The utilisation of services in patients with psychosis who engage in antisocial behaviours

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The data that support the findings of this study are available on request from the corresponding author (AC), The data are not publicly available due to ethical restrictions e.g., their containing information that could compromise the privacy of research participants.

Abstract

Three pathways of antisocial behaviour and psychosis have been described. Three subgroups within a typology have been categorised as (i) schizophrenia preceded by conduct disorder (SZ+CD), (ii) offenders with schizophrenia and no childhood history of antisocial behaviour who begin offending at illness onset (SZ+AS), and (iii) offenders with schizophrenia (SZ). There are no studies investigating how the subgroups utilise services. This study aimed to examine the concurrent validity of the typology, and examine differences in service utilisation.

The sample consisted of 77 male patients admitted to low and medium secure units in the United Kingdom. The subgroup of patients was determined from data collected from health records. Analysis assessed the difference in aetiological variables amongst the typology and examined the relationship of subgroup service utilisation.

This study provided further evidence of distinguishing characteristics emphasising typology heterogeneity and found differences in service utilisation. The SZ+CD subgroup were more likely to have used services preceding a diagnosis of psychosis. Following the onset of psychosis, the SZ+AS and SZ subgroups had a higher proportion that used general adult psychiatry services. Those patients within the SZ+AS and SZ subgroups had a higher use of general adult services after psychosis onset. Understanding about how these subgroups utilise services will enable clinicians to develop effective management plans that address the distinct characteristics of offenders with psychosis.

Keywords: schizophrenia, antisocial personality disorder, conduct disorder, violence, criminality, forensic psychiatry

Word Count: 5035

1.0 Introduction

Even though most patients with psychosis are not violent, there is robust empirical evidence for a group level association between psychosis and antisocial behaviours, including an increased risk of aggression and violence (Varshney et al., 2016, Volavka, 2016). The factors that influence antisocial behaviour in patients with psychosis is multifactorial and research is inconclusive regarding clear associations between active psychotic symptoms and criminal behaviours. Therefore, alternative theories to explain this link have been explored. This includes hypotheses that psychosis exacerbates a person's predisposition for antisocial behaviour, or that psychosis and antisocial behaviour arise from similar aetiological roots, be those developmental, social, or genetic (Wallace et al., 2004).

Research has suggested that there may be distinct categories of patients that can explain this relationship between psychosis and antisocial behaviours. Specifically, a tripartite typology has been proposed (also termed the Hodgins' typology) based on differences across several factors including the clinical trajectory of the disease and antisocial behaviour, demographics, aetiological factors, and comorbidities (Hodgins, 2008).

Firstly, there is a pathway for early-start offenders, which have been identified as those with psychosis that has been preceded by conduct disorder (CD), the SZ+CD subgroup. Secondly, there is a group of patients that start to display antisocial behaviours in parallel to the onset of psychosis, a late-onset SZ+AS subgroup. The third group of patients involve those with a long history of a psychotic disorder and no history of antisocial or aggressive behaviours, who will present to services following a first conviction for non-violent or violent crime, the late-late-onset SZ subgroup. The literature base exploring the typology has termed the three subgroups based on their onset of psychosis and antisocial behaviour i.e., early-

onset, late-onset, late-late-onset, and/or into three types categorised as (i) schizophrenia preceded by conduct disorder (SZ+CD), (ii) offenders with schizophrenia and no childhood history of antisocial behaviour who begin offending at illness onset (SZ+AS), and (iii) offenders with schizophrenia (SZ) (Hodgins et al., 2014).

This typology categorisation has not been investigated from the perspective of the utilisation of mental health (MH) services and criminal justice services (CJS). Several United Kingdom (UK) enquiries investigating homicide and mental illness have raised considerable interest in the need to identify factors that are associated with and are predictive of antisocial behaviours including violence (Milton et al., 2001). A better understanding of the different patterns of service utilisation would inform when and how to implement targeted interventions to reduce the likelihood of criminal offending in patients with psychosis.

1.1 Typology of Psychosis and Antisocial Behaviours

Psychosis, and specifically schizophrenia spectrum disorders, are a major mental illness whereby a person's thoughts, mood, perception and behaviour are significantly altered (National Collaborating Centre for Mental Health, 2014). In the current diagnostic classification systems, impaired reality testing remains central conceptually, operationalised as the presence of specific symptoms (e.g., hallucinations, delusions) (Arciniegas, 2015). The presence of psychotic symptoms is a defining feature of a diagnosis of a schizophrenia spectrum disorder. However, psychosis can also be found in other mental illness, including affective and substance use disorders. Those suffering from a severe mental illness with evidence of psychosis are at a higher risk of being convicted of violent criminal offences. Interestingly, as a group, offenders suffering from a schizophrenia spectrum disorder have been found to be very heterogenous, and attempts have been made to structure this into distinct subgroups (Hodgins et al., 2014, Lau et al., 2019).

