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Examining the timing of mental health contacts across female offending trajectories



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Abstract

Background There is a strong relationship between mental health and female offending, but few studies use longitudinal data to capture the differences in mental health service contact and diagnoses across diverse female offending trajectories. Most studies focus on broad trends, often overlooking how mental health contacts and diagnoses differentially unfold across female offending trajectories. We address this gap by utilising state-wide, linked administrative data for all females registered as born in Queensland (Australia) in 1983 and 1984 to examine the prevalence, timing, and frequency of mental health service contact and diagnoses across distinct female offending trajectories, including comparisons with non-offending females.

Results Females with serious and persistent offending patterns were more likely to have contact with mental health services and receive earlier and more frequent mental health diagnoses than those with low or non-offending patterns. Additionally, females with adult-onset offending patterns were more likely than any other group to contact mental health services before their first recorded offence. Despite a decrease in mental health-related hospital admissions by late adolescence, all offending groups experienced a rise in community mental health contacts as they transitioned into adulthood.

Conclusions This study expands existing evidence by providing insight into the relationship between mental health and female offending trajectories. Our study also provides important implications for policy and practice to improve the mental health and well-being of females involved in the justice system.

Keywords Trajectories, Girls, Women, Mental health, Diagnosis, Mental health service contact

Introduction

Females' entry into the criminal justice system (CJS) is influenced by a multitude of factors, including a history of childhood abuse, trauma, substance use, and mental health issues. These factors often co-occur and can profoundly shape a female's pathway into the CJS (Haysom, 2024). There is a strong association between mental

*Correspondence: Aydan Kuluk a.kuluk@griffith.edu.au ¹Griffith University, Brisbane, Australia ²University of New Mexico, Albuquerque, USA health diagnoses and contact with the CJS (Ogilvie et al., 2023), and research indicates that mental health issues are more prevalent in women compared to men, in both the general community and the offending population (Australian Institute of Health and Welfare (AIHW), 2024; Haysom, 2024). Women with a mental health diagnosis are overrepresented in the CJS in countries, such as the United States, the United Kingdom, and Australia (Al-Rousan et al., 2017; Tyler et al., 2019). For example, Australian statistics reveal that around 63% of women had self-reported a history of a mental health condition upon entering prison, compared to 49% of men (AIHW, 2023a). The high proportion of mental health



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issues among women has been linked to a range of lifecourse factors, including adverse childhood experiences, parental mental health issues, family dysfunction, limited social support, unemployment, and caregiving responsibilities. These factors are often present in the lives of women with mental health issues and those involved in the CJS (Dolan et al., 2013; Green et al., 2016).

Despite the strong association between mental health and criminal behaviour in females, there is a lack of research investigating how the timing and likelihood of receiving a mental health diagnosis vary across female offending pathways. This study addresses this gap by examining how the prevalence, timing, and frequency of mental health service contact and diagnoses vary across female offending trajectories. It also aims to identify agerelated peaks and patterns in service use and diagnoses, thereby deepening our understanding of the relationship between mental health and female offending and enhancing theoretical insights into female offending pathways.

Offending trajectories and mental health among females

Despite extensive research on mental health and offending, much of it is based on cross-sectional arrest and incarceration data or qualitative transcripts. Although qualitative data provides rich, individualised information, it often does not provide clear implications for how mental health histories are associated with life-course offending pathways, as it focuses on personal experiences rather than broader patterns (e.g., Caulfield, 2016; DeHart et al., 2014; Harner & Riley, 2013). However, longitudinal studies that do focus on life-course offending pathways have found significant relationships between mental health service utilisation, mental health diagnoses, and female life-course offending pathways.

For example, a recent longitudinal state-wide cohort study found a high prevalence of mental health service contact across various female offending pathways, ranging from low to high-rate escalating offending patterns. However, higher rates and earlier onset of mental health contacts were identified among more serious and persistent offending trajectories (Ogilvie et al., 2024). Yet, it is unclear how the age-related patterns of mental health service contact and diagnoses vary across distinct female offending trajectories. This study addresses this gap by providing a comprehensive examination of the timing, patterns, and potential variations in mental health histories across different female offending trajectories. Specifically, we aim to document variation across trajectory groups in the age-related peaks in mental health service contact and diagnosis. Although we also explore potential variation in the timing of the first mental health contact relative to the first recorded offence, our analysis is descriptive and does not seek to establish temporal ordering or causality.

Longitudinal research consistently demonstrates that substance use disorders and specific mental health disorders, such as anxiety and major depression are highly prevalent among women who follow persistent patterns of offending. For example, women following escalating and chronic or persistent offending pathways are approximately twice as likely to be diagnosed with major depression compared to those following low offending pathways (Krupa & Childs, 2014; Odgers et al., 2008; Ogilvie et al., 2024; Walker et al., 2019). Additionally, Bergman and Andershed (2009) found that around 60% of females in the chronic or persistent offending groups were registered for psychiatric care. This proportion was higher than that of men in the same group (30.8%) and higher than females in the adult-onset and adolescent-limited offending groups, where only 15-20% were registered for psychiatric care. This suggests a complex relationship between females' persistent involvement in the CJS and their mental health needs, highlighting the importance of providing targeted and timely mental health support for these women.

Despite the growing body of literature on the relationship between mental health and female offending, there remains a gap in understanding how the timing, patterns, and likelihood of mental health diagnoses differ across various female offending pathways and how this compares to females who are not involved in the CJS. Previous evidence suggests that variations in race/ethnicity, motherhood, and history of childhood maltreatment help to account for women's diverse offending pathways (Broidy et al., 2018; Cauffman et al., 2015; Odgers et al., 2008). These factors may also help explain differences in stress levels and mental health issues across women (Badr et al., 2018; Sapkota, Ogilvie et al., 2024). In this study, these factors are included as covariates, which allows for a more precise analysis of the relationship between mental health and female offending trajectories.

This research is important since young females with mental health issues may experience unique challenges that may be linked to their offending behaviour, such as economic vulnerability, social isolation, lack of family support, lack of access to support services, and stigma (Covington, 2002; Sapkota et al., 2024a, b). These challenges are central to feminist pathways literature, which highlights gendered experiences, such as childhood maltreatment and mental health issues, as commonly observed among females who come into contact with the justice system (Daly, 1992). Over the past few decades, scholars have expanded on this model by emphasising the heterogeneity of female offending, showing how these factors are associated with female offending (e.g., Broidy et al., 2018). This study builds on this body of work and contributes to the broader theoretical understanding of how mental health contact and diagnoses present across

female offending trajectory groups and how they unfold over time.

Current study

Our study aims to address knowledge gaps about mental health and female offending by examining how the timing and patterns of mental health service contacts and diagnoses vary across diverse female offending trajectories, including how this compares to females not involved in the CJS. Additionally, we explore how female offending trajectories are associated with the likelihood of receiving a mental health diagnosis, while controlling for a set of covariates, including motherhood status, history of childhood maltreatment, and race/ethnicity. These covariates have been previously identified as influencing mental health outcomes, especially among females (Badr et al., 2018; Sapkota, Ogilvie et al., 2024). Utilising the offending trajectory groups identified by Kuluk et al. (2024) through Group-Based Trajectory Modelling (GBTM), our analyses aim to capture variation in mental health outcomes across distinct female offending trajectories. Given limited research on how life-course experiences shape the diversity of women's offending patterns, our research is largely exploratory and not guided by discrete hypotheses. This work is an important starting point for advancing our theoretical understanding of the diversity of female offending trajectories and related variations in life experiences that shape this diversity. It is also crucial for developing targeted intervention practices that address these unique experiences.

Specifically, we aim to address the following research questions:

RQ1 Are there differences in the frequency of mental health service contacts and diagnoses over time across offending trajectory groups?

RQ2 What is the cumulative probability of mental health diagnoses across offending trajectory groups over time?

RQ3 Are there differences in the timing of the first mental health contact relative to the first offence across offending trajectory groups?

RQ4 How is offending trajectory group membership associated with the likelihood of receiving a mental health diagnosis over time, after controlling for available covariates?

