PARENTAL STATUS AND CHARACTERISTICS OF WOMEN IN SUBSTANCE USE TREATMENT SERVICES: ANALYSIS OF ELECTRONIC PATIENT'S RECORDS

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ABSTRACT

Background: Many women receiving substance use treatment services are mothers. Despite this, it remains inconclusive whether substance use treatment services are addressing the specific needs of mothers. This study explored differences in socio-demographic, psychological, patterns of substance use and treatment characteristics between mothers and women without children, and between mothers whose children were in alternative care. **Method:** Data were extracted from electronic patient records (EPRs) of women who attended South London and Maudsley (SLaM) National Health Services (NHS) Foundation Trust addiction services between 2013 and 2020 (N= 4370). **Results:** 1730 participants (39.6%) were identified as mothers, of whom 1340 (77.4%) had dependent children. The average number of births was 1.83 (SD = 1.0). 54.3% of mothers did not disclose whether their dependent child(ren) was under their care and 37.5% of mothers indicated that at least one of their child(ren) was in alternative care. Alcohol related problems were the most reported type of substance used in the past 28 days. Suicide attempts and hospitalization due to mental health problems were highly reported. Compared to women without children, mothers were more likely to be young, experience housing problems, use opioids and/or crack-cocaine in the past 28 days and experience lifetime domestic violence victimisations. Mothers were also less likely to have alcohol related problems, experience overdose and social isolation than women without children. **Conclusion:** The study highlights the need for substance use services to invest in approaches to improve mothers' disclosure of parenting and childcare issues. It also demonstrates that key characteristics relating to mothers can be identified using EPRs.

1. INTRODUCTION

Studies report a significant proportion of women in treatment for substance use are mothers, a prevalence of between 40% and 70% (Gilchrist & Taylor, 2009; Meier et al., 2004; Public Health England, 2018). Parenthood is particularly challenging for this population. Research has shown that mothers with substance use problems are often single, have poor social networks and experience greater socioeconomic adversities (Canfield et al., 2017). These characteristics may impose additional challenges to providing effective and nurturing parenting to children. Whilst not all mothers who use substances neglect their children, maternal substance use is an indicator of care proceedings involvement (The Association of Directors of Children's Services, 2016; Harp & Oser, 2016; Public Health England, 2018; Taplin & Mattick, 2013). It is estimated that approximately 50% of mothers receiving substance use treatment are involved with care proceedings (Fernandez & Lee, 2013; National Treatment Agency for Substance Misuse, 2012; Tsantefski et al., 2014), this figure is even higher among those women receiving treatment for opioid use (Lundgren et al., 2009; Taplin & Mattick, 2015). The so-called 'toxic trio' – domestic violence and abuse, parental substance misuse, and parental mental illness – which are key drivers for children ending up in care, have been estimated to be present in the households of 3.6% of all children in England (Chowdry, 2018).

It is well accepted today that women with substance use problems differ from the general male population of substance users in terms of physical and psychosocial adversities (e.g., greater prevalence of both mental and physical morbidity, and history of physical and sexual abuse (Frem et al., 2017; Gilchrist et al., 2015; Simpson & McNulty, 2008)), substance use patterns (e.g., higher severity of addiction, greater sharing of injecting equipment) (Garcia-Guix et al., 2018; Iversen et al., 2015; Peters et al., 2019) and treatment utilization (e.g., less readiness for treatment, more relapses) (Greenfield et al., 2007; Tuchman, 2017). In the past two decades, awareness of the distinct treatment needs of female service users has grown (Greenfield 2002; Simpson & McNulty, 2008; Tarasoff et al., 2018). However, there are still gaps in provision: despite the majority of women with

substance use problems being of child-bearing age (Tarasoff et al., 2018; WHO, 2008), it remains inclusive whether substance use treatment services are addressing the specific needs of mothers (Canfield et al., 2017; Hederson et al., 2007; Lloyd, 2018).

Mothers and their children are more likely to have positive outcomes when treatments integrate a wide range of services. Programmes which include substance use interventions, parent/parenting classes, service linkages and children's programmes can reduce maternal substance use (Tarasoff et al., 2018), and mental health problems, improve parenting and childhood development (Milligan et al., 2010; Niccols et al., 2012; Ofstead and Care Quality Commission, 2013). However, mothers with substance use problems tend to experience significant issues in accessing and engaging with supportive services (Lloyd, 2018; Best et al., 2004; Kuo et al., 2012; Olsen, 2013), and face many barriers for seeking help including feelings of guilt, high stigmatization, fear of losing custody of their children and lack of transportation (Olsen, 2013; Radcliffe, 2011). For instance, women with children are less likely to attend residential treatment services than women without children (Lloyd, 2018).

Across England and other European nations, little is known about the needs and difficulties faced by mothers who are receiving treatment for substance use including whether psycho-social adversities (e.g., suicidality, domestic violence) are different from women with and without children. Gathering this information is vital for improving the provision of support to these families. Despite national efforts to encourage substance use and child services (i.e., social services, children centers) to work collaboratively to address the needs of mothers with substance using problems, only a few studies to date have focused on women with children attending substance use services (e.g., Gilchrist & Taylor, 2009; Chandler et al., 2013; Powis et al., 2000). The generalisability of these studies have been limited by their focusing on a particular type of treatment received (i.e., treatment for opioid use, harm reduction, and/or residential treatment) within small samples.

The current study aimed to address gaps in current evidence by conducting a study of a very large clinical sample of women attending substance use treatment services in

South London. Using a large scale clinical register, covering inner city and suburban substance treatment centre, we conducted an exploratory analysis to: first explore differences in socio-demographic, psychological, patterns of substance use and treatment characteristics between mothers and women without children; and second to examine potential differences in those mothers whose children were in alternative care, compared to those whose children were under their care.

