

# Trajectories of psychological distress after prison release: implications for mental health service need in ex-prisoners

E. G. Thomas<sup>1,2\*</sup>, M. J. Spittal<sup>1</sup>, E. B. Heffernan<sup>3</sup>, F. S. Taxman<sup>4</sup>, R. Alati<sup>5</sup> and S. A. Kinner<sup>1,3,6</sup>

<sup>1</sup>Melbourne School of Population and Global Health, University of Melbourne, Parkville, VIC, Australia

<sup>2</sup>Department of Biostatistics, Harvard T.H. Chan School of Public Health, Harvard University, Boston, MA, USA

<sup>3</sup>School of Medicine, University of Queensland, Herston, QLD, Australia

<sup>4</sup>Criminology, Law & Society, College of Humanities and Social Sciences, George Mason University, Fairfax, VA, USA

<sup>5</sup>School of Public Health and Centre of Youth Substance Abuse Research, University of Queensland, Herston, QLD, Australia

<sup>6</sup>Griffith Criminology Institute and Menzies Health Institute Queensland, Griffith University, Mt Gravatt, QLD, Australia

**Background.** Understanding individual-level changes in mental health status after prison release is crucial to providing targeted and effective mental health care to ex-prisoners. We aimed to describe trajectories of psychological distress following prison discharge and compare these trajectories with mental health service use in the community.

**Method.** The Kessler Psychological Distress Scale (K10) was administered to 1216 sentenced adult prisoners in Queensland, Australia, before prison release and approximately 1, 3 and 6 months after release. We used group-based trajectory modeling to identify K10 trajectories after release. Contact with community mental health services in the year following release was assessed via data linkage.

**Results.** We identified five trajectory groups, representing consistently *low* (51.1% of the cohort), consistently *moderate* (29.8%), *high increasing* (11.6%), *high declining* (5.5%) and consistently *very high* (1.9%) psychological distress. Mood disorder, anxiety disorder, history of self-harm and risky drug use were risk factors for the *high increasing*, *very high* and *high declining* trajectory groups. Women were over-represented in the *high increasing* and *high declining* groups, but men were at higher risk of *very high* psychological distress. Within the *high increasing* and *very high* groups, 25% of participants accessed community mental health services in the first year post-release, for a median of 4.4 contact hours.

**Conclusions.** For the majority of prisoners with high to very high psychological distress, distress persists after release. However, contact with mental health services in the community appears low. Further research is required to understand barriers to mental health service access among ex-prisoners.

Received 22 May 2015; Revised 17 September 2015; Accepted 22 September 2015; First published online 9 November 2015

**Key words:** Community mental health services, ex-prisoners, mental health, psychological distress, trajectory models.

## Introduction

One in seven people passing through prisons worldwide suffers from a severe mental disorder (Fazel & Seewald, 2012). In Australia, the odds of psychiatric illness are 10 times greater in prisoners than the wider population (Butler *et al.* 2006). After release, former prisoners continue to be at dramatically elevated risk of adverse mental health outcomes (Alan *et al.* 2011; Frank *et al.* 2013) and suicide (Binswanger *et al.* 2007; Spittal *et al.* 2014). Ex-prisoners with a history of mental disorder are at even greater risk than other ex-prisoners for a host of poor outcomes, including

substance misuse, homelessness, unemployment (Cutcher *et al.* 2014), reincarceration (Baillargeon *et al.* 2009) and mortality from drug overdose and suicide (Kariminia *et al.* 2007; Webb *et al.* 2011).

There have been few prospective studies examining changes in mental health status after release from custody. No previous research has investigated individual-level changes in mental health status among prisoners or ex-prisoners: most existing longitudinal studies report only changes in the mean value of various mental health indicators across the cohort. For example, one study of adult prisoners in Australia found that the mean score on a depression scale declined following release compared with immediately pre-release, although the mean anxiety score remained relatively constant (Shinkfield & Graffam, 2010) and self-rated psychological health varied (Shinkfield & Graffam, 2009). In another study of US adult male prisoners the percentage of the cohort

\* Address for correspondence: E. G. Thomas, Department of Biostatistics, Harvard T.H. Chan School of Public Health, 655 Huntington Avenue, Building 2, 4th Floor, Boston, MA 02115, USA. (Email: emmathomas@g.harvard.edu)

reporting a mental illness increased in the first year following release (Visher & Courtney, 2007).

After release, many ex-prisoners continue to have substantial mental health service needs (Kinner, 2006; Alan *et al.* 2011). However, neither the extent and nature of these needs, nor the degree to which they are currently being met, are well understood (Mears & Cochran, 2012). Previous research on mental health service utilization among ex-prisoners has focused on the needs of those with a known mental disorder. One study of male ex-prisoners found that about half of those reporting a mental disorder were receiving prescription medication or other mental health treatment 1 year after release (Visher & Courtney, 2007). In another study of mentally ill male and female ex-prisoners, half the participants accessed community mental health services in the first year after release, but the frequency and duration of service contacts was typically low (Lovell *et al.* 2002). A third study found that 60% of ex-prisoners with severe mental illness used community mental health services within 90 days of release, but this percentage was higher for those with health insurance (Morrissey *et al.* 2006). To our knowledge, no previous studies have examined mental health service access among general prisoner cohorts, despite the fact that their mental health needs may still be substantial.

While measuring aggregate changes in mental health status can help in assessing the overall extent of mental health service need among ex-prisoners, understanding individual-level changes is essential to the delivery of targeted and individually tailored transitional care. Studying individual trajectories of mental health problems could help identify predictors of ongoing or increasing need for mental health services and reveal at what points before and after prison release this need is most acute. A detailed understanding of the demand for and access to mental health services among former prisoners is critical, given the empirical link between mental illness and a host of poor outcomes following release, and the corresponding potential for mental health services to facilitate successful community re-integration and reduce harmful outcomes (Hammett *et al.* 2001). By comparing mental health trajectories with actual post-release service utilization, it is possible to consider whether current levels of service access are commensurate with need.

