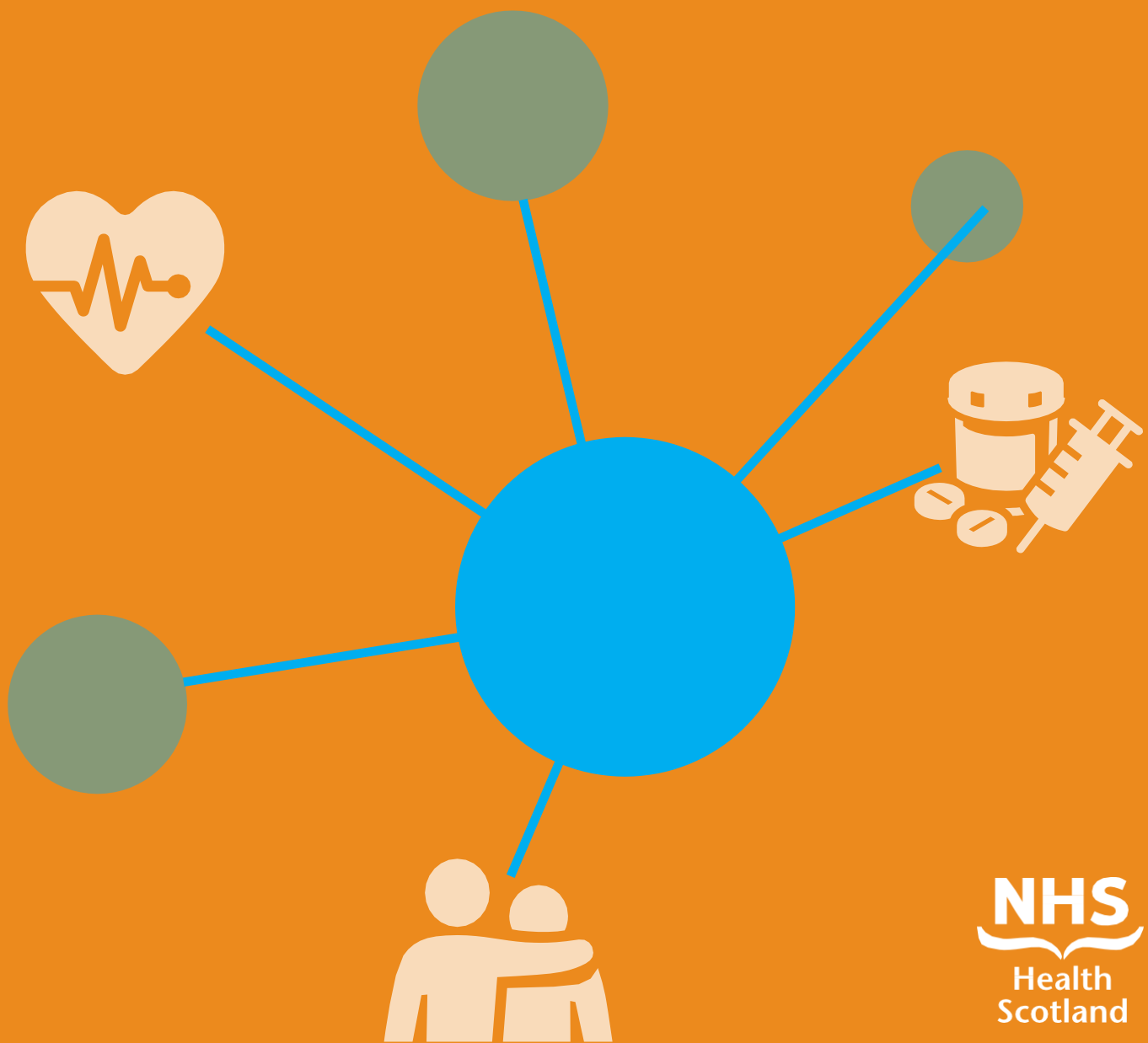



The Scottish Burden of Disease Study, 2016

Drug use disorders technical overview



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Background

The Scottish Burden of Disease (SBoD) study team have published comprehensive estimates of the burden of disease and injury in Scotland for 2016 [1]. The purpose of this technical overview is to provide background information on the data and methodology used, noting any caveats associated with estimating the burden of drug use disorders (DUDs) in SBoD. When estimating the burden of DUDs, we have considered disorders related to the use of cannabis, amphetamine, cocaine, opioids and other drug use disorders.

