Why is Scotland's reconviction rate falling?

-1 words

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Overview

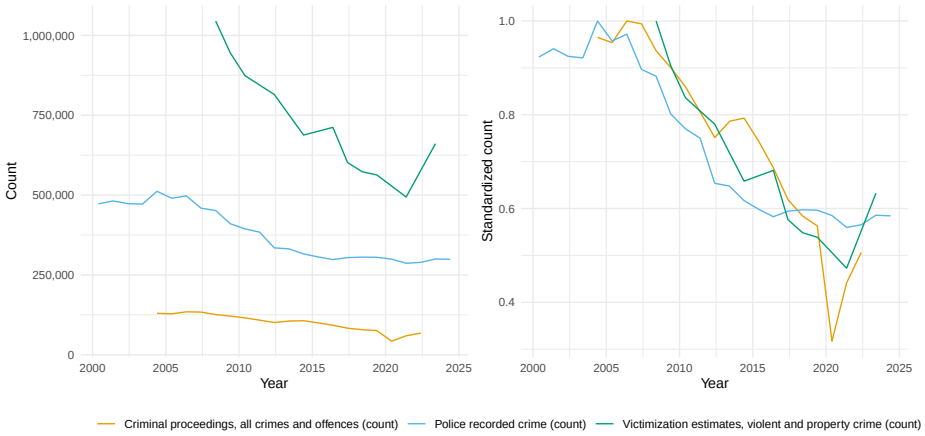
- The crime drop has changed the demographics of people being convicted
- Changing demographics of people convicted complicates comparisons in the aggregate reconviction rate over time
- The overall change in the reconvictions rate is partly due to less reconvictions and partly due to changing demographics
- This creates statistical bias in the aggregate reconviction rate if it's used as a measure of 'effectiveness' of the justice system
- We demonstrate this problem with a worked example using Scottish reconvictions data

Part One: The crime drop in Scotland

Over the past thirty years or so Scotland has seen consistent falls in police recorded crime, the number of people proceeded against in court, and since at least the late 2000s, the prevalence of victimization[1] (see Figure One) This overall picture of declining crime levels across multiple measures of crime - at least as is captured by standard measures like those listed above - follows a familiar pattern seen across many parts of the global north known as the 'crime drop'.

[1]The only area of justice system activity which does not show this decline is imprisonment, where the average daily prison population increased steadily through the 2000s before peaking in the early 2010s and subsequently fluctuated close to this peak.

Less crime



The overall reconviction rate is falling

The demographics of convictions are changing

A gap in the crime drop

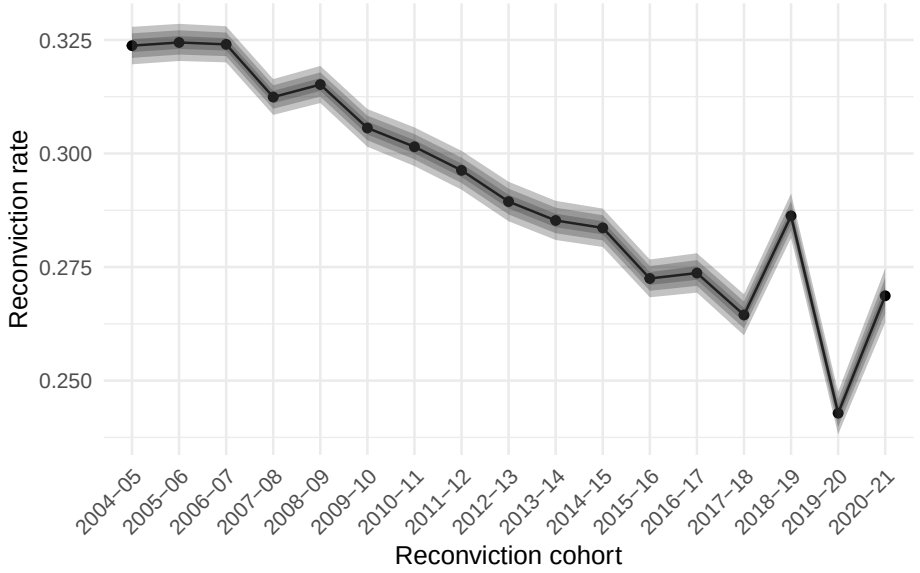
- There has been *a lot* written about the causes of the crime drop (Farrell, Tilley, and Tseloni 2014; Tonry 2014; Ball et al. 2023). Crime drop research has seen many (how many) papers published describing change over time in empirical patterns of crime across the globe, from neighbourhood-level analysis (Bannister, Bates, and Kearns 2018) to global (Dijk, Nieuwbeerta, and Joudo Larsen 2022) analysis, with national Atak (2020) and regional analysis (Aebi and Linde 2010) in between. There is a structure common to many of these analysis (including my own previous work on the topic (Matthews and Minton 2018a)): empirical evidence about how patterns of crime have changed is presented, and then are weighed against rival explanations for *why* crime has fallen.
- Whilst many studies of the crime drop focus on describing change in recorded crime, victimization or conviction rates, an group of studies have focused on describing changes in the demographics of crime and use these descriptions to build explanations for why there is less crime now than in the past (Matthews and Minton 2018b; Tuttle 2024; Farrell, Laycock, and Tilley 2015). In Scotland, the key finding of past examinations of the changing demographics of crime is that "the crime drop is a *youth* crime drop" (Matthews and Minton 2018b, 300) - the fall in overall convictions overall between 1989 and 2011 primarily reflected lower conviction rates for young people and in fact hid *increases* in conviction rates for those aged 30 to 40. People aged 16-24 have also shown larger falls in victimization in Scotland compared to any other age group (Matthews, McVie, and Norris, n.d.). Preliminary evidence suggests that Scotland may be distinctive in the scale of this youth crime drop compared to other jurisdictions in