2. METHODS

The study employed a retrospective observational design. Participants consisted of all women who attended Tier 3 (i.e. community-based drug assessment and structured treatment including community prescribing, psychosocial interventions, and day programmes) and 4 (i.e. residential treatment, such as NHS inpatient units and voluntary sector rehabilitation centres) structured treatment interventions for their alcohol and/or drug use within the South London and Maudsley (SLaM) National Health Service (NHS) Foundation Trust addiction services between 1st January 2013 and 31st January 2020. SLaM provides addiction services to people resident in four South London boroughs covering roughly a population of 1.36 million.

Data were extracted using the Clinical Record Interactive Search (CRIS) system (Perera et al., 2016), which contains anonymized electronic patient records (EPRs) from SLaM services recorded during routine clinical practice. NHS Hospital Episodes (HES) data has been linked to EPRs from SLaM by CRIS system and captures hospitalisation information including the number of life births. CRIS was approved as a dataset for secondary analysis by Oxfordshire Research Ethics Committee C (reference 08/H0606/71+5) and the current study was approved by the CRIS oversight committee (reference 19078) Data extraction for each case began at their first recorded treatment outcome profile (TOP) assessment and ended at the last TOP assessment during 2013 and 2020.

2.1 Sample

All female service users who received care from SLaM substance use treatment services were considered. The total sample comprised of 4370 women. For each service user, the 'point of assessment' was defined as the date of the first TOP assessment completed between 1st January 2013 and 31st January 2020 within the completion of the Child Needs and Risks (CNR) form. These two assessments were considered due to the first providing information about substance use patterns and the later providing information about childcare and maternal characteristics. However, in cases where the CNR form was not completed, the earliest TOP assessment date during this period was used (N = 1155, 26% of total sample). It is possible that the CNR was not completed due to service users dropping-out/ending treatment before the 6 months window period allowed for CNR to be completed after the TOP assessment. In addition, while the CNR form was part of the service assessments before the observation period of this study, its administration only became mandatory from January 2013, therefore not all women who entered treatment before 2013 had CNR completed.

Mothers were identified by HES data on reports of 'ever given birth' before the first date of the TOP assessment being completed within the observation period of this study. These data were matched with reports of having a dependent child(ren) on the CNR (defined as having a dependent under the age of 18 years). It was noted that 239 women reported having a dependent child in the CNR but had no reports of giving birth in the HES data. Analysis of the CNR free-text data suggested that this discrepancy was largely due to these women being originally from another country and thus birth might have occurred outside England, where this was clear in the free-text data, mother status was attributed. The term 'mothers' in this study refers to patients who ever gave birth, whereas 'mothers of a dependent child(ren)' refers to mothers of a child/children aged <18 years independently of living together. The flow diagram of the study participants is illustrated in Figure 1.

Insert Figure 1 here

2.2 Measurements

The following assessment forms were extracted to identify clinical, psychological and childcare characteristics. All the forms are compulsorily administered by staff to all patients attending substance use services (see supplementary figure, FS1, for details about time points for assessments of each form and supplementary table, TS1, for details about the variables within the forms).

- *Treatment outcome profile (TOP)* (Marsden et al., 2018): Data about patterns of substance use were extracted from the TOP. This form is administered at treatment entry and re-administered every 6 months during the treatment journey and when patients leave treatment. The TOP contains a set of questions on the frequency that the following substances were used per day on each of the past 4 weeks and the total number of using days in the 28 day period: alcohol, opioids, crack-cocaine, cocaine, amphetamines and cannabis. Weekly average use was calculated for each these items and a score of 1 was assigned if alcohol was consumed mostly every day of the week (>3 times) and if any other substance was used at least once a week. Additional information extracted from the TOP includes an interval measure ranging from 0 (poor) to 20 (good) where patients rate their own levels of 1) physical health; 2) psychological health and 3) quality of life in the past 28 days.
- *Alcohol Use Disorders Identification Test (AUDIT) (*Babor et al., 2001): Frequency and quantity of alcohol consumed in the past 12 months was extracted from the AUDIT. This is completed at treatment entry by all patients regardless of whether or not they are drinkers. It consists of a ten-item measure and provides an indication of person's drinking is lower risk (scores < 7), increasing risk (scores 8-15), higher risk (scores 16-20) or possibly dependent (scores > 20).

- *Addiction Brief Risk Scale Assessment (BRSA-A):* Risk areas specific to patients who use substances including currently having a blood borne virus infection, lifetime history of suicide attempts, lifetime history of overdose, hospitalization due to mental health problems in the past 12 months were recorded using the BRSA-A (yes/no responses). Additional information extracted from this form included patient's reports of social isolation, risk sexual behaviour and self-neglect in the past 12 months. This risk form is a target for the clinical addiction teams and should be completed as part of the patient's initial assessment.
- *Child Needs and Risks form (CNR)*: This form is completed as part of clinical assessment within a six-month window following the completion of the TOP form (i.e., treatment entry/reviews/discharge) regardless of being a parent of dependent children. Data from the CNR was used to identify those patients who have a dependent child/ren and childcare arrangements (under the care of the mother/in alternative care). In addition, this form provides self-reported information on pregnancy status and lifetime history of domestic violence, whether the patients' substance use, mental health or learning disability impacts on their capacity/ability to meet the needs of the child/ren (i.e., high risk to children, yes/no responses) and whether safeguarding referrals were made by the substance use treatment services to the Multi Agency Risk Assessment Conference (i.e., referral to social services, yes/no responses). However, given that parental status is self-reported and focuses on having any dependent children rather than being a parent or ever giving birth, it is possible that data from these forms lacks information on those women that decide not to disclosure their parental status or those mothers who had their right to care for their children terminated by child protection services.

To ascertain the number of women who were mothers and had given birth, we used the HES database, which includes maternity data and has been previously linked to the CRIS database. The number of deliveries before the first TOP assessment was administrated within the observation period of this study was extracted for each patient.