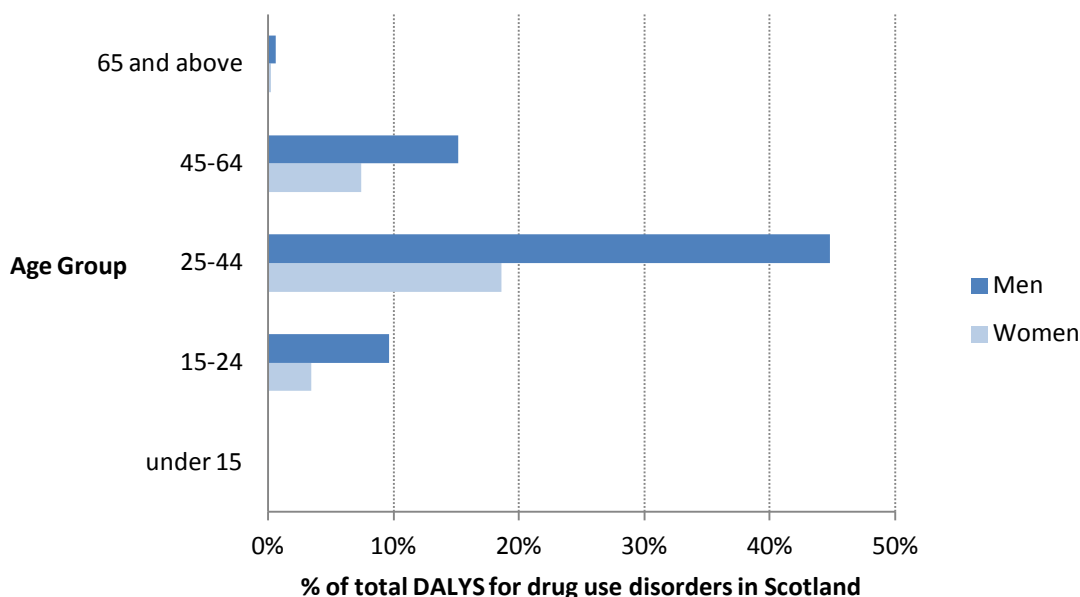
Burden of disease studies aim to estimate the difference between ideal and actual health in a country or region at a specific point in time. Individuals can suffer non-fatal health loss due to suffering disability attributable to a disease or injury, or suffer fatal health loss which is early death due to a disease or injury. To quantify the total burden, non-fatal and fatal health loss are combined to produce a single metric called the Disability-Adjusted Life Year (DALY).

In SBoD 2016, all data are presented as three year averages for period 2014-2016. A three year period is used to smooth out most of the effect if the mortality or morbidity of a single year happens to be unusual. Further information about the SBoD study, including a more thorough explanation of the methodology used, overview reports, detailed results and other specific disease briefings, can be found on the website of the Scottish Public Health Observatory (ScotPHO) [1].

Estimated burden due to drug use disorders

DUDs was the 8th most common cause of disease burden in Scotland in 2016 resulting in a total of approximately 48,000 DALYs. Of this total burden, 60% was due to premature mortality attributed to DUDs and 40% was attributed to health loss suffered as a result of drug use disorders.