Research has shown that the distinct subgroups of psychosis and antisocial behaviour are distinguishable by their association between antisocial behaviours and the onset of a psychotic illness i.e., their disease development and clinical trajectory. There is support for the importance of different underlying mechanisms and outcomes for mentally disordered

offenders based on the relationship between criminality and illness onset (Kooyman et al., 2012, Stevens et al, 2015). Studies have demonstrated the differences between pre-morbid offenders and post-morbid offenders, where pre-morbid offenders are more likely to be male, have a later age of illness onset, a low pre-morbid intelligence quotient and are more likely to suffer from neurological deficits (Kooyman et al., 2012).

Research examining this heterogeneity of mentally disordered offenders has led to the development of a typology, established from broad samples of individuals with both psychosis and offending histories. Studies investigating the aetiology and psychopathology of three distinct subgroups has provided support for the tripartite typology. Specific aetiological factors, comorbidities, antisocial conduct, and history have all been identified as differential factors between each distinct subgroup (Simpson et al., 2015). Studies have shown that there are significant differences in psychopathology between patients with and without a history of antisocial behaviour before onset of first-episode psychosis (Munkner et al., 2009). Substance misuse, childhood maltreatment, genetic heritability, and neurobiological correlates have been explored as distinguishing characteristics between subgroups (Hopfer et al., 2013, Tengström et al., 2001).

An alternative approach, latent class analysis, has also been used to investigate the presence of Hodgins' typology. Previous studies have demonstrated that there were three distinct subgroups that fit within the typology (Lau et al., 2019). Another study identified two distinct subgroups, early starters akin to the SZ+CD subgroup and late starters (SZ+AS) but did not support a SZ late-late starters subgroup (Penney et al., 2018). A study also investigated subgroups of patient remission in psychopathology during inpatient treatment and whether these subgroups were associated with Hodgins' typology (Kirchebner et al., 2021). This research demonstrated that the typology is a useful classification for predicting the psychopathological response of patients to inpatient MH treatment (Kirchebner et al., 2021). A current gap in our knowledge is how each subgroup uses MH services and CJS, which may allow us to predict how subgroups will utilise services, their pathways within services and when to deliver effective interventions. No studies to date have investigated the utilisation of services of Hodgins' subgroups.

1.2 Service Utilisation

The core principle of forensic psychiatry services is to care for individuals with mental disorders who are deemed to be at risk to others, and where that risk is felt to be associated with their mental disorder. The forensic MH pathways are comprised of multiple service components. Figure one illustrates the forensic psychiatry secure care pathways (adapted from Natarajan et al., 2012).

Insert Figure 1 Here.

Forensic psychiatry is at the interface between mental disorder and offending behaviours, and its role is not only to treat mental illness, but to also reduce risk of reoffending. The essential components for forensic MH services include a range of services from community MH care to high security, the incorporation of services to CJS, and the use of strong links with General Adult (GA) MH services and Child and Adolescent Mental Health Services (CAHMS) (Soothill et al., 2012). Within the UK, the inpatient secure mental health service design is based on stratified therapeutic security, with hospitals categorised as high, medium and low security. High secure hospital beds are provided by the National Health Service (NHS), medium secure hospital beds are split between NHS and private sector (approximately 65% in the NHS) and low secure services tend to be more diverse geographically (Latham & Williams., 2020). Low secure hospitals can vary from representing the upper end of GA psychiatry services to where other hospitals are more integrated into the forensic model, representing the lower end of the forensic MH pathway (Latham & Williams., 2020). Within UK secure hospitals mentally disordered offenders are subject to conditions of the mental health act and/or criminal justice legislation.

The secure forensic hospitals sit at the centre of a complex interplay between different services. This includes patients transferred to and from the CJS and prisons, GA psychiatry services and CAHMS services. Understanding more about how forensic patients utilise services will hopefully provide information that will have implications for risk management, service provision and treatment planning.

2. Aims

This study aimed to (i) examine the concurrent validity of Hodgins' typology using routinely recorded data and (ii) investigate differences in the service utilisation patterns of patients between these subgroups.

3. Methodology

3.1 Sample

The sample consisted of patients admitted to one low secure forensic hospital and one medium secure forensic hospital within the North West of England, UK. As this was an exploratory study, sample size was calculated pragmatically with a minimum of 40 patients collected from each data set. A total of 90 patients who met the inclusion criteria were identified for data collection in the study. These were inpatients to the service over a defined period of five years (2014-2019).