Method

Data sources

In this study, we utilise state-wide, linked administrative data from the Queensland Cross-Sector Research Collaboration (QCRC) that includes records for all individuals registered as born in 1983 or 1984 in Queensland (Australia). We utilised the following administrative records for all females in the cohort: births (including birth records of both individuals into the cohort and their children), deaths and marriages (from the Queensland Registry of Births, Deaths and Marriages; RBDM); child safety notifications (from the Department of Child Safety, Seniors and Disability Services; DCSSDS); youth justice contacts (from the Department of Youth Justice and Victim Support); youth cautions and conferences (from the Queensland Police Service; QPS), including formal cautions for minor offences and police referrals to restorative justice conferences as an alternative to court proceedings; youth and adult court appearances (from the Queensland Department of Justice); community mental health contacts and hospital admissions relating to mental health diagnoses (from Queensland Health). Data are stored in the Social Analytics Lab (SAL), a secure data facility at Griffith University (Allard et al., 2020). Ethical clearance was approved by the Griffith University Human Research Ethics Committee (2021/356).

Cohort and study design

We used a prospective, longitudinal design to examine how the timing and patterns of mental health service contacts and diagnoses vary across female offending trajectories, including how this compares to non-offending women. We also examined the likelihood of receiving a mental health diagnosis after controlling for available covariates, including Aboriginal and/or Torres Strait Islander identity, motherhood status, and history of childhood maltreatment among females captured in the QCRC database. Our sample includes a total of 40,416 females registered as born in Queensland in 1983 and 1984, for whom criminal justice contact data was analysed from the age of 10 (minimum age of criminal responsibility) up to the age of 30.

Trajectory groups

Our study builds on the work of Kuluk et al. (2024), who utilised Group-Based Trajectory Modelling (GBTM) to identify and analyse five distinct offending groups of females in the QCRC database who had at least one proven offence by age 30. The GBTM used Poisson models with quadratic functions of age/time, controlled for exposure time using sentencing records, and capped offences at 100 per year per individual to reduce skew and the influence of outliers (Kuluk et al., 2024). The five-group trajectory model (entropy > 0.8; Average Posterior Probability > 0.7; Odds of Correct Classification > 5) was selected for its interpretability and to explore varied offending patterns among our sample of 8,120 females with at least one proven offence (see Supplementary Table S1 for goodness-of-fit and classification accuracy statistics).

As shown in Fig. 1, the trajectory model is comprised of the following offending groups: (1) early adult-onset escalating (n = 507; 6.2% of females involved in the CJS; 1.3% of all females); (2) adolescent-limited low (n = 3,428; 42.2% of females involved in the CJS; 8.5% of all females); (3) adult-onset low (n = 3,467; 42.7% of females involved in the CJS; 8.6% of all females); (4) early onset young adult peak (n = 559; 6.9% of females involved in the CJS; 1.4% of all females); (5) chronic early adult peak (n = 159; 2.0% of females involved in the CJS; 0.4% of all females). A separate sixth group was created for women with no CJS contact, which we identified as "non-offending women" (n = 32,296; 79.9%). Further information regarding the method used to generate the five offending groups can be found in Kuluk et al.'s (2024) study.

Variables Offending

We obtained CJS contact information from police diversions (youth cautions and conferences) and records of both finalised youth and adult court outcomes. Our data on offending includes all proven offences where individuals from age 10 (which is the age of criminal responsibility in Queensland) to age 30 either pleaded guilty or were found guilty and finalised by the police (in case of diversions) or in court. A proven offence can lead to different legal outcomes (i.e., finalisations), including but not limited to diversions, fines, probation, and detention. To ensure that the observation periods for both birth cohorts are comparable, the data is appropriately right censored at the age of 30. Individuals without any proven offences until the age of 30 were classified as non-offending.



Fig. 1 Female trajectory model (n = 8,120) from Kuluk et al. (2024)

Mental health

Mental health-related contact and diagnosis information was obtained from Queensland Health data, which includes information on both community mental health contacts (from the Consumer Integrated Mental Health Application; CIMHA) and mental health-related hospital admissions (Queensland Hospital Admitted Patient Data Collection; QHAPDC). The CIMHA dataset records interactions with outpatient Community Mental Health Services, including direct healthcare services and other activities related to the individual. CIMHA covers the period between September 2000 and December 2013, which means we were able to gather information about community mental health service utilisation for individuals between the ages of 16/17 and 29/30. The QHAPDC dataset provides information on individuals diagnosed with a primary or secondary mental illness during hospital admissions, including multiple admissions and diagnoses over time. QHAPDC includes records from July 1995 to June 2014, spanning from 10/11/12 years to 29/30/31 years for the 1983/1984 cohorts and these data were right censored at age 30 years for all cohort individuals. Since CIMHA data is left-truncated relatively late into adolescence, variables related to the timing of onset are based on the first QHAPDC contact.

Timing of first hospital-admission based mental health

diagnosis The *timing of first mental health diagnosis* was measured by calculating the number of years between the individual's date of birth from Queensland RBDM records and the individual's first recorded mental health-related hospital admission date from the QHAPDC.

Timing of first mental health contact and first offence We calculated the timing of the first mental health contact in relation to their first offence using the individual's first recorded mental health-related hospital admission date from the OHAPDC, the first recorded community mental health service date from the CIMHA, and the earliest offence date from the youth cautions and conferences data and court finalisations. A categorical variable was created to identify all combinations of any mental health contact (hospital or community) relative to the first offence: (1) individuals who had any mental health contact before the first offence (defined as before 31 days); (2) those who had any mental health contact after the first offence (defined as after 31 days), and (3) those who had any mental health contact at the same time as the first offence (defined as within 31 days).

Types of mental health contact We used data from CIMHA and QHAPDC to create binary variables indicating if an individual ever had contact with community mental health services (1 = yes, 0 = no) and if an individual

ever received a mental health diagnosis during a hospital admission (1 = yes, 0 = no). We then created a categorical variable to identify all combinations of mental health service contact: (1) *community contact only*; (2) *hospital admissions only*; (3) *both community and hospital contact*; and (4) *no mental health service contact*.

Psychiatric ward admission A binary indicator was created based on hospital records to determine whether an individual was ever admitted to a psychiatric ward during a hospital admission.

Mean counts of mental health service contacts The mean counts of hospital admissions and community mental health service contacts were calculated by averaging the total counts of contacts across all individuals in each trajectory group for each age of the observation period.

Frequency of mental health service contacts The frequency of community mental health service contacts and hospital admissions were summed for each individual over the entire observation period, as recorded in CIMHA and QHAPDC, respectively.

Age at first mental health contact Age at first mental health contact was calculated using the individual's birth date and first admission date recorded in the QHAPDC data, as well as the date of their first recorded community mental health service contact in the CIMHA data.

Covariates

Aboriginal and/or Torres Strait Islander identity Aboriginal and/or Torres Strait Islander identity was considered a covariate since Aboriginal and/or Torres Strait Islander peoples are disproportionately overrepresented in the Australian CJS (AIHW, 2024), emphasising the importance of including Aboriginal and/or Torres Strait Islander identity in our analysis. Individuals were assigned Aboriginal and/or Torres Strait Islander identity if they had ever self-identified or been identified by the data custodians as Aboriginal and/or Torres Strait Islander in any of the QCRC databases. Individuals were assigned non-Indigenous if they had not self-identified. Aboriginal and/or Torres Strait Islander identity is the only cultural identity variable available within QCRC datasets.

Motherhood status Individuals were identified as mothers if they had at least one registered biological child from the Queensland RBDM (1 = yes, 0 = no).

Childhood maltreatment notification The variable ever received a Child Protection System (CPS) notification was defined as any recorded notification of maltreatment with the CPS, including emotional, physical, sexual, and neglect, between the ages of 0-17 (1 = ever, 0 = never). Notifications of maltreatment were considered, as opposed to substantiations, to account for the potential presence of maltreatment in unsubstantiated cases, thereby increasing the number of potentially victimised children (Bartlett et al., 2017; Font et al., 2020; McKenzie et al., 2021).

