Patterns of Offending and Victimisation with a cohort of Methamphetamine Offenders

Methamphetamine in New Zealand Research Programme

Tranche 3: Second Report

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Executive Summary

Purpose

This report presents the second of three stages of research being conducted as part of Tranche 3 of the NZ Police-led Methamphetamine in New Zealand Research Programme. The purpose of this research stage is to investigate patterns of offending and victimisation within a cohort of individuals who have recorded methamphetamine offences.

Background

The first report in Tranche 3 found that: individuals with methamphetamine offences committed more offences, caused more crime harm, experienced more victimisations and more harm from those victimisations, and were involved in more non-crime incidents (e.g., family harm investigations and mental health incidents) than a cohort of offenders without methamphetamine offences, both in total and for every specific type of offence. The academic literature suggests that virtually all offenders commit offences of many different types, however, there is also evidence of short-term offending specialisation amidst the broader generalised pattern. Therefore, it would stand to reason that most individuals within the methamphetamine cohort used in Tranche 3 are likely to commit a wide range of offences. However, this does not necessarily mean that individuals within the cohort will be committing these offences as a result of methamphetamine use.

Method

Latent profile analysis was implemented to differentiate subgroups of offenders within the methamphetamine cohort who share similar patterns of offending or involvement with non-crime incidents. Individuals within each subgroup committed a similar number of offences or were involved in a similar number of incidents, while also being as distinct as possible within their offending and non-crime incident patterning from the individuals in the other subgroups.

Subsequent analyses were also conducted to determine whether the crime harm of offences, and the number of victimisations experienced was different between the identified subgroups.

Key Insights

The latent profile analysis found that there are five distinct subgroups of methamphetamine offenders within the cohort based on their number of offences perpetrated and incidents involved in. Whilst there was a degree of generalised offending and incident involvement for all of the subgroups, there was some degree of specialisation.

- The first subgroup included 326 individuals who specialised primarily in dealing drug offences especially for methamphetamine,

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- The second subgroup were 239 individuals who were characterised by a high volume of non-crime incidents especially mental health and family harm,
- The third subgroup was the largest with 23,463 individuals. This subgroup was characterised by a more generalised offending and incident pattern,
- The fourth subgroup was the second largest group with 4,398 individuals. This subgroup was also characterised by generalised offending, however, there was a degree of specialisation with acquisitive crime and offences relating to public order, property damage or crimes against justice, and
- The fifth subgroup of 208 individuals appeared to specialise more in fraud and acquisitive crimes.

Comparing the volume of offences and incidents accounted for by each subgroup highlighted that subgroup 1, 2, 4, and 5 account for a significant number of offences and incidents committed by the methamphetamine cohort despite the relatively small number of individuals with these subgroups.

Subgroup 4 and subgroup 5 caused the highest crime harm on average. Additionally, subgroup 1 caused more crime harm than subgroup 2 and subgroup 3, and subgroup 2 caused more crime harm than subgroup 3.

Next Steps

The third and final report of Tranche 3 will explore the longitudinal nature and trajectory of the offending of the methamphetamine cohort. Specifically, it will investigate the offending trajectories of the five subgroups, and determine the offending career of the subgroups.

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Background

The analysis presented in this report is the second of three stages being conducted as part of the Tranche 3 of the NZ Police-led Methamphetamine in New Zealand Research Programme.

The previous report in Tranche 3 (Evidence Based Policing Centre, 2022) found that individuals with methamphetamine offences committed more offences, caused more crime harm, experienced more victimisations, and were involved in more non-crime incidents than a cohort of offenders without methamphetamine offences, both in total and for every specific type of offence. Whilst the methamphetamine cohort committed more illicit drug offences of all kinds (and caused more crime harm associated with those drug offences) than the comparison cohort, most of their volume and crime harm for this category could be attributed to methamphetamine-specific offences. The academic literature suggests that virtually all offenders are generalists (commit offences of many different types), however, there is also evidence of short term offending specialisation amidst the broader generalised pattern (DeLisi & Piquero, 2011). Therefore, it would stand to reason that most individuals within the methamphetamine cohort used in Tranche 3 are likely to commit a wide range of offences. However, this does not necessarily mean that individuals within the cohort will be committing these offences because of methamphetamine.

Building upon the findings of the first report in Tranche 3, this research explores available police data to determine whether there are different patterns of offending, and involvement in non-crime incidents amongst individuals with methamphetamine offences. This report is exploratory and therefore does not make hypotheses about the patterns of offending behaviour that may be present: instead, the report aims to explore what patterns exist in a New Zealand offender cohort. The insights from this analysis may contribute to current understanding of the need for nuanced intervention and prevention strategies.

Method

Data

Offences, victimisation, and incidents

Data used in this report were extracted from the NZ Police National Intelligence Application (NIA). The data included offences ,victimisations[1], and non-crime incidents[2] linked to people with at least one methamphetamine related offence (the "methamphetamine cohort"). The

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[1] For the purpose of this report, a "victim" is a person linked in NIA to an offence as "victim", "complainant", or "principal victim".

[2] For the purpose of this report, a person is directly involved in an incident if they are linked in NIA as "subject of" or "subject of missing person"; "bound by order" or "person at risk" in relation to police safety orders; "applicant", "respondent", or "other protected person" of a Family Violence Act protection order; "predominant aggressor", "primary victim", "mutual participant", or "child or young person exposed to family violence" in relation to family harm investigations (5F); or the "target" of a warrantless search (6X).

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"methamphetamine cohort" included 28,634 people who were either (a) recorded as the offender[3] of a methamphetamine offence between 01 January 2010 and 24 June 2021 (n = 27, 634) or (b) people identified by National Road Policing Group who had tested positive for methamphetamine after blood testing between 01 January and mid November 2020 (n = 1,000, of whom 200 were already identified by criterion (a)).