In this paper, we apply group-based trajectory modeling (GBTM; Nagin, 2009) to data on psychological distress in a large cohort of adult ex-prisoners in Australia. The aims of the study were to:

(1) Describe trajectories of psychological distress after prison release;

- (2) Characterize individuals following different trajectories according to their pre-release characteristics; and
- (3) Describe patterns of community mental health service use during the first year post-release, among individuals following different psychological distress trajectories.

## Method

### Study design

This was a prospective cohort study of sentenced adult prisoners from seven prisons in the state of Queensland, Australia, recruited between August 2008 and July 2010. The original study was a randomized controlled trial of a re-entry intervention, described in greater detail elsewhere (Kinner *et al.* 2013; Kinner *et al.* 2014). Eligible participants were within 6 weeks of expected release (full-time or parole) at baseline.

Psychological distress was assessed during a pre-release interview and at three follow-up interviews approximately 1, 3 and 6 months post-release. Baseline (pre-release) interviews were conducted in person. Post-release interviews were conducted via telephone for those residing in the community. Interviews in prison were typically face to face, with a minority conducted by telephone for hard-to-reach subjects. The study employed a range of strategies to minimize attrition (David *et al.* 2013; Kinner *et al.* 2013).

We investigated mental health service utilization in the first year post-release via linkage with the Consumer Integrated Mental Health Application (CIMHA), a system that records information on contacts with community mental health services in Queensland.

### Measures

#### Psychological distress

Psychological distress at each interview was assessed using the Kessler Psychological Distress Scale (K10), a screening tool designed to assess non-specific psychological distress. The K10 has high accuracy in discriminating between those with and without mental illness according to criteria from the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) (Kessler *et al.* 2002) and has been used extensively in both general population (e.g. Australian Bureau of Statistics, 2008b) and prison-based surveys (e.g. Butler & Allnutt, 2003; Australian Institute of Health and Welfare, 2013). The 10 items address the frequency of a range of mental health symptoms within the past 4 weeks. Each item is scored from 1 to 5 in ascending order of frequency, for a total score ranging

from 10 to 50. Scores on the K10 can be categorized into low (10–15), moderate (16–21), high (22–29) and very high (30–50) psychological distress (Andrews & Slade, 2001).

#### *Baseline characteristics*

We selected a range of demographic, criminal justice, substance use and mental health variables from the baseline survey in order to assess their association with psychological distress trajectories. Demographic variables included age (<25 *v.* ≥25 years), gender (female *v.* male), and indigenous status (Aboriginal and/or Torres Strait Islander *v.* neither). We defined high-risk illicit drug use in the 3 months prior to incarceration as a score ≥27 on the Alcohol, Smoking and Substance Involvement Screening Test (Humeniuk *et al.* 2010) for at least one of cannabis, hallucinogens, ecstasy, methamphetamines, cocaine, benzodiazepines, heroin or other opiates. We defined high-risk drinking in the year prior to incarceration as a score ≥16 on the Alcohol Use Disorders Identification Test (Babor *et al.* 2001). Current mental illness (schizophrenia, anxiety disorder or mood disorder) was assessed by self-report using questions adapted from Australia's National Health Survey (Australian Bureau of Statistics, 2008a): participants were asked if they had ever been told by a doctor, psychologist or psychiatrist that they had a mental illness. If yes, they were asked to specify the illness and whether they currently suffered from that illness. History of self-harm, including attempted suicide, was self-reported. Queensland Corrective Services (QCS) provided data on length of incarceration (≤180 days *v.* >180 days) and prior incarcerations (any history of incarceration as an adult prior to baseline incarceration *v.* none).

#### *Mental health service contact*

CIMHA captures all state-funded community mental health services in Queensland, including services provided to non-mental health in-patients. Private mental health services are not captured, although financial barriers are likely to exclude most ex-prisoners from private care. We obtained CIMHA data for the first year after prison release, including the date of contact, type of service and length of consultation. Common types of services included therapy, counseling, crisis management, case management, education, intake, assessment (including speech and language assessment), review and administrative activities. We included only records in which the participant had direct contact with a clinician or other employee, in person, by telephone or via videoconference, while in the community (i.e. not during a period of incarceration). In order to ascertain the dates when participants were in the

community and therefore able to access community-based services, QCS provided release and re-incarceration dates up to 1 year post-release.

Baseline data were linked to CIMHA by the Queensland Health Data Linkage Unit using LinkageWiz software, followed by a full clerical review of all possible matches. LinkageWiz employs a probabilistic record linkage algorithm that has an estimated positive predictive value of 96% and sensitivity of 79% for identifying true matches (Ferrante & Boyd, 2010). All known aliases of participants (obtained from prison records) were included as matching variables, a process that improves sensitivity without reducing specificity (Larney & Burns, 2011).

#### *Analyses*

GBTM is a statistical technique used to characterize longitudinal patterns of change in a population by identifying a fixed number of latent groups whose members follow similar outcome trajectories. The analyst must specify the number of trajectory groups, but the shapes of the trajectories are estimated semi-parametrically from the data (Nagin, 2009). Compared with other trajectory modeling techniques such as growth curve and growth mixture modeling, GBTM constrains treatment of within-group variances (random effects are not considered). However, GBTM can be regarded as a device for approximating a more complex distribution of trajectories, it is well suited to exploratory studies without pre-specified hypotheses regarding the trajectory shapes, its outputs are easier to visualize and interpret, and fewer modeling assumptions are required (Nagin & Odgers, 2010).

