023 Taliban opium bans were and could be two of the largest ever disruptions to a major illegal drug market. To help understand potential implications of the current ban for Europe, this paper analyzes how opioid markets in seven Baltic and Nordic countries responded to the earlier ban, using literature review, key informant interviews, and secondary data analysis.

The seven nations' markets responded in diverse ways, including rebounding with the same drug (heroin in Norway), substitution to a more potent opioid (fentanyl replacing heroin in Estonia), and substitution to one with lower risk of overdose (buprenorphine replacing heroin in Finland). The responses were not instantaneous, but rather evolved, sometimes over several years.

This variety suggests that it can be hard to predict how drug markets will respond to disruptions, but two extreme views can be challenged. It would be naive to imagine that drug markets will not adapt to shocks, but also unduly nihilistic to presume that they will always just bounce back with no lasting effects. Substitution to another way of meeting demand is possible, but that does not always negate fully the benefits of disrupting the original market. Nonetheless, there is historical precedent for a European country's opioid market switching to synthetic opioids when heroin supplies were disrupted. Given how much that switch has increased overdose rates in Canada and the United States, that is a serious concern for Europe at present. A period of reduced opioid supply may be a particularly propitious time to expand treatment services (as Norway did in the early 2000s).

## Introduction

Opioids – notably heroin – have historically contributed greatly to the global burden of disease (Degenhardt et al., 2013) and to drug-related harms in Europe in particular (EMCDDA, 2023a). For many years, Afghanistan dominated supply, accounting for an estimated 86 % of global illegal opium production in 2021 (UNODC, 2022a). Its share of supplies to Europe is likely even greater, since the (smaller) Western Hemispheric market is supplied primarily by Mexico. European supplies had been relatively abundant; between 2011 and 2021, index trends for purity rose by 38 % and for prices (unadjusted for purity) fell by 16 % (EMCDDA, 2023a).

In April 2022, the Taliban government in Afghanistan announced a

ban on poppy cultivation. There were few effects on 2022 production because of a two-month grace period that allowed the 2022 crop to be harvested (UNODC, 2022b). However, cultivation was radically lower in 2023 (Mansfield, 2023). If the ban is sustained for a second year, and so continues longer than pre-ban inventories are expected to last, it likely will have major effects on opioid markets. The range of possible effects runs the gamut, from rosy scenarios of reduced use to a disastrous replacement of deadly heroin by even deadlier synthetic opioids – something that has been catastrophic for overdose rates in Canada and the United States (Humphreys et al., 2022).

This paper tries to shed light on possible outcomes by examining a neglected historical precedent, namely how the earlier Taliban 2000–2001 ban on poppy cultivation affected markets in seven Nordic

\* Corresponding author.

E-mail address: [caulkins@andrew.cmu.edu](mailto:caulkins@andrew.cmu.edu) (J.P. Caulkins).

and Baltic countries,<sup>1</sup> thereby broadening the work on Estonia by Oja et al. (2021), among others. Those seven country cases are instructive to the extent that by sitting on Europe's periphery and at the end of the heroin supply chain, they experienced the longest disruptions. Because the earlier ban effectively ended with the tumult following the October 2001 invasion of Afghanistan, only a single harvest was disrupted, and the effects on the primary European markets – while visible – were muted by sales from existing stockpiles (Paoli et al., 2009, Chapter 4).

Before exploring in detail the disruption of opioid markets in the seven Nordic and Baltic countries following the 2000–2001 Afghan poppy ban, the next section provides a brief survey of literature on other market disruptions.

## Literature on drug supply disruptions

This paper focuses on a particular type of drug supply disruption, namely the Taliban banning poppy cultivation. Arguably, such bans are in a class unto themselves, given Afghanistan's dominant role in global production. Nonetheless, when contemplating possible effects of the current ban, and ways the markets might respond, we think it is useful to recognize and draw on the broader history of supply disruptions.

Hence, we expanded Pardo and Reuter (2020) list of supply disruptions through a general literature review and consultation with professional colleagues. While we did not impose any specific definition of a supply disruption, we focused on nationwide events that were reasonably well documented. In most cases these are described in peer-reviewed articles that were available in Danish, English, Norwegian, Spanish, or Swedish, and which discuss the nature of the disruption, actors, substances involved, and short-term (price, availability, purity, consumption, and harms) and long-term effects (duration, substitution, harms, and changes in suppliers).

This modest effort identified approximately 80 disruptions (approximately because it can sometimes be hard to tell whether disruptions in multiple countries are manifestations of the same underlying event). They fell into six categories, reflecting the presumed or proximate source of the disruption:

1. Scheduling/Rescheduling a Controlled Substance.
2. Precursor Chemical Controls.
3. Disruption of Online Cryptomarkets.
4. Interventions to Reduce Diversion of Pharmaceutical Drugs.
5. Societal Disruptions not Specific to Drugs.
6. Other Nationwide Disruptions of the Market for an Illegal Drug.