For each individual within the sample, their number of offences, victimisations, and incidents during the data period per ANZSOC Division (for offences and victimisations) and per incident code (for specific incidents of interest) were counted. For the latent profile analysis, the number of offences and incidents per ANZSOC category were summed in order to create a more manageable number of relevant offence and incident categories. The variables created for the latent profile analysis were:

a) **Violence** which combined the offences relating to homicide, acts intended to cause injury, sexual assault, robbery, abduction and harassment, and negligent behaviour
b) **Acquisitive Crime** which combined the offences for theft and burglary/unlawful entry
c) **Fraud** which used the offences under the fraud ANZSOC Division
d) **Manufacture** which combined the offences for importing or exporting drugs, and the offences for manufacturing or cultivating drugs
e) **Deal Drugs** which used the offences relating to dealing or trafficking drugs
f) **Possess Drugs[4]** which used the offences for possessing or using drugs
g) **Other Drug[5]** which used the offences that are under the other drug offences ANZSOC category
h) **Traffic** which combined traffic offences and offences for dangerous driving or the dangerous use of a vehicle
i) **Prohibited Weapons** which includes the offences under the prohibited weapons ANZSOC Division
j) **Other Offences** which included offences relating to property damage, public order, crimes against justice, and other offences listed as miscellaneous
k) **Mental Health** which combined the incident codes of 1M – mental health, and 1X – threaten or attempt suicide
l) **Family Harm** which combined the incident codes of 1D – domestic dispute, 5F – family harm investigation, 6C – child protection report, and 6S – police safety order breach
m) **Bail Breaches** which combined the incident codes for 6D – bail breach, and 6E – electronic monitoring bail breach

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[3] For the purpose of this report, an "offender" is a person linked in NIA to an offence as "cleared offender", "offender", or "youth aid offender", being people, whom police have sufficient evidence to proceed against for a given offence.

[4] Due to the very small number of use of methamphetamine offences (n = 455), use was combined with possession for the purpose of analysis

[5] Other offences include possessing utensils, and allowing premise/vehicle for manufacturing/supply purposes

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n) **Other Incidents** which combined the rest of the relevant incident codes

Other Characteristics

Demographic information available in NIA was also extracted. These covariate variables were:

a) Age at the time of their first contact with police as an offender
b) Gender
c) Ethnicity (as self-identified by the individual where possible). For this report, ethnicity was grouped to align with the Stats NZ categories of European, Māori, and Other.
d) Whether offenders were on the National Gang List, as at April 2021.

Age of the time of first police contact was calculated by the researchers by subtracting the year of an individuals' first offence from the year the individual was born. Gender and ethnicity were extracted from NIA and the last variable was provided by the Gang Intelligence Centre, who manage the NZ Police National Gang List (K. Parkes, personal communication, July 23, 2021)[6]. The information is as accurate as it can be however, it is possible that information had been recorded incorrectly in NIA. Additionally, Police data is recorded for operational purposes rather than research purposes: this means that it can be challenging to clean the data for analyses. Therefore, it is an assumption of the research that there may be a degree of error within the data.

Crime harm

The crime harm associated with offences was calculated using the New Zealand Crime Harm Index (NZ CHI). The NZ CHI is a proxy measure of harm which calculates the minimum number of days a first-time offender would spend in prison for a specific offence code (Curtis-Ham & Walton, 2018). For offences that have fines rather than prison time, the equivalent number of days it would take for an individual to pay off the fine on minimum wage is calculated (Curtis-Ham & Walton, 2018). For this report, the highest NZ CHI value (most serious offence) in each occurrence for each offender was taken; these NZ CHI values were then summed for each individual to give a total highest crime harm score for each offender.

Analysis Approach

Latent profile analysis is a person-centric statistical method to identify unobserved profiles or subgroups from a set of observed variables (Nylund-Gibson & Choi, 2018). Latent profile analysis was used to answer the question of whether there were different patterns of offending or involvement in non-crime incidents amongst individuals with methamphetamine offences.

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[6] The National Gang List is comprised of information about validated patched or prospect New Zealand Adult Gang Members, and does not record gang associates or affiliates. The Gang List is not an official statistic, and should not be used to count gang membership numbers. However, it does enable a greater understanding of the harm caused by, to, and within gangs, allows for the identification of themes or trends to support prevention initiatives, and helps to support prioritisation of resources for building resilience to gang-related harm.

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In the case of the present report, this means that latent profile analysis was used to identify subgroups of offenders within the "methamphetamine cohort" who share similar patterns of offending or involvement with non-crime incidents in such a way that the individuals within each subgroup have committed a similar number of offences or were involved in a similar number of incidents in each type, and that those placed in a subgroup are as distinct as possible in their patterning of offending or involvement in non-crime incidents from the individuals in the other subgroups. Latent profile analysis also generates fit statistics to measure how well the models fit the data and considers measurements of uncertainty or error before assigning individuals to different subgroups (Isler et al., 2016).

Latent profile analysis is an iterative process in which all individuals are treated as belonging to a single group to begin with. Additional subgroups are added one by one to examine whether adding groups provides a better fit for the data: this process is continued until the fit statistics indicate additional groups provide diminishing returns.

Limitations

Several limitations of the analysis method warrant mention. First, it is recognised that ethnicity is often a proxy for socio-economic circumstances that affect outcomes such as offending and victimisation (Datta et al., 2017; Prince & Schwarcz, 2020; Wang, 2004). However socio-economic variables are not available in Police data.

Second, the analysis only looks at the types of offending, victimisation, and incidents present in the records of those with methamphetamine; the offences, victimisations, and incidents could have happened either before or after the methamphetamine/other offending. Therefore, this analysis only answers the question of whether within a group of individuals with methamphetamine offences different patterns of offending and incident involvement can be identified. It cannot say whether methamphetamine is a cause or consequence of offending or incident involvement.

Latent profile analysis assigns individuals to profiles or subgroups based on the probability that an individual belongs to a specific subgroup based on their pattern of scores on the indicator variables (i.e., the number of offences and incidents in each category). As such, there is no definitive guarantee that the individuals assigned to a particular subgroup do in fact belong to that subgroup (Weller et al., 2020). By extension, there is no guarantee that any subgroups found during the latent profile analysis will exist outside of the dataset used: a validation study would be required to test whether the same subgroups are found using a different dataset. However, this is the total population of individuals with recorded methamphetamine offences for the defined period within data held by New Zealand Police. Therefore, results could only differ if additional data was examined (such as using self-report data, or including individuals who were suspected of an offence but there was insufficient evidence).

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Results

Latent Profile Analysis

Latent Profile Analysis generates a selection of fit statistics in order to help determine the correct model: full details are presented in Appendix A. Based on the convergent information from the fit statistics, entropy, and how interpretable the results were: the five-profile model was selected as the final model.

Description of the final model

Table 1 provides an overview of the final model including the number of individuals assigned to each subgroup, the total number of offences and incidents that group committed (or were involved in), the minimum and maximum number of offences or incidents an individual from each subgroup committed (or were involved in), and median number of offences and incidents per individual in each subgroup. Subgroup 1 has the highest number of offences committed by an individual whilst the highest median number of offences committed, and incident involvement was subgroup 5.