Figure 1 Percentage of total DALYs by gender and age-group for DUDs

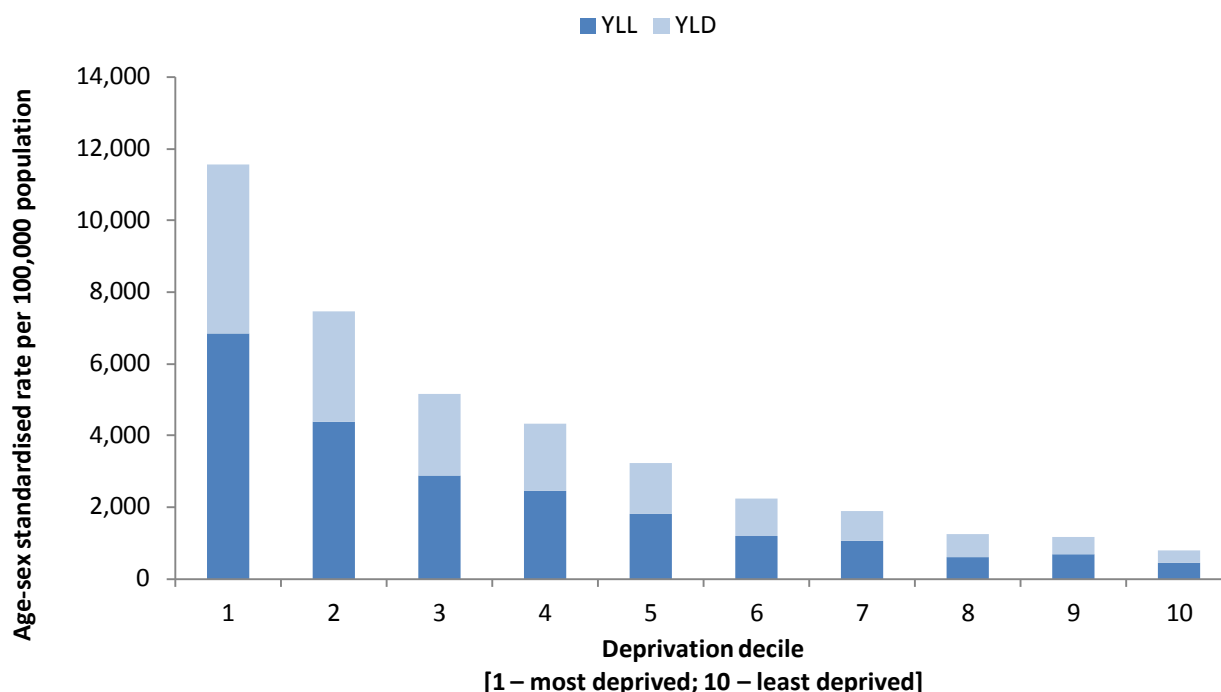


Men accounted for the majority of the total DUDs burden in Scotland in 2016, accounting for 70% of the burden, compared to 30% among women. Overall, 39% of the total DUDs burden was contributed by men aged 35 to 64 years followed by 30% for men aged 15 to 34 years. Under 15 year olds and those aged 65 years and over accounted for approximately 1% of the DUDs burden in Scotland in 2015, as outlined in Figure 1. Note that the burden which we are describing above is the absolute burden and has not been adjusted for the age/gender case-mix.

The age standardised DALY rates for DUDs, by deprivation¹ decile, are shown in Figure 2. Individuals in the most deprived decile experienced a burden that was 15 times greater than individuals living in the least deprived decile.

¹ We used the Scottish Index of Multiple Deprivation ([SIMD 2016](#)) to analyse patterns of inequality in the burden of disease across Scotland. SIMD2016 is categorised into deciles 1 (most deprived) to 10 (least deprived), SIMD2016 calculates deprived areas, not deprived individuals.

Figure 2 DALYs (rates per 100,000²) of total drug use disorders burden by deprivation decile



How did we produce these estimates?

DALYs attributed to a disease, or injury, are calculated by combining estimates from two individual metrics: Years of Life Lost (YLL) due to premature mortality and Years Lived with Disability (YLD).

Years of Life Lost (YLL) to drug use disorders

YLL measures the years of life lost due to premature deaths i.e. the fatal component of burden of disease. YLLs are calculated by subtracting the age at each DUDs death from the expected remaining life expectancy for a person at that age.