**Scheduling/Rescheduling:** This component of the review has been published separately (Caulkins et al., 2021). Briefly, we found 139 articles or abstracts describing the outcomes of 26 instances of a drug being newly scheduled or “up-scheduled” to a more restrictive category, 14 in the U.S. and 12 in other countries. Most studies are before and after or interrupted time series comparisons published in medical journals. In more than half of instances with quantitative outcome data, the rescheduling apparently led to a decline of 40 % or more in prescribing, use and/or harms associated with the drug that was rescheduled. Substitution was documented in some cases, but sometimes that substitution was towards substances with less risks. For example, when the U.S. rescheduled hydrocodone combination products from Schedule III to Schedule II in 2014, most of the substitution appeared to be to tramadol and codeine-containing medications, alternatives less associated with morbidity and mortality (e.g., Schultz et al., 2016).

**Precursor controls:** McKitin et al. (2011) provide a systematic review of evaluations of 13 rounds of methamphetamine precursor regulations in the United States, Canada, and Mexico, as well as two interdiction events, finding that 7 of the 15 had significant (12–77 %) effects on

outcomes such as price, purity, hospital admissions, treatment admissions, seizures, and self-reported use. They conclude that there was strong evidence that certain of these were effective, at least temporarily, and there was no evidence of substitution to other drugs. Other studies addressed precursors and essential chemicals for cocaine production, finding modest effects for two interventions (sulfuric and hydrochloric acid controls in 1992 and methyl isobutyl ketone controls in 1995) and larger and longer-lasting effects from controls in 1989 on potassium permanganate and in 2006 on sodium permanganate (Cunningham et al. 2015, 2016). Cunningham et al.'s. (2013) ARIMA-intervention time series analysis concluded that U.S. regulation of acetic anhydride in November 1989 had substantial effects on heroin price, purity, and seizures that lasted 2–5 years. Overall, the literature produces some optimistic projections of effects on outcomes, including treatment seeking and emergency department mentions, although the effects are not long lasting (Dobkin and Nicosia, 2009).

More recently, efforts at disrupting illegal manufacturing of fentanyl by placing its key precursors, NPP and 4-ANPP, under international control appear to have had limited impact. The move led to a notable decrease in seizures of these chemicals; however, illegal fentanyl manufacturers replaced these with their immediate precursors or with other non-scheduled precursors. Effective control of synthetic opioid precursors is hampered by the fact that the number of commercially available precursors that could be used to manufacture fentanyl or its analogues is likely at least a few thousand, with many having a wide range of commercial uses (Commission on Combating Synthetic Opioid Trafficking, 2022).

Indeed, some have noted that since the U.S. (2018) and China (2019) implemented core-structure scheduling of fentanyl-related compounds, there has been an increase in detection of new non-fentanyl derived synthetic opioids (e.g., Zawilska et al., 2023). We personally think it is too soon yet to draw firm conclusions about the effects of the U.S. and Chinese actions.

**Disruption of online markets:** The first darknet or cryptomarket (Silk Road) began selling illegal drugs in 2011. Since then, there have been many instances in which the leading cryptomarket was shut down or abruptly ceased operation. Notably, enforcement shut down Silk Road (2013), then also its immediate successors including Agora and Silk Road 2.0 in Operation Onymous (Soska and Christin, 2015; Décary-Hétu and Giommoni, 2017; Christin and Thomas, 2019). The next major market, Evolution, disappeared in an exit scam – meaning the market operators abruptly shut down the site and pocketed the money that they had promised to transfer from buyers to sellers (Van Buskirk et al., 2017). AlphaBay then emerged as the leader until it and the Hansa market were infiltrated and eliminated in 2017 by Dutch and U.S. enforcement in Operation Bayonet (Van Wegberg and Verburgh, 2018). A more recent example is the German and U.S. police shutting down the long-running site Hydra (Tidy, 2022; Goonetilleke, Knorre, & Kuriksha, 2022). To date, each time a marketplace disappeared another replaced it fairly quickly (perhaps in 4–12 months), although sometimes with modified tactics. However, online sales continue to account for a quite modest fraction of the global drug market trade, despite offering obvious benefits (UNODC, 2021, Booklet 2).

**Efforts to reduce diversion of prescription opioids:** The literature addresses a range of programs, such as stringent regulation of methadone clinics, New York State's triplicate prescription program (Simoni-Wastila, et al., 2004), tamper resistant formulations (e.g., of Oxycontin in 2010, cf. Havens et al., 2014), and Prescription Drug Monitoring Programs (PDMPs). For example, while the effects of voluntary PDMPs alone are unclear (Fink et al., 2018), “must access” PDMPs appear to significantly reduce misuse (Puac-Polanco et al., 2020), and Rutkow et al. (2015) find that pill mill interventions in tandem with PDMPs reduced the flow of diverted opioids in Florida. Although Cicero and Ellis (2015) found that one-third of individuals misusing OxyContin migrated to other opioids, Meinhofer (2016) did not observe evidence of an oxycodone supply recovery or substantial substitution to other opioid

<sup>1</sup> Denmark, Estonia, Finland, Latvia, Lithuania, Norway, and Sweden.

pain relievers.