In addition, a number of sociodemographic variables were extracted. Ethnicity is routinely recorded on SLaM electronic patient records in their designated fields. Ethnic group classifications were condensed to “White British” and “Others” (Black and Minority Ethnic groups). Age was calculated on the date on which women completed their first TOP form within the observation period. Homelessness/unstable housing and receiving an employment salary were recorded on TOP form.

2.3 Analysis

All analyses were performed using Stata SE V.16.0. Basic descriptive statistics were computed to characterise the demographic, maternal and clinical profiles of the entire sample. Descriptive information about childcare characteristics of identified mothers were reported. Bivariate analyses using *t* tests and chi- square tests compared women who are mothers and those who are not mothers. Effect sizes (odds ratios and 95% confidence intervals) of factors associated with mother status was calculating using logistic regression. In addition, a series of univariate analysis using logistic regression were used to identify possible factors associated with those mothers whose children are under their care, compared to those whose children were in alternative care.

3. RESULTS

3.1 Sample characteristics

4370 female patients were identified using the CRIS data extraction tool (Figure 1). Of these, 1730 participants (39.6%) were mothers, of whom 1340 (77.4%) had dependent children. Table 1 describes the characteristics of the total sample. The mean age was 41.33 (SD = 11.7 years). Over half of the sample (68.2%) were White British and the majority were not in paid employment (81.5%). Housing problems were reported by 12.8% of the patients. The most commonly used illicit drugs in the past 28 days were opioids (16.0%) and crack-cocaine (15.7%). Just over half the sample met criteria for alcohol dependence using the

AUDIT (51.3%) and 30.0% had consumed alcohol mostly every day of the week in the past 28 days. Reports of lifetime drug overdose were high (73.2%). The mean quality of life scores were (M=11.17, SD = 4.9; out of 20): psychological health (M=10.67, SD= 4.7) and physical health (M=11.50, SD =4.8). Just under half the sample reported a history of suicide attempts (37.7%) and hospitalization due to mental health (46.5%). Reports of social isolation and self-neglect were common (25.6% and 15.2%, respectively). Lifetime domestic violence victimisation was reported by 9.3% of the sample.

Insert Table 1

3.2 Factors associated with women who were mothers compared to women without children

Characteristics of the sample by 'mother' status is described in Table 1. Compared to non-mothers, those who were mothers were younger and a greater proportion reported not being in paid employment (OR 2.54, 95%CI 1.72, 2.42) and experiencing housing problems (OR 1.55 95%CI 1.29, 1.86). A greater proportion of mothers in substance use treatment, compared to non-mothers, had used opioids and crack-cocaine in the past 28 days. Whereas, a lower proportion of mothers in substance use treatment, compared to non-mothers, reported drinking alcohol mostly every day of the week in the past 28 days, or met AUDIT criteria for alcohol dependence. There was no meaningful difference in the proportions using amphetamines or cocaine in the past 28 days between the two groups. Only a small proportion of the total sample received inpatient treatment for substance use (2.5%), with no difference between mothers and non-mothers. Non-mothers were more likely to have overdosed on drugs before entering substance use treatment compared to mothers. While differences in quality of life domains between the two groups were statistically significant the magnitude of the difference was negligible. There was a higher proportion of mothers reports of ever experiencing domestic violence compared to non-mothers (OR 4.03, 95%CI 3.0, 5.3) and a lower proportion reported social isolation (OR .78, 95%CI .66, .93). While no differences were identified between the two groups for any other health

characteristics, the prevalence of suicide attempts and hospitalisation due to mental health problems were high.

3.3 *Maternal characteristics*

Table 2 describes the maternal characteristics of the mothers (*N*=1730). The average number of births was 1.83 (SD = 1.0) in those who were mothers. Some variables had high levels of missingness which have been reported in Table 2. In particular, data on number of children were missing in 33% of identified mothers and data on type of childcare arrangement were missing in 54% of identified mothers. 37.5% of the mothers indicated that at least one of their dependent child(ren) was in alternative care. Of those with data on childcare arrangement (*N*=790), alternative care was reported by 82.1% of the mothers. The proportion of mothers considered high risk to the child(ren) was small (3.5%), as were the number of referrals made to social services by the substance use treatment services (2.8%).

Insert Table 2 here

3.2 Factors associated with mothers whose children were in alternative care compared to those whose children were under their care

Considering the mothers of dependent child/ren whom have reported childcare arrangements only (*N* = 790*,* Table 3), those mothers whose children were in alternative care were more than three times likely to report lifetime domestic violence (OR 3.22, 95%CI 1.64 6.33), more likely to report lifetime drug overdose and less likely to report opioid and crack-cocaine used in the past 28 days and blood borne virus than those mothers whose children were under their care.

Insert Table 3 here

4. DISCUSSION

In this study based on EPR data collected from women attending substance use treatment services across South London, England, we found that approximately 40% of female service-users were mothers, with an average of nearly two birth episodes at the time of assessment. Of those female patients identified as mothers, approximately 80% reported being a mother of dependent child(dren) aged <18 years and approximately 40% of them reported that their child(ren) was not being cared for by them (ie. alternative care). It was not possible however, to identify the nature of alternative care (e.g., in foster care, kinship care or adoption) neither was possible to ascertain the type of contact the mothers had with their dependent child(ren) (e.g., under supervision). Moreover, more than half of the identified mothers of dependent child(ren) did not disclose childcare arrangements, thus, it is possible that alternative care of the child(ren) of mothers in substance use treatment services is underreported. This lack of information raises practical questions about the ability of mothers to communicate openly about childcare issues to health services.