Analytical strategy

Data analyses were performed in four stages. First, descriptive statistics were conducted using SPSS version 29.0 (IBM Corp, 2022) to examine the prevalence of mental health variables and covariates across the female trajectory groups. Second, we plotted mean counts of community mental health contacts and hospital admissions by age and stratified by the female trajectory groups. Third, the cumulative probability of mental health diagnosis was measured as the proportion of women within each trajectory group experiencing their first mental health diagnosis from a hospital admission between 10/11/12 years to 30 years of age and was modelled using Kaplan-Meier survival plots with the survival package for R version 4.4.0 (R Core Team, 2024). Fourth, the timing of the first mental health contact in relation to offending onset was examined by comparing the proportion of individuals within each trajectory group who had a mental health contact before, at the same time, or after their first recorded offence. Lastly, a Cox proportional hazards regression was performed to examine how trajectory group membership is associated with the likelihood and timing of receiving a mental health diagnosis, after controlling for covariates. The aim of this analysis was to identify differences between groups, rather than to establish temporal ordering or causality. To facilitate comparisons across trajectory groups, we alternated the reference group. Schoenfeld residual plots for covariates showed consistent hazards over time (see Supplementary Figure S1). An assessment of the proportional hazards assumption is provided in Supplementary Table S2. The inclusion of covariates resulted in violations of the proportional hazards assumption. However, these violations are primarily attributed to the large sample size and are considered tolerable, suggesting they are unlikely to impact the outcomes significantly (Ogilvie et al., 2023; Therneau & Grambsch, 2000). The Cox proportional hazards model was estimated using the *survival* package for R version 4.4.0 (R Core Team, 2024; Therneau, 2024).

Results

Descriptive statistics

Overall, 5.4% of women were assigned as Aboriginal and/or Torres Strait Islander, with higher proportions of Aboriginal and/or Torres Strait Islanders among more serious and/or persistent offending groups. Nearly half of the women have at least one registered biological child, with higher rates among women in the chronic early adult peak, early adult-escalating, and early onset young adult peak groups compared with the low offending and non-offending groups (see Table 1). Additionally, females in the chronic group had the highest rate of ever receiving a CPS notification (54.7%), followed by the escalating and early onset groups (30.8% and 36.9% respectively), then the adolescent-limited low and adult-onset low groups (11.5% and 13.2% respectively), and the nonoffending group had the lowest rate (3.7%).

As shown in Table 1, 7.8% of females in the total sample had received a mental health diagnosis from a hospital admission, with the chronic group exhibiting the highest proportion (67.3%) compared to any other trajectory group, although elevated rates were also observed amongst the escalating and early onset groups (49.7% and 39.1% respectively). Additionally, the chronic group experienced considerably higher rates of being admitted to a psychiatric ward during a hospital admission (32.1%) compared to any other trajectory group. Significant differences were also found in the prevalence of different types of mental health services across the trajectory groups, χ^2 (15, N=40,416) = 5,069.01, p <.001, j_c = 0.20. Specifically, the chronic group were most likely to have experienced both community and hospital-based mental health contacts (56.6%), followed by the escalating and early onset groups (34.1% and 26.1%, respectively), with the low offending (adolescent-limited = 7.1% and adultonset = 11.5%) and non-offending groups (2.5%) least likely to have both community and hospital-based mental health contacts. Although most of the low offending and non-offending groups had no mental health contacts, 82% of females in the chronic groups had at least one mental health contact.

Mean counts of mental health service contacts across trajectory groups

To address research question one, we plotted mean counts of community mental health contacts and hospital admissions by age and stratified by the six female trajectory groups (see Fig. 2). The chronic offending group had the highest average overall rates of hospital admissions (M = 10.04, SD = 10.35) and community mental health service contacts (M = 44.03, SD = 112.93) among all trajectory groups. Although the escalating and early onset groups had lower average rates of community mental health service contacts compared to the chronic group, their rates were still significantly higher than those in the low and non-offending groups, which had fewer than six contacts on average (see Table 1). Moreover, Fig. 2 unveils some interesting differences in the patterns of contact over time amongst these groups.

Table 1 Descriptive statistics of Socio-demographics, childhood maltreatment, mental health diagnosis from a hospital admission, and types of mental health contact by traj	/ trajectory
groups	

		Tra	ijectory groups					
Variables	Early adult-onset escalating (<i>n</i> =507; 1.3%)	Adolescent-limited : low (n = 3,428; 8.5%)	Adult-onset low (<i>n</i> =3,467; 8.6%)	Early onset young adult peak (<i>n</i> =559; 1.4%)	Chronic early adult peak (<i>n</i> = 159; 0.4%)	Non-offending (<i>n</i> = 32,296; 79.9%)	φ _c /Eta-squared)	Total (N = 40,416; 100%)
	[%] u	n [%]	n [%]	n [%]	n [%]	n [%]		[%] u
Aboriginal and/or Torres Strait Islander identity								
Aboriginal and/or Torres Strait	216 [42.6] ^{a,b}	311 [9.1] ^c	615 [17.7] ^d	206 [36.9] ^b	86 [54.1] ^a	765 [2.4] ^e	0.35***	2,199 [5.4]
Islander				<u>)</u>				
Non-Indigenous	291 [57.4] ^{a. p}	3,118 [91.0] ^c	2,852 [82.3] ^a	352 [63.0] ⁰	73 [45.9] ^a	31,531 [97.6] ^e		38,217 [94.6]
Motherhood status								
Ever had a child	384 [75.7] ^a	2,055 [59.9] ^b	2,087 [60.2] ^b	416 [74.6] ^a	125 [78.6] ^a	13,125 [40.6] ^c	0.18***	18,192 [45.0]
Never had a child	123 [24.3] ^a	1,373 [40.1] ^b	1,380 [39.8] ^b	143 [25.6] ^a	34 [21.4] ^a	19,171 [59.4] ^c		22,224 [55.0]
Ever received a CPS notification								
Yes	156 [30.8] ^a	395 [11.5] ^b	456 [13.2] ^b	206 [36.9] ^a	87 [54.7] ^c	1,183 [3.7] ^d	0.27***	2,483 [6.1]
No	351 [69.2] ^a	3,034 [88.5] ^b	3,011 [86.8] ^b	352 [63.0] ^a	72 [45.3] ^c	31,113 [96.3] ^d		37,933 [93.9]
Mental health diagnosis from hospital admissions								
Yes	252 [49.7] ^a	433 [12.6] ^b	616 [17.8] ^c	218 [39.1] ^d	107 [67.3] ^e	1,510 [4.7] ^f	0.31***	3,136 [7.8]
No	255 [50.3] ^a	2,996 [87.4] ^b	2,851 [82.2] ^c	340 [60.9] ^d	52 [32.7] ^e	30,786 [95.3] ^f		37,280 [92.2]
Types of mental health contact								
Community contacts only	64 [12.6] ^a	267 [7.8] ^b	390 [11.2] ^a	86 [15.4] ^a	23 [14.5] ^a	1,197 [3.7] ^c	0.20***	2,027 [5.0]
Hospital admissions only	79 [15.6] ^a	189 [5.5] ^b	217 [6.3] ^b	72 [12.9] ^a	17 [10.7] ^{a,b}	707 [2.2] ^c		1,281 [3.2]
Both community and hospital	173 [34.1] ^a	244 [7.1] ^b	399 [11.5] ^c	146 [26.1] ^a	90 [56.6] ^d	803 [2.5] ^e		1,855 [4.6]
contact								
No mental health service contact	191 [37.7] ^a	2,729 [79.6] ^b	2,461 [71.0] ^c	254 [45.4] ^a	29 [18.2] ^d	29,589 [91.6] ^e		32,253 [87.2]
Psychiatric ward admission								
Yes	96 [18.9] ^a	153 [4.5] ^b	233 [6.7] ^c	89 [15.9] ^a	51 [32.1] ^d	556 [1.7] ^e	0.20***	1,178 [2.9]
No	411 [81.1] ^a	3,275 [95.5] ^b	3,234 [93.3] ^c	470 [84.1] ^a	108 [67.9] ^d	31,740 [98.3] ^e		39,238 [97.1]
Frequency								
	[<i>D</i> 5] <i>W</i>	[<i>ds</i>] <i>W</i>	[<i>D</i>] <i>W</i>	M [SD]	M [SD]	M [SD]		M [SD]
Hospital admissions	8.81 [6.83] ^a	5.67 [8.15] ^b	8.17 [19.55] ^a	10.04 [13.30] ^c	12.56 [11.50] ^c	6.10 [15.26] ^b	0.01***	7.16 [15.00]
	Range	Range	Range	Range	Range	Range		Range
	0-48	009	0-367	0-102	0-72	0-338		0-367
Community contacts	35.09 [89.59] ^a	25.42 [75.53] ^b	26.16 [68.97] ^b	51.72 [116.98] ^c	61.95 [112.93] ^c	21.11 [83.34] ^b	0.01***	26.57 [84.01]
	Range 0-786	Range 0–1.085	Range 0–1,108	Range 0-675	Range 0-641	Range 0–2.998		Range 0–2,998
Ace at first mental health contact								
				ICIS I M		I [CD]		ICD1
		[20] 14			[~~] 141	[)] M		[~~] INI