**Societal disruptions not specific to drugs:** Among those assessed in the literature have been the 2003 earthquake in Bam, Iran (Movaghar et al., 2005), Hurricane Katrina's effect on the New Orleans drug market (Dunlap et al., 2007; Kotarba, et al., 2010), the great recession of 2008 (Costa Storti et al., 2011), and COVID-19 (e.g., UNODC, 2020; Farhadian et al., 2021; Price et al., 2022; McGrath et al., 2023). Many disruptions are relatively short-lived, as appears to be the case with COVID-19 in at least some markets (Price et al., 2023), but heroin supplies were disrupted extensively and for longer by World War 2 (Courtwright et al., 1989; Courtwright, 2001).

**Other nationwide disruptions:** Table 1 lists some other major disruptions that have been discussed in the literature with varying degrees of certainty concerning their causes. The disruption of heroin markets in Australia in early 2001 is particularly well-studied, but its relationship to the contemporaneous changes in British Columbia's market are unclear (Wood et al., 2006).

In summary, this review shows that national markets respond in a variety of ways to disruption. Even for a specific class of disruption the responses can be quite idiosyncratic and unexpected.

### Opioid use in Nordic and Baltic countries after the 2000–2001 Taliban poppy ban

In June of 2000, the Taliban regime banned cultivation of opium poppies in Afghanistan, which was then responsible for around 70 % of global opium output (UNODCCP, 2001). The ban abruptly closed down poppy cultivation, while allowing the processing and trafficking of existing stockpiles, which according to some accounts appear to have begun running out in the summer of 2001. The literature has focused on effects in Afghanistan (Farrell & Thorne, 2005), although some studies

**Table 1**

Other nationwide disruptions of illegal drug markets that have been described in the literature.

Drug	Year(s)	Precipitating event or location of market	Sources
Heroin	1970–1974	End of US heroin epidemic after breaking of the French Connection and imposition of the Turkish Opioid Ban	Dupont and Greene (1973), Agar and Reisinger (2002)
	Early 1980s	Suppression of heroin trade to New Zealand	McMinn (2014), Newbold (2016)
	2001	Australian heroin drought (origins contested)	Weatherburn et al. (2003), Degenhardt et al. (2005)
	2001	Contemporaneous heroin shortage in British Columbia (origins unknown)	Wood et al. (2006)
	Early 2000s	Taliban poppy cultivation ban in Afghanistan	Farrell and Thorne (2005), Jelsma (2005), Paoli et al. (2009)
	2010–2011	Heroin shortages of 2010–2011 (origins unknown)	
		◦ Effects in the UK and Ireland	Hallam (2011), Griffiths et al. (2012)
		◦ Effects in Kenya	Mital et al. (2016)
	1989–1990	Disruptions of U.S. cocaine market by multiple U.S.-Colombian efforts	Crane et al. (1997), Cunningham et al. (2015, 2016)
	1995	Disruption of U.S. cocaine markets by elimination of Peruvian Air Bridge and/or precursor controls	Crane et al. (1997), Cunningham et al. (2015, 2016)
	2006–2010	Roughly 50 % decline in U.S. cocaine consumption (origins contested)	Caulkins et al. (2015)
LSD	2000	Sharp, sustained declines U.S. LSD indicators after seizure of a major lab	Grimm (2009)

have addressed how end markets reacted (Pietschmann, 2004; Gibson et al., 2005). Here we offer what we believe is the first comparison and contrast of subsequent trends in the seven Nordic and Baltic countries. They are a particularly interesting set because they illustrate a range of market responses including the emergence of fentanyl, have been relatively neglected by the literature, and share certain cultural commonalities that facilitate comparison and contrast.

The method is primarily literature review and synthesis, supplemented by interviews with 25 drug policymakers and practitioners (spanning domains such as treatment, harm reduction, law enforcement, surveillance) from selected international jurisdictions. For details on the interview process, see Pardo et al. (2019).

Overdose data were compiled from the national reports available on the EMCDDA website (EMCDDA, n.d.). Overdose data were available for the three Scandinavian countries and Finland from 1996 to 2006; for the three Baltic countries, overdose data were available from 1999 to 2006. The data capture all drug-related fatalities, and not solely opioids, and so partially capture substitution effects. We describe the numbers as reported, but offer a general caution that there can be changes in reporting systems over time that influence trends.

The three Scandinavian countries traditionally were thought to receive heroin from Afghanistan primarily via the “Balkan Route.” That route passes through Iran (sometimes first via Pakistan), Turkey, and Southeastern Europe before reaching Western European markets (UNODC, 2019). The Balkan Route remains relevant today, along with a newer “Southern Route” that involve maritime transport to the east coast of Africa.