Table 1: Overview of the final model

	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4	Subgroup 5
Total Number of individuals and percentage of total cohort	N = 326 (1.1%)	N = 239 (0.8%)	N = 23,463 (81.9%)	N = 4,398 (15.4%)	N = 208 (0.7%)
Total Number of offences and incidents	28,734	23,439	775,343	568,628	32,923
Minimum Number	28	15	1	59	58
Maximum Number	619	345	147	500	406
Median	77	88	28	118	150

All of the subgroups that were identified during the latent profile analysis have a degree of generalised offending and incident involvement i.e., all of the subgroups have members who have committed or were involved in every type of offence or incident. However, there were

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differences in the types and amount of offending between the subgroups. As shown in Figure 1, subgroup 1 has the highest median number of dealing drug offences whilst Subgroup 5 have the highest median number of offences for acquisitive crimes and fraud. Additionally, subgroup 2 had the highest median of mental health incidents, and subgroup 4 has the highest median for violence. Manufacturing drugs, possessing drugs, and other drug offences were very low on average for all of the subgroups. Each of the subgroups is described in more detail below, along with a breakdown of their offending and incidents.
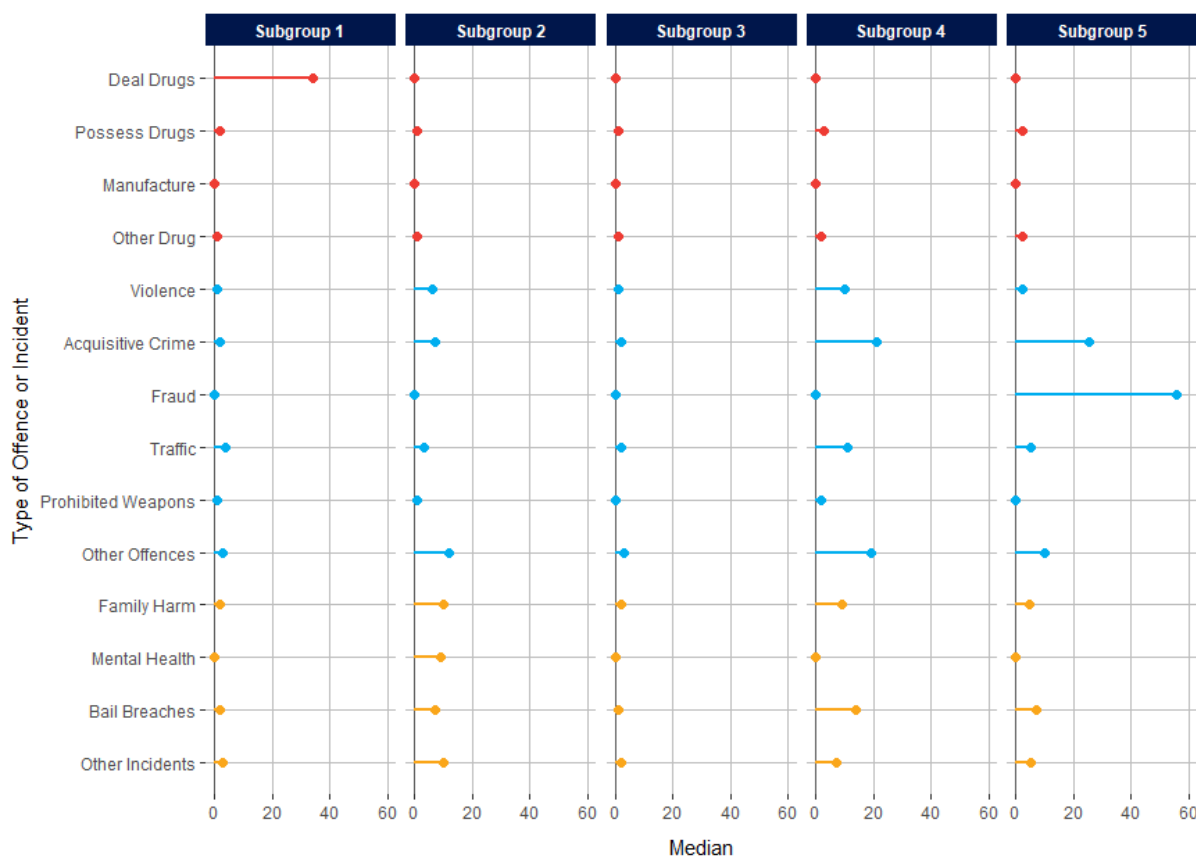
Figure 1: Median number[7] of offences and incidents per offence and incident category for each of the subgroups

Subgroup 1

Subgroup 1 comprises 326 individuals which is 1.1% of the methamphetamine cohort. Of those individuals:

- 156 (48%) individuals in this subgroup were European, 136 (42%) were Māori, and 34 (10%) were another ethnicity.
- 245 were male (75%), and 81 were female (25%).

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[7] The median a type of average, and is the middle number in which half of the values are above the median and half are below.

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- 46 people (14%) were recorded as being on the National Gang List.
- 61% of the subgroup had their first contact with police as an offender at age 24 or under.

Subgroup 1 committed or were involved in 28,734 offences and incidents. Of those offences and incidents, 48% (13,922) were for dealing drugs (predominantly methamphetamine), 8% were for acquisitive offences, and 7% were for other offences. With the exception of dealing, other drug offending was low albeit present: 2% (480) of their offending related to the manufacture or cultivation of drugs; 3% (923) was related to the possession or use of drugs; and 2% (626) was related to other drug offences. The manufacturing or cultivating, and possession or use of drug offences were predominantly for cannabis, and the other drug offences were predominantly for methamphetamine.
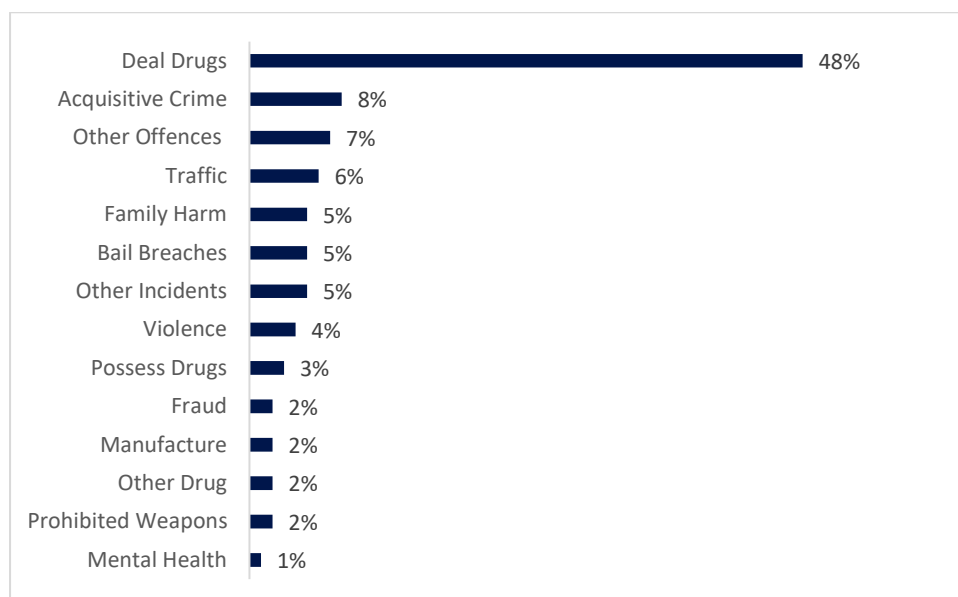

Figure 2: Percentage of offences and incidents of subgroup 1 by offence and incident type.