3.2 Data Collection

Data was collected retrospectively from patient case notes within an electronic health record (EHR). The EHR was accessed by clinician-researchers local to each NHS Trust. The EHR contains daily clinical notes and more comprehensive report documents (e.g., Mental Health Act tribunal reports, access assessment reports, Historical Clinical Risk-20 risk assessment reports) that were used to extract data. Researchers reviewed multiple documents to ensure consistency of the data. This data was copied verbatim from the EHR to avoid error and minimise bias. The researchers undertaking the data extraction of aetiological variables were blinded from the typology categorisation.

Data was gathered on the onset and extent of antisocial behaviour, and the diagnosis and onset of a psychotic illness. This history of antisocial behaviour was obtained from a variety of sources, including recorded offences/convictions, relevant multidisciplinary reports and from patient self-reports. A mental health diagnosis was determined by International

Classification of Diseases (ICD-10) criteria documented within the EHR. The onset of psychotic illness was documented based of a formal diagnosis of a psychotic illness. The EHR was also reviewed to determine an estimated onset of psychosis based on the patient's psychopathology in accordance with diagnostic criteria.

Previous diagnoses prior to the onset of a psychotic illness were also recorded. A diagnosis of CD was documented if there was a formal historic diagnosis of CD, or if there was evidence of a pattern of antisocial behaviour that was persistent through childhood and adolescence that would meet diagnostic criteria for CD. Conduct disorder is characterised by a repetitive, persistent and enduring pattern of dissocial, aggressive or defiant conduct, whereby the basic rights of others or major age-appropriate societal norms or rules are violated (American Psychiatric Association, 2013).

Data was collected on variables known from existing literature that have an association with psychosis and antisocial behaviour. These variables were used to assess the construct validity of the typology. Information was collected on:

- History of substance misuse
- History of adverse childhood experience(s) (childhood maltreatment; emotional, physical, and sexual abuse, and neglect).
- Neurodevelopmental traits/diagnosis
- A family history of psychosis

Data on the utilisation of services for each patient was gathered. Information was collected on whether the patient was known to psychiatric services prior to the diagnosis of a psychotic illness. This included care under CAMHS and GA MH services. Data was collected on the use of community services and the number of inpatient admissions to both services respectively. Data on the patient's contact with CJS and time spent in prison was also recorded. The use of MH services from the diagnosis of a psychotic illness to the patient's current admission pathway was collected. This was documented as number of admissions to CAMHS, GA psychiatric services and admissions to low, medium, and high forensic psychiatric services. Data was collected on the use of both NHS and private sector bed use.

3.3 Typology Categorisation

A categorisation checklist was developed to determine the typology subgroup of patients. Cases were allocated to one of the three subgroups. A patient without a diagnosis of a psychotic illness was excluded. Patient's that were not able to be categorised, or if there was a significant degree of subjectivity when discriminating the subgroup, a consensus discussion was completed.

The categorisation checklist can be found in figure two. The initial inclusion criteria for allocation to each subgroup is the presence of a psychotic disorder. The allocation of an individual to the SZ+CD subgroup is associated with a previous diagnosis of CD, or evidence of a pattern of antisocial behaviour that was persistent through childhood and adolescence that would meet diagnostic criteria for CD. If the patient did not fit the criteria for CD, the onset of psychotic illness was examined in correlation with the onset and extent of antisocial behaviour. If the age of onset of antisocial behaviour was approximately in correlation with an onset of a diagnosis of a psychotic illness, the patient was categorised as the SZ+AS subgroup. If there was a substantial time lapse between onset of psychosis that preceded antisocial behaviour, the patient was allocated to the SZ subgroup. If there was no clear correlation of antisocial behaviour and psychotic illness that would fit within each subgroup, this patient was labelled as 'indeterminate'.

To ensure reliability of the categorisation checklist the inter-rater reliability of the checklist was assessed. Two researchers independently applied the checklist to the patient data. Independent from data collection and blinded from the data extraction process, two researchers reviewed the variables for each patient and determined the typology. To quantify inter-rater reliability, Cohen's Kappa statistical test was used. The two independent researchers agreed with the typology of 98% patients. This yielded a near perfect agreement on Cohen's kappa (kappa = 0.844, n = 41). These results show excellent reliability of the categorisation checklist.

3.4 Analysis

Each patient was applied to the categorisation checklist for typology determination. The differences in the distribution of aetiological factors (substance misuse, adverse childhood experience(s), neurodevelopmental traits, family history), and service utilisation (CAHMS, GA before psychosis diagnosis, GA use after psychosis diagnosis, forensic MH, criminal justice service) was examined. The degree of association of each variable collected with the typology was explored. A chi-squared test was used for categorical variables and a one-way ANOVA for continuous variables.