By contrast, Finland and the three Baltic countries may have received some or all of their heroin from Afghanistan via the “Northern Route,” a supply chain going through Central Asia with branches reaching into Russia and the post-Soviet republics in Eastern Europe (Golunov, 2007). That route was relatively new back in 2001. Following independence from the Soviet Union in 1990/1991, and associated social disruption, Estonia, Latvia, and Lithuania all experienced increasing rates of illicit drug use and drug-related mortality (McKee, 2002). However, for most of the 1990s, “kompot,” a homemade liquid opioid, was the predominant opioid (Lagerspetz and Moskalewics, 2002). In late 1997, however, heroin began arriving and soon eclipsed kompot (Allaste and Lagerspetz, 2006).

We sort the seven countries' descriptions in order of increasing distance from Germany and the other major Western European markets. The general pattern is of greater and longer-lasting disruptions with increasing distance. That pattern might be consistent with Afghan supplies rebounding more quickly along the Balkan than along the Northern route. Hence, while the source of the shock might have been common across all seven countries, the size of the shock may possibly have been greater for the Baltic countries and Finland.

**Denmark:** Denmark and Norway had the largest heroin markets among the Nordic countries (Olsson et al., 1997), both of which could trace back to the counterculture of the 1960s (Tallaksen, 2017). In contrast, Finnish and Swedish drug markets had historically revolved around amphetamines. In Denmark – the country closest and most physically integrated into the main Western European heroin markets – drug-related deaths were stable before and after the Taliban opium ban. However, the purity levels of heroin declined abruptly in 2002 and stayed significantly below its 2000–2001 levels for a number of years (EMCDDA, 2013). Furthermore, heroin's role in fatal opiate overdoses began a long-term relative decline in 2002, and methadone remained a more common cause of overdose into the 2010s (Simonsen, et al., 2015). While fentanyl made brief appearances in the 2010s, it did not seem to have made significant inroads in Denmark's illicit opiate market.

**Sweden:** Swedish authorities did not observe any significant changes in heroin supply at that time (Ågren, 2002, p. 15). However, deaths were increasing through 2000 or 2001 and then either stabilized or fell for a number of years, depending on the specific measure or definition. See Leifman (2016) for a detailed discussion, but two distinctions are

whether and when tramadol and dextropropoxyphene (DXP) get included in the counts and whether improved drug detection methods affected counts of “drug deaths” (meaning the drug was present) by more than they affected counts of “drug-related deaths” (meaning deaths caused by the drug). The series shown in Fig. 1 – which we believe to be consistent with the other countries included in that figure – shows declines in total drug-related fatalities of 19 % from 2001 to 2005. Leifman contains other series indicating total fatalities to be stable, not declining, over that period, but also showing pronounced declines in heroin fatalities in particular, which would seem to be the most relevant for the purposes of assessing the effects of the Taliban ban. By one measure, heroin fatalities doubled from 72 to 143 between 1995 and 2000, but then fell to an average of 86 from 2003 to 2006.

Sweden's markets apparently had three separate touches with fentanyl (Pardo et al., 2019). It first appeared in the mid-1990s when—sold as heroin—it resulted in nine deaths (Kronstrand et al., 1997). It also appeared briefly in the early 2000s, with at least some evidence of the origin being Estonia or other post-Soviet areas. At that time, it was sold either alone or mixed with heroin and marketed as either heroin or “China White,” but disappeared by 2004. Consistent with that, Leifman's data show a small spike in fentanyl deaths in 2003, and also a larger and sustained increase after 2007 when other factors beyond the 2000-2001 Taliban ban may have come into play.

**Norway:** In Norway, drug-related fatalities had been rising sharply before the ban, from 143 in 1995 to 374 in 2000 and 405 in 2001 (Amundsen, 2015). In the Fall of 2001, authorities noticed a decrease in heroin purity, and fatalities then declined by more than 50 % over the next four years (Fig. 1). Amundsen and Bretteville-Jensen (2010) note that this decline also coincided with an expansion of access to methadone treatment as well as a relative increase in amphetamine use, so the decline may have multiple sources. In the 2010s, a growing number of fatal overdoses could be ascribed to pharmaceutical opioids, seemingly a result of more liberal prescribing practices (Gjersing and Amundsen, 2007). While fentanyl appeared briefly in 2016 and 2017, the drug did not gain a permanent foothold in the Norwegian market for illicit opiates, which remained dominated by heroin (Gjerde et al., 2023).

All four of the countries that had traditionally had greater exposure to the Northern Route experienced sharp declines in heroin purity after the 2000–2001 Taliban ban, but they also shared recent and substantial exposure to the fallout from the 1998 Russian financial crisis. Systematic death data do not begin until 1999 (Fig. 2), but overall it appears that their drug situations had been worsening before 2000–2001 (at least when looking at deaths), albeit from relatively small bases.

**Lithuania:** In Lithuania, heroin purity fell to 520 % in late 2001 and kompot reappeared (NKD, 2004). However, by 2005 heroin returned to Lithuania and its drug-related fatalities rebounded and even exceeded pre-drought levels (NKD, 2005). It was only in the second half of 2010s that synthetic opioids emerged as a notable phenomenon in the country (EMCDDA, 2018).