Subgroup 2
Subgroup 2 comprises 239 individuals which is 0.8% of the methamphetamine cohort. In the subgroup:

- 125 (52%) individuals in this subgroup were European, 94 (39%) were Māori, and 28 (8%) were another ethnicity.
- 132 were male (55%), and 107 were female (45%).
- Four people (2%) were recorded as being on the National Gang List.
- 71% had their first contact with police as an offender at the age of 24 or under.

Subgroup 2 committed or were involved in 23,439 offences/incidents. Of those offences/incidents, 15% each were for family harm incidents, and other incidents, 12% for acquisitive crimes, 11% for mental health incidents, 10% for bail breaches, and 16% were for other offences,. Taken together, incidents accounted for 51% of their total. Drug offending for

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this subgroup was present, although was low: 53 instances (0.2%) of manufacturing or cultivating drugs; 110 instances (0.5%) of dealing drugs; 2% (n = 454) was related to the possession or use of drugs; and 2% (n = 459) was related to other drug offences. Methamphetamine was the main drug involved in subgroup 2's other drug offences whilst cannabis was the predominant drug for the subgroups' possession or use offences and their manufacturing or cultivation offences. Half of the dealing drug offences for subgroup 2 were for methamphetamine, and the other half was a range of drugs, predominantly cannabis.
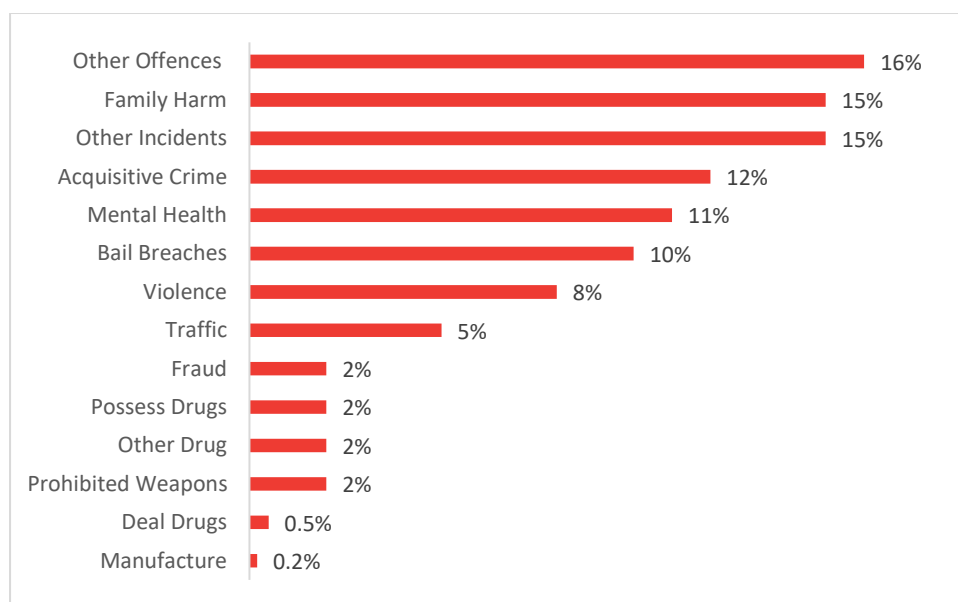
Offence/Incident Type	Percentage
Other Offences	16%
Family Harm	15%
Other Incidents	15%
Acquisitive Crime	12%
Mental Health	11%
Bail Breaches	10%
Violence	8%
Traffic	5%
Fraud	2%
Possess Drugs	2%
Other Drug	2%
Prohibited Weapons	2%
Deal Drugs	0.5%
Manufacture	0.2%

Figure 3: Percentage of offences and incidents of subgroup 2 by offence and incident type.

Subgroup 3

Subgroup 3 is the largest group which comprises the majority of individuals within the methamphetamine cohort (n = 23,463; 81.9%). In this subgroup:

- 11,691 (50%) individuals in this subgroup were European, 8,820 (38%) were Māori, and 2,952 (12%) were another ethnicity.
- 16,439 were male (70%), and 7,016 were female (30%).
- 1,382 people (6%) were recorded as being on the National Gang List.
- 59% of subgroup 3 had their first contact with police as an offender at the age of 24 or under.

Subgroup 3 committed or were involved in 775,343 offences/incidents which is over half of all the offences/incidents of the "methamphetamine group". Subgroup 3 had more generalised offending and incidents as there was not a specific category that accounted for the bulk of their offending and this subgroup were involved in high volume of all types. Family harm (15%: 117,183), other offences (14%: 105,105), acquisitive crimes (13%: 103,515), traffic offences (11%: 88,438), and other incidents (10%: 75,754) accounted for most of their

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offending/incidents. Drug offending for subgroup 3 was present, although was low: 2% (15,363) of their offending related to the manufacture or cultivation of drugs; 4% (30,713) was related to dealing drugs; 5% (37,559) was related to the possession or use of drugs; and 4% (32,131) was related to other drug offences. Methamphetamine was the predominant drug for the subgroups' dealing, and other drug offences whilst cannabis was the predominant drug for their possession or use offences. The manufacturing or cultivating offences involved a range of drugs with no clear dominant drug.
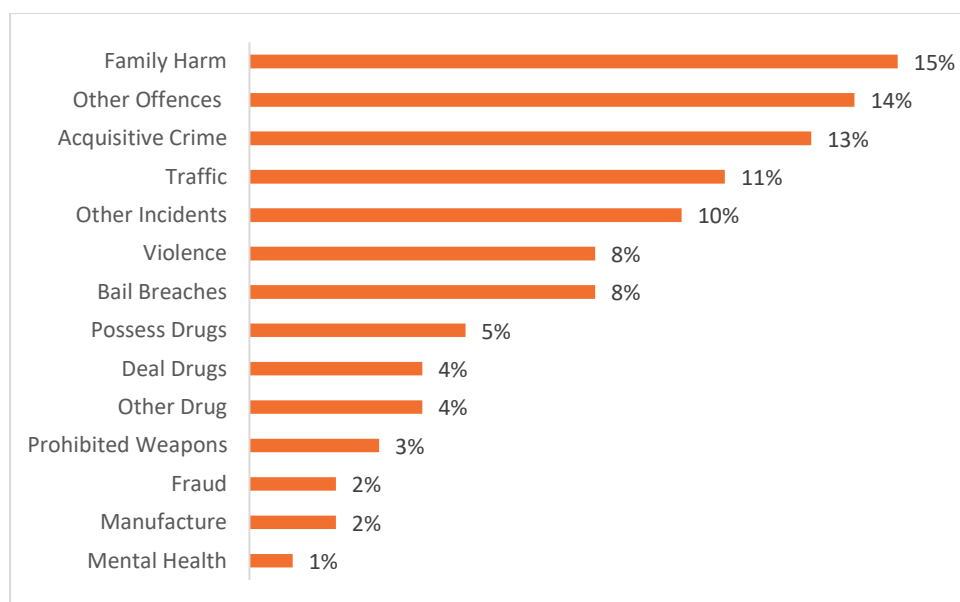
Offence/Incident Type	Percentage
Family Harm	15%
Other Offences	14%
Acquisitive Crime	13%
Traffic	11%
Other Incidents	10%
Violence	8%
Bail Breaches	8%
Possess Drugs	5%
Deal Drugs	4%
Other Drug	4%
Prohibited Weapons	3%
Fraud	2%
Manufacture	2%
Mental Health	1%