The outcome in our trajectory analyses was psychological distress, as measured by the K10. Because interviews were conducted within a flexible time window, we excluded any K10 data collected more than 8 weeks prior to prison release or more than 1 year after release. Participants were included in trajectory analyses if they responded to the K10 during at least one interview within this time period. Within each trajectory group, we assumed that the outcome followed a censored normal distribution and modeled the uncensored mean as a function of time since release using a polynomial of cubic or lower order (Nagin & Odgers, 2010).

Trajectory model building proceeded in two stages. First, we fitted trajectory models with two to seven latent groups and chose the model that maximized the Bayesian information criterion (BIC) after non-significant ( $p < 0.05$ ) polynomial coefficients were dropped (Andruff *et al.* 2009). Second, to investigate possible associations between baseline characteristics and trajectory group membership, we re-estimated

our trajectory model allowing the log odds of group membership (relative to a reference group) to depend linearly on all baseline variables, as in (unordered) multinomial logistic regression (Nagin, 2009). We then assigned participants to trajectory groups according to their maximum posterior probability of group membership and assessed model fit by computing the mean posterior probability of group membership and odds of correct classification (OCC) within each group.

Next, within assigned trajectory groups, we calculated the percentage of mental health service users, defined as those who had at least one community mental health service contact in the first year after prison release, and tested for differences using logistic regression. Among service users, we then computed the median cumulative duration of mental health service contact in the first year post-release. To control for time spent in the community (as opposed to periods of re-incarceration), these analyses were weighted by the proportion of follow-up time spent in the community. Among service users, we computed the median number of days after release until the first service contact.

#### *Sensitivity and attrition analyses*

In order to determine whether return to custody during the follow-up period affected our results, in a sensitivity analysis we excluded any data obtained after the date of the participant's first re-admission to prison (if any). We also excluded individuals for whom K10 data were available from only one interview prior to re-incarceration. We repeated all analyses in this reduced sample to check for any substantive changes to our conclusions. In order to investigate the potential impact of missingness in the outcome variable on our results, we examined univariate associations between missing at least one K10 score at follow-up and baseline variables via logistic regression.

All analyses were performed in Stata version 13.1 (USA). GBTM analyses employed the *traj* package (Jones & Nagin, 2013).

#### *Ethical standards*

All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. Ethics approval for this study was granted by the Behavioural and Social Sciences Ethical Review Committee of the University of Queensland and the Queensland Health Human Research Ethics Committee.

## **Results**

### *Preliminary analyses*

Of the 1325 participants recruited to the study, 94.1% responded to the K10 at baseline, 65.1% at the 1-month follow-up, 64.4% at the 3-month follow-up and 67.7% at the 6-month follow-up. The mean K10 scores for respondents were 17.9 (baseline), 17.1 (1-month follow-up), 16.6 (3-month follow-up) and 16.6 (6-month follow-up). Of those who responded to the K10 at each follow-up interview, 5.2% (1-month follow-up), 12.1% (3-month follow-up) and 23.1% (6-month follow-up) had returned to custody and so were interviewed in prison. Online Supplementary Table S1 shows the percentage of participants in each K10 category (low, moderate, high or very high) at each interview and compares prison and community percentages.

The median age of participants at baseline was 30 years; 21.1% were female and 25.5% identified as indigenous. Table 1 shows the distribution of baseline characteristics for those scoring low/moderate *v.* those scoring high/very high on the K10 at baseline, with  $\chi^2$  tests for differences in proportions.

### *Trajectory modeling results*

The BIC was maximized by a model with five trajectory groups (see online Supplementary Table S2), and we therefore used a five-group model in all subsequent analyses. Our final trajectory model included baseline predictors of group membership and so was applied to data from the 1216 (92%) participants who responded to the K10 at least once during the study period and had data available for all baseline variables. Fig. 1 shows the mean K10 score as a function of time since release for each trajectory group and online Supplementary Table S3 shows the estimated polynomial coefficients. We refer to these groups as follows: *low* – mean K10 score consistently within the low psychological distress range (an estimated 51.1% of the cohort); *moderate* – mean K10 consistently within the moderate distress range (29.8%); *high increasing* – mean K10 within the high distress range, and increasing slightly (11.6%); *high declining* – mean K10 in the very high distress range prior to release, then declining to the low to moderate range (5.5%); and *very high* – mean K10 score consistently within the very high distress range (1.9%). We italicize the trajectory group names throughout this paper to distinguish them from the usual cross-sectional K10 categories. For each group, the mean posterior probability of group membership and OCC, respectively, were 0.86 and 5.75 (*low*), 0.75 and 7.18 (*moderate*), 0.81 and 31.89 (*high increasing*), 0.79 and 65.53 (*high declining*) and 0.86 and 305.84 (*very high*), indicating adequate model fit (Nagin, 2009).



**Table 1.** Participant characteristics according to level of psychological distress at baseline ( $n = 1247$ )

Baseline characteristic	Psychological distress level at baseline (K10)		$\chi^2$ Test: $p$
	Low/moderate ( $n = 923$ ), % ( $n$ )	High/very high ( $n = 324$ ), % ( $n$ )	
Female	17.0 (157)	32.1 (104)	<0.001
Age <25 years	24.8 (229)	26.5 (86)	0.537
Indigenous	23.6 (218)	27.8 (90)	0.135
Prior incarceration	65.6 (603)	63.2 (203)	0.442
Sentence >6 months	47.0 (432)	38.0 (122)	0.005
High-risk drug use <sup>a</sup>	24.4 (225)	31.0 (100)	0.020
High-risk drinking <sup>b</sup>	34.3 (311)	43.3 (136)	0.004
Anxiety disorder <sup>c</sup>	5.0 (46)	16.5 (53)	<0.001
Mood disorder <sup>c</sup>	10.5 (97)	34.6 (111)	<0.001
Schizophrenia <sup>c</sup>	3.0 (28)	6.2 (20)	0.012
History of self-harm	20.5 (189)	46.6 (151)	<0.001

K10, Kessler Psychological Distress Scale.