**Latvia:** In neighboring Latvia, heroin purity also dropped to around 10–20 % in the fall of 2001. While some users reportedly turned to tramadol, by and large no other opioid emerged to replace heroin, and the number of treatment patients with a recorded diagnosis related to opioids dropped from 1661 in 2001 to 740 in 2002 (NVA, 2002). There were increases in use of benzodiazepines or amphetamines, whose prices were dropping (NVA, 2004), but the country's overall drug-related fatalities fell to very low levels after 2002 (Fig. 2). As in Lithuania, synthetic opioids did not make a notable appearance until the second half of 2010, when they became a major cause of drug-related harms (EMCDDA, 2019). In addition to fentanyl and its analogs, synthetic benzimidazole opioids have also become present on the Latvian market (EMCDDA, 2023a).

**Estonia:** After the ban, many Estonian users initially went back to kompot (UN ODCCP, 2002). In late 2001, however, fentanyl arrived, causing a rash of overdoses in 2002, as people who use drugs initially mistook it for heroin (Talu et al., 2003). Fatal opioid overdoses rose from

18 in 2000 and 24 in 2001 to 83 in 2002 (Tuusov et al., 2013) then rose again in 2004 with the arrival of another synthetic opioid, 3-methylfentanyl (Tuusov et al., 2013). Deaths continued to increase for a number of years thereafter, and for a decade from 2007 to 2017 Estonia had the highest per capita overdose death rate in Europe, with most caused by fentanyl (Usküla et al., 2020; Oja et al., 2021).

At the time, the vast majority of Estonian opioid users were from the country's Russian-speaking minority, and this may have fueled the country's opioid crisis (Ojanperä et al., 2008) with fentanyl being available through the same networks that used to distribute heroin. The importation of fentanyl into Estonia by Russian-speaking organized crime groups is documented in the literature (Ojanperä et al., 2008, Tuusov et al., 2013) and fentanyl production in post-Soviet Russia at that time was noted by law enforcement sources (Europol, 2007). The possibility that Russia served as a transit country for fentanyl produced in China has also been put forward (Denissov, 2014).

The Estonian switch to fentanyl raises a question why the same development did not take place in Lithuania and Latvia, both of which also border Russia and have large Russian-speaking minorities. One possible explanation, suggested by a Latvian public health interviewee, was that Latvian traffickers had a larger heroin stockpile, which allowed them to better weather the temporary supply disruption. Another is that Estonian fentanyl may have been produced domestically, although evidence of domestic production did not emerge until 2017 (Usküla et al., 2020).

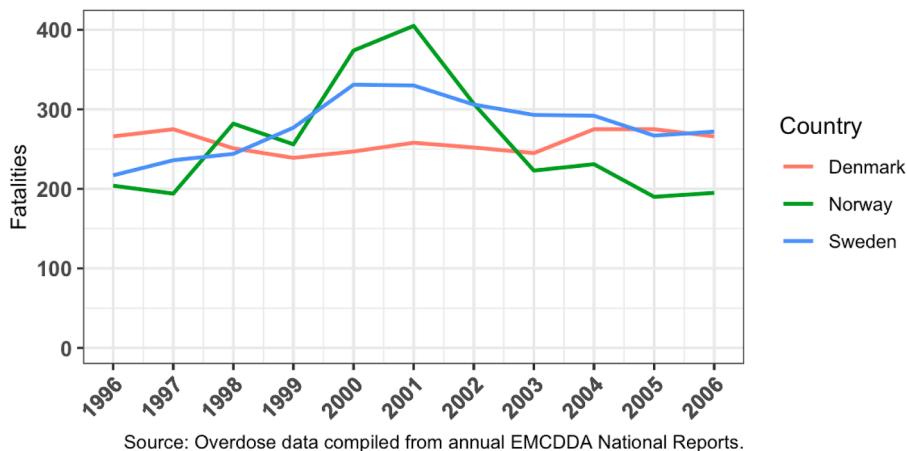
Note that after the study period addressed here, the Estonian opioid market experienced a second shock in 2017 when law enforcement arrested a number of high-level drug traffickers (Oja et al., 2021; Abe-1-Ollo, 2022). That appears to have led to a substantial disruption of the country's fentanyl market. The number of drug-related deaths dropped from 110 in 2017 to 40 the following year and remained at or below this level for the next few years. Since then, the market has gradually been restored and synthetic opioids, including benzimidazole opioids, have been again linked to drug-related mortality in the country (EMCDDA, 2023a). The number of drug related deaths has since risen to 80 in 2022 (TAI, 2023).