Estimating the number of deaths

For the period 2014-2016, we estimated an average of 646 deaths per year caused by DUDs. These deaths were identified from the underlying cause of death on the National Records of Scotland (NRS) register of deaths [2]. To classify deaths, the GBD 2016 cause list was used, which has been created using the International Statistical Classification of Diseases and Related Health Problems (ICD-10) [3, 4]. However, for DUDs, we have aligned the ICD10 codes we used with those used by the NRS drug related deaths statistics [5]. The NRS register of deaths has a Community Health Index (CHI) number attached to each death, which allows for demographic data such as gender, geographical area of residence and age at death to be established for each individual.

² Where the data were age-standardised, this was done directly using the 2013 European Standard Population to account for differences in age structure between SIMD deciles.

Included in the total DUDs mortality count are deaths that have come from what are termed ill-defined causes of death in burden of disease studies. These ill-defined deaths are causes of death that have been coded with ICD-10 codes in vital registers but for the purposes of burden of disease studies, are not regarded as sufficiently specific causes of death. In SBoD, these ill-defined deaths are redistributed amongst specific causes of death across the burden of disease cause list based on the secondary causes of death recorded on the death certificate. For a small number of cases, where there was no additional information relating to secondary causes of death, the individuals clinical history was evaluated to inform the target cause for redistribution. For DUDs, approximately 11% of the mortality count comes from these ill-defined deaths. For this reason, the number of deaths due to DUDs which have been reported are different from that of officially reported sources. Further explanation of this method is available in the Invited chapter of The Registrar General's Annual Review of Demographic Trends [6].

Life expectancy and YLL

Each single death contributes to the total YLL through calculating the difference between the age at death and the life expectancy at that age. Life expectancy was defined using the 2014-2016 gender-specific National Life Tables for Scotland [7]. There were approximately 28,900 YLL due to DUDs in Scotland in 2016. Dividing the total YLL for DUDs by the total mortality count indicates that, on average, individuals who die due to DUDs die approximately 44 years earlier than would otherwise be expected on the basis of the life expectancy of the general population.

Years Lived with Disability (YLD) due to drug use disorders

Years lived with disability (YLD) are estimated using:

- disease and injury prevalence estimates
- levels of severity
- disability weights

Our sources of information for these three components are as follows:

Prevalence

The prevalence of DUDs in SBoD is based on the GBD 2016 study specifications and is comprised of the following drug types/groups [8]:

- Cannabis use disorders
- Amphetamine use disorders
- Cocaine use disorders
- Opioid use disorders
- Other DUDs.

Cannabis, Amphetamine, and Cocaine prevalence

SBoD used the Scottish Crime and Justice Survey (SCJS) to estimate the prevalence of cannabis, amphetamine and cocaine drug use disorders in Scotland [9]. The SCJS is a large-scale social survey which asks people about their experiences and perceptions of crime including questions on illicit drug use. The survey is based on approximately 11,500 face-to-face interviews with adults (aged 16+ years) living in private households in Scotland. The sample is designed to be representative of all private residential households across the Scottish mainland.

The SCJS also includes a self-completion illicit drug use questionnaire to establish whether adults aged 16 years or over reported illicit drug use over three different time periods: at some point in their lives (ever), in the last year and in the last month before the survey interview. In SBoD, we have used data on reported drug use in the last month from the SCJS to estimate prevalence of cannabis, amphetamine, cocaine and other drug use disorders [9]. We have used reported drug use in the last month as this is closest match to the GBD case definition for these drug use disorders.