<sup>a</sup> In the 3 months prior to incarceration.

<sup>b</sup> In the year prior to incarceration.

<sup>c</sup> Self-reported current diagnosis at baseline interview.

Table 2 shows percentages of baseline characteristics by assigned trajectory group and  $p$  values from the multinomial logistic regression model (for full results, see online Supplementary Table S4). In adjusted multinomial analyses, we found strong evidence that being female, a history of high-risk drug use or self-harm, and reporting a mood or anxiety disorder at baseline were risk factors for membership in the moderate, high declining and high increasing K10 trajectory groups compared with the low group. Reporting an anxiety disorder or history of self-harm was significantly associated with membership in the very high group compared with the low group.

#### Post-release mental health service use

A total of 1318 (99.5%) participants were successfully linked to both the CIMHA and QCS data. Of these, 155 (11.8%) had direct contact with public mental health services at least once in the 12 months following release. Those scoring high or very high on the K10 at baseline were significantly ( $p < 0.001$ ) more likely to access services (19.4%) than those scoring low/moderate (9.1%). Among those who accessed mental health services at least once, the median cumulative duration of contact was 2.7 h [interquartile range (IQR) 1.3–6.4 h] and the median number of days until the first contact was 92 (IQR 10–222).

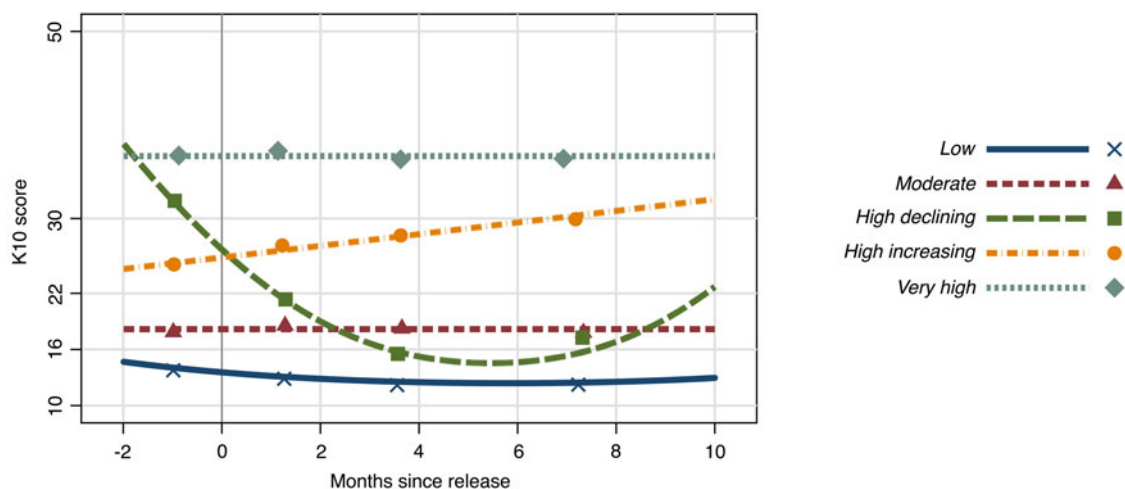
Table 3 shows indicators of mental health service usage by trajectory group for the 1209 participants included in trajectory analyses and for whom CIMHA and QCS data were available. The odds of

any contact were significantly greater for all other trajectory groups when compared with the low group. Among service users, the median time until first service contact was longest in the low (123 days) and moderate groups (153 days), somewhat shorter in the high increasing group (88 days), and much shorter in the high declining (26 days) and very high groups (7 days). The median cumulative duration of mental health service visits in the first year post-release was similar for the low (2.3 h) and moderate (1.8 h) groups, and somewhat higher for the high declining (3.4 h), high increasing (4.1 h) and very high groups (5.1 h).

Fig. 2 shows the percentage of participants accessing mental health services at least once in each quarter following prison release, by trajectory group. The rate of service contact in the low, moderate and high increasing groups was largely constant over time. However, in the high declining group and particularly the very high group, the contact rate declined after the first quarter following release (from 35% in the first quarter to 9% in the second quarter for the very high group, and from 16% to 4% for the high declining group) and increased slightly thereafter.

#### Sensitivity and attrition analyses

The K10 trajectories, probabilities and predictors of group membership and rates of service contact by trajectory group were not substantively altered when we removed data obtained after participants' first return to custody and participants with only one K10 response



**Fig. 1.** Estimated mean Kessler Psychological Distress Scale (K10) trajectories ( $n = 1216$ ). The plotted curves show the estimated mean K10 score as a function of months since release, where negative months signify the pre-release period, for each psychological distress trajectory group. The plotted points show the mean K10 score and mean interview date weighted by the posterior probability of membership in each trajectory group. The horizontal gridlines were chosen to reflect established (static) categories of psychological distress: low (scores 10–15), moderate (16–21), high (22–29) and very high (30–50) (Andrews & Slade, 2001). The estimated population percentages in each trajectory group were 51.1% (*low*), 29.8% (*moderate*), 11.6% (*high increasing*), 5.5% (*high declining*) and 1.9% (*very high*). For a color figure, see the online version.

(for full results, see online Supplementary Fig. S1 and online Supplementary Tables S5, S6 and S7).

We observed moderate to strong positive associations between missing at least one K10 score at follow-up and being indigenous (odds ratio [OR] 2.52), prior incarcerations (OR 2.42), high-risk drinking (OR 1.58) and high-risk drug use (OR 1.47). Associations between all other baseline variables, including baseline K10 score, and attrition were relatively weak (OR < 1.40 and OR > 1/1.40; see online Supplementary Table S8).