**Finland:** Before the late 1990s, Finland's rate of heroin use had been marginal compared to its neighbors (Hakkarainen et al., 2007), but the arrival of cheap and potent heroin through Estonia enabled the growth of a Finnish market, perhaps abetted as well by the economic dislocation accompanying the Scandinavian banking crises. Drug-related fatalities rose from 74 in 1995 to 170 in 2000 (Hakkarainen et al., 2007). However, by the fall of 2001, heroin purity had decreased to around 10 %. Another possible indicator of heroin scarcity is a reported tripling of break-ins at pharmacies and medicine warehouses (Partanen and Mäki, 2004).

Most Finnish heroin users turned to diverted medical-grade buprenorphine (Pardo et al., 2019), very likely from sources outside of Finland, because it predominantly consisted of the buprenorphine monoformulation, whereas the Finnish MOUD system uses primarily the buprenorphine/naloxone combination (Pardo et al., 2019). France was already a source before the ban; in 1999, Kinnunen and Nilson (1999) found that at least 150 Finnish opioid users frequently flew to France to obtain buprenorphine. Then in 2003, Estonia made buprenorphine available on a fee-for-service basis (Vorobjov, 2012), and Finnish authorities estimated that the number of so-called “Subutex tourists” routinely traveling back and forth from Finland to Estonia rose from 30 in 2003 to 350 in 2005 (Kärrstrand and Jonsson, 2007).<sup>2</sup> Organized crime groups from Estonia and Finland also became important players in buprenorphine trafficking (Leskinen, 2018; Pardo et al., 2019).

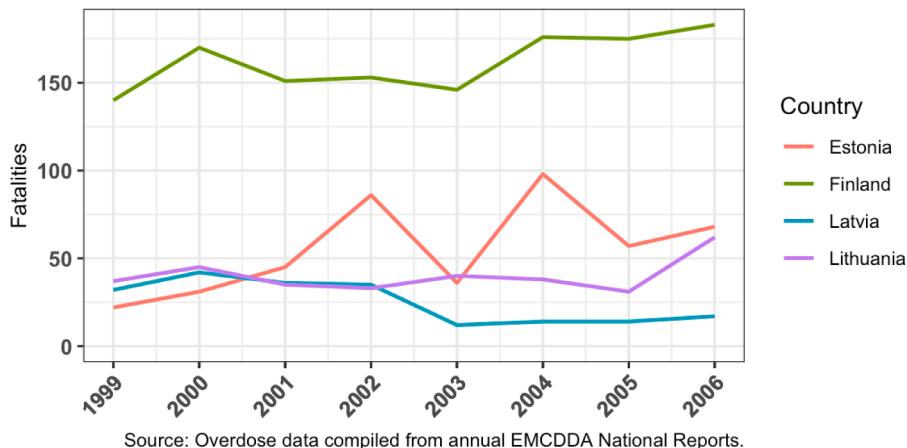
Whatever the source, among Finnish opioid users seeking treatment, buprenorphine eclipsed heroin as the primary opioid in 2002 (Partanen

<sup>2</sup> Subutex contains buprenorphine, but unlike Suboxone does not contain naloxone, so it is more prone to non-medical use.



Source: Overdose data compiled from annual EMCDDA National Reports.

Fig. 1. Drug-related fatalities in Scandinavia.



Source: Overdose data compiled from annual EMCDDA National Reports.

Fig. 2. Drug-related fatalities in the Baltics and Finland.

and Mäki, 2004), and fatal heroin overdoses fell to 4 in 2003 and zero in 2004 and 2005 (Rönkä and Salonen, 2006). Buprenorphine is a partial not a full opioid receptor agonist and has lower risk of overdose, but as injection use of buprenorphine increased in 2004 (Rönkä and Virtanen, 2007), so too did the number of fatal overdoses (Fig. 2).

**Summary.** Six of the seven Nordic and Baltic countries' heroin supply and/or use indicators saw abrupt changes after the Taliban's poppy ban of 2000–2001; only Denmark's remained stable.

In Norway and Sweden – the two other countries supplied via the Balkan route – heroin supplies contracted, purity declined, and long-term increases in drug-related fatalities abruptly stalled or reversed, but heroin never disappeared. Those markets rebounded from the shock without substituting to a different substance, but depending on what one believes the no-shock counterfactual trajectory would have looked like, the temporary shock might have had long-run effects on levels of use.

By contrast, in Finland and Estonia the shock led to long-lasting shifts in what opioid drug dominated. In Estonia heroin was replaced by a more potent substitute, namely fentanyl. In Finland heroin was replaced by a substitute with a lower risk profile, namely buprenorphine. Both substitutes were synthetic opioids, but one (fentanyl) was illegally manufactured whereas the other was primarily diverted from legal medical supplies (Pardo et al., 2019).

Latvia represents perhaps the best case inasmuch as no other opioid emerged to fill the hole left by reduced heroin supplies, and Latvia enjoyed sustained reductions in drug-related deaths.

Lithuania is an intermediate case, with another opioid (kompot) emerging, but only temporarily to bridge the market over until heroin

returned in 2005.