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		Tra	jectory groups					
Variables	Early adult-onset escalating (<i>n</i> = 507; 1.3%)	Adolescent-limited low $(n = 3,428;$ 8.5%)	Adult-onset low (<i>n</i> = 3,467; 8.6%)	Early onset young adult peak (<i>n</i> =559; 1.4%)	Chronic early adult peak (<i>n</i> = 159; 0.4%)	Non-offending (n = 32,296; 79.9%)	φ _c /Eta-squared)	Total (N=40,416; 100%)
	n [%]	n [%]	n [%]	n [%]	n [%]	[%] u		[%] u
Hospital admissions	18.38 [3.81] ^a	18.28 [4.08] ^a	19.19 [4.35] ^b	17.03 [3.47] ^c	16.72 [2.95] ^c	19.79 [4.88] ^b	0.04***	19.05 [4.54]
	Range	Range	Range	Range	Range	Range		Range
	11-29	10–30	10–30	10–30	11–28	10–30		10-30
Community contacts	22.99 [3.59] ^a	21.33 [3.60] ^b	22.43 [3.78] ^a	21.02 [3.71] ^b	21.40 [3.85] ^b	22.06 [3.86] ^a	0.02***	22.01 [3.81]
	Range 16–30	Range 16–30	Range 16–30	Range 16–30	Range 16–30	Range 16–30		Range 16–30

Fable 1 (continued)

n proportions or means at $\alpha = 0.05$. Values that do not share superscripts differ significantly <0.001; ** <0.01; * <0.05 $\varphi_c = Cramer's V$ ***

Hospital admissions peaked during adolescence for most groups, particularly for those in the chronic and early onset offending groups. This was followed by a rise in community mental health contacts in adulthood. The chronic group had the highest mean count of hospital admissions overall. In addition, the chronic group experienced their first spike in hospital admissions around 11 years of age, which is three years earlier than the early onset group. Although the early onset group had fewer hospital admissions on average than the chronic group, their average count was significantly higher than the escalating, low offending, and non-offending groups. The mean count of hospital admissions for the adult-onset low group fell between the chronic, escalating and nonoffending groups. The non-offending group maintained a similar mean count of hospital admissions to the adolescent-limited low offending group.

During the transition into adulthood, there was a decline in hospital admissions across all groups, with a particularly sharp decline observed in the chronic and early onset groups. However, in terms of community mental health service contacts, the chronic, early onset and escalating groups experienced the highest average counts in their mid-20s, with the chronic and escalating groups peaking around 24 years of age and again at around 27 years of age. Although the early onset group had more community mental health contacts than the escalating group in adolescence, the escalating group generally had higher rates from their mid-20s. The adultonset low group, similar to the adolescent-limited low group in adolescence, had higher rates of community mental health contact in adulthood. Overall, the low offending and non-offending groups had fewer and more stable mean counts of community mental health service contacts compared to the chronic, escalating, and early onset offending groups.

Time to first mental health diagnosis across trajectory groups

To address research question two, we used survival curves to model the cumulative probability of females receiving a hospital-based mental health diagnosis over time, stratified by trajectory groups (see Fig. 3). The results indicate significant differences across trajectory groups, (c^2 (5, N = 40,416) = 5,108.38, p <.001). The chronic, escalating, and early onset groups had the highest probabilities of ever receiving a mental health diagnosis and were the youngest at the time of their first diagnosis. Specifically, the chronic group had the highest probability of ever having a mental health diagnosis (67%) and the youngest median age at first diagnosis of 17.37 years. The escalating group followed with a 50% probability of a mental health diagnosis. The early onset group

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Fig. 2 Mean counts of mental health service contacts by age across trajectory groups



Fig. 3 Kaplan-meier curves showing cumulative probability of first mental health diagnosis by trajectory groups

had a 39% probability and a median age of 18.37 years at first diagnosis. The latter two groups overlap in the late teenage years. However, the probability of diagnoses for the escalating group continues into their late 20s, but the early onset group's probability stabilises by the same age.

Conversely, the adolescent-limited low and adult-onset low groups had lower probabilities of mental health diagnosis, at 13% and 18% respectively, but were still significantly higher than the non-offending group at 5%. These groups were significantly older at first diagnosis than the more persistent offending groups, with median ages of 29.85, 29.97, and 29.98 years, respectively. While the adolescent-limited low and adult-onset low groups mirrored each other in adolescence, the adult-onset group continued to escalate into adulthood.

Timing of first offence and first mental health contact across trajectory groups

Research question three considers differences in the timing of the first mental health contact in relation to

Table 2 Timing of first mental health contact relative to first offence across trajectory groups

	Trajectory groups				
	Early adult-onset escalating	Adolescent- limited low	Adult-onset low	Early onset young adult peak	Chronic early adult peak
	n [%]	n [%]	n [%]	n [%]	n [%]
Any mental health contact (n = 2,456)					
Any mental health contact before first offence	116 [36.7]	211 [30.1]	627 [62.3]	66 [21.7]	28 [21.5]
Any mental health contact after first offence	195 [61.7]	474 [67.7]	368 [36.6]	226 [74.3]	102 [78.5]
Any mental health contact at <i>same time</i> as first	5 [1.6]	15 [2.1]	11 [1.1]	12 [3.9]	а

Note. a = Confidentiality was maintained by suppressing counts and percentages for cells with fewer than five participants and any adjacent cells that could lead to their recalculation

the onset of offending across trajectory groups. Table 2 indicates that most females had any mental health contact (community mental health contact or mental healthrelated hospital admissions) after their first offence, which was observed in over 60% of females in the escalating, chronic, early onset, and adolescent-limited low groups. Conversely, in the adult-onset low group, just over one-third had any mental health contact after their first offence. The proportion of females with any mental health contact at the same time as their first offence was low across all groups. The early onset group had the highest rate of such contacts at 3.9%, followed by the adolescent-limited low group at 2.1%, the escalating group at 1.6%, and adult-onset low group at 1.1%. The chronic group had nearly zero instances of any mental health contact at the same time as their first recorded offence.

The influence of trajectory group membership and covariates on mental health diagnosis

A Cox proportional hazards regression was conducted to address research question four, alternating each trajectory group as a reference (see Table 3). This approach allowed us to examine the association between trajectory group membership and the likelihood of receiving a mental health diagnosis over time, after controlling for available covariates.