Figure 4: Percentage of offences and incidents of subgroup 3 by offence and incident type.

Subgroup 4

Subgroup 4 is the second largest group which comprises 4,398 individuals (15.4%). Within this subgroup:

- 1,514 (34%) individuals in this subgroup were European, 2,371 (54%) were Māori, and 513 (12%) were another ethnicity. This is the only subgroup in which the majority of the group is Māori.
- 3,876 were male (88%) and 522 were female (12%).
- 857 (19%) people were recorded as being on the National Gang List.
- 76% of subgroup 4 had their first contact with police as an offender at the age of 24 or under.

Subgroup 4 committed or were involved in 568,628 offences/incidents which is 40% of all the offences/incidents of the "methamphetamine group". Acquisitive crimes (21%: 122,024), other offences(17%: 97,476), and bail breaches (14%: 81,455) accounted for most of their offending/incidents. Drug offending for subgroup 4 was present although did not account for a large percentage of their offences and incidents: less than 1% (2,176) of their offending

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related to the manufacture or cultivation of drugs; 1% (5,307) was related to dealing drugs; 3% (14,810) was related to the possession or use of drugs; and 2% (12,048) was related to other drug offences. Methamphetamine was the predominant drug for the subgroups' other drug offences whilst cannabis was the predominant drug for their possession or use offences. The manufacturing or cultivating offences involved a range of drugs although was cannabis. Finally, over half of the dealing of drug offences were for methamphetamine and the other half was a wide range of drugs.
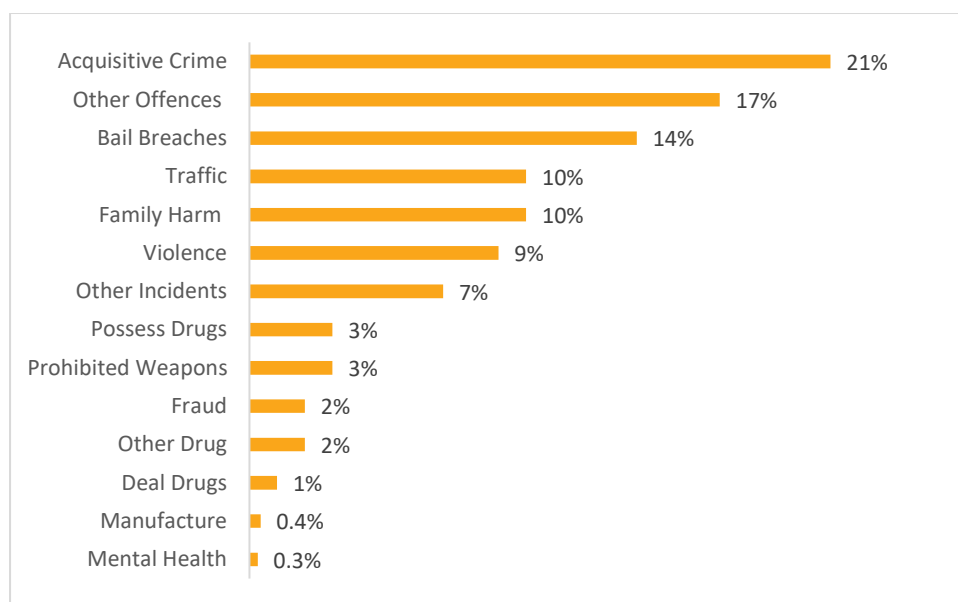

Figure 5: Percentage of offences and incidents of subgroup 4 by offence and incident type.

Subgroup 5

Subgroup 5 comprises 208 (0.7%) individuals. Of these individuals:

- 106 (51%) individuals in this subgroup were European, 81 (39%) were Māori, and 21 (10%) were another ethnicity.
- 130 were male (63%), and 78 were female (37%).
- 9 people (4%) were recorded as being on the National Gang List.
- 68% of subgroup 5 had their first contact with police at the age of 24 or under.

Subgroup 5 committed or were involved in 32,923 offences and incidents (insert percentage of total?). Fraud (42%: 13,781) and acquisitive crimes (21%: 7,040) accounted for most of their offending and incidents. Drug offending for subgroup 5 was present although did not account for a large percentage of their offences and incidents: less than 1% (106) of their offending related to the manufacture or cultivation of drugs; 1% (269) was related to dealing drugs; 2% (555) was related to the possession or use of drugs; and 2% (554) was related to other drug offences. Methamphetamine was the predominant drug for the subgroups' dealing, and other drug offences whilst cannabis was the main drug for the manufacturing or cultivating offences.