4.1 Comparisons to previous studies

While the prevalence of mothers in our study is comparable to rates of mothers attending substance use in studies conducted elsewhere including Australia (Taplin & Mattick, 2013) and the USA (Blacklow et al., 2012), it is lower than the latest national report in England which suggests that 58% of females receiving substance use treatment are either parents or lived with children when they started treatment (Public Health England, 2019). The lower rate in our study might have be driven in part by a relative change in the age profile of female service-users over the last decade. For instance, while the Public Health England reported data from women attending substance use services in the past 12 months, our study reports data from the past decade. It is very likely that the proportion of women with dependent children would be higher in years when there were more women entering treatment who were of childbearing age. In addition, data from our study is from population

attending substance use services in South London only, possible regional differences in the profile of service users across England might have also contributed for the lower rate in our study.

4.2 Characteristics of the mothers

We found that several sociodemographic and clinical features differentiated mothers from non-mothers in substance use treatment. Specifically, mothers tended to be younger, to experience more housing problems and to not be in paid employment. There is substantial research literature that consistently demonstrates that socioeconomic adversities impose additional stresses for mothers (Basnet et al., 2015; Doab et al., 2015; Lussier et al., 2011). Evidence also shows that when substance use occurs in the context of other multiple risks, the mother's ability to care for their child(ren) is reduced (Canfield et al., 2017; Nair et al., 2005). We also found that while alcohol related problems were highly reported among non-mothers, opioid and crack-cocaine use was more frequently reported by mothers. These findings highlight two particular issues. Firstly, it is known that child-related harms associated with maternal alcohol use might be influenced by different patterns of drinking (e.g., binge drinking, hazardous drinking, in combination with other substance) rather than the level of alcohol consumption alone (Adamson et al., 2012). There remains a lack of robust research available on harmful drinking among patients receiving treatment for drug use (Radcliffe et al., 2019; Soyka 2015). Evidence is also lacking on how treatment for alcohol use in/ not in combination with other drug use might support mothers retaining care of their children (Canfield et., 2017). Further research is needed to address harmful drinking among mothers presenting to drug treatment services. Secondly, while there is compelling evidence for methadone treatment improving mothers' ability to care for their children, there is less convincing evidence for the protective role of treatment for mothers who use stimulants such as crack-cocaine (Canfield et al., 2017). The treatment of crack-cocaine dependence has unique challenges: there is no drug-replacement treatment available, dependence is

characterised by highly uncontrollable craving to the drug use and high frequency of relapses, and there is limited evidence-based information on the effectiveness of psychosocial approaches to reduce clinical patterns of its dependence (Chaves et al., 2011; Connolly et al., 2009). Our findings emphasise the need for further research to investigate how clinical patterns of crack-cocaine and treatment utilization might impact in their own right the ability of mothers to care for their child(ren).

Reports of lifetime rates of domestic violence victimisation were far higher among mothers than non-mothers, with the likelihood of reports increasing by almost five-fold. The likelihood of reporting domestic violence was also higher for those mothers whose children were in alternative care compared to mothers that were caring for their children. Research shows that violence and substance use are interconnected in complex ways (Fulu et al., 2013; Garcia-Moreno, 2005; Gilchrist et al., 2017). In the context of female substance users, the most cited explanation for this link is that women who are subjected to domestic violence use alcohol and/or drugs to cope with the trauma of the abuse (Humphreys et al., 2005). Other explanations explore the extent to which risk factors such as childhood abuse and parental violence may lead to both substance use problems and intimate partner violence later in life (El-Bassel et al., 2003; Lipsky et al., 2005). Also suggested in the literature is the increased risk of women with substance use problems having partners who also use substances (Gilchrist et al., 2019; Testa et al., 2012). In cases where both partners use substances, violence towards women often arises from disputes over raising funds to buy substances, due to the effects of substance use (intoxication, craving and withdrawal), sexual jealousy and men's perceptions of female improper behaviours and opposition to their male authority (Gadd et. al., 2019; Radcliffe et al., 2019). While these explanations might not fully explain the reasons for high rates of domestic violence victimisation in mothers compared to non-mothers, it might help us to understand how concerns for the wellbeing of children might be involved in such scenarios, particularly when there are other compounding vulnerabilities in the mothers' life such as lack of housing, stigmatisation and

psychological problems. For instance, women might delay leaving their abusive partners due to fear of losing the care of their children by the social stigma associated with being a single mother and a substance user or because they worry about the safety of their children if they leave them in the care of an abusive partner (Poole et al., 2008). Moreover, judgemental attitudes from social and health services are not uncommon, with social services appearing "*to construct women as the one with the responsibility to care for children, and then to blame women for the domestic violence in the home and the consequent failure to protect their children*"(Douglas et al., 2009, *pp. 55*). Thus, it is crucial that substance use services emphasise the importance of establishing a sound therapeutic relationship with mothers based on respect, non-judgmental attitudes and patient empowerment (Tarasoff et al., 2018). Women who enter substance use treatment services often do so for child-related reasons and attempt to protect their children from their substance use and social context (Kuo et al., 2013). Children exposed to parental substance misuse in the presence of domestic violence are at increased risk of being neglected and having poor outcomes in adolescence and beyond including emotional and mental health problems, development of substance use problems and problematic relationships (Velleman & Templeton, 2016). Improving support for those mothers who experience domestic violence through multiple means (e.g., mental health support, treatment engagement approaches, women-centred care) may be a worthwhile approach which should be at the forefront of substance use services. However, there is also a need to simultaneously address the behaviour of perpetrators (Davies & Biddle, 2018). Interventions aimed at ending violence, promoting better fathering, and increasing men's accountability of the violent act such as Father for Change has provided promising outcomes on preventing future violence and improving paternal parenting in the context of parental substance use (Stover, 2015).