The findings indicate a strong association between trajectory group membership and the likelihood of receiving a mental health diagnosis. Females in any offending group were significantly more likely to receive a mental health diagnosis compared to those in the non-offending group, after controlling for key covariates. Specifically, the chronic offending group had a strikingly higher hazard (aHR = 12.47, 95% CI: 10.09, 15.42, p <.001) of receiving a mental health diagnosis compared to the non-offending group and all other offending trajectory groups. This was followed by the escalating group (aHR = 8.72, 95% CI: 7.54, 10.09, p <.001) and the early onset group (aHR = 6.58, 95% CI: 5.65, 7.67, p <.001), suggesting a substantial increase in the likelihood of receiving a mental health diagnosis among females populating the more serious and persistent offending groups compared to those in the non-offending group. Additionally, the escalating, early onset, and chronic offending groups had a significantly higher likelihood of receiving a mental health diagnosis compared to the low offending groups. Although the early onset offending group was more likely to receive a mental health diagnosis than the low offending groups, their hazard was still lower than that of the escalating and chronic offending groups. Within the low offending groups, the adult-onset group had a higher hazard (aHR = 1.37, 95% CI: 1.21, 1.54) of receiving a mental health diagnosis than their adolescentlimited counterparts (aHR = 0.73, 95% CI: 0.65, 0.83).

The analysis also revealed significant associations between covariates and the likelihood of receiving a mental health diagnosis. Table 3 indicates that females with a CPS notification had a significantly higher hazard (aHR = 2.11, 95% CI: 1.92, 2.33, p <.001) of receiving a mental health diagnosis compared to females without such a history. Additionally, Aboriginal and/or Torres Strait Islander women exhibited an increased hazard (aHR = 1.39, 95% CI: 1.25, 1.54, p <.001) of receiving a mental health diagnosis compared to their non-Indigenous Australian counterparts. Lastly, females with at least one registered biological child had a higher hazard (aHR = 1.49, 95% CI: 1.38, 1.61, p <.001) of receiving a mental health diagnosis compared to females without children.

Two supplementary analyses were performed to provide additional insight into the relationship between mental health and offending trajectories. The first supplementary analysis involved a Cox regression to examine the association between the covariates and the likelihood of mental health diagnosis within each trajectory group (see Supplementary Table S3). Identifying as Aboriginal and/or Torres Strait Islander was associated with an increased hazard of receiving a mental health diagnosis only within the escalating group. Having at least one registered biological child was associated with an increased

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	Reference group					
Trajectory groups & covariates	Early adult-onset escalating group	Adolescent- limited low group	Adult-onset low group	Early onset young adult peak group	Chronic early adult peak group	Non- offending group
	aHR [95% CI]	aHR [95% CI]	aHR [95% CI]	aHR [95% CI]	aHR [95% CI]	aHR [95% CI]
Early adult-onset escalating group	-	3.66*** [3.12, 4.30]	2.69*** [2.31, 3.12]	1.32** [1.10, 1.59]	0.79** [0.56, 0.88]	8.72*** [7.54, 10.09]
Adolescent-limited low group	0.27*** [0.23, 0.32]	-	0.73*** [0.65, 0.83]	0.36*** [0.31, 0.43]	0.19*** [0.15, 0.24]	2.38*** [2.14, 2.66]
Adult-onset low group	0.37*** [0.32, 0.43]	1.37*** [1.21, 1.54]	-	0.49*** [0.42, 5.78]	0.26*** [0.21, 0.32]	3.25*** [2.95, 3.58]
Early onset young adult peak group	0.76** [0.63, 0.91]	2.76*** [2.34, 3.27]	2.03*** [1.73, 2.37]	-	0.53*** [0.42, 0.67]	6.58*** [5.65, 7.67]
Chronic early adult peak group	1.49** [1.14, 1.80]	5.23*** [4.19, 6.53]	3.84*** [3.10, 4.75]	1.89*** [1.50, 2.39]	-	12.47*** [10.09, 15.42]
Non-offending group	0.11*** [0.10, 0.13]	0.42*** [0.38, 0.47]	0.31*** [0.28, 0.34]	0.15*** [0.13, 0.18]	0.08*** [0.06, 0.10]	-
Aboriginal and/or Torres Strait Islander identity ^a	1.39*** [1.25, 1.54]	1.39*** [1.25, 1.54]	1.39*** [1.25, 1.54]	1.39*** [1.25, 1.54]	1.39*** [1.25, 1.54]	1.39*** [1.25, 1.54]
Motherhood status ^b	1.49*** [1.38, 1.61]	1.49*** [1.38, 1.61]	1.49*** [1.38, 1.61]	1.49*** [1.38, 1.61]	1.49*** [1.38, 1.61]	1.49*** [1.38, 1.61]
Ever received a CPS notification ^c	2.11*** [1.92, 2.33]	2.11*** [1.92, 2.33]	2.11*** [1.92, 2.33]	2.11*** [1.92, 2.33]	2.11*** [1.92, 2.33]	2.11*** [1.92, 2.33]
Likelihood ratio test ^d	2,848***	2,848***	2,848***	2,848***	2,848***	2,848***
Wald test	3,852***	3,852***	3,852***	3,852***	3,852***	3,852***
Logrank test	5,916***	5,916***	5,916***	5,916***	5,916***	5,916***

Note. aHR = Adjusted Hazard Ratio

CI = Confidence Interval

^a reference group = non-Indigenous

^b reference group = non-mothers

^c reference group = no history of childhood maltreatment

^d df=8

* p <.05, ** p <.01, *** p <.001

hazard of receiving a mental health diagnosis in the two low offending groups only. Females with a CPS notification experienced an increased hazard of mental health diagnosis across all groups except for the chronic group. No significant associations were found for the chronic group, which could be attributed to its small sample size or homogeneous nature.

The second supplementary analysis involved a multinomial logistic regression examining the association between age at first mental health diagnosis and trajectory group membership, alternating each trajectory group as a reference (see Supplementary Table S4). The full model identified significant variation in the trajectory groups, χ^2 (5, N=40,416)=2,313.55, p<.001, and explained a modest amount of variance (Cox and Snell R^2 =6.0%; Nagelkerke R^2 =7.0%). A key finding was that a younger age at first mental health diagnosis significantly increased the likelihood of membership in the chronic, escalating, and early onset offending groups, relative to the two low offending and non-offending groups. This finding is consistent with the Kaplan-Meier survival plots (see Fig. 3).

Discussion

The existing research consistently finds a strong relationship between mental health issues and female offending (e.g., Haysom, 2024; Tyler et al., 2019; Zhao et al., 2021). However, there remains a significant gap in longitudinal studies examining how female offending trajectories are associated with mental health service contact and diagnoses. This research is necessary for improving our understanding of distinct female offending patterns and developing targeted interventions to improve mental health outcomes for females in the CJS. Our study addresses this gap by providing a better understanding of the relationship between mental health contact/diagnoses and female offending across the life-course. Specifically, we examined variations in the timing of mental health system contacts and diagnoses across distinct female offending pathways and made comparisons with

women not involved in the CJS. There were important differences in the prevalence, timing, and frequency of mental health service contacts and diagnoses across all six female trajectory groups, which provide important insights for timely and targeted intervention strategies to support the mental health and well-being of females in the justice system. While our study provides insight into the age-related patterns of mental health service contact across female offending trajectories, disentangling the temporal relationship between mental health and offending is a significant challenge, as these factors are deeply intertwined throughout the life-course.

Consistent with previous research (Cauffman et al., 2015; Krupa & Childs, 2014; Walker et al., 2019), our findings indicate that females following the chronic, escalating, and early onset offending patterns had a remarkably high frequency of mental health diagnoses and mental health service contacts compared to those in the low offending and non-offending groups. Fazel et al. (2016) suggest that such patterns may partly stem from systemic issues, where mental health symptoms are often criminalised rather than adequately treated. Additionally, the chronic group experienced the highest rate of psychiatric ward admissions among all trajectory groups. Notably, females in the chronic, escalating, and early onset offending groups were around 10 years younger than the low offending and non-offending females at the time of their first mental health diagnosis. This age disparity suggests that females following persistent offending pathways may experience more severe and early onset of mental illnesses compared to those following the less frequent or non-offending pathways.

We observed that hospital admissions peaked during adolescence for most offending groups, particularly those following persistent offending patterns. This peak is followed by an increase in community mental health contacts as these individuals enter adulthood, suggesting a transition from hospital-based care to ongoing community mental health services. However, this trend may be influenced by the specific age ranges of the data. Moreover, our findings suggest an overlap in the probability of the first mental health diagnoses during the teenage years for the early onset and escalating groups. However, as females from the escalating group entered their late 20s, the probability of receiving a diagnosis continued to increase, while it levelled off for those in the early onset group. At the same time, while the early onset group had higher frequencies of contact during adolescence, the escalating group had higher frequencies of contact in their late 20s.