3.5 Ethics

The study received ethical approval from Health Research Authority and Health and Care Research Wales (ref: 274820).

4. Results

4.1 Sample

A total of 90 patients were identified. A total of 77 patients were included in the study. Twelve patients were excluded from the study, of which the reasons for exclusion were, (i) duplicate patient (*n*=2), (ii) limited clinical information within EHR (*n*=8), and (iii) patient did not have a diagnosis of a psychotic disorder (*n*=3).

The average age of the sample was 42 years. Table one demonstrates the breakdown of the ICD-10 diagnoses of the sample. The most common primary diagnosis found was a schizophrenia spectrum disorder and highest frequency secondary diagnosis was mental and behavioural disorders due to psychoactive substance use.

Insert table one here.

4.2 Typology Categorisation

Within the sample there were forty patients in the SZ+CD subgroup (*n=40, 52%)*, twenty-three patients in the SZ+AS subgroup (*n=23, 30%)*, and ten patients in the SZ subgroup. (*n=10, 13%).*

From data collection it became evident that there was a small subset of patients that did not fit within the three subgroups. These were termed 'indeterminate' within our study (*n=4, 5%)*. On analysis of this subgroup's clinical trajectory, the patients within this population had evidence of antisocial behaviour starting in adulthood (>18 years of age) that preceded psychosis onset by a significant period.

Table two demonstrates the presence of aetiological factors within each typology. The results demonstrate typology heterogeneity with differences in aetiological factors between each subgroup. A history of substance misuse and a history of adverse childhood experiences were more common in those with an earlier onset of antisocial behaviour (SZ+CD) and within the SZ+AS subgroup. This difference was found to be statistically significant. A family history of a psychotic disorder and neurodevelopmental traits was also more frequently found in those with an earlier onset of antisocial behaviour; however, the differences were not found to be statistically significant between subgroups.

Insert table two here.

4.3 Service Utilisation

The use of different MH services and CJS throughout each of the subgroups clinical trajectory is detailed within table three.

Insert table three here.

Utilisation of CAHMS and GA services before the onset of psychosis and the use of prison was more frequently found in those with a history of CD. Contact with MH services was less likely in subgroups with a later onset of antisocial behaviours (SZ+AS and SZ subgroups), and this difference was statistically significant. Those with an earlier onset of antisocial behaviours (SZ+CD) and those with a temporal link between their psychosis and antisocial behaviour (SZ+AS) were found to have a higher percentage use of CJS and forensic psychiatry services.

Table four shows the number of admissions between different services for each typology prior to their current admission. There was a higher percentage of admissions to CAHMS with the SZ+CD subgroup than the other subgroups. However, this difference was not found to be statistically significant. Those patients within the SZ+AS and SZ subgroups have a higher use of GA services after psychosis onset. This difference was not statistically significant. Most patients within the SZ+CD and SZ+AS subgroups had not utilised forensic MH inpatient services prior to their current admission. A higher percentage of those within the SZ subgroup had been admitted to a forensic MH service before, which was not statistically significant.

Insert table four here.

5. Discussion

5.1 Typology of Psychosis and Antisocial Behaviours

This research adds to the empirical evidence base for the construct validity of the typology for psychosis and antisocial behaviour. There is evidence of distinguishing aetiological factors between each subgroup, with significant differences found between the early-start offenders (SZ+CD) and later onset offenders (SZ+AS and SZ). This includes the increased use of substances and the high rates of adverse childhood experiences found in the SZ+CD subgroup. The research is in keeping with other studies whereby almost all persons with the onset of childhood antisocial behaviour and persistence of antisocial behaviour in adulthood also have a persistent pattern of substance misuse (Compton et al., 2007). Research has also found that those with CD and a psychotic illness, as compared to those without a CD history, are more likely to have experienced abuse (Tengström et al., 2001). Due to this, cases for the

inclusion of family history and early substance misuse into the diagnostic criteria for CD alone have been made (Moffitt et al., 2008).

The study utilised patient records to retrospectively assess whether individuals would meet the diagnostic criteria for CD during their childhood. Research has shown that 42% of males in a mentally ill sample would fulfil the criteria for CD prior to age fifteen, and that there are CD rates of 40% among adults with a schizophrenia spectrum disorder (Hodgins et al., 2008, Kim-Cohen et al., 2003). Our study showed that 52% of the sample would have met the criteria for CD prior to age fifteen. This is slightly higher than previous studies and that found in the general population. The higher percentage in our study may be due to the specific population group of mentally ill offenders within forensic psychiatry services. Previous research has often been conducted in much broader samples of individuals with psychosis and antisocial behaviours.