Placing these disparate experiences on a map suggests one potential partial explanation. Denmark, Norway, and Sweden were supplied via Europe by the "Balkan Route," while Finland and the Baltic States may have been at least partially supplied via Russia by the "Northern Route." It may be that the Taliban ban reduced supplies along the Balkan Route but led to true shortages for countries at the far end of the Northern Route. Consistent with that hypothesis, some authors think kompot also expanded in Russia in response to these heroin shortages (Grund et al., 2013), and Katselou et al. (2014) describe "krokodil" (a crude desomorphine preparation) as having emerged there in 2003 as well.

We stress that this is merely a hypothesis, not a conclusion, because it was generated *ex post*, after looking at the data, and it does not explain the differences in outcomes across the four Northern Route countries. E.g., why did fentanyl emerge in Estonia but not Latvia?

It is also important not to over-interpret patterns in what are quite small countries. Lithuania is the largest of the Baltic countries, with a population of 3.5 million in 2000 – or a shade smaller than metro Minneapolis. Estonia's population is smaller than that of Gdansk or the Raleigh, North Carolina metro area. At that scale, drug markets can be quirky. E.g., Washington DC has long had a substantial PCP market, whereas nearby Baltimore does not.

#### Implications for European opioid markets in 2024 and beyond

Our interpretation of the implications of this evidence for Europe today is highly consonant with what the EMCDDA has recently

concluded in its assessment of emerging threats (EMCDDA, 2023b). The modern European heroin market has been fairly stable for many years, but that does not mean that the new Taliban opium ban will not shock it. In 2006, the U.S. cocaine market was large, stable, and seemingly invulnerable, having been the world's largest by revenue for about 20 years. Yet, over just five years, consumption fell sharply from an estimated 384 pure metric tons (MT) in 2006 to 143 MT in 2010 and 2011 (Kilmer et al., 2014; Midgette et al., 2019).<sup>3</sup>

Disrupted drug markets often bounce back in more or less their original form, which may characterize what happened in most western European countries after the 2000–2001 Taliban poppy ban. Temporary disruptions can still have value by suppressing use and use-related deaths for a time. Furthermore, markets may not rebound with the same vigor. The Afghan opium ban might have ended a period of growth in Norwegian heroin markets, as the French connection/Turkish opium ban may have broken the back of the 1960s/1970s U.S. heroin epidemic (DuPont and Greene, 1973; Agar and Reisinger, 2002). When markets do not bounce back to their original form, one can expect substitution. Whether that is to more or less harmful substances is difficult to predict.

Two contrasting examples occurred in Finland and Estonia after 2001, where heroin markets were replaced with buprenorphine and fentanyl, respectively. The switch to buprenorphine was probably a net positive, but in Estonia drug-related fatalities soared. Neither outcome was intentionally guided by government policy, although Finland's expansion of treatment prior to the disruption may have increased familiarity with buprenorphine (and its perception as a relatively safer and more predictable alternative) and so contributed to the comparatively less risky substitution (Pardo et al., 2019). The contrast of the two nations, so close to each other, is also a reminder of how idiosyncratic national drug markets are. The response across the nations of Europe may be quite varied.

Both favorable and unfavorable substitution have also been seen after rescheduling of prescription drugs. For example, the literature evaluating the U.K.'s rescheduling of mephedrone in 2010 expresses considerable concern about behavioral response undercutting benefits; by contrast, the literature evaluating Australia's 2018 action to make codeine prescription-only acknowledges some substitution, but finds mostly minor increases or no effect on the existing upward trends of other opioids (Caulkins et al., 2021).

One nightmare scenario for Europe today would be that illegally manufactured fentanyl or other synthetic opioids replace heroin. When that happened with fentanyl in Canada and the United States, starting in the mid to late 2010s, opioid overdose deaths soared, killing many hundreds of thousands (Wilson et al., 2020). The discussion above, however, makes clear that is not the only possible result. Indeed, one can imagine at least five scenarios.

1. No sustained effect because the ban ends before existing stockpiles and inventories are used up (akin to what may have happened in Denmark in 2000–2001). If production in other growing regions (Myanmar, Mexico) expanded, that might also mean that European markets would not have to react. However, given that these other producer countries are an order of magnitude smaller than Afghanistan in terms of opium production, this is unlikely to occur within the next few years. The UNODC reports that Myanmar has overtaken Afghanistan as the world's largest producer, but that is mostly because of the decline in Afghanistan. Between 2022 and

<sup>3</sup> It is unclear what caused that dramatic and unexpected change, but since dependent users dominate consumption and dependence is a highly stable behavior, supply disruptions are potential explanations, of which there are two primary candidates that are not mutually exclusive: (1) Mexico's crackdown on trafficking and ensuing violence and (2) a suite of events in Colombia, including increases in manual eradication, cocaine seizures, and the destruction of production labs (Isaacson, 2005; Caulkins et al., 2015).

2023 cultivation in Myanmar rose by 7000 hectares, but it fell in Afghanistan by more than 200,000 hectares (UNODC, 2023).