Our study provides new insights into the timing of first mental health contact in relation to the first recorded offence across diverse female offending trajectories. Although most females contacted mental health services after their first offence, a significant proportion of those with adult-onset offending patterns contacted mental health services before their first offence. Given the narrower age window for mental health contact (17-19 years for hospital admissions and 23 years for community services), the timing of these contacts relative to CJS involvement can vary. This variation highlights the importance of timely mental health interventions. For those with early system contact, prompt recognition and support of mental health needs are essential. For females who engage with mental health services later, timely interventions could help reduce the likelihood of future CJS involvement. Such proactive measures could enable earlier identification of mental health issues, preventing escalations in offending behaviour and supporting rehabilitation in the CJS.

Our findings align with recent statistics (AIHW, 2023b), indicating that Aboriginal and/or Torres Strait Islander females are more likely to receive a mental health diagnosis compared to non-Indigenous females. We recognise that various social, historical, and economic disadvantages have significantly contributed to the high rates of mental health issues experienced by Aboriginal and/or Torres Strait Islander peoples (AIHW, 2023b).

In line with Daly's (1992) feminist pathways perspective, our findings highlight the complex and varied ways in which mental health and CJS involvement unfold in women's lives. Rather than assuming a unidirectional relationship, our results indicate that for most females, mental health service contact occurred after their first offence, while for others, it preceded their involvement with the justice system. This variation reflects the interwoven nature of mental health and offending across the life-course and highlights challenges of establishing clear temporal order. The inclusion of covariates in our study further illustrates this complexity. For example, females with a history of childhood maltreatment and those with at least one biological child were more likely to receive a mental health diagnosis compared to their counterparts. These findings align with previous research highlighting the correlation between mental health issues and childhood maltreatment. They also highlight the complexities often associated with motherhood that exacerbate mental health issues, including caregiving responsibilities, financial difficulties, and lack of support (Blegen et al., 2010; Keyes et al., 2012; Klausen et al., 2016). These factors emphasise the importance of considering sociodemographic factors, trauma, and life circumstances when designing tailored support programs and effective interventions for females to improve their mental health and well-being. Overall, our findings provide a comprehensive insight into the timing and patterns of mental health service contact and diagnoses across diverse female offending trajectories.

Strengths and limitations

We must acknowledge the important limitations of our study. Our data on mental health contacts are leftcensored, resulting in an underestimation of mental health issues during childhood and adolescence. Additionally, due to differences in the availability of hospital (QHAPDC) and community-based (CIMHA) mental health datasets across age groups, service contacts from ages 10 to 15 and 16 onwards likely reflect different types of mental health outcomes. This limitation should be considered when interpreting age-based patterns in service use.

Combining both hospital admissions and community mental health service contacts improves insight into the timing of mental health service contact relative to the first recorded offence. However, this measure underestimates those who have earlier mental health service contacts not recorded by Queensland Health data, providing a conservative estimate. Improved data collection methods are needed to capture earlier mental health service contacts, thereby enhancing the accuracy of the timing of mental health service contacts in relation to the first recorded offence. Additionally, deaths were not incorporated into the measure of exposure time, which may reduce precision in assessing exposure time in the community.

It is important to highlight that mental health and offending are deeply interwoven, reflecting a complex relationship. As such, our study was unable to establish causality or temporal ordering between mental health and offending. We also recognise that GBTM only captures offending behaviours that trigger system contact, which may not encompass all offending patterns, and some individuals may not fit into any identified group (Ogilvie et al., 2024). Although our study examined factors related to race/ethnicity, child maltreatment, and parenthood in relation to mental health diagnosis, it is important to examine the influence of additional factors, such as socioeconomic status, education, and employment. These factors have previously been identified in the literature to influence mental health outcomes among females (Aydiner-Avsar & Piovani, 2021; Williams et al., 2013). Future research should consider these factors to further investigate underlying differences in mental health service contact and diagnosis across varying levels of socioeconomic status, education level, and employment. This would inform targeted interventions and policies aimed at improving mental health outcomes for women across diverse socio-demographic backgrounds.

Despite these limitations, our study provides a step towards understanding the complex relationship between mental health contact and diagnosis across diverse pathways of female offending. By utilising state-wide linked administrative data, we had a unique opportunity to investigate how the timing, types and frequency of mental health contacts and diagnosis vary across female offending trajectories, including how these patterns differ for females not involved in the CJS. Moreover, our data allowed for an in-depth investigation of the chronic female offending group, a group that was highly correlated with early and frequent mental health contact and diagnoses. However, chronic female offending patterns are rarely identified in female trajectory studies, partly due to the study's small sample size, limited age range, or the use of self-report data (Block et al., 2010; Cauffman et al., 2017; Fergusson & Horwood, 2002).

Implications for policy and practice

Our findings indicate that persistent female offending behaviour is associated with increased mental health service utilisation, earlier and more frequent mental health diagnoses, and a higher rate of psychiatric ward admissions. While we do not claim a direct causal relationship or aim to establish temporal ordering, these patterns highlight a potential opportunity for early, targeted mental health support. Importantly, we acknowledge that service contact does not necessarily reflect effective treatment or meaningful engagement. Rather, our findings support the need for appropriate and targeted mental health interventions tailored to the needs of at-risk females, rather than simply an increase in the volume of services. Ogilvie et al. (2024) advocate for early intervention as a potential strategy to reduce the risk of persistent offending, though we acknowledge that their work does not present direct evidence of this effect. As such, our findings align with early mental health care while reinforcing the need for further research into which types of services are most effective in reducing offending behaviour. Programs such as these should be continuous, holistic, and integrated into school and community settings to ensure that females receive support at different stages of life (Castillo, 2019; Sheeran, 2022).

Moreover, our research shows that females who experienced childhood maltreatment are more likely to receive a mental health diagnosis than those without such a history. Therefore, implementing trauma-informed approaches in educational, community, and Child Protection settings is essential to build resilience and create a supportive environment for victimised females to improve their mental health outcomes (Lynch et al., 2017; Sheeran, 2022). In addition to early intervention programs, it is important for interventions to address the specific needs of females involved in the CJS. For example, our findings indicate that mothers are more likely to receive a mental health diagnosis compared to nonmothers. Therefore, it is essential to provide a system of care for these women that addresses their specific needs, including access to parenting support, childcare services,

and family-focused interventions leading to improved mental health and well-being for both mothers and their children (Blegen et al., 2010).

Given the significant relationships between mental health diagnosis, Aboriginal and/or Torres Strait Islander identity, motherhood, childhood maltreatment, and offending among women, it is essential to establish an evidence-based collaborative system. This system should integrate mental health professionals, the CJS, social services, and community-based organisations (Don et al., 2022). These collaborative efforts are necessary to ensure that females have access to a variety of services and resources to improve their mental health outcomes and general well-being. For example, the evidence-based Throughcare program in Australia has demonstrated promising outcomes in supporting women from different socio-demographic backgrounds (National Indigenous Australians Agency, 2024). This initiative is designed to provide support for women's mental health, substance use disorders, and experiences of trauma while also reducing their risk of re-offending. These programs involve multidisciplinary teams, including medical personnel, parole/probation officers, and family members (Australian Health Ministers' Advisory Council, 2013). Furthermore, establishing cross-sector collaboration and providing culturally and socially sensitive support can lead to more effective interventions and address the specific needs of women in the CJS and the broader community (Fleming et al., 2021). To address the intersection of mental health and the criminal justice system (CJS), policy changes are necessary. The updates from DSM-IV to DSM-5 (1995-2013) may have influenced mental health diagnoses, impacting how these conditions intersect with the CJS (American Psychiatric Association, 2024). Moreover, shifts in charging and sentencing practices could affect female involvement in the CJS, warranting consideration in targeted intervention strategies (Hidderley et al., 2022).