Prevalence of mental health problems was high among both mothers and women without children. We also found that rates of lifetime history of drug overdose and social isolation were lower among mothers compared to women without children. Motherhood is

often viewed as a window opportunity for changing substance use behaviours (Gilchrist & Taylor, 2009; Tarasoff et al., 2018) and intervening during pregnancy and children's early years being most beneficial (Neger & Prinz, 2015). However, parents of older children often present with more complex profiles in terms of substance use patterns and sociodemographic characteristics (Syed et al., 2018). Complicating the issue further is the effect that removing children from their mothers' care has on women's motivation to engage in substance use treatment. Our findings show that, overall, the complex profile of mothers in treatment for substance use remains similar across those who had their children under their care with those who had their children in alternative care. In a review of interventions aimed at addressing parenting and parental substance use, Neger and Pritz (2015) stressed that in some cases removal of children from a mothers' care is a motivating factor for them to participate in treatment, while other research has found that mothers who have restricted contact with their children and/or have lost the care of their child to foster care may have reduced motivation for substance use treatment participation and poorer well-being as a result. Information such as children's age, previous and current involvement with childcare proceedings and the type of contact that mothers' have with their children is vital to assessing the type of supportive practices that should be provided to mothers. However, without sensitive and equitable screening tools to assess childcare issues in substance use services, it is not possible to evaluate best practices in this area. Further research is needed to clarify how to improve mothers' disclosure about parenting in substance use treatment services. Moreover, there is an urgent need to reconsider when childcare issues should be assessed within substance use treatment. The six months window period for completing the CNR form in our study suggests that parental status and the needs of children for many families may have not been addressed for several months, since the start of mother's treatment. The current window period for CNR to be completed also indicates that services might have missed the opportunity to address childcare issues in mothers who dropped-out or ended treatment before the 6 months period.

4.3 Strengths and limitations

By understanding the profile of mothers receiving treatment from substance use services using data extraction methods from EPRs, findings from this study demonstrate further how to anonymously explore maternal substance use in an efficient and cost-effective way. This information will be helpful to improve the support provided to women in substance use treatments to increase the number of children who remain cared for by their mother. This includes, for example, enhancing treatment programs for mothers in substance use treatment by focusing on several service mechanisms that address barriers to positive substance use access and engagement and the delivery of services that meet needs wider than their substance use (i.e., mental health, housing, educational support and parenting skills programmes). In addition, this study demonstrates that key characteristics relating to mothers can be identified within a large scale clinical register (CRIS). These findings might enable linkage to other datasets including family court datasets to conduct further analysis. Research show that recruiting and retaining mothers who use substances and are involved in care proceedings has proven to be challenging (Boreham et al., 2018; Radcliffe et al., 2020). Therefore, the use of electronic patient's records (EPR) provide opportunities that enable population analysis of potentially hard to recruit research groups at a level of detail.

However, our findings must also be considered in light of limitations that warrant attention and future study. Firstly, while there are many advances in using EPRs, these data are not collected for the purposes of research and thus clinical measurements are subject to the exigencies and habits of prevailing clinical practice. This might have influenced missing data. Only TOP and AUDIT measurements were previously evaluated as a measurement in terms of psychometric constructs (e.g., discriminant validity, reliability). Moreover, the TOP assessment information used for analysis was the first within the observation period but may not have been the first TOP assessment conducted in a patient's lifetime. Thus, there will be patients who have had previous treatment episodes, and subsequently previous TOP assessment conducted, occurring prior to our observation period. This limitation might have

impacted reports of substance use in the past 28 days. Similarly, we do not know if any new birth episode and/or change in childcare arrangements occurred in subsequent TOP assessments. In addition, multiple readmissions were excluded from our analysis, as this was beyond the scope of this study. Despite the administration of all the assessments being mandatory in practice, information from the AUDIT, CNR and BRSA-A forms was completed by 59.5%, 74% and 66.4% of the sample, respectively. It is therefore possible that in some cases, important psychological and childcare information including domestic violence, suicide attempts and childcare arrangements would not have been captured. Furthermore, due to the nature of CRIS data, we were unable to determine the type of contact mothers had with their children including involvement with childcare proceedings and the outcome of such proceedings. Finally, the sample was drawn from a population attending substance use services in South London, therefore the sample may not be generalizable to jurisdictions with other treatment approaches and available support services for women.

5. Conclusions

Our study provides evidence of the prevalence and characteristics of mothers receiving substance use treatment services. The study highlights the need for substance use services to invest in approaches to improve mothers' disclosure of parenting and childcare issues. This information may be useful to improve the support provided to mothers and the outcome for their children. In addition, this study demonstrates that key characteristics relating to mothers can be identified within a large-scale clinical register. This information may enable linkage to other datasets to further explore the mechanisms by which treatment participation might impact on outcomes for children and their mothers.