## Discussion

We have, for the first time, described individual-level trajectories of psychological distress after prison release. This has allowed us to distinguish between aggregate changes and individual-level patterns of psychological distress over time, and to investigate mental health service utilization among those for whom there is evidence of ongoing need for such services following release. Prior to release, more than half of participants experienced at least moderate psychological distress, compared with less than one-third in the Australian community (Slade *et al.* 2011). The mean K10 score in our cohort declined slightly following release, from 17.9 pre-release to 16.6 about 6 months after release. However, our trajectory model results suggest that nearly 83% of participants (the *low*, *moderate* and *very high* trajectory groups) experienced minimal changes in psychological distress in the first 6 months after release. About one in 10

experienced moderate increases in distress after release from prison (the *high increasing* group) and about one in 20, who were typically highly distressed in custody, experienced a large decline in distress after release (the *high declining* group). These findings suggest that, for most individuals who are distressed prior to release, transition into the community is likely to remain a distressing and challenging time.

Two possible interpretations of the *high declining* trajectory are that: (1) the experience of being imprisoned and near to release was highly distressing, a phenomenon sometimes referred to as ‘gate fever’ (Castellano & Soderstrom, 1997), and was followed by a natural decline in psychological distress after release; or (2) psychological distress in this group improved following release due to effective transitional management, mental health care or other treatment in the community. Of the *high declining* group, three-quarters did not contact community mental health services in the first year post-release, and those who did engage with services typically had minimal service contact (for a median of 2.7 h of contact over 1 year), thus favoring the first interpretation. Increased social and emotional support in the community could also contribute to declining distress (Jacoby & Kozie-Peak, 1997; Naser & La Vigne, 2006; Shinkfield & Graffam, 2010). Our results suggest that the mental health of individuals in the *high declining* group may be amenable to management outside the public mental health system, while the *high increasing* and *very high* groups are more likely to require public mental health services.

**Table 2.** Participant baseline characteristics by K10 trajectory group ( $n = 1216$ )<sup>a</sup>

Variable	Trajectory group					Wald test: $p$
	Low ( $n = 664$ ), %	Moderate ( $n = 336$ ), %	High increasing ( $n = 138$ ), %	High declining ( $n = 55$ ), %	Very high ( $n = 23$ ), %	
Female	12.2	26.5	42.0	41.8	13.0	<0.0001
Age <25 years	31.0	16.7	18.1	29.1	0.0	0.0554
Indigenous	25.9	18.8	30.4	21.8	17.4	0.3993
Prior incarceration	61.6	74.7	72.7	38.2	52.2	0.0796
Sentence >6 months	48.0	42.3	34.1	38.2	52.2	0.9716
High-risk drug use <sup>b</sup>	16.9	39.3	34.8	40.0	0.0	0.0098
High-risk drinking <sup>c</sup>	32.8	41.7	35.5	50.9	39.1	0.0983
Anxiety disorder <sup>d</sup>	2.4	11.3	15.9	25.5	34.8	0.0022
Mood disorder <sup>d</sup>	5.6	20.5	44.2	54.6	39.1	<0.0001
Schizophrenia <sup>d</sup>	2.3	4.5	5.1	16.4	4.4	0.6153
History of self-harm	9.5	43.5	54.4	63.6	52.2	<0.0001

K10, Kessler Psychological Distress Scale.

<sup>a</sup> The Table shows the raw percentages of participants having baseline characteristics by trajectory group. The rightmost column shows results from a multinomial logistic regression model estimated jointly with the K10 trajectory model, in which the baseline characteristics were included as covariates. The  $p$  values are from Wald tests of the null hypothesis that each baseline characteristic has no effect on the probability of trajectory group membership, after adjustment for all other listed characteristics. Full results from the multinomial model are shown in online Supplementary Table S4.

<sup>b</sup> In the 3 months prior to incarceration.

<sup>c</sup> In the year prior to incarceration.

<sup>d</sup> Self-reported current diagnosis at baseline interview.

Females were over-represented in the *moderate*, *high increasing* and *high declining* trajectory groups in our study. This is consistent with cross-sectional research showing higher psychological distress in female Australian prison entrants and dischargees (Australian Institute of Health and Welfare, 2013), as well as women in the general Australian population (Slade *et al.* 2011). By contrast, men were at higher risk of persistently *very high* psychological distress. As expected, indicators of mental disorder were strong predictors of the higher distress trajectories, as was a history of high-risk drug use. Participants in the *high declining* group reported the highest rates of mood disorder (55%), schizophrenia (16%), self-harm (64%), risky drinking (51%) and illicit drug use (40%). This suggests that other characteristics or life experiences, beyond mental illness, drove the difference between reductions in and persistence of high psychological distress after prison release. Further research is required to understand the factors contributing to declining compared with persisting psychological distress during community re-entry.

While the K10 has high predictive accuracy for clinical mental disorder in community samples (Furukawa *et al.* 2003) and was designed to correlate with symptom severity (Kessler *et al.* 2002), it is not a clinical marker of mental illness. In our study, 47%

of individuals in the *high increasing*, *high declining* and *very high* trajectory groups reported no mood disorder, anxiety disorder or schizophrenia diagnosis at the time of baseline interview. It is possible that mental disorder was underdiagnosed in this group, or that self-report is unreliable. Another possibility is that high psychological distress in our cohort was often driven by factors other than mental disorder, including the prison environment, legal concerns, substance withdrawal, concerns about family members, anxiety about prison release or difficulties transitioning back into the community (Castellano & Soderstrom, 1997; Visher & Courtney, 2007). To the extent that this is the case, our study suggests the need for a broad range of mental health supports for ex-prisoners, including not only management of major mental disorder but support for securing housing and employment post-release, managing substance misuse and meeting broader cultural and psychosocial needs (Draine & Herman, 2007). In particular, in our study 30% of those in the *high increasing*, *high declining* and *very high* trajectory groups reported a history of risky drug use. The high prevalence of co-occurring substance use and mental disorder in prisoners is well documented, and there is widespread recognition of the benefits of coordinated treatment (Edens *et al.* 1997).

