PRELIMINARY RESULTS
DREAM MARKET DATA BY NOVEL SYNTHETIC OPIOID CATEGORIES

COMPARISON TO ARCHIVED AGORA DATA
ALL COLLECTED DREAM MARKET DATA

- 20 data points (the crawler was launched 20 times).
- Data collection targeted “Opioid” and “Research Chemical” categories.
- A total of 80,566 ads collected.
ALL COLLECTED DREAM MARKET DATA BY OPIOID CATEGORY

<table>
<thead>
<tr>
<th>Substance Type</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl and Fentanyl Analogs</td>
<td>3,693</td>
<td>4.6%</td>
</tr>
<tr>
<td>Other Novel Synthetic Opioids</td>
<td>548</td>
<td>0.7%</td>
</tr>
<tr>
<td>Other Opioids</td>
<td>65,572</td>
<td>81.4%</td>
</tr>
<tr>
<td>Unrelated</td>
<td>10,725</td>
<td>13.3%</td>
</tr>
</tbody>
</table>

- About 5.3% of all ads were related to fentanyl, fentanyl analogs and other novel synthetic opioids (including “China White” and “Synthetic Heroin”).
- Most ads were related to other types of opioids (e.g., heroin, oxycodone, buprenorphine).
- 13.3% were not related to opioids (misplaced ads, ads related to other types of research chemicals).
TOTAL NUMBER OF FENTANYL ADS
(DREAM MARKET, MARCH-AUGUST, 2018)

- Total ads: 934
  - Non-pharmaceutical: 67.8%
  - Pharmaceutical: 32.1%

- Shipment:
  - 62.7% of fentanyl ads advertised shipment Worldwide.
  - 25.9% advertised shipment to the U.S.

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Product description

Pure Fentanyl HCL
Real Deal here

Picture does not do itself justice. It has very shiny fish-scale like coats all over the whole substance as a whole and is consistent, and the smell is very strong!
MONTHLY AVERAGE NUMBER OF FENTANYL ADS, SPRING 2018 (DREAM) VERSUS SPRING 2015 (AGORA) DATA

Greater number of fentanyl-related ads in the Spring of 2018, compared to the Spring of 2015.
TOTAL NUMBER OF FENTANYL ANALOG ADS (DREAM MARKET, MARCH-AUGUST, 2018)

- Total ads: 581
- Shipment:
  - 81.1% of fentanyl analog ads advertised shipment Worldwide;
  - 13.9% advertised shipment to the U.S.
TOTAL NUMBER OF FENTANYL ANALOG ADS
(DREAM MARKET, MARCH-AUGUST, 2018)

- Furanylfentanyl - the most commonly advertised analog;
- Availability of lesser known analogs, e.g., ortho-methoxyfuranylfentanyl.

<table>
<thead>
<tr>
<th>Analog</th>
<th>Ads</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furanylfentanyl</td>
<td>220</td>
</tr>
<tr>
<td>Methoxyacetylfentanyl</td>
<td>105</td>
</tr>
<tr>
<td>4-Fluoroisobutyrfentanyl</td>
<td>100</td>
</tr>
<tr>
<td>Carfentanil</td>
<td>52</td>
</tr>
<tr>
<td>Butyrfluorofentanyl</td>
<td>41</td>
</tr>
<tr>
<td>4-ANPP</td>
<td>25</td>
</tr>
<tr>
<td>4-Phenylfentanyl</td>
<td>15</td>
</tr>
<tr>
<td>Acetylfentanyl</td>
<td>13</td>
</tr>
<tr>
<td>3-Methyl Methoxyacetylfentanyl</td>
<td>11</td>
</tr>
<tr>
<td>Ortho-Methoxyfuranylfentanyl</td>
<td>4</td>
</tr>
<tr>
<td>Butyrfentanyl</td>
<td>4</td>
</tr>
<tr>
<td>Phenylfentanyl</td>
<td>1</td>
</tr>
</tbody>
</table>
MONTHLY AVERAGE NUMBER OF FENTANYL ANALOG ADS: SPRING 2018 (DREAM) VERSUS SPRING 2015 (AGORA) DATA

Greater number and variety of fentanyl analogs in 2018.
TOTAL NUMBER OF ADS FOR OTHER NOVEL SYNTHETIC OPIOIDS (DREAM MARKET, MARCH-AUGUST, 2018)

- Total ads: 548

- Shipment:
  - 95.0% of all ads indicate shipment from China/Hong Kong;
  - 96.5% of all ads indicate shipment Worldwide.