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The majority of the possession or use of drug offences for this subgroup was related to cannabis although methamphetamine was still prominent.
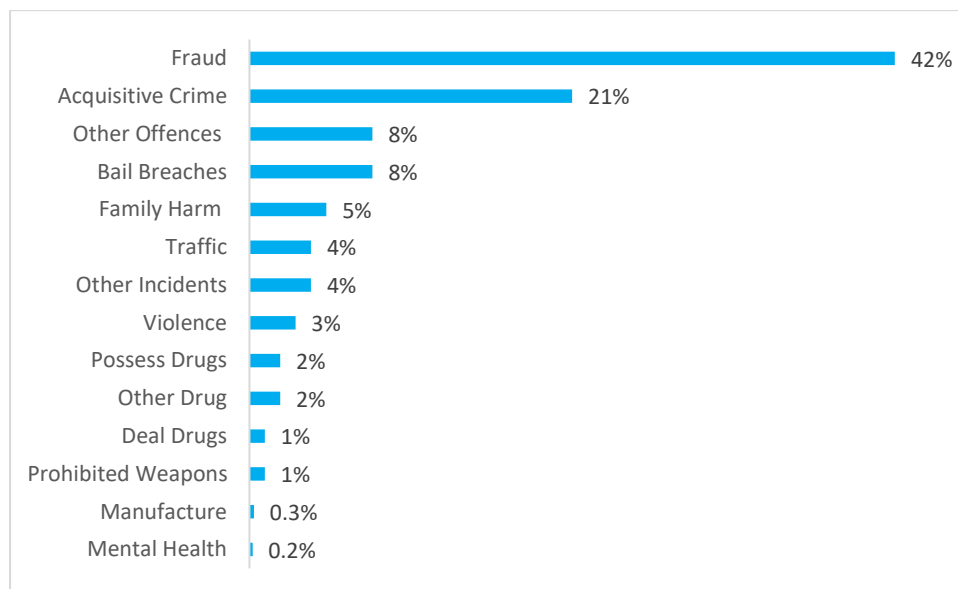

Fraud	42%
Acquisitive Crime	21%
Other Offences	8%
Bail Breaches	8%
Family Harm	5%
Traffic	4%
Other Incidents	4%
Violence	3%
Possess Drugs	2%
Other Drug	2%
Deal Drugs	1%
Prohibited Weapons	1%
Manufacture	0.3%
Mental Health	0.2%

Figure 6: Percentage of offences and incidents of subgroup 5 by offence and incident type.

Comparisons between subgroups

When looking at the volume of offences and incidents for the entire methamphetamine cohort, subgroup 3 which represents the majority of the methamphetamine cohort (82%) accounts for 54% of the volume of offences committed and incidents involved. However, whilst Subgroup 4 may account for only 15.4% of the individuals in the methamphetamine cohort, they committed or were involved in 40% of all of the offences and incidents of the methamphetamine cohort.

Despite the smaller number of individuals assigned to the subgroup 4, these individuals perpetrated:

- half of the acquisitive crimes,
- over half of the bail breaches,
- 44% of the violence offences,
- a third of the fraud offences,
- 39% of the traffic offences,
- 38% of the prohibited weapons offences, and
- were involved in a third of the family harm incidents of the cohort.

Furthermore, whilst subgroup 2 is only 239 individuals (0.8% of the methamphetamine cohort), this subgroup was involved in a quarter of the mental health incidents of the methamphetamine cohort. Whilst subgroup 1 has only 326 individuals (1.1% of the methamphetamine cohort), this group committed about a third of the dealing of drug offences

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perpetrated by the methamphetamine cohort. Subgroup 5 is 208 individuals (0.7% of the methamphetamine cohort), and perpetrated approximately a third of the fraud offences of the cohort.

Differences in crime harm of offending between subgroups

Since the latent profile analysis focused on the number and type of offences and incidents, a subsequent analysis was conducted in order to determine whether the crime harm (NZCHI value) of the subgroups' offences was different. In order to determine the appropriate analysis to conduct, the crime harm data for the subgroups was examined[8].

Table 2 shows the minimum and maximum crime harm value an individual from each subgroup had, as well as the median crime harm per subgroup[9] whilst Figure 7 shows the distribution of the crime harm values. Subgroup 5 has the highest median crime harm whilst subgroup 3 has the lowest. However, subgroup 3 and subgroup 4 have more variability in the range of crime harm committed by individuals: as such, there are more individuals within these two subgroups who have more extreme harm values.

Table 2: Crime harm descriptive statistics per subgroup

	Minimum	Maximum	Median	Standard Deviation
Subgroup 1	45	5,621	631	797
Subgroup 2	12	3,184	335	480
Subgroup 3	2	13,616	235	681
Subgroup 4	10	16,610	991	1076
Subgroup 5	80	4,058	1,169	744

Note: Numbers represent equivalent prison days

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[8] This process found that the crime harm data was positively skewed meaning that most of the harm values for each individual were in the lower end of the scale. Due to the skewness of the crime harm data, it was decided to use statistical tests which do not require the data to be normally distributed or have similar variances between the groups (non-parametric tests).

[9] Due to the skewness of the data, the median is presented instead of the mean.

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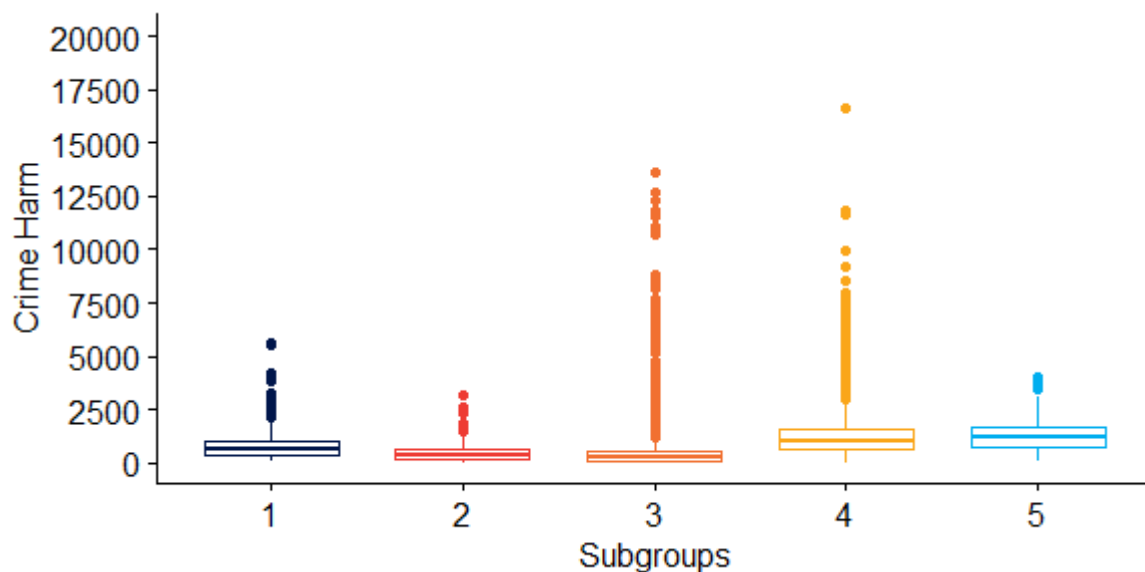EVIDENCE —
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Figure 7: Distribution of total crime harm (equivalent prison days) for each individual by subgroup

A Kruskal-Wallis test found that there was a significant difference in mean rank of crime harm values between the five subgroups with a large effect size[10] (H (4) = 6289.5, p < .001, η^2 = 0.22). Pairwise comparisons with a Bonferroni correction were used to determine where the differences between the groups were. All of the subgroups are statistically significantly different from each other (p <.001) except for between subgroup four and five which was not significant (p = 0.14). These results indicate that individuals in subgroup 4 and subgroup 5 caused similar amounts of crime harm, and that individuals within these two subgroups caused more crime harm on average than individuals in each of the other three subgroups. Additionally, subgroup 1 perpetrated more crime harm than subgroup 2 and subgroup 3, and subgroup 2 caused more crime harm than subgroup 3.