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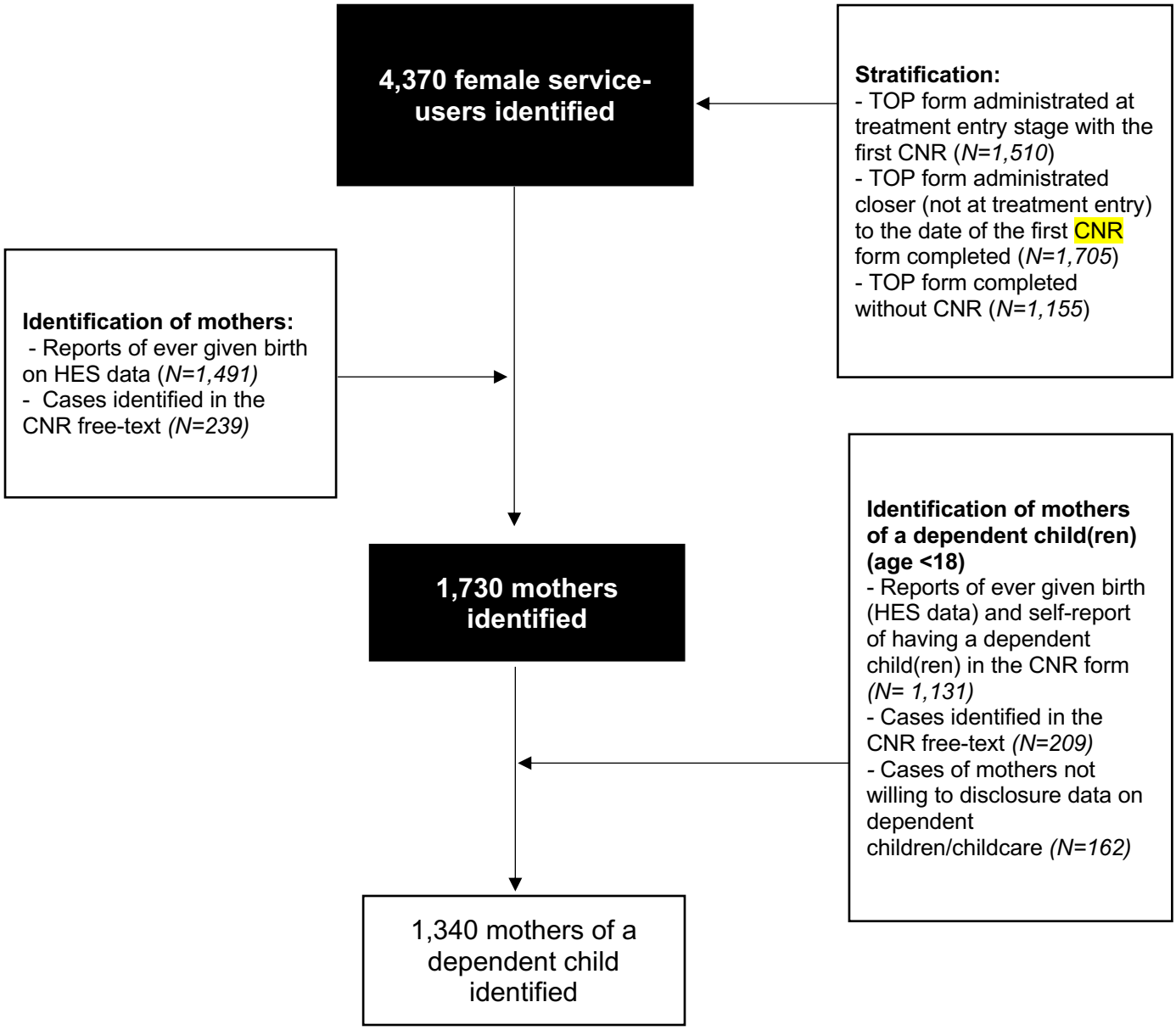

Figure 1. Study participation flow diagram

Table 1. Description of female service-users (sociodemographic factors, substance use and treatment factors and health factors) by mother status at the date of the first TOP assessment recorded between January 2013-2020

	TOTAL SAMPLE (N = 4,370)	MOTHERS[a] (N = 1,730, 39.6%)	NON-MOTHERS (N = 2,640, 60.4%)	P VALUE	OR (95% CI)
Socio-Demographics					
Age [Mean (SD)]	41.33 (11.7)	**38.2 (8.2)**	**43.3(13.06)**	**<.001**	**.62 (.58, .67)**
White British	2,870 (68.2%)	1,150 (69.3%)	1,720 (67.4%)	.204	1.09 (.95, 1.24)
Not in paid employment	3,562 (81.5%)	**1,515 (87.7%)**	**2047 (77.5%)**	**<.001**	**2.54(1.72, 2.42)**
Housing problems	539 (12.4%)	**264 (15.3%)**	**275 (10.4%)**	**<.001**	**1.55 (1.29, 1.86)**
Substance use and treatment					
Opioids used in the past 28 days	698 (16.0%)	**316 (18.3%)**	**382 (14.5%)**	**.001**	**1.18 (1.05, 1.41)**
Crack-cocaine used in the past 28 days	688 (15.7%)	**352 (20.3%)**	**336 (12.7%)**	**<.001**	**1.75 (1.49, 2.06)**
Cocaine used in the past 28 days	271 (6.2%)	109 (6.3%)	162 (6.1%)	.826	1.03 (.80, 1.32)
Amphetamines used in the past 28 days	46 (1.0%)	17 (1.0%)	29 (1.1%)	.714	.89 (.49, 1.63)
Cannabis used in the past 28 days	651 (14.9%)	**284(16.4%)**	**367 (13.9%)**	**.022**	**1.22(1.03, 1.43)**
Alcohol consumed mostly every day of the week in the past 28 days	1,311 (30.0%)	**426 (24.6%)**	**885 (33.5%)**	**<.001**	**.65 (.56, .74)**
AUDIT total score	18.6 (12.5%)	**17.8 (12.3)**	**19.1 (12.1)**	**.009**	.90 (.83, .97)
Probability alcohol dependence – AUDIT[1]	1,332 (51.3%)	**437 (44.0%)**	**895 (55.7%)**	**<.001**	**.62 (.53, .74)**
Overdose history[2]	2,124 (73.2%)	**860 (69.9%)**	**1.264 (75.7%)**	**<.001**	**.74(.643 .88)**
Receiving inpatient treatment	108 (2.5%)	43 (2.5%)	65 (2.5%)	.614	1.01 (.68, 1.49)
Health characteristics					
Overall quality of life [Mean (SD)][^]	11.17 (4.9)	**11.38 (4.9)**	**11.05 (4.8)**	**.030**	**1.32 (1.12, 1.55)**
Psychological health [Mean (SD)][^]	10.67 (4.7)	**10.93 (4.8)**	**10.49 (4.7)**	**.003**	**1.10 (1.03, 1.67)**
Physical health [Mean (SD)][^]	11.50 (4.8)	**11.90 (4.8)**	**11.24 (4.7)**	**<.001**	**1.15 (1.08, 1.23)**
Blood borne virus[2]	313 (10.8%)	118 (9.6%)	195 (11.7%)	.073	**.80 (.63, 1.03)**
Suicide attempt history[2]	1,095 (37.7%)	482 (39.2%)	613 (36.7%)	.179	1.10 (.95, 1.29)
Lifetime hospitalisation due to mental health problems	1349 (46.5%)	567 (46.1%)	782 (46.8%)	.683	.97 (.84, 1.13)
Lifetime domestic violence victimisation[3]	278 (9.3)	**205(15.5%)**	**73 (4.3%)**	**<.001**	**4.03 (3.0, 5.3)**
Social isolation[2]	744 (25.6%)	**283 (22.9%)**	**461 (27.6%)**	**.005**	**.78 (.66, .93)**
Risk sexual behaviour [2]	206 (7.1%)	88 (7.1%)	118 (7.1%)	.932	1.05 (.79, 1.41)
Self-neglect[2]	440 (15.2%)	185 (15.0%)	255 (15.3%)	.858	.98 (.80, 1.20)