50g ISOPROPYL-U-47700 HCL

<table>
<thead>
<tr>
<th></th>
<th>FortunesCookie (5) (5.00🌟)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price</td>
<td>¥0.117 ($974.48)</td>
</tr>
<tr>
<td>Ships to</td>
<td>Worldwide, Worldwide</td>
</tr>
<tr>
<td>Ships from</td>
<td>China</td>
</tr>
<tr>
<td>Escrow</td>
<td>Yes</td>
</tr>
</tbody>
</table>
TOTAL NUMBER OF ADS FOR OTHER NOVEL SYNTHETIC OPIOIDS (DREAM MARKET, MARCH-AUGUST, 2018)

- U-48800 is the most commonly advertised;
- Most substances are analogs of U-47,700.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Ads</th>
</tr>
</thead>
<tbody>
<tr>
<td>U-48800</td>
<td>179</td>
</tr>
<tr>
<td>U-50488</td>
<td>90</td>
</tr>
<tr>
<td>U-4TDP</td>
<td>75</td>
</tr>
<tr>
<td>isopropyl-U-47700</td>
<td>73</td>
</tr>
<tr>
<td>MPF-47700</td>
<td>47</td>
</tr>
<tr>
<td>MP-47700</td>
<td>42</td>
</tr>
<tr>
<td>U-47700</td>
<td>31</td>
</tr>
<tr>
<td>U-49900</td>
<td>8</td>
</tr>
</tbody>
</table>
Drastic changes in the type of novel synthetic opioids advertised in the Spring 2015 and Spring 2018.
DREAM MARKET VENDOR ACTIVITY: LIMITED NUMBERS, BRIEF LIFESPAN

Fentanyl and Fentanyl Analogs:

- 86 vendors since March 2018, but only 3 selling at each time point;
- 29 highly active vendors (more than 20 ads), including 8 with more than 100 ads.

Other Novel Synthetic Opioids:

- 13 vendors since March 2018, 2-5 vendors at each time point.
- 2 highly active vendors (one posted 318 and another 142 ads);
- Only 1 had more than 3 months activity.
Retail or Wholesale? Percentage of Ads for Different Amounts of Non-Pharm Opioids (Powder Form)

- Retail-level amounts were more common for fentanyl/analogs.

- Wholesale amounts were more common for other novel synthetic opioids.
HOW ARE FENTANYL, FENTANYL ANALOGS AND OTHER NOVEL SYNTHETIC OPIOIDS ADVERTISED?
MARKETING: INFORMATION PROVIDED IN PRODUCT DESCRIPTIONS

- Purity and potency are emphasized.
- Warning about potential overdose and safer usage.

“This is the real deal 5 grams of carfentanil hcl. My supplier says purity is over 99%. I do not have lab test results yet, but I did send a sample in for testing and I will update when I have concrete factual numbers! I do know this is VERY STRONG STUFF please be careful and no unexperienced users!!! I mail from within the USA so you don't need to worry about customs. Orders ship fast fast fast! DM me with any questions and I will get back to you quick.”
New or lesser known substances are compared to other, better known products.

“Pure 4-Fluoroisobutyrfentanyl. No adulterant added! For 1:10 Caffeine mix check our other listing. 4-FiBF is fentanyl analog belongs to opioid compounds group, shares their common features like providing nice opioid high. **Comparing to Fu-F [Furanylfentanyl], 4-FiBF provides longer lasting effects.** It's also described to be more euphoric with potency and dosing similar to Fu-F. Users with no previous experience with opioids are advised to start with no more than 1mg/dose. Use carefully.”