There has been limited research on the SZ subgroup, likely due to the smaller patient sample found within previous research and the absence of this group from some study populations (Hodgins, 2008). This study found a small sample of patients that would fit into this typology. Research has suggested this subgroup may be an exemplar among the late starter SZ+AS subgroup (Penney et al., 2018). Our study did not support this, demonstrating a difference in substance misuse and adverse childhood experiences between the SZ and SZ+AS/SZ+CD subgroups. Family history of psychosis also showed an increased percentage in the SZ+CD and SZ+AS subgroups compared to the SZ subgroup, however this was not statistically significant. The presence of substance misuse and childhood maltreatment may increase the likelihood of the SZ+AS subgroup engaging in antisocial behaviours following illness onset, with an earlier onset compared to the SZ subgroup.

Previous research has revealed some inconsistencies in the number of subgroups and operationalisation of the concept (Lau et al., 2019). Our study revealed a very small number of patients that did not fit into Hodgins' typology. We termed this the 'indeterminate' subgroup, which on further analysis portrayed a clinical trajectory of antisocial behaviour beginning in adulthood (i.e., not meeting diagnosis for CD) several years before the onset of any psychotic symptoms. Further exploration of those individuals' psychiatric history is important as this may reveal important information about their clinical trajectory. It may indicate a prolonged prodromal illness prior to a diagnosis of psychosis and/or possible psychotic symptoms that were misdiagnosed on previous contact with MH services and/or CJS. There is also a need

to distinguish whether a primary diagnosis of a psychotic illness against a secondary diagnosis of a psychotic illness would influence typology categorisation and service utilisation. It is important to determine the characteristics of these offender types in more detail to develop effective risk management plans and interventions.

In terms of risk management, pharmacological treatment, namely antipsychotic medication, has been reported to reduce violent behaviour by up to 45%, highlighting the need to identify psychotic symptoms in those displaying antisocial behaviours (Fazel et al., 2014). Early recognition of the relationship between a person's antisocial behaviour and their mental health may lead to the introduction of effective interventions that reduce positive psychotic symptoms and violent behaviours. It may also highlight the need to consider the use of validated risk assessment tools in those presenting with first episode psychosis or the prodromal phase of a psychotic illness, rather than waiting to complete these tools once the person has come to the attention of forensic MH services. Early use of evidence-based risk assessments may reduce antisocial behaviours and violence amongst those with a serious mental illness (Challinor et al., 2021). This emphasises the importance of research investigating subgroups of mentally disordered offenders and how they utilise services. Understanding more about the pathways of mentally disordered offenders will allow earlier introduction of interventions to manage and reduce risk.

5.2 Service Utilisation

To the authors knowledge, this is the first study to investigate the utilisation of services amongst the Hodgins' patient typology. The results demonstrated that each subgroup utilises MH services and CJS differently, establishing further distinguishing factors between each subgroup. Understanding how the subgroups utilise services is important for understanding more about the trajectory of patients with psychosis that display violent behaviours, and for consideration of treatment interventions along their clinical pathway. Knowledge of the service utilisation pathways for different clinical trajectories would enable more targeted interventions with the aim to predict or prevent antisocial behaviours in patients with psychosis. It would also aid the formulation of risk assessments and the stratification of patient care pathways.

Prior research has suggested that the SZ+CD subgroup would benefit less from inpatient treatment, and specifically pharmacological treatment (Hodgins et al., 2014). This is important

considering the findings of our study, whereby those within the SZ+CD subgroup had a higher percentage use of CAHMS and GA services preceding psychosis onset in comparison to the other subgroups. The SZ+CD subgroup also had a higher use of forensic MH services and CJS than the other subgroups. Interestingly the SZ+CD subgroup had a lower use of GA services than the other subgroups following psychosis diagnosis. Of these differences in service utilisation between subgroups, only the GA use before psychosis onset reached statistical significance. Further studies with a greater sample size are required to determine whether these non-significant observed effects could reach a statistical threshold to assert the observed inference. These results indicate that the pathways into forensic services are more commonly observed through the CJS than GA MH inpatient services, despite the presence of possible psychotic symptomatology. This reduces the opportunities for the delivery of effective treatment (e.g., antipsychotic medication), which has been shown to reduce violent behaviours in those with psychosis (Fazel et al., 2014).