Conclusions

Our study examined how the timing and patterns of mental health service contact and diagnoses varied across diverse female offending trajectories. We found that the more serious and persistent or chronic female offending groups experienced earlier, more frequent mental health service contact and diagnoses, as well as a higher rate of psychiatric ward admissions, compared to those in low offending and non-offending groups. Moreover, females characterised by adult-onset offending patterns were most likely to have experienced their first mental health diagnosis before their first recorded offence. Our findings indicate that females with a CPS notification, having at least one registered biological child, and Aboriginal and/ or Torres Strait Islander females were significantly more likely to receive a mental health diagnosis compared to their non-Indigenous counterparts. The findings of our research highlight the need for improved early and contemporaneous mental health interventions that address the specific needs of females in the justice system.

Supplementary Information

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Supplementary Material 1

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Author contributions

A.K. conceptualised the study, performed the formal analysis, and led the methodology, visualisation, and original drafting. T.A., C.T., J.O., and L.B. provided supervision and contributed to writing through review and editing. All authors read and approved the final manuscript.

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Data availability

Data for this study are held in Griffith University's Social Analytics Lab and are not publicly available due to custodial restrictions. Researchers can request access through the Social Analytics Lab management committee at (socialanalyticslab@griffith.edu.au) with relevant support and approvals.

Declarations

Ethics approval and consent to participate

The requirement to obtain informed individual participant consent was waived given the use of historical de-identified administrative data, which was approved by the Griffith University Human Research Ethics Committee (HREC 2021/356). The authors store only de-identified data under a Data Transfer and Use Agreement between Griffith University and The State of Queensland Acting through Queensland Treasury in the Social Analytics Lab (SAL), a secure data facility at Griffith University.

Competing interests

The authors declare no competing interests.

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References

- Al-Rousan, T., Rubenstein, L., Sieleni, B., Deol, H., & Wallace, R. B. (2017). Inside the Nation's largest mental health institution: A prevalence study in a state prison system. *Bmc Public Health*, 17(1), 342. https://doi.org/10.1186/s12889-017-4 257-0
- Allard, T., McCarthy, M., & Stewart, A. L. (2020). Establishing better cost estimates for Indigenous and non-Indigenous offender trajectories. Australian Institute of

Criminology. https://www.aic.gov.au/sites/default/files/2020-05/CRG-12-161 7-FinalReport.pdf

- American Psychiatric Association (2024). DSM history. https://www.psychiatry.org/ psychiatrists/practice/dsm/about-dsm/history-of-the-dsm
- Australian Institute of Health and Welfare (AIHW) (2024). Prevalence and impact of mental illness. https://www.aihw.gov.au/mental-health/overview/prevalenc e-and-impact-of-mental-illness
- Australian Institute of Health and Welfare (2024). Measure 2.11 contact with the criminal justice system data visualisation, Aboriginal and Torres Strait Islander Health Performance Framework. https://www.indigenoushpf.gov.au/measures /2-11-contact-with-the-criminal-justice-system/data
- Australian Institute of Health and Welfare (2023a). *The health of people in Australia's prisons 2022*. https://www.aihw.gov.au/reports/prisoners/the-health-of-peopl e-in-australias-prisons-2022/contents/summary
- Australian Institute of Health and Welfare (2023b). *Mental health*. https://www.indi genousmhspc.gov.au/topics/mental-health#aboutthistopic
- Australian Health Ministers' Advisory Council (2013). A national framework for recovery-oriented mental health services: Guide for practitioners and providers. ht tps://www.health.gov.au/sites/default/files/documents/2021/04/a-national-f ramework-for-recovery-oriented-mental-health-services-guide-for-practition ers-and-providers.pdf
- Aydiner-Avsar, N., & Piovani, C. (2021). The gender impact of unemployment on mental health: A micro analysis for the united States. *Forum for Social Economics*, 50(4), 505–529. https://doi.org/10.1080/07360932.2018.1535991
- Badr, H. E., Naser, J., Al-Zaabi, A., Al-Saeedi, A., Al-Munefi, K., Al-Houli, S., & Al-Rashidi, D. (2018). Childhood maltreatment: A predictor of mental health problems among adolescents and young adults. *Child Abuse & Neglect*, *80*, 161–171. htt ps://doi.org/10.1016/j.chiabu.2018.03.011
- Bartlett, J. D., Kotake, C., Fauth, R., & Easterbrooks, M. A. (2017). Intergenerational transmission of child abuse and neglect: Do maltreatment type, perpetrator, and substantiation status matter? *Child Abuse & Neglect*, 63, 84–94. https://doi. org/10.1016/j.chiabu.2016.11.021
- Bergman, L. R., & Andershed, A. K. (2009). Predictors and outcomes of persistent or age-limited registered criminal behavior: A 30-year longitudinal study of a Swedish urban population. *Aggressive Behavior*, 35(2), 164–178. https://doi.or g/10.1002/ab.20298
- Blegen, N. E., Hummelvoll, J. K., & Severinsson, E. (2010). Mothers with mental health problems: A systematic review. *Nursing and Health Sciences*, 12(4), 519–528. https://doi.org/10.1111/j.1442-2018.2010.00550.x
- Block, R. C., Blokland, A. A. J., van der Werff, C., van Os, R., & Nieuwbeerta, P. (2010). Long-term patterns of offending in women. *Feminist Criminology*, 5(1), 73–107. https://doi.org/10.1177/1557085109356520
- Broidy, L., Payne, J., & Piquero, A. R. (2018). Making sense of heterogeneity in the influence of childhood abuse, mental health, and drug use on women's offending pathways. *Criminal Justice and Behavior*, 45(10), 1565–1587. https:// doi.org/10.1177/0093854818776687
- Castillo, E. G., Ijadi-Maghsoodi, R., Shadravan, S., Moore, E., Mensah, M. O., Docherty, M., Aguilera Nunez, M. G., Barcelo, N., Goodsmith, N., Halpin, L. E., Morton, I., Mango, J., Montero, A. E., Koushkaki, R., Bromley, S., Chung, E., Jones, B., Gabrielian, F., Gelberg, S., L., et al. (2019). Community interventions to promote mental health and social equity. *Current Psychiatry Reports*, *21*(5). https://doi.o rg/10.1007/s11920-019-1017-0
- Cauffman, E., Monahan, K. C., & Thomas, A. G. (2015). Pathways to persistence: Female offending from 14 to 25. *Journal of Developmental and Life-Course Criminology*, 1(3), 236–268. https://doi.org/10.1007/s40865-015-0016-z
- Cauffman, E., Fine, A., Thomas, A. G., & Monahan, K. C. (2017). Trajectories of violent behavior among females and males. *Child Development*, 88(1), 41–54. https:// doi.org/10.1111/cdev.12678
- Caulfield, L. S. (2016). Counterintuitive findings from a qualitative study of mental health in english women's prisons. *International Journal of Prisoner Health*, *12*(4), 216–229. https://doi.org/10.1108/JJPH-05-2016-0013
- R Core Team (2024). R: A language and environment for statistical computing, Vienna, Austria. https://www.R-project.org/
- Covington, S. S. (2002). A woman's journey home: Challenges for female offenders. In J. Travis, & M. Waul (Eds.), Prisoners once removed: The impact of incarceration and reentry on children, families, and communities (pp. 1–32). Urban Institute.
- Daly, K. (1992). Women's pathways to felony court: Feminist theories of lawbreaking and problems of representation. Southern California Review of Law and Social Justice, 2, 11.
- DeHart, D., Lynch, S., Belknap, J., Dass-Brailsford, P., & Green, B. (2014). Life history models of female offending: The roles of serious mental illness and trauma in

women's pathways to jail. *Psychology of Women Quarterly*, 38(1), 138–151. htt ps://doi.org/10.1177/0361684313494357