We have pooled the previous five waves of the SCJS (2008 to 2014) and taken the average rates to project to the Scottish population. We used the SCJS survey prevalence of those reporting drug use in the last month and in conjunction with age-specific mid-year population estimations from NRS, we have made an inference nationally on the number of individuals in Scotland that are suffering from mild or severe dependence (see Table 1 below for the definition of mild and severe dependence by drug type) on cocaine, amphetamines, cannabis and other drug use disorders. We used the age-SIMD profile from SMR applied to the gender specific national numbers to further distribute them into age and SIMD groups Using this method we estimated that there were approximately:

- 58,300 individuals in the Scottish population with mild, moderate or severe dependence from cannabis use
- 6,000 individuals in the Scottish population with mild, moderate or severe dependence from amphetamine use
- 17,500 individuals in the Scottish population with mild, moderate or severe dependence from cocaine use

Opioid and Other Drug Use Disorders prevalence

To estimate prevalent cases of opioid use and other drug use disorders in 2016, the Scottish Morbidity Record 01 (SMR01) dataset was used. This dataset contains structured data in the form ICD-10 codes relating to diagnoses made on discharge from general and acute hospitals during inpatient episodes and day cases. There are up to six individual ICD-10 codes that can be recorded, where the primary diagnosis relates to the main reason for the hospital episode of care, and the other secondary diagnoses refer to co-morbidities that may affect care during that hospital episode of care.

The SMR01 dataset has a Community Health Index (CHI) number attached to the episode of care, which allows for the identification of records for an individual. This CHI number has been linked to records from the NRS register of deaths, to exclude individuals that have died from prevalence estimates that relate to a period following their date of death. The number of individuals that had a primary diagnosis of opioid drug use (ICD-10 codes: F11.0-F11.9) and other drug use disorders (ICD-10 codes F13, F16-F19, P96.1), as per GBD 2016 disease classification [3] between 1 January 2006 to 31 December 2016, was used to estimate the number of prevalent cases.

Using this method of identifying prevalent cases, we estimated that there were approximately 18,700 individuals in the Scottish population suffering disability due to opioid DUDs in 2016 and approximately 3,000 individuals suffering disability due to other drug use disorders.

Severity distribution and disability weights

The levels of severity and disability due to DUDs in Scotland were based on the specifications of the GBD 2016 study [10]. This allowed prevalent cases to be disaggregated by levels of severity and the associated disability at each level of severity. The disability weights were developed by the GBD study through surveys of the general public and take into account the consequences of each disease, condition and injury [11]. The severity distributions and disability weights for each of the individual DUD classifications are shown Table 1.

The severity distributions and disability weights were applied to the estimated number of individuals suffering from DUDs (approximately 103,400) which resulted in approximately 19,100 YLD due to drug use disorders in Scotland in 2016.

Table 1 Description and allocation to severity levels for DUDs with corresponding disability weight

Severity level	Description	% of individuals	Disability weight
Opioid			
Asymptomatic		16	0.000
Mild dependence	Uses heroin (or methadone) daily and has difficulty controlling the habit. When not using, the person functions normally.	36	0.335
Moderate to severe dependence	Uses heroin daily and has difficulty controlling the habit. When the effects wear off, the person feels severe nausea, agitation, vomiting and fever. The person has a lot of difficulty in daily activities.	47	0.697
Cocaine			
Mild dependence	Uses cocaine at least once a week and has some difficulty controlling the habit. When not using, the person functions normally.	51	0.116
Moderate to severe dependence	Uses cocaine and has difficulty controlling the habit. The person sometimes has mood swings, anxiety, paranoia, hallucinations and sleep problems, and has some difficulty in daily activities.	49	0.479
Amphetamine			
Mild dependence	Uses stimulants (drugs) at least once a week and has some difficulty controlling the habit. When not using, the person functions normally.	43	0.079
Moderate to severe dependence	Uses stimulants (drugs) and has difficulty controlling the habit. The person sometimes has depression, hallucinations and mood swings, and has difficulty in daily activities.	57	0.486
Cannabis			
Mild dependence	Uses marijuana at least once a week and has some difficulty controlling the habit. When not using, the person functions normally.	86	0.039
Moderate to severe dependence	Uses marijuana daily and has difficulty controlling the habit. The person sometimes has mood swings, anxiety and hallucinations, and has some difficulty in daily activities.	14	0.266
Other drug use disorders	Uses other drugs at least once a week and has some difficulty controlling the habit. When not using, the person functions normally	100	0.116

Data quality

In order to provide a measure of the degree of accuracy³ and relevance⁴ of the estimated disease DALYs to users, a measure of data quality has been developed for the SBoD study. This measure assigns a RAG (Red; Amber; Green) status to each disease or injury indicative of the accuracy and relevance of the estimates. Interpretation of the RAG status can be defined as follows:

Highly accurate and relevant

Estimates have been derived using relevant and robust data sources with only a small degree of adjustments performed to the input data.