Victimisations experienced by the subgroups

Additional analyses were conducted to determine whether the number of victimisations experienced by the subgroups was different. Similar to the crime harm data, the data for the number of victimisations was positively skewed. Therefore, the same non-parametric analyses were conducted.

Table 3 shows the minimum and maximum number of victimisations an individual from each subgroup experiences as well as the median number of victimisations per subgroup whilst Figure 8 the distribution of the number of victimisations per subgroup. The median number of

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[10] An effect size is a statistic that indicates how meaning the difference between the groups examined is. In this instance, a large effect size indicates that the difference in crime harm between the subgroups is likely to have substantial practical significance

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victimisations was low in all of the subgroups although subgroup 2 had the highest median number of victimisations at 8 whilst subgroups 1, 3 and 4 had the lowest with a median of 3. Furthermore, subgroup 3 and subgroup 4 have more variability in the range of number of victimisations committed by individuals: as such, there are more individuals within these two subgroups who experienced a larger number of victimisations.

Table 3 : Descriptive statistics for number of victimisations of the subgroups

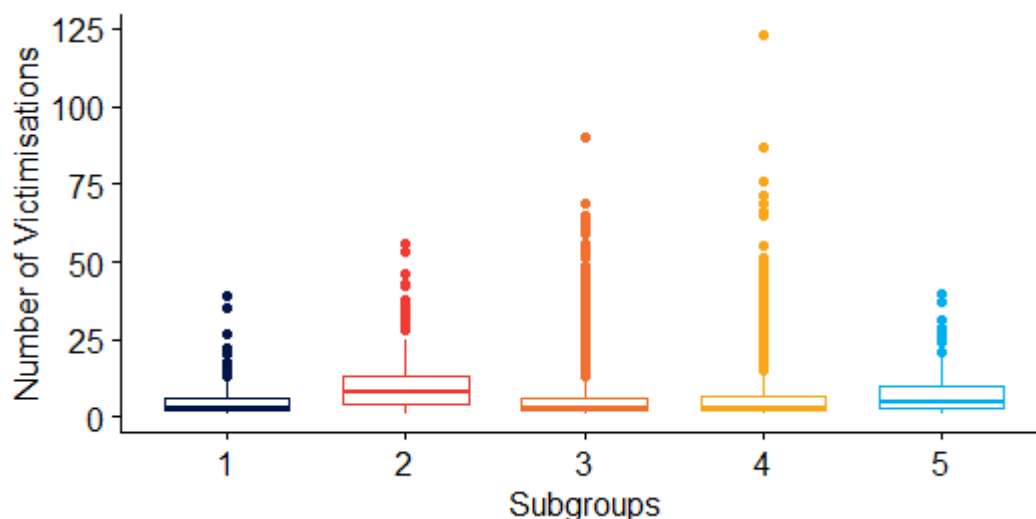|	Minimum	Maximum	Median	Standard Deviation
Subgroup 1	1	39	3	5.4
Subgroup 2	1	56	8	9.4
Subgroup 3	1	90	3	5.9
Subgroup 4	1	123	3	7.3
Subgroup 5	1	40	5	7.4

Figure 8: Distribution of the number of victimisations per subgroup

Due to the skewed data, a Kruskal-Wallis test was conducted to examine whether there was a difference in the number of victimisations experience by the five subgroups. The test indicated that the mean rank of number of victimisations was significantly different between the subgroups with a small effect size[11] (H (4) = 192.46, p < .0001, η^2 = 0.008). Pairwise comparisons with a Bonferroni correction showed there were no significant differences between subgroups 1 and 3, and subgroups 1 and 4. However, the test also showed that there were significant

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[11] Due to the small size of the effect, it can be argued that while there are differences in the number of victimisations between the subgroups, the difference is likely to be minimal in practice.

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differences. Specifically, subgroups 2 and 5 were statistically different than all of the other subgroups, and subgroups 3 and 4 were statistically different from each other as well[12].

Table 4 shows which crime types accounted for the subgroups' victimisations. As can be seen, all of the subgroups mostly experienced acts intended to cause injury, theft, burglary, property damage, and abduction/harassment. Subgroup 2 has the highest percentage of their victimisations experienced relating to sexual assault.

Table 4: Total number of victimisations per subgroup and percentage breakdown by type of victimisation

	Subgroup 1	Subgroup 2	Subgroup 3	Subgroup 4	Subgroup 5
Total Number of Victimisations	1,107	2,313	88,961	20,471	1,359
Acts Intend to cause Injury	299 (27%)	866 (37%)	29,411 (33%)	8,452 (41%)	434 (32%)
Theft	292 (26%)	537 (23%)	22,076 (25%)	4,299 (21%)	367 (27%)
Burglary	152 (14%)	244 (11%)	11,172 (13%)	1,918 (9%)	185 (14%)
Property Damage	138 (12%)	133 (6%)	10,062 (11%)	2,023 (10%)	128 (9%)
Abduction or Harassment	78 (7%)	203 (9%)	6,746 (8%)	1,445 (7%)	92 (7%)
Public Order	46 (4%)	73 (3%)	3,745 (4%)	911 (4%)	49 (4%)
Robbery	35 (3%)	48 (2%)	1,683 (2%)	461 (2%)	28 (2%)
Sexual Assault	27 (2%)	171 (7%)	1,614 (2%)	456 (2%)	32 (2%)
Fraud	23 (2%)	31 (1%)	1,700 (2%)	320 (2%)	37 (3%)
Dangerous Vehicle	13 (1%)	6 (0.3%)	588 (1%)	131 (1%)	6 (0.4%)
Homicide	3 (0.3%)	0	94 (0.1%)	25 (0.1%)	0
Negligent Behaviour	1 (0.1%)	1 (0.04%)	70 (0.1%)	30 (0.1%)	1 (0.1%)

Summary

The latent profile analysis found that there are five distinct subgroups of methamphetamine offenders based on their number of offences and incidents. The majority of offenders within the subgroups were male although subgroups 2 and 5 had relatively even numbers of males

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[12] All of these significant differences were significant at p <.001

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and females. Each of the subgroups was predominately European except subgroup 4 which was predominantly Māori. However, Māori were disproportionately represented in the other subgroups.