Despite previous research suggesting the SZ+CD subgroup would benefit less from inpatient hospital treatment, a more recent study has found that the SZ+CD subgroup benefited most from available inpatient treatment and the SZ subgroup were often disadvantaged from available inpatient treatment (Kirchebner et al., 2021, Hodgins et al., 2014). An explanation for this observation was the engagement in psychological intervention within the SZ+CD group (Kirchebner et al., 2021). Thus, a patient will likely benefit from more tailored pharmacological and non-pharmacological treatments dependent on which typology the patient is in. Those with a previous diagnosis of CD are known to consume more psychiatric care and significantly higher amounts of pharmacological treatment (Hofvander et al., 2017). Our study showed the increased percentage utilisation of CAHMS and GA services amongst the SZ+CD subgroup. Thus, this study demonstrated that there is potentially a role for CAHMS and GA services to recognise this subgroup earlier and deliver effective treatment, in the form of psychological interventions, a treatment shown to benefit the SZ+CD subgroup (Kirchebner et al., 2021). Doing so may reduce the high amounts of CJS and forensic MH service use in this subgroup as found in our study and reduce any pharmacological burden. There is a need to improve the identification of behaviours in keeping with a diagnosis of CD, and for those within the SZ+CD subgroup. There is reason to argue that these individuals could be identified and treated at an earlier age to reduce the likelihood of mental illness and recidivism. This is important not only for our health services, but for all social welfare institutions.

Interestingly, those within the SZ subgroup had a greater number of admissions to forensic MH services prior to their current hospital pathway. This may be because this subgroup is

thought to be associated with an isolated offence of high severity. Thus, readmissions following relapse of their mental disorder may be more likely to be managed in forensic MH services than GA services. This provides an important insight the risk management and progression from MH service of the SZ subgroup after the onset of offending. Research into the clinical pathways is important to distinguish how this subgroup utilise forensic MH services and to identify and predict outcomes upon release from hospital.

There is likely to be value in identifying potential causal theories of the emergence of violence in the SZ+AS and SZ subgroups. Those with a clear relationship between their mental disorder and anti-social behaviour are likely to benefit more from psychiatric treatment. The increased percentage use of GA services after psychosis onset, in comparison to the SZ+CD typology, has implications for these patients' treatment and risk management. Comprehensive and validated risk assessment tools may yield benefits for these subgroups, whereby increasing risks may be discovered earlier, and interventions identified. Greater focus an individual's pathway to antisocial behaviour in relation to the onset of psychosis may inform better risk management and treatment, and aid decision making on individual care pathways.

5.3 Limitations

A limitation in the current study was the use of retrospective content analysis of the EHR. The data, although often detailed and comprehensive, was not standardised within the research study and used self-report and case files. To avoid reliance on self-report, additional data was also sourced for each patient of formal documentation of offence(s). This allowed more accurate retrospective diagnoses of CD, and data on the onset of psychosis and antisocial behaviour. The use of EHR and categorisation via an operationalised checklist for typology allocation has limitations whereby some of the criteria that are used to allocate cases to the different subgroups may be expected to be associated with differences in some of the variables compared between the subgroups. Most notably CD was used as part of the subgroup categorisation, and CD is more likely to be associated with CAHMS utilisation than other subgroups. Also, CD is associated with increased risk of early onset antisocial behaviours, which may be associated with increased CJS contact and imprisonment.

The exploratory nature and small sample size of our study is an important limitation. The sample size was limited and selective to forensic psychiatry services. Previous research examining the typology have done so on broader samples of individuals with psychosis and offending behaviour. The small sample sizes limited the number of individuals within the less commonly found subgroups (SZ and indeterminate). It is important to develop an evidence base for forensic psychiatry service use, improve its patient outcomes and limit heterogeneity of patients between different geographical regions. These have all been highlighted as significant concerns with the development of forensic services (Latham & Williams., 2020). Researching how different subgroups of mentally disordered offenders within forensic psychiatry hospitals utilise services before admission may allow for the introductions to prevent lengthy and costly admissions to forensic hospitals. A limitation is that the selective sample limits generalisability of the results. However, research on how mentally disordered offenders use forensic services specifically is also of benefit.

A limitation of research on Hodgins' typology to date have been an inconsistent conceptual operationalisation in research over time (Lau et al., 2019). To reduce inconsistent operationalisation, an alternative approach to this data would be to utilise a latent class analysis to identify similarities and differences within the data set and correlate this to each homogenous subgroup. To limit bias and interpretation of the data by chance, this study enabled operationalisation of the data for typology categorisation using a categorisation checklist. This checklist demonstrated very good interrater reliability and categorisation of subgroups was performed by researchers independent from data collection.

The Hodgins' postulated typology has been consistently applied to male populations. This study focussed on male forensic MH inpatients. Current evidence has suggested that factors associated with the mental disorder of those within forensic female MH services are intricately connected with their antisocial behaviours across different developmental stages (Hodgins, 2022). A limitation of this research is that it focussed solely on the male offender population. Further research on the clinical and antisocial trajectories of females are needed to contribute to the prevention of suffering.