Northern Europe (Matthews 2023), with Scandinavian countries showing falls in youth crime but to a lesser degree, and other studies focusing on the USA have also shown greater falls in arrests for young people compared to older people over the couse of the crime drop (Farrell, Laycock, and Tilley 2015; Tuttle 2024). Recent studies of the age-crime curve outside the Global North (Kang and Hureau 2022; Steffensmeier, Slepicka, and Schwartz 2025) suggest that the 'typical' age-crime curve with a peak in adolescence may itself by typical only within the Global North.

- However, with so much focus on the effort to understand - or debunk (see Kotzé 2019) - the crime drop, there has not to our knowledge been any focus on systematically understanding the downstream implications of the crime drop for how we empirically measure the functioning of the justice system. There haven't - at least as far as I'm aware - been any studies which go on to explore the *consequences* of these changing demographics for the justice system more broadly. One particular area these changing demographics can matter are when measuring CJS 'performance'. In this paper we will demonstrate that the changing demographics of conviction, and particularly the falling proportion of younger people as part of the population receiving criminal convictions, has further pushed down reconviction rates in a way that has nothing to do with the functioning of the justice system in 'rehabilitating' people who have been convicted. This matters because reconviction rates are used as performance measures of the criminal justice system.

Part Two: Measuring Justice System 'Performance'

Reconviction rates as a performance metric



- Move to National Targets under New Labour in 2000s, with goals for reductions in reoffending (see Kirkwood)

In 2007 'Reduce overall reconviction rates by 2 percentage points by 2011' was introduced as a National Indicator. This was revised to 'Reduce reconviction rates' in 2012 (West Lothian Council), and then removed following the 2018 National Performance Framework review (SPICe). Whilst not as emphasised in national level performance management, reducing reconviction rates are still widely seen as an important measure of how the criminal justice system is functioning. The Sentencing Council (for England and Wales) says the reconviction rate is a "key metric for evaluating the effectiveness of sentencing" (Gormley, Hamilton, and Belton 2022, p18). In Northern Ireland, NISRA says "The ability to compare and discuss trends in reoffending is important to its usefulness as a performance target within government" (Browne 2024, p19). Scottish Government says "Measuring recidivism is important, as it is one indicator of the effectiveness of the criminal justice system in the rehabilitation of offenders. Reconviction rates are a proxy measure for recidivism" (Scottish Government 2024, p8). The common logic across England and Wales, Scotland and Northern Ireland is that if the aggregate reconviction rate goes down then the criminal justice system is doing a better job at rehabilitating offenders.

However, it's far from straightforward to use reconviction rates as performance measures. A simple comparison of reconviction rates in different years is a poor performance measure because there could be lots of reasons the overall reconviction rate might fall that aren't due to how 'effective' the justice system is. One

Reconviction rates in Scotland, 1995/6 and 2003/04

	Reconviction rate			Proportion of people convicted	
Sex	1995/96	2003/04	Change	1995/96	2003/04
Men	0.46	0.47	Increasing	0.86	0.84
Women	0.31	0.37	Increasing	0.14	0.16
Total	0.45	0.45	No change	-	-

Source: Kirkwood (2008)

possible counfounding factor is that the characteristics of the convicted population are likely to vary over time; as Browne puts it "differences in the offending related characteristics of those included in each cohort make comparing reoffending rates problematic, across both time and jurisdictions." (Browne 2024, p19). This changing demographic mix can distort comparisons of overall reconviction rates because we can think of the overall reconviction rate as a *weighted* mean of the reconviction rates in different demographic groups, weighted by the relative group size. You can have changes in the rate due to changes in the means or changes in the rates - this phenomenon is known in the statistical literature as the amalgamation paradox (Good and Mittal 1987) or Simpson's (1951) paradox. Any change in the aggregate reconviction rate will be both due to changes in the prevalence of reconviction amongst demographic groups, but also the mix/composition of those groups who are in each reconviction cohort.