**Table 3.** Mental health service use in the first year after prison release by K10 trajectory group (n = 1209)

Statistic	Trajectory group					Total <sup>a</sup> (n = 1209)
	Low (n = 673)	Moderate (n = 326)	High increasing (n = 140)	High declining (n = 54)	Very high (n = 23)	
Percentage with any service contact (n) <sup>b</sup>	7.0 (46)	13.4 (44)	23.8 (32)	25.3 (14)	36.6 (9)	12.1 (146)
Odds ratio (95% CI) <sup>b</sup>	1.0 (ref.)	2.1 (1.3–3.3)	4.2 (2.5–7.1)	4.5 (2.2–9.3)	7.7 (3.1–19.5)	–
Median number of days to first service contact for service users (IQR)	123 (7–253)	153 (49–243)	88 (25–205)	26 (9–159)	7 (2–17)	92 (10–222)
Median contact hours for service users (IQR) <sup>b</sup>	2.3 (1.0–3.8)	1.8 (1.0–3.5)	4.1 (1.8–9.5)	3.4 (1.9–4.3)	5.1 (1.5–11.3)	2.7 (1.3–6.4)

K10, Kessler Psychological Distress Scale; CI, confidence interval; ref., reference; IQR, interquartile range.

<sup>a</sup> Among participants included in K10 trajectory analyses.

<sup>b</sup> Weighted by proportion of first year after release spent in the community.

In our study, relatively few participants (12%) accessed public mental health services in the first year after release and, among service users, 75% had no more than 6.3 cumulative hours of service contact. While those who followed *high increasing* and *very high* distress trajectories initiated mental health service contact more frequently and sooner after release, contact rates were still low, with only 25% using public mental health services and for a median of 4.4 cumulative contact hours. This suggests the presence of significant barriers to public mental health service access for ex-prisoners, even among those who exhibit ongoing mental health need. Notably, while individuals following the *very high* distress trajectory typically initiated service contact within 3 weeks of release, service access declined sharply after the first 3 months. This suggests that highly distressed prisoners who initiate service contact soon after release may not be retained in care despite the persistence of very high distress. Given the strong associations between distress, mental disorder and poor post-release outcomes (Cutcher *et al.* 2014), it is likely that this group incurs substantial health and criminal justice costs (Social Exclusion Unit, 2002; Alan *et al.* 2011), such that increased investment in holistic transitional support and active follow-up post-release may be both warranted and cost-effective.

### Limitations

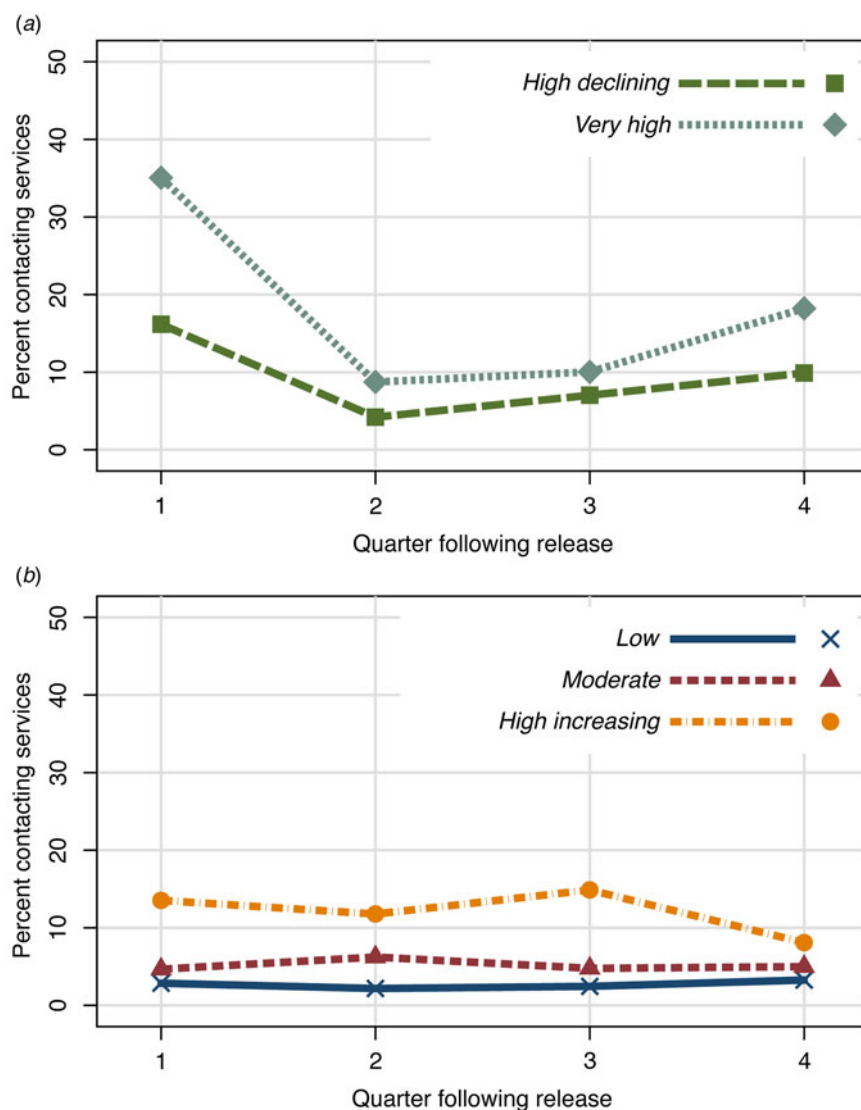
Loss to follow-up in our study ranged between 32% and 36% across the post-release interviews. Baseline K10 score was weakly associated with missing K10

score(s) at follow-up; if the association between true (possibly missing) K10 score at follow-up and missingness were similarly weak, then attrition would not have caused significant bias in our trajectory analyses (Nagin, 2009). We observed moderate to strong positive associations between several other baseline variables and loss to follow-up. However, all participants with at least one K10 score and all baseline variables available were retained in our multinomial regression model. This was 92% of our cohort. As such, any attrition bias in the observed associations between baseline characteristics and trajectory group membership is likely to be small.