Despite some limitations, this study contributes to the evolving literature on the subgroups of the offender population that suffers from a psychotic disorder. The study has provided further data that allows refinement of the construct validity of each typology, and to the authors

knowledge, it is the first study that has explored the service utilisation of these offender subgroups. Exploring service utilisation in more narrowly defined groups of mentally disordered offenders may allow for introduction of interventions aimed at reducing risk. Further research is needed to examin effectiveness of treatment packages within different services that address the distinct characteristics of each subgroup.

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Figures

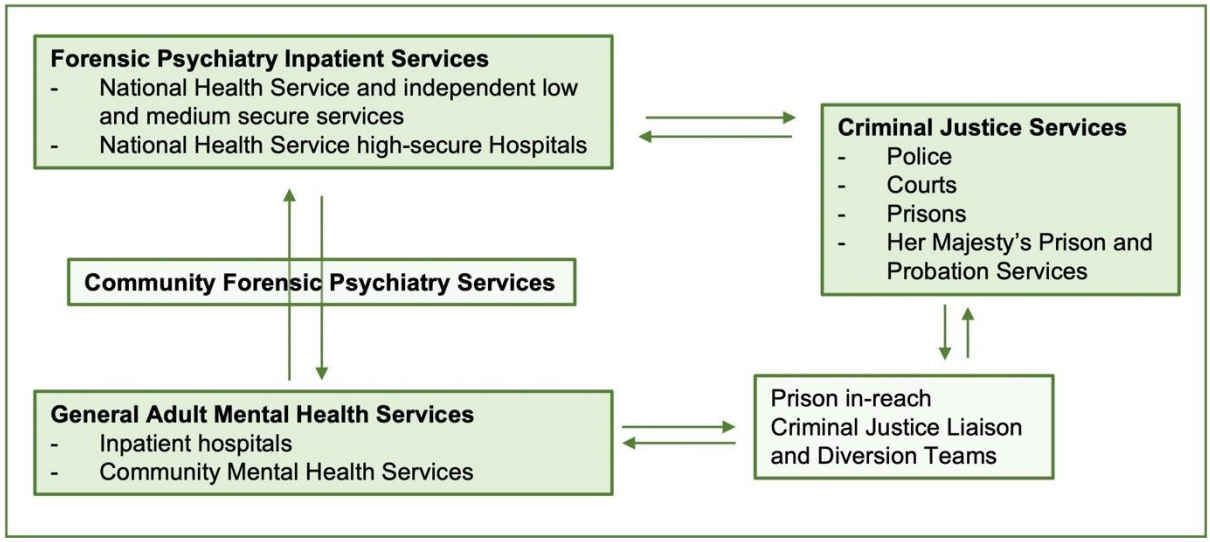

Figure 1. Forensic psychiatry pathways and discharge/diversion pathways.

Categorisation Checklist
1. Diagnosis of Psychosis - yes, continue 2. Diagnosis of conduct disorder before the onset of a psychotic illness – Yes, SZ+CD subgroup / No, continue 3. History of antisocial behaviour within childhood or adolescence that would meet the diagnostic criteria for CD retrospectively – Yes, SZ+CD subgroup / No, continue 4. No significant history of antisocial disorder before onset of psychotic illness diagnosis – yes, continue 5. Age and extent of antisocial behaviour in correlation with the onset of a diagnosis of a psychotic illness – Yes, SZ+AS subgroup / No, continue 6. Diagnosis of a psychotic illness present for a substantial period before the onset of a significant incident of antisocial behaviour – Yes, SZ subgroup / No, continue 7. Patient does not fit into one of three subgroups – Yes, Indeterminate subgroup.

Figure 2. Typology Categorisation Checklist.

Tables

International Classification of Disease Code	Primary Diagnosis, *n* (%)	Secondary Diagnosis, *n* (%)
F0-09 Organic, including symptomatic, mental disorders	0 (0%)	0 (0%)
F10-19 Mental and behavioural disorders due to psychoactive substance use	1 (1%)	33 (43%)
F20-29 Schizophrenia, schizotypal and delusional disorders	74 (96%)	4 (5%)
F30-39 Mood (affective) disorders	2 (3%)	3 (4%)
F40-49 Neurotic, stress related and somatoform disorders	0 (0%)	0 (0%)
F50-59 Behavioural syndromes associated with physiological disturbances and physical factors	0 (0%)	0 (0%)
F60-69 Disorders of adult personality and behaviour	0 (0%)	9 (12%)
F70-79 Mental retardation	0 (0%)	4 (5%)
F80-89 Disorders of psychological development	0 (0%)	0 (0%)
F90-98 Behavioural and emotional disorders	0 (0%)	0 (0%)
F99 Unspecified mental disorder	0 (0%)	0 (0%)
No formal diagnosis	0 (0%)	24 (31%)

Table 1. Primary and Secondary diagnoses of the patient sample according to the International Classification of Disease.