We can describe this situation more formally as:

$$\text{Overall Reconviction Rate} = \sum_i (\text{Subgroup Rate}_i \times \text{Subgroup Size}_i)$$

To use reconviction rates as measures of criminal justice system 'performance' you would only want to measure change in the subgroup rates - but change in the overall rate can come from either changes in the subgroup rates *or changes in the subgroup sizes*. This is not just an abstract maths problem. The following example comes from Kirkwood (2008). Comparing reconviciton rates for 1995/96 and 2003/04 leads to the unexpected situtation where reconviction rates in Scotland increased for both men and women, but the overall reconviction rate stayed the same (see Table One). This puzzling situation is explained because of the increasing proportions of women as part of the overall reconvictions cohort. As women consistently had lower reconviction rates than men, the overall reconviction rate was pulled down as women made up a larger proportion of the reconviction cohort.

The amalgamation paradox in reconviction rates

This is situation causes problems if you want to use the overall reconviction rate as a performance measure, and to equate a falling reconviction rate with improved justice system performance:

> "If the target for a reduction in the overall reconviction rate is met, and this is mainly due to more people with a lower likelihood of re-offending being brought into the criminal justice system and being convicted, rather than through a reduction in rates of re-offending among those who would normally be brought into the system, this would bring little cause for celebration." (Kirkwood 2008, p9)

Standardized reconviction rates as performance indicators

This compositional problem is well known in studies of reconviction rates, particularly those focused on measuring performance. The typical solution adopted is to come up with some counterfactual 'standardized' reconviction rate in order to facilitate comparisons across years when measuring performance (Francis, Harman, and Humphreys 2005; Cunliffe and Shepherd 2007; Drake, Aos, and Barnoski 2010). The analysis by Francis, Harman, and Humphreys (2005) and Cunliffe and Shepherd (2007) provide good examples. In Francis, Harman, and Humphreys (2005)'s analysis historic data on a range of demographic, incident, sentence and criminal history are for people convicted in 1998, 1999 and 2000 are used to learn the statistical patterns between these characteristics and the probability that a person would be reconvicted in the next two years. Once learned, these patterns can be used to predict the levels of reconviction for those in new reconviction cohorts, provided the same variables are available, and these individual predictions can be aggregated to form an overall predicted reconviction rate. Cunliffe and Shepherd (2007), who thank two of the authors of Francis, Harman, and Humphreys (2005) in their report, use predicted reconviction rates estimated in a similar way to compare observed reconviction rates in 2004 to an estimated baseline from 2000 to identify whether a target reduction in the overall reconviction rate has been met.

Two features of this approach are noteworthy. First, the comparisons are designed only to be conducted over the short term. Francis, Harman, and Humphreys (2005) say "It is essential that these current predictor models be reviewed periodically … When sufficient time has passed to allow [changes in legislation and sentencing] to feed through the criminal justice system the reconviction predictor model should be remodelled based on the new data." The precludes examining the type of long-term demographic changes seen over the crime drop, and to date, no studies have assessed the extent to which these long-term demographic changes as reflected in the crime drop can influence aggregate performance measures. Second, These methods typically focus on whether the observed reconviction rate is higher or lower than the standardized rate - the methods do not directly assess the drivers of any change in the observed rate. Their aim is not to identify the relative importance of demographic changes versus change in 'sub-group' reconviction rates in producing change in the aggregate

rate - it is only to provide a benchmark aggregate rate as a comparison. In this paper we present an alternative approach which allows us to describe the impact of long-term changes in demographics on the overall reconviciton rate in Scotland and to calculate the importance of this change on the trend in the aggregate reconviction rate.

A word on desistance

Before outlining our method, it is worth pausing to discuss the conceptual limitations of reconviction as a performance measure. Many researchers have expressed discontent as the use of reconvictions indicators. Klingele (2019) advocates for measuring 'markers of desistance' instead of a binary reconviction measure, arguing that a binary measure of whether a person was reconvicted or not may hide important signs that a person is moving away from offending; instead we should use measures such as "increasing intervals between offences" or "patterns of de-escalating behaviour" and replace crude indicators with more nuanced quantification of desistance. Using more complicated indicators of 'desistance' could also be challenged on conceptual grounds given that many articulations definitions of desistance have been proposed (see e.g. Weaver (2019)), including visions of desistance as a 'social movement' (Maruna 2025) rather than something individual focused, as would be the case for Klingele (2019). However, these definition disagreements are not so relevant for our concerns here - the same statistical distortion due to amalgamation bias would occur regardless of the outcome measure used[2].