Whilst there was a degree of generalised offending and incident involvement for all of the subgroups (i.e., all of the subgroups were involved in all types of incidents, and committed offences in every offence category), there was some degree of specialisation for some of the subgroups. The first subgroup specialised more in dealing drug offences especially for methamphetamine, the second subgroup was characterised by a high volume of non-crime incidents, the third subgroup was characterised by having the greatest generalised offending and incident pattern, the fourth subgroup was also characterised by generalised offending although there was a some degree of specialisation with acquisitive crime and offences relating to public order, property damage or crimes against justice, and the fifth subgroup appears to specialise more in monetary crimes (fraud and acquisitive crimes). These findings broadly support the academic literature in that the majority of the methamphetamine cohort offend in a generalised manner (in particular subgroup 3). However, the results also support the notion of offender specialisation: at this stage, it is uncertain if the offence specialisation observed in this report is short lived as evidence in the previous literature or if it is persistent over time. Questions relating to the longitudinal nature and trajectories of the offending of the subgroups will be explored in the final report of Tranche 3.

Comparing the volume of offences and incidents accounted for by each subgroup highlighted that despite their small numbers of individuals: subgroup 1 committed approximately a third of the dealing of drug offences, subgroup 2 was involved in a quarter of the mental health incidents, and subgroup 5 committed approximately a third of the fraud offences of the methamphetamine cohort. Additionally, subgroup 4 perpetrated: half of the acquisitive crimes, over half of the bail breaches, 44% of the violence offences, a third of the fraud offences, 39% of the traffic offences, 38% of the prohibited weapons offences, and were involved in third of the family harm incidents of the cohort.

While there were some differences in the number of victimisations experienced by the subgroups, the differences were shown to be relatively small overall. However, subgroup 2 did experience the highest median number of victimisations.

Examining the crime harm of the subgroups highlighted that the subgroups were causing different levels of crime harm. Specifically, subgroup 5 committed the highest median level of crime harm despite being the smallest subgroup with 208 people. Subgroup 3 which comprises the majority of the methamphetamine cohort caused the lowest median crime harm whilst having substantial variability in the range of crime harm values. This result indicates that most of the individuals assigned to subgroup 3 (and therefore the majority of the methamphetamine cohort) commit relatively low harm offences when compared to the other subgroups, however,

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there are also more individuals in subgroup 3 than the other subgroups that cause an extreme amount of crime harm.

The findings of this report indicate that in order to effectively reduce the offending committed and associated crime harm caused by those associated with methamphetamine, different approaches may be needed for different groups as the cohort are not offending at the same level or in the same way. For example, whilst subgroup 2 are committing offences, most of their police contact relates to non-crime incidents, therefore more social based interventions might be the most appropriate for these individuals. Furthermore, as the resources of NZ Police and other agencies are limited, it would be beneficial to provide the most support to those individuals who are causing the most crime harm. With that in mind, targeting behaviours such as those exhibited by members of subgroups 1, 4, and 5 would likely lead to the largest reductions in crime harm: targeting these subgroups might be easier in a practical sense due to the relatively smaller number of individuals in these subgroups. Furthermore, the final Tranche 3 report will help to determine which groups of individuals may benefits most from an intervention due to the focus on understanding the trajectories and offending over time for the subgroups.

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Appendix A – Statistical Results from the Latent Profile Analysis

Latent Profile Analysis generates fit statistics to help determine the correct model. As can be seen in Table 5, all of the fit statistics decrease with the addition of each profile: this means that statistically speaking, adding more profiles to the model provides a better fit and therefore the 7-profile model could be considered the most optimal.

Table 5: Fit Statistics for models

	Model Fit Criteria			
	LL	AIC	BIC	SABIC
Model 1	-1,190,762	2,381,581	2,381,812	2,381,723
Model 2	-1,162,089	2,324,265	2,324,620	2,324,484
Model 3	-1,149,535	2,299,186	2,299,665	2,299,481
Model 4	-1,139,254	2,278,654	2,279,258	2,279,026
Model 5	-1,130,359	2,260,894	2,261,621	2,261,341
Model 6	-1,122,914	2,246,035	2,246,886	2,246,559
Model 7	-1,114,359	2,228,954	2,229,929	2,229,554

Notes: LL = Log-likelihood; AIC = Akaike information criterion; BIC = Bayesian information criterion; SABIC = Sample size adjusted Bayesian information criterion.

In practice, it is common for information criterion to continue to decrease with each additional profile: in these instances, it can be useful to graph the fit statistics in order to look for an "elbow" i.e., a point in which there is diminishing returns in model fit when adding more profiles (Nylund-Gibson & Choi, 2018). Figure 9 highlights that increasing the number of additional profiles does continue to provide benefit in a statistical sense, however, examining the profiles determined that the practical benefits of more than five profiles was reduced.

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Figure 9: Bayesian information criterion fit statistic for the Latent Profile Analysis

Entropy is a value between 0 and 1 which indicates how distinct the profiles in each model are from each other: higher numbers equal more distinction and less overlap between groups (Isler et al., 2016). There is no definitive cut-off value for entropy in order to provide good model classification, however, values above 0.8 are considered high, 0.6 as medium, and 0.4 as low (Clark & Muthén, 2009). All of the entropy values were above 0.9 indicating that there is a high level of distinction between the subgroups and therefore low amount of overlap (see Table 6). Average posterior probability of membership is another method for determining the correct number of profiles in a model. This is calculated by averaging the membership of each individual within each profile once they have been assigned to their most likely profile, and represents the level of misclassification. Due to the nature of latent profile analysis, misclassification is inevitable, however, the general rule is when average posterior probability is 0.7 or greater (Nagin, 2005). For the models, the average posterior probabilities of class membership were high (above 0.9) which indicates that the individuals classified into each profile within each model are likely to have been classified correctly.

Table 6: Entropy and Average probability of profile membership for the Latent Profile Analysis

| | Entropy | Average probability of profile membership | | | | | | |
		Profile 1	Profile 2	Profile 3	Profile 4	Profile 5	Profile 6	Profile 7
Model 1	1.0	-	-	-	-	-	-	-
Model 2	.93	.99	.95	-	-	-	-	-
Model 3	.96	.99	.99	.94	-	-	-	-
Model 4	.97	.99	.99	.98	.95	-	-	-
Model 5	.97	.98	.97	.99	.94	.99	-	-
Model 6	.97	.97	.99	.97	1.0	.94	.99	-
Model 7	.95	.98	.99	.91	.97	.97	.95	.98

It is important to also consider how interpretable each model is. Examining the models determined that adding more than five profiles did not increase utility and ease of interpretability.