- Dolan, R. M., Birmingham, L., Mullee, M., & Gregoire, A. (2013). The mental health of imprisoned mothers of young children: A follow-up study. *Journal of Forensic Psychiatry & Psychology*, 24(4), 421–439. https://doi.org/10.1080/14789949.2 013.818161
- Don, K., Robert, L. W., & Lamberti, J. S. (2022). Promoting mental health and criminal justice collaboration through system-level partnerships. *Frontiers in Psychiatry*, 13. https://doi.org/10.3389/fpsyt.2022.805649
- Fazel, S., Hayes, A. J., Bartellas, K., Clerici, M., & Trestman, R. (2016). Mental health of prisoners: Prevalence, adverse outcomes, and interventions. *The Lancet Psychiatry*, 3(9), 871–881. https://doi.org/10.1016/S2215-0366(16)30142-0
- Fergusson, D. M., & Horwood, L. J. (2002). Male and female offending trajectories. Developmental and Psychopathology, 14, 159–177. https://doi.org/10.1017/S0 954579402001098
- Fleming, E., Wright, F., Wurzburg, S., & Ney, B. (2021). Adopting a gender-responsive approach for women in the justice system: A resource guide. New York: The Council of State Governments Justice Center. https://csgjusticecenter.org/pu blications/adopting-a-gender-responsive-approach-for-women-in-the-justic e-system-a-resource-guide/
- Font, S., Cancian, M., Berger, L. M., & DiGiovanni, A. (2020). Patterns of intergenerational child protective services involvement. *Child Abuse & Neglect*, 99, 104–247. https://doi.org/10.1016/j.chiabu.2019.104247
- Green, B. L., Dass-Brailsford, P., Hurtado de Mendoza, A., Mete, M., Lynch, S. M., DeHart, D. D., & Belknap, J. (2016). Trauma experiences and mental health among incarcerated women. *Psychological Trauma: Theory Research Practice* and Policy, 8(4), 455–463. https://doi.org/10.1037/tra0000113
- Harner, H. M., & Riley, S. (2013). The impact of incarceration on women's mental health: Responses from women in a maximum-security prison. *Qualitative Health Research*, 23(1), 26–42. https://doi.org/10.1177/1049732312461452
- Haysom, L. (2024). Forensic mental health issues for women in contact with the criminal justice system. *Australasian Psychiatry*, 32(3), 210–213. https://doi.org /10.1177/10398562241232523
- Hidderley, L., Jeffs, S., Thoms, D., & Klambauer, E. (2022). Engendering justice: The sentencing of women and girls in Queensland. Queensland Sentencing Advisory Council. https://www.sentencingcouncil.qld.gov.au/__data/assets/ pdf_file/0008/735425/Sentencing-profile-on-womens-and-girls.pdf
- IBM Corp. (2022). IBM SPSS statistics for windows (Version 29.0) [Computer software]. IBM Corp.
- Keyes, K. M., Eaton, N. R., Krueger, R. F., McLaughlin, K. A., Wall, M. M., Grant, B. F., & Hasin, D. S. (2012). Childhood maltreatment and the structure of common psychiatric disorders. *British Journal of Psychiatry*, 200(2), 107–115. https://doi. org/10.1192/bjp.bp.111.093062
- Klausen, R. K., Karlsson, M., Haugsgjerd, S., & Lorem, G. F. (2016). Motherhood and mental distress: Personal stories of mothers who have been admitted for mental health treatment. *Qualitative Social Work*, 15(1), 103–117. https://doi.o rg/10.1177/1473325015584981
- Krupa, J., & Childs, K. (2014). Trajectories and risk factors of criminal behavior among females from adolescence to early adulthood. *Laws*, 3(4), 651–673. htt ps://doi.org/10.3390/laws3040651
- Kuluk, A., Allard, T., Thompson, C., Ogilvie, J. M., & Broidy, L. (2024). Offending trajectories in an Australian birth cohort: Differences and similarities across sex. *Criminal Justice and Behavior*, 51(6), 807–830. https://doi.org/10.1177/00 938548241234373
- Lynch, S. M., DeHart, D. D., Belknap, J., Green, B. L., Dass-Brailsford, P., Johnson, K. M., & Wong, M. M. (2017). An examination of the associations among victimization, mental health, and offending in women. *Criminal Justice and Behavior*, 44(6), 796–814. https://doi.org/10.1177/0093854817704452
- McKenzie, E. F., Thompson, C. M., Hurren, E., Tzoumakis, S., & Stewart, A. (2021). Who maltreats? Distinct pathways of intergenerational (dis)continuity of child maltreatment. *Child Abuse & Neglect*, *118*, 105105–105105. https://doi.org/10. 1016/j.chiabu.2021.105105
- National Indigenous Australians Agency (2024). Evaluation of the adult & youth Through Care programs. https://www.niaa.gov.au/resource-centre/evaluatio n-adult-youth-through-care-programs
- Odgers, C. L., Moffitt, T. E., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., Poulton, R., Sears, M. R., Thomson, W. M., & Caspi, A. (2008). Female and male antisocial trajectories: From childhood origins to adult outcomes. *Development and Psychopathology*, 20(2), 673–716. https://doi.org/10.1017/S095457 9408000333
- Ogilvie, J. M., Tzoumakis, S., Thompson, C., Allard, T., Dennison, S., Kisely, S., & Stewart, A. (2023). Psychiatric illness and the risk of reoffending: Recurrent event

analysis for an Australian birth cohort. *BMC Psychiatry*, 23(1), 355. https://doi.org/10.1186/s12888-023-04839-0

- Ogilvie, J. M., Broidy, L., Thompson, C., Dennison, S., Allard, T., Kuluk, A., Crissman, B., Kisely, S., & Stewart, A. (2024). Trajectories of offending and mental health service use: Similarities and differences by gender and Indigenous status in an Australian birth cohort. *Journal of Developmental and Life-Course Criminology*, *10*(1), 97–128. https://doi.org/10.1007/s40865-023-00246-x
- Sapkota, D., Dennison, S., & Thompson, C. (2024a). Mental disorders among mothers in contact with the criminal justice system: A scoping review and Meta-analysis. *Community Mental Health Journal*, 1–14. https://doi.org/10.100 7/s10597-023-01222-x
- Sapkota, D., Ogilvie, J., Dennison, S., Thompson, C., & Allard, T. (2024b). Prevalence of mental disorders among Australian females: Comparison according to motherhood status using Australian birth cohort data. Archives of Women's Mental Health, 27(4), 625–635. https://doi.org/10.1007/s00737-024-01444-2
- Sheeran, E. (2022). Identifying women's pathways to offending and the primary prevention and early intervention opportunities for women at risk of offending in Wales. ACE hub Wales. https://acehubwales.com/wp-content/uploads/2022/ 11/Pathways-to-Offending-reports-E-final.pdf
- Therneau, T. (2024). A package for survival analysis in R. R package version 3.6-4. htt ps://cran.r-project.org/web/packages/survival/index.html
- Therneau, T. M., & Grambsch, P. M. (2000). *Modeling survival data: Extending the Cox* model. New York; Springer.

- Tyler, N., Miles, H. L., Karadag, B., & Rogers, G. (2019). An updated picture of the mental health needs of male and female prisoners in the UK: Prevalence, comorbidity, and gender differences. *Social Psychiatry and Psychiatric Epidemiology*, *54*(9), 1143–1152. https://doi.org/10.1007/s00127-019-01690-1
- Walker, G. H., Boden, J. M., Fergusson, D. M., & Horwood, L. J. (2019). Examining the associations between offending trajectories in adolescence/young adulthood and subsequent mental health disorders. *Journal of Criminal Justice*, 62, 94–100. https://doi.org/10.1016/j.jcrimjus.2018.09.008
- Williams, J., Byles, J., & Cunich, M. (2013). The impact of socioeconomic status on changes in the general and mental health of women over time: Evidence from a longitudinal study of Australian women. *International Journal for Equity in Health*, 12(1), 1–11. https://doi.org/10.1186/1475-9276-12-25
- Zhao, Q., Cepeda, A., Chou, C. P., & Valdez, A. (2021). Incarceration trajectories and mental health problems among mothers imprisoned in state and federal correctional facilities: A nationwide study. *International Journal of Mental Health and Addiction*, *21*(1), 492–510. https://doi.org/10.1007/s11469-021-00608-w

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