In this study, the outcome was measured at relatively few time points (four), limiting our ability to map trajectories of psychological distress in detail. Furthermore, the sensitivity of the K10 to small or rapid changes in distress levels in response to rapid changes in life circumstances is unknown. However, it is questionable whether changes too small or rapid to be detected by our study would have clinically meaningful implications.

Some of the trajectories identified, particularly the *high declining* and *very high* trajectories, represented small proportions of our cohort. The lack of significant baseline predictors of these trajectories most likely reflects a lack of statistical power rather than a lack of true associations. The small number of mental health service users in some trajectory groups also made it difficult to estimate parameters related to service contact hours and time to first service contact with adequate statistical precision.





**Fig. 2.** Mental health service contact against time since release by Kessler Psychological Distress Scale (K10) trajectory group ( $n = 1209$ ): *high declining* and *very high* (a); *low*, *moderate* and *high increasing* (b). The figures show the percentage of participants who contacted services in each quarter (a period of approximately 3 months) following prison release, by K10 trajectory group. The calculated percentages are weighted by the proportion of time spent in the community in each quarter. For a color figure, see the online version.

Finally, trajectory modeling uses a discrete approximation to represent a continuous distribution of trajectories (Nagin & Odgers, 2010). While, for the purposes of discussion, it is useful to treat the five trajectories estimated as representing distinct groups that genuinely exist in the population from which the sample was drawn, reality is usually much more complex. Heterogeneity in psychological distress is still present within the groups and group assignment involves uncertainty.

Despite these limitations, our study still represents one of the largest cohorts of ex-prisoners ever studied in the level of detail provided by our surveys and data linkage.

## Conclusions

We found that rates of psychological distress in our cohort were elevated compared with community samples. For most participants experiencing high distress prior to release, symptoms persisted during community re-integration, although a minority experienced a sharp decline in distress. Despite this, rates of mental health service contact post-release were low. Further research is needed to better understand the causes of high psychological distress in ex-prisoners, to evince the drivers of persisting *versus* declining distress post-release and to illuminate the barriers to mental health care access in ex-prisoners.

## Supplementary material

For supplementary material accompanying this paper visit <http://dx.doi.org/10.1017/S0033291715002123>

## Acknowledgements

This work was supported by Australian National Health and Medical Research Council (NHMRC) Strategic Award no. 409966, NHMRC Project Grant no. 1002463 and Australian Research Council (ARC) Discovery Project DP140102333. S.A.K. is supported by NHMRC Senior Research Fellowship no. 1078168. The authors wish to thank QCS, the Passports study interview team for assistance with data collection, and the Queensland Health Statistical Analysis and Linkage Unit for assistance with data linkage. The views expressed herein are solely those of the authors, and in no way reflect the views or policies of QCS. We wish to thank the Passports study participants for sharing their stories. Finally, we wish to acknowledge the late Professor Konrad Jamrozik for his invaluable contribution to the conception, development and implementation of the Passports study.

## Declaration of Interest

None.