In bold = p<.05

[a] Mothers = ever gave birth;

[1] N of reports =2598; [2]N of reports = 2,901; [3]N of reports = 3,001

[^] Quality of life; Psychological and physical health = *scores ranging from 0 to 20*

Table 2: Maternal characteristics of mothers (ever gave birth) receiving substance use treatment services

Maternal characteristics	**Prevalence Mothers N =1730**
Number of births [Mean (SD)]	1.83 (1.00)
One	730 (42.2%)
Two	425 (24.6%)
Three/Four	318 (18.4%)
Five	18 (1.04%)
Not reporting (missing data)	239 (13.8%)
Have dependent child(ren)	
Yes	1340 (77.4%)
No	228 (13.2%)
Not reporting (missing data)	162 (9.4%)
Number of dependent child(ren) [Mean (SD)]	1.94 (1.13)
One	508(29.4%)
Two	377 (21.8%)
Three/Four	227 (13.1%)
Five or more	40 (2.3%)
Not reporting (missing data)	578 (33.4%)
Childcare arrangement	
Under the care of the mother	141 (8.1%)
In alternative care	649 (37.5%)
Not reporting (missing data)	940 (54.3%)
High risk to children[1]	
Yes	60 (3.5%)
No	1365 (78.9%)
Not reporting (missing data)	305 (17.6%)
Referral to social services[2]	
Yes	49 (2.8%)
No	1,317(76.1%)
Not reporting (missing data)	364 (21.0%)
Pregnant	
Yes	72 (4.2%)
No	1,353(78.2%)
Not reporting (missing data)	305 (17.6%)

[1] Mothers' substance use, mental health or learning disability impacts on their capacity/ability to meet the needs of the child/ren

[2] Referrals made by the substance use services

Table 3. Factors associated with whose mothers of children in alternative care and whose mothers of children under their care (*N*=790)

	MOTHERS OF CHILDREN IN ALTERNATIVE CARE (N = 649; 82.1%)	MOTHERS OF CHILDREN UNDER THEIR CARE (N = 141; 17.9%)	P VALUE	OR (95% CI)
Socio-Demographics				
Age [Mean (SD)]	38.01 (8.2)	39.28(13.1)	.095	.80 (.61, 1.04)
White British	424 (68.2%)	88 (64.2%)	.374	1.19 (.81, 1.76)
Not in paid employment	577(88.9%)	127 (90.1%)	.687	.88 (.48, 1.61)
Housing problems	91 (14.4%)	23 (16.3%)	.487	.83 (.51 1.38)
Number of giving birth [Mean (SD)]	1.90 (1.0)	1.73 (0.9)	.107	1.18 (.96, 1.46)
Number of dependent children [Mean (SD)]	.93 (0.2)	.89 (.31)	.150	1.57 (.84, 2.92)
Substance use and treatment				
Opioids used in the past 28 days	**108 (16.6%)**	**43 (30.5%)**	**<.001**	**.45(.30, .69)**
Crack-cocaine used in the past 28 days	**120(18.5%)**	**46 (32.6%)**	**<.001**	**.47 (.31, .70)**
Cocaine used in the past 28 days	**45 (6.9%)**	**2 (1.4%)**	**.012**	**1.13 (1.02, 1.20)**
Amphetamines used in the past 28 days	8 (1.2%)	0	.185	1.21 (.72, 2.02)
Cannabis used in the past 28 days	108(16.6%)	20 (14.2%)	.284	1.11(.92, 1.33)
Alcohol consumed mostly every day of the week in the past 28 days	169 (26.0%)	29 (20.6%)	.174	1.36 (.87, .2.12)
AUDIT total score	17.11 (17.2)	16.60 (12.1)	.773	1.03 (.81, 1.32)
Probability of alcohol dependence – AUDIT[1]	159 (44.1%)	23 (33.8%)	.106	1.56 (.91, 1.69)
Overdose history[2]	**386 (74.9%)**	**91 (66.4%)**	**.045**	**1.51 (1.02, 2.27)**
Receiving inpatient treatment	15 (2.3%)	4 (2.8%)	.712	.81 (.26, 2.48)
Health characteristics				
Overall quality of life [Mean (SD)]^	**11.60(4.9)**	**11.05 (4.8)**	**.001**	**.87 (.72, 1.05)**
Psychological health [Mean (SD)]^	**10.25 (4.8)**	**10.49 (4.7)**	**.003**	**.85 (.70, 1.14)**
Physical health [Mean (SD)]^	**12.12 (4.8)**	**11.24 (4.7)**	**<.001**	**.90 (.75, 1.08)**
Blood borne virus[2]	**42 (8.2%)**	**23 (16.8%)**	**.003**	**.44 (.25, .76)**
Suicide attempt history[2]	216 (41.9%)	53 (38.7%)	.491	1.14 (.78, 1.68)
Lifetime hospitalisation due to mental health problems	240 (46.6%)	59 (43.1%)	.460	1.15 (.79, 1.68)
Lifetime domestic violence victimisation[3]	**115 (19.9%)**	**10 (7.1%)**	**<.001**	**3.22 (1.64 6.33)**
Social isolation[2]	128 (24.8%)	26 (19.0%)	.150	1.41 (.88, 2.26)
Risk sexual behaviour [2]	79 (7.4%)	118 (7.1%)	.932	1.05 (.79, 1.41)
Self-neglect[2]	45 (8.7%)	10 (7.3%)	.590	1.19 (.70, 2.04)