“**MPF-47700 (Powder). U47700 replacement.** Quantity: 1000 Grams. MPF-47700 produces analgesic relaxing sedating and euphoric effects when administered.”
CHANGES BETWEEN MARCH-AUGUST 2018, DREAM MARKET DATA
Attorney General Sessions Announces New Tool to Fight Online Drug Trafficking

Attorney General Jeff Sessions today announced a new resource to help federal law enforcement disrupt online illicit opioid sales, the Joint Criminal Opioid Darknet Enforcement (J-CODE) team.
DECREASES IN FENTANYL AND FENTANYL ANALOG ADS
NUMBER OF FENTANYL ANALOGS ADS ON DREAM MARKET, MARCH-AUGUST, 2018

• Fentanyl analog ads also declined significantly.

• Carfentanil ads virtually disappeared after the ban.
Non-Pharmaceutical Fentanyl-related ads declined sharply after the ban in May 2018.

After the ban, fentanyl is not mentioned directly in the “Product Description” section.
• Other Novel Synthetic Opioid ads increased over time.

• Dream Market “Fentanyl Ban” does not include other novel synthetic opioids.
Number of heroin ads remained relatively stable over time, compared to fentanyl and analog ads.
ADAPTING TO THE BAN:
SELLING FAKE PRODUCTS?
“CODE” WORDS?
INCREASED UNCERTAINTY?
Notable increases in oxycodone ads since May 2018.
FAKE OXYCODONE PRODUCTS: BEFORE THE BAN

- Prior to the “Fentanyl Ban,” fake oxycodone tablets were often advertised openly as laced with fentanyl or other novel synthetic opioid products.

“30mg Roxycodone pressed with 1mg of fent hcl not a cheap analog . they look spot on color size print.. And they hit perfect.. No hot spots each pill is accuratley dosed..”
FAKE OXYCODONE PRODUCTS: AFTER THE BAN

• About 10% of all oxycodone ads (even after the Ban) indicate sale of pressed tablets.

• However, no information is provided about the types of substances included in the fake oxycodone pills (fentanyl is no longer mentioned in the product names).
Over time about 10% (n=1,024) of all oxycodone ads offered “pressed,” non-pharmaceutical products.
“SYNTHETIC HEROIN” AND “CHINA WHITE:” INCREASED AMBIGUITY

- Before the ban, “synthetic heroin” and “china white” ads included mentions of fentanyl or specific fentanyl analogs;

“This listing is for synthetic heroin also known as china white. This is a mix of Furanyl-Fentanyl and Pharma grade mannitol professionally mixed in a mixer. Fu-F is very potent…”

LEVEL 1 - 7g Synthetic Heroin - Purple Stuff

Vendor: cdnven (5000) (4.88★)
Price: $0.1184 ($760)
Ships to: Worldwide, Worldwide
Ships from: CANADA
Escrow: No

Product description

★★★★ CHECK TERMS AND CONDITIONS FOR ORDERING PROPER STRENGTH ★★★★

This Synthetic Heroin is long lasting (10 hour Half Life)
Dose small amount for needed ENERGY or Dose large amount for SUPER NOD
“CHINA WHITE” AND “SYNTHETIC HEROIN” PRODUCTS: INCREASED AMBIGUITY

• After the ban, “china white” and “synthetic heroin” ads do not include information about fentanyl and/or fentanyl analog additives;

• Some emphasize that their products DO NOT contain fentanyl.

3.0g China White Heroin. 99% Pure. No Fentanyl.

Vendor: superboss (1150) (4.84★)
Price: $0.0515 ($332.8)
Ships to: United States, Worldwide
Ships from: USA
Escrow: Yes

Product description
China White Heroin direct from Sinaloa mountain tops to your door step. Smells creamy and is a super clean and smooth high. Get as much as you can while it is in stock. Be careful with the purity, go slow. It hits very hard.
No significant decline in the number of “synthetic heroin” ads after the ban.
The number of “China White” ads has shown fluctuation over time: although declined initially, the numbers increased again in mid-to-late summer.
AFTER THE BAN: COMMUNICATION ABOUT FENTANYL AND FENTANYL ANALOGS THROUGH PRIVATE MESSAGING?