## References

- Alan J, Burmas M, Preen D, Pfaff J (2011). Inpatient hospital use in the first year after release from prison: a Western Australian population-based record linkage study. *Australian and New Zealand Journal of Public Health* **35**, 264–269.
- Andrews G, Slade T (2001). Interpreting scores on the Kessler Psychological Distress Scale (K10). *Australian and New Zealand Journal of Public Health* **25**, 494–497.
- Andruff H, Carraro N, Thompson A, Gaudreau P, Louvet B (2009). Latent class growth modelling: a tutorial. *Tutorials in Quantitative Methods for Psychology* **5**, 11–24.
- Australian Bureau of Statistics (2008a). *National Health Survey: Users' Guide – Electronic*. Australian Bureau of Statistics: Canberra.
- Australian Bureau of Statistics (2008b). *National Survey of Mental Health and Wellbeing: Summary of Results*. Australian Bureau of Statistics: Canberra.
- Australian Institute of Health and Welfare (2013). *The Health of Australia's Prisoners 2012*. Australian Institute of Health and Welfare: Canberra.
- Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG (2001). *The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*. World Health Organization: Geneva.
- Baillargeon J, Binswanger IA, Penn JV, Williams BA, Murray OJ (2009). Psychiatric disorders and repeat incarcerations: the revolving prison door. *American Journal of Psychiatry* **166**, 103–109.
- Binswanger IA, Stern MF, Deyo RA, Heagerty PJ, Cheadle A, Elmore JG, Thomas D, Koepsell MD (2007). Release from prison – a high risk of death for former inmates. *New England Journal of Medicine* **356**, 157–165.
- Butler T, Allnutt S (2003). *Mental Illness Among New South Wales Prisoners*. NSW Corrections Health Service: Sydney.
- Butler T, Andrews G, Allnutt S, Sakashita C, Smith NE, Basson J (2006). Mental disorders in Australian prisoners: a comparison with a community sample. *Australian and New Zealand Journal of Psychiatry* **40**, 272–276.
- Castellano TC, Soderstrom IR (1997). Self-esteem, depression, and anxiety evidenced by a prison inmate sample: interrelationships and consequences for prison programming. *Prison Journal* **77**, 259–280.
- Cutcher Z, Degenhardt L, Alati R, Kinner SA (2014). Poor health and social outcomes for ex-prisoners with a history of mental disorder: a longitudinal study. *Australian and New Zealand Journal of Public Health* **38**, 424–429.
- David M, Alati R, Ware RS, Kinner SA (2013). Attrition in a longitudinal study with hard-to-reach participants was reduced by ongoing contact. *Journal of Clinical Epidemiology* **66**, 575–581.
- Draine J, Herman DB (2007). Critical time intervention for reentry from prison for persons with mental illness. *Psychiatric Services* **58**, 1577–1581.
- Edens JF, Peters RH, Hills HA (1997). Treating prison inmates with co-occurring disorders: an integrative review of existing programs. *Behavioral Sciences and the Law* **15**, 439–457.
- Fazel S, Seewald K (2012). Severe mental illness in 33 588 prisoners worldwide: systematic review and meta-regression analysis. *British Journal of Psychiatry* **200**, 364–373.
- Ferrante A, Boyd J (2010). *Data Linkage Software Evaluation: A First Report (Part 1)*. Public Health Research Network Centre for Data Linkage, Curtin University: Perth, Western Australia.
- Frank JW, Andrews CM, Green TC, Samuels AM, Trinh TT, Friedmann PD (2013). Emergency department utilization among recently released prisoners: a retrospective cohort study. *BMC Emergency Medicine* **13**, 16.
- Furukawa TA, Kessler RC, Slade T, Andrews G (2003). The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychological Medicine* **33**, 357–362.
- Hammett TM, Roberts C, Kennedy S (2001). Health-related issues in prisoner reentry. *Crime and Delinquency* **47**, 390–409.
- Humeniuk R, Henry-Edwards S, Ali R, Poznyka V, Moneiro M (2010). *The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Manual for Use in Primary Care*. World Health Organization: Geneva.
- Jacoby JE, Koziak-Baker B (1997). The benefits of social support for mentally ill prisoners: prison-to-community transitions. *Behavioral Sciences and the Law* **15**, 483–501.
- Jones BL, Nagin DS (2013). A note on a Stata plugin for estimating group-based trajectory models. *Sociological Methods and Research* **42**, 608–613.

- Kariminia A, Law MG, Butler TG, Corben SP, Levy MH, Kaldor JM, Grant L** (2007). Factors associated with mortality in a cohort of Australian prisoners. *European Journal of Epidemiology* **22**, 417–428.
- Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand S-L, Walters EE, Zaslavsky AM** (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine* **32**, 959–976.
- Kinner SA** (2006). Continuity of health impairment and substance misuse among adult prisoners in Queensland, Australia. *International Journal of Prisoner Health* **2**, 101–113.
- Kinner SA, Lennox N, Williams GM, Carroll M, Quinn B, Boyle FM, Alati R** (2013). Randomised controlled trial of a service brokerage intervention for ex-prisoners in Australia. *Contemporary Clinical Trials* **36**, 198–206.
- Kinner SA, van Dooren K, Boyle FM, Longo M, Lennox N** (2014). Development of an intervention to increase health service utilisation in ex-prisoners. *Health and Justice* **2**, 4.
- Larney S, Burns L** (2011). Evaluating health outcomes of criminal justice populations using record linkage: the importance of aliases. *Evaluation Review* **35**, 118–128.
- Lovell D, Gagliardi GJ, Peterson PD** (2002). Recidivism and use of services among persons with mental illness after release from prison. *Psychiatric Services* **53**, 1290–1296.
- Mears DP, Cochran JC** (2012). U.S. prisoner reentry health care policy in international perspective: service gaps and the moral and public health implications. *Prison Journal* **92**, 175–202.
- Morrissey JP, Steadman HJ, Dalton KM, Cuellar A, Stiles P, Cuddeback GS** (2006). Medicaid enrollment and mental health service use following release of jail detainees with severe mental illness. *Psychiatric Services* **57**, 809–815.
- Nagin D** (2009). *Group-Based Modeling of Development*. Harvard University Press: Cambridge, MA.
- Nagin DS, Odgers CL** (2010). Group-based trajectory modeling in clinical research. *Annual Review of Clinical Psychology* **6**, 109–138.
- Naser RL, La Vigne NG** (2006). Family support in the prisoner reentry process: expectations and realities. *Journal of Offender Rehabilitation* **43**, 93–106.
- Shinkfield AJ, Graffam J** (2009). Community reintegration of ex-prisoners: type and degree of change in variables influencing successful reintegration. *International Journal of Offender Therapy and Comparative Criminology* **53**, 29–42.
- Shinkfield AJ, Graffam J** (2010). The relationship between emotional state and success in community reintegration for ex-prisoners. *International Journal of Offender Therapy and Comparative Criminology* **54**, 346–360.
- Slade T, Grove R, Burgess P** (2011). Kessler Psychological Distress Scale: normative data from the 2007 Australian National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Psychiatry* **45**, 308–316.
- Social Exclusion Unit** (2002). *Reducing Re-Offending by Ex-Prisoners*. Social Exclusion Unit, Office of the Deputy Prime Minister: London.
- Spittal MJ, Forsyth S, Pirkis J, Alati R, Kinner SA** (2014). Suicide in adults released from prison in Queensland, Australia: a cohort study. *Journal of Epidemiology and Community Health* **68**, 993–998.
- Visher CA, Courtney SME** (2007). *One Year Out: Experiences of Prisoners Returning to Cleveland*. Urban Institute Justice Policy Center: Washington, DC.
- Webb RT, Qin P, Stevens H, Mortensen PB, Appleby L, Shaw J** (2011). National study of suicide in all people with a criminal justice history. *Archives of General Psychiatry* **68**, 591–599.