2. No sustained effect in Europe because markets elsewhere absorb the shock. Caulkins and Hao (2008) suggest that in the face of shortages, global supply chains may "short" most severely the least lucrative markets. Since most Afghan heroin is thought to be consumed in Africa and Asia where retail prices are much lower, drug traffickers may decide to divert some of this supply towards the more profitable European market. Thus, European consumption may be only moderately affected, even if heroin consumption declines more sharply elsewhere.
3. Heroin shortages in Europe are offset by increased consumption of legally-supplied opioids, whether through expansions in conventional treatment with medications for opioid use disorder (MOUD), heroin assisted treatment, liberal prescribing of prescription opioid pain relievers, or adoption of a "prescribed safer supply" whereby people who use drugs are provided with a pharmaceutical-grade version of opioids available on the street market (Glegg et al., 2022).
4. Heroin shortages in Europe are offset by increased consumption of illegal, non-opioid drugs such as cocaine or methamphetamine. Supplies of these drug are abundant in Europe (EMCDDA, 2022a, 2022b) and such a shift has been reported in Estonia post-2017 and also following the Australian heroin drought.<sup>4</sup> In this regard, it is worth recalling that in many EU countries there are decreasing numbers of new entrants to illegal opioid markets and the population of people who use opioids is getting older and somewhat less numerous (EMCDDA, 2023a). In other words, current trends are already eating away at opioids' share of drug consumption in Europe, and it is possible that a heroin drought would accelerate this process.
5. Heroin shortages lead to greater consumption of other illegally-supplied opioids either temporarily (as in Lithuania after the earlier opium ban) or in a sustained manner (as in Finland and Estonia), and the new opioid may be associated with lower risks (as in Finland) or greater (as in Estonia).

Hence, the nightmare scenario (a sustained switch to a potent synthetic opioid) is just one version of one of the five scenarios. It is, however, eminently plausible since there is no natural limit on synthetic opioid production, the current ban may last longer than the 2001 ban did, and fentanyl is considerably less expensive than heroin per morphine equivalent dose to high-level traffickers (Pardo et al., 2019).

Arguably, broad economic, social, and technological changes since 2001 also increase the risk. Globalization, cryptocurrencies, and improvements in secure digital communication technologies make it easier to support new intercontinental supply chains, movement of goods within Europe has become easier with the expansion of the Schengen area and its lack of internal border checks, and the considerable production of non-opioid synthetic drugs within Europe could create capability for "domestic" production of synthetic opioids.

Further, the scenario may not be confined to a Europe-wide repetition of what Estonia experienced in the early 2000s. It could also include fentanyl-containing counterfeit prescription pills (sold on the street as either opioids or non-opioids) and unexpected and dangerous mixing of synthetic opioids with other drugs, including benzodiazepines and xylazine, sometimes referred to as 'benzo-dope' and 'tranq-dope' (Friedman et al., 2022; Rock et al., 2023).

Therefore, it may make sense to prepare for the worst, as the EMCDDA has already noted (EMCDDA, 2023b), and Viskari and Tammi (2021) argue that more could be done to prepare. There is near universal endorsement of expanding treatment and naloxone, and widespread support for select other demand and harm reduction interventions

<sup>4</sup> Our view on the Australian event is that the substitution was delayed and partial, but others argue it was much greater. See, e.g., Bush et al. (2004).

(Christie et al., 2017; Humphreys et al., 2022; Abel-Ollo, 2022). Further investments in improving the sensitivity of reporting systems is also sensible. Those measures have value regardless of whether the supply disruption is short or the market shifts to a new equilibrium. Even a short disruption may present a unique window of opportunity to engage PWUO into treatment. And if Taliban-induced supply disruption pushes opioid markets into a new equilibrium by allowing some substitute to emerge, it would be far better if that substitute were legal opioids provided through medication for opioid use disorder, not illegal synthetic opioids supplied by organized crime groups.

The historical record hints at the potential value of such an approach. Norway expanded access to methadone treatment following the Taliban poppy ban, and by 2005, drug overdoses had fallen by over 50 % compared to its 2001 peak.

In sum, there is no guarantee that illegally manufactured fentanyl or other synthetic opioids will rise in Europe even if the new Taliban opium ban is sustained. Drug markets are too unpredictable to make guarantees. However, it is plausible. Since the costs of “over-reacting” to a threat that does not emerge are modest, and the costs of failing to act pre-emptively are high, expanding treatment and overdose prevention services now can be seen as a prudent precaution.

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The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation. RAND IRB approval # is 2018-0848.

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## CRedit authorship contribution statement

**Jonathan P. Caulkins:** Writing – review & editing, Investigation, Funding acquisition. **Amund Tallaksen:** Writing – original draft, Investigation. **Jirka Taylor:** Writing – review & editing, Investigation. **Beau Kilmer:** Writing – review & editing, Investigation, Funding acquisition. **Peter Reuter:** Writing – review & editing, Investigation, Funding acquisition.

## Declaration of competing 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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