• Buyer comments in the Product Review sections suggest use of private messaging to share banned product information;

• For example, buyer’s comment about “synthetic heroin” product:

ORDERED A SAMPLE TO LEAVE FEEDBACK FOR CDNVEN. I HAVE SEIZURES IF I USE FENTANYL, SO I MESSAGED THEM ASKING IF THEIR PRODUCT WAS SAFE. WITH INTEGRITY, THEY REPLIED THAT IT WAS AN ANALOGUE, AND THAT THEY ARE SORRY BUT I SHOULDN'T BUY FROM THEM. VERY TRUSTWORTHY SOURCE FOR WHAT MY FRIEND SAYS IS VERY HIGH-QUALITY SYNTHETIC HEROIN, WITH LONGER LEGS THAN THE REAL THING!
POTENTIAL CHANGES IN MARKETING: “CODE WORDS”?

Some vendors may “obfuscate” substance names by indicating tolerance/experience LEVEL instead:

“LEVEL X - Expert Opiate User - i.e. Street Fentanyl Users (NOT PURE)
LEVEL 1 - Advanced Opiate User - i.e. Heroin Users
LEVEL 2 - Experienced Opiate User - i.e. Morphine Users
LEVEL 3 - Seasoned Opiate User - i.e. Oxycontin Users
LEVEL 4 - Beginner Opiate User - i.e. Perc, Codeine, Lean Users
LEVEL 5 - NON OPIATE USER - i.e. ARE NOT ADDICTED TO OPIATES”
CHINA BANS AND TRADE WAR

Vendors adapt to changes by using decoy, other shipment routes, replacing banned substances....
CONCLUDING REMARKS
CONCLUSIONS

• Fentanyl, fentanyl analogs, and other synthetic opioids represent 5.3% of all opioid-related ads on Dream Market;

• Almost 90% of all fentanyl and other novel synthetic opioid ads indicated potential shipping to the US;

• Compared to archived Agora data in 2015, Dream Market data from the Spring of 2018 show greater number and variety of fentanyl and other novel synthetic opioid products.
CONCLUSIONS: EFFECTS OF DREAM MARKET FENTANYL BAN

• Significant declines in fentanyl and fentanyl analog product ads after Dream Market banned fentanyl and fentanyl analog sales in May 2018.

• However, other novel synthetic opioid-related ads increased after the ban.

• More oxycodone products after the ban, but less certainty about fentanyl-type additives in fake (“pressed”) products.

• More ambiguity about “synthetic heroin” and “china white” products after the ban.

• Potentially increased reliance on encrypted private messaging about banned products.
CONCLUSIONS AND IMPLICATIONS

• Cryptomarkets are rich data sources for monitoring novel synthetic substance availability.
  • Timely alerts to toxicology labs and policy makers about emerging new substances.

• Cryptomarket bans of fentanyl products might lead to reduced access to such products and/or to greater numbers of unsuspecting users becoming exposed to contaminated products.

• Continued research is needed to understand how cryptomarkets, vendors, and buyers adapt to these changes and restrictions.
Cyber security concerns of the hosting institution:
  - Inform legal department
  - Work with cyber security team at the University

Cryptomarket instability;

Developing web crawlers for cryptomarkets can be challenging:
  - Different cryptomarkets may have different security measures
LIMITATIONS AND FURTHER RESEARCH

• These are preliminary findings;
• Data are limited to one cryptomarket. We are developing crawlers to collect data from additional cryptomarkets.
• Product review data have not yet been consistently captured to improve product identification and disambiguation techniques.
• Additional research is needed to assess the trends in other opioid sales on cryptomarkets.
• Further research is needed to assess the relationship between the cryptomarket data on novel synthetic opioid trends and changes in opioid-related overdose mortality trends.
THANK YOU!