Moderately accurate and relevant

Estimates have been derived using reasonably relevant and robust data sources with only a moderate degree of adjustments performed to the input data.


Uncertainties over accuracy and relevance

Estimates have been derived using less comprehensive or relevant data sources with a high degree of adjustments performed to the input data.

The data quality has been assessed using three main criteria:

- Relevance and accuracy of the data source used to measuring the population of interest
- Likelihood that the implemented disease model captured the overall burden of disease or injury
- The relative contribution of ill-defined deaths to YLL, and YLL to DALY.

These criteria are subjectively assessed and each criterion is scored on a scale of 1 to 5. Further details on these data quality measures are available on the ScotPHO website [1].

Based on these criteria, the estimates of burden of DUDs are deemed to be  **moderately accurate and relevant.**

³ How precise, unbiased or certain the estimate is.

⁴ Do we measure the thing we want to measure?

Although the SCJS is the best available source for estimates of prevalence of amphetamine, cannabis, cocaine in Scotland, these estimates will be an under-report of the actual prevalence of these types of drug use. In part, this will be due to the fact that some people who use drugs may live in accommodation not covered by a survey of private households. The survey is also likely to under-represent those with the most problematic or chaotic drug use, some of whom may live in accommodation outwith the scope of the SCJS and some of whom may live in private households covered by the survey, yet they may be rarely be at home or be unable to take part in an interview due to the chaotic nature of their lives.

In comparison with the Global Burden of Disease 2016 study estimates, we have estimated, for example, a prevalence of 58,300 mild, moderate and severe cannabis users compared to GBD estimate of 24,371. For amphetamine and cocaine use, SBoD estimate prevalence of 6,014 and 10,185 17,500 respectively compared to GBD estimates of 7,078 and 12,032 [12].

Our estimate of opioid dependent prevalence use (n= 189,713) is also an under-estimate of the true prevalence. Our estimate is only based on those individuals admitted to hospital in Scotland either because of their opioid use or if their opioid use is an existing co-morbidity. Estimates of national and local prevalence of problem drug use (defined as the problematic use of opiates (including illicit and prescribed methadone use) and/or the illicit use of benzodiazepines) in Scotland suggest that the SBoD estimate is only capturing approximately a third of actual prevalent population. In 2012/2013, for example, the estimated number of individuals with problem drug use in Scotland during 2012/13, aged 15 to 64 years old, was 61,500 (95% CI = 59,900 - 63,300) [13]. The definition of problem drug use in this study however also includes estimates of benzodiazepine use which are not included in the GBD case definition of opioid drug use disorders. In GBD, these are included in the category of 'other drug use disorders'. Separate estimates of opiate problem use are not available from the Scottish study so it is difficult to compare SBoD opioid prevalence with national estimates of problem drug use. The Global Burden of Disease 2016 study estimated a prevalence of approximately 29,900 opioid drug uses Scotland in 2016 [12], compared to SBoD prevalence of 18,700.

What next to improve estimates for drug use disorders?

Future iterations of the SBoD study will work to refine the estimates of DUDs prevalence. This work will include reviewing the coding and recording of DUDs in primary and secondary care national datasets, exploring further estimates from the national drug problem use survey in Scotland. Further to this, work will be carried out to attempt to derive estimates of severity levels that are dependent on age and that are specific to the Scottish population.

These improvements are partly dependant on exploring other data sources and reviewing evidence from high quality research that it is relevant to Scotland. Please contact the SBoD project team (nhs.healthscotland-sbod-team@nhs.net) for enquiries and suggestions on how to improve our estimates.

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