	Typology				
	SZ+CD (*n* = 40), *n* (%)	SZ+AS (*n* = 23), *n* (%)	SZ (*n* = 10), *n* (%)	Indeterminate (*n* = 4), *n* (%)	*P*-value
Substance Misuse					
Yes	39 (97.5)	20 (87)	5 (50)	4 (100)	0.001*
No	1 (2.5)	3 (13)	5 (50)	0 (0)	
Family History of psychosis					
Yes	21 (52.5)	11 (47.8)	2 (20)	1 (25)	0.247
No	19 (47.5)	12 (52.2)	8 (80)	3 (75)	
Neurodevelopmental Traits					
Yes	8 (20)	1 (4.3)	1 (10)	0 (0)	0.268
No	32 (80)	22 (95.7)	9 (90)	4 (100)	
Adverse Childhood Experiences					
Yes	24 (60)	9 (39.1)	0 (0)	2 (50)	0.007*
No	16 (40)	14 (60.9)	10 (100)	2 (50)	

Table 2. Presence of aetiological factors for patients with psychosis and antisocial behaviour typology. (*p-value ≤ 0.05).

	Typology				
	SZ+CD (*n* = 40), *n* (%)	SZ+AS (*n* = 23), *n* (%)	SZ (*n* = 10), *n* (%)	Indeterminate (*n* = 4), *n* (%)	*P*-value
CAHMS use					
Yes	12 (30)	3 (13)	0 (0)	1 (25)	0.135
No	28 (70)	20 (87)	10 (100)	3 (75)	
GA use before psychosis					
Yes	16 (40)	2 (8.7)	1 (10)	2 (50)	0.020*
No	24 (60)	21 (91.3)	9 (90)	2 (50)	
GA use after psychosis					
Yes	21 (52.5)	19 (82.6)	8 (80)	2 (50)	0.064
No	19 (47.5)	4 (17.4)	2 (20)	2 (50)	
Previous forensic MH use					
Yes	17 (42.5)	5 (21.7)	4 (40)	0 (0)	0.058
No	23 (57.5)	18 (78.3)	6 (60)	4 (4)	
Criminal Justice Services Use					
Yes	27 (67.5)	14 (60.9)	5 (50)	3 (75)	0.715
No	13 (32.5)	9 (39.1)	5 (50)	1 (25)	
Previous imprisonment					
Yes	24 (60)	8 (34.8)	4 (40)	2 (50)	0.475
No	16 (40)	15 (65.2)	6 (60)	2 (50)	

Table 3. Service utilisation of antisocial behaviour and psychosis typology. (*p-value ≤ 0.05).

	Typology				
	SZ+CD (*n* = 40), *n* (%)	SZ+AS (*n* = 23), *n* (%)	SZ (*n* = 10), *n* (%)	Indeterminate (*n* = 4), *n* (%)	*P*-value
CAHMS					
0	35 (88)	23 (100)	10 (100)	4 (100)	
1-2	4 (10)	0 (0)	0 (0)	0 (0)	
3-7	0 (0)	0 (0)	0 (0)	0 (0)	0.621
≥8	1 (2.5)	0 (0)	0 (0)	0 (0)	
Mean (S.D)	0.35 (1.59)	0 (0)	0 (0)	0 (0)	
GA services before psychosis					
0	27 (67.5)	19 (82.6)	8 (80)	3 (75)	
1-2	7 (17.5)	4 (17.4)	1 (10)	1 (15)	
3-7	5 (12.5)	0 (0)	1 (10)	0 (0)	0.439
≥8	1 (2.5)	0 (0)	0 (0)	0 (0)	
Mean (S.D)	0.90 (1.88)	0.26 (0.62)	0.90 (2.23)	0.25 (0.50)	
GA services after psychosis					
0	22 (55)	6 (26.1)	2 (20)	2	
1-2	8 (20)	5 (21.7)	2 (20)	0 (0)	
3-7	6 (15)	9 (39.1)	3 (30)	2	0.258
≥8	4 (10)	3 (13)	3 (30)	0 (0)	
Mean (S.D)	2.20 (4.71)	4.26 (5.25)	4.80 (4.57)	2.25 (2.87)	
Forensic MH services					
0	28 (70)	18 (78)	4 (40)	4 (100)	
1-2	11 (28)	3 (13)	5 (50)	0 (0)	
3-7	1 (2.5)	2 (8.7)	1 (10)	0 (0)	0.096
≥8	0 (0)	0 (0)	0 (0)	0 (0)	
Mean (S.D)	0.48 (0.82)	0.39 (0.89)	1.10 (1.10)	0 (0)	

Table 4. Number of admissions to MH services between antisocial behaviour and psychosis typology. (*p-value ≤ 0.05).