In bold = p<.05

[1] N of reports =426; [2]N of reports = 652; [3]N of reports = 647 ^ Quality of life; Psychological and physical health = *scores ranging from 0 to 20.*

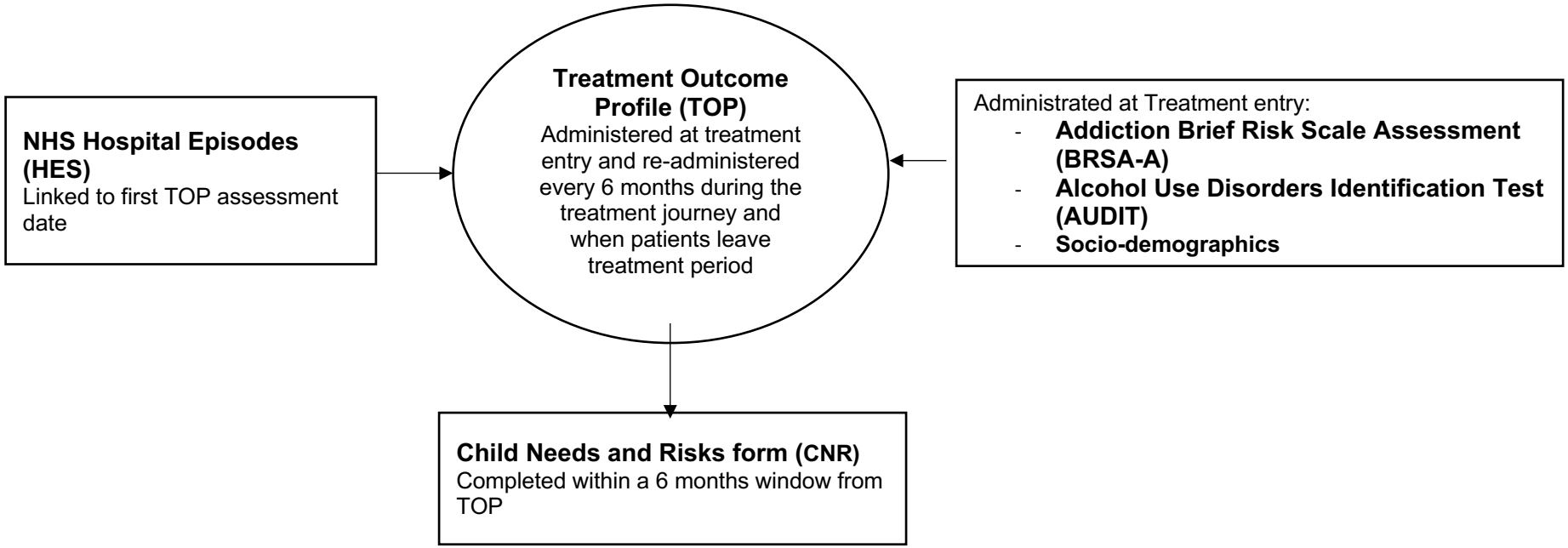

Figure S1. Time points of assessments of each form.

Table S1. Variables source and prevalence of completed data

Variables	Source*	N (%) completed data
Sociodemographic		
Age	TOP	4370 (100%)
White British	Routinely collected	4370 (100%)
Not in paid employment	Routinely collected	4370 (100%)
Housing problems	Routinely collected	4370 (100%)
Maternal characteristics		
Gave birth	CNR and HES	4370 (100%)
Number of births	CNR	1491 (86.2%)
Having dependent children	CNR	1568 (90.6%)
Number of dependent children	CNR	1152 (66.6%)
Childcare arrangements	CNR	790 (45.7%)
High risk to children	CNR	1425 (82.4%)
Referral to social services	CNR	1366 (78.9%)
Pregnant	CNR	1425 (82.4%)
Substance use and treatment		
Opioids used in the past 28 days	TOP	4370 (100%)
Crack-cocaine used in the past 28 days	TOP	4370 (100%)
Cocaine used in the past 28 days	TOP	4370 (100%)
Amphetamines used in the past 28 days	TOP	4370 (100%)
Cannabis used in the past 28 days	TOP	4370 (100%)
Alcohol consumed mostly every day of the week in the past 28 days	TOP	4370 (100%)
AUDIT total score	AUDIT	2598 (59.4%)
Probability of alcohol dependence – AUDIT	AUDIT	2598 (59.4%)
Overdose history	BRSA-A	2901 (66.4%)
Receiving inpatient treatment	TOP	4370 (100%)
Health characteristics		
Overall quality of life	TOP	4370 (100%)
Psychological health	TOP	4370 (100%)
Physical health	TOP	4370 (100%)
Blood borne virus	BRSA-A	2901 (66.4%)
Suicide attempt history	BRSA-A	2901 (66.4%)
Lifetime hospitalisation due to mental health problems	BRSA-A	2901 (66.4%)
Lifetime domestic violence victimisation	CNR	3001 (68.7%)
Social isolation	BRSA-A	2901 (66.4%)
Risk sexual behaviour	BRSA-A	2901 (66.4%)
Self-neglect	BRSA-A	2901 (66.4%)

Note: * TOP = Treatment Outcome Profile, CNR = Children Needs Risk, HES = Hospital Episodes, AUDIT = Alcohol Use Disorders Identification Test, BRSA-A = Addiction Brief Risk Scale Assessment