Part Three: An alternative approach

Standardization and decomposition

- The methods of standardization and decomposition can separate out changes in the reconviction rate that are due to demographic change from those due to change in the underlying reconviction rate for different age groups
- Standardization and decomposition can also separate out the relative importance of different factors in driving aggregate change (e.g. age and sex)
- Previous regression-based approaches (Francis, Harman, and Humphreys 2005; Cunliffe and Shepherd 2007; Drake, Aos, and Barnoski 2010) to correct for the problem of changing 'offender mix' can perform this standardization part, but don't focus on the decomposition part
- We illustrate this approach using the standardization and decomposition methods described by (Das Gupta 1993) and implemented in the `{dasguptr}` R package (King and Matthews 2025) to Scottish reconvictions data from 2004-2022

[2] Assuming that any reconviction measure is an equally good (or equally bad) measure across the demographic groups of interest. // Josiah is this right??

Research design

Research Question

- How much of the change in the overall reconviction rate in Scotland between 2004 and 2022 is attributable to changing demographics?

Data

- We analyse data from 'reconviciton cohorts' in Scotland between 2004-2020. These are made available by Scottish Government as part of their Reconvictions Bulletin (Scottish Government 2024)
- A reconviction cohort is "all offenders who either received a non-custodial conviction or were released from a custodial sentence in a given financial year, from the 1st April to the 31st March the following year" (Scottish Government 2024, p40)
- There is nothing particularly special about these time points, and the same approach would work for other time periods and other characteristics
- Some evidence that Scotland might be an extreme case here with larger demographic changes than in other countries (Matthews 2023)

Measures

- "The reconviction rate is presented as the percentage of offenders in the cohort who were reconvicted one or more times by a court within a specified follow up period from the date of the index conviction. For most reconviction analyses in this bulletin, the follow-up period is one year," (Scottish Government 2024, p10)
- We decompose the overall reconviction rate by age and sex
- Age groups:
  - Under 21, 21 to 25, 26 to 30, 31 to 40, over 40
- Sex:
  - Male, female

Sex is "generally based on how a person presents and is recorded when a person's details are entered into the [Criminal Histories System]. It is recorded for operational purposes, such as requirements for searching" (Scottish Government 2024, p44)

Method

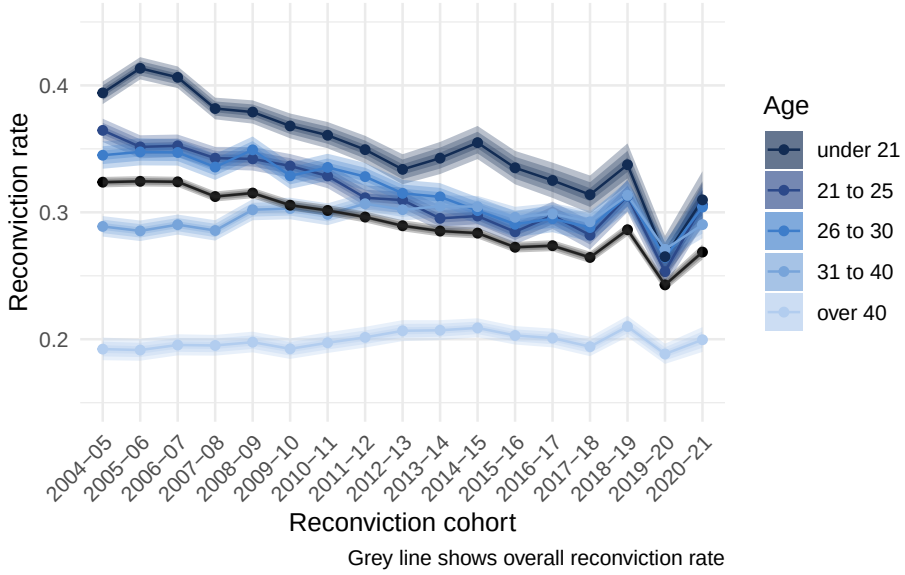
- The Das Gupta (1993) approach to standardization and decomposition calculates what the reconviction rate 'would have been' in each comparison year if each year had the average demographic composition
- The differences between these 'standardized' rates to the observed rates are then used to calculate how much of the change in the observed rate is due to changes in the underlying reconviction rates for each age group, and how much is due to the change in the mix of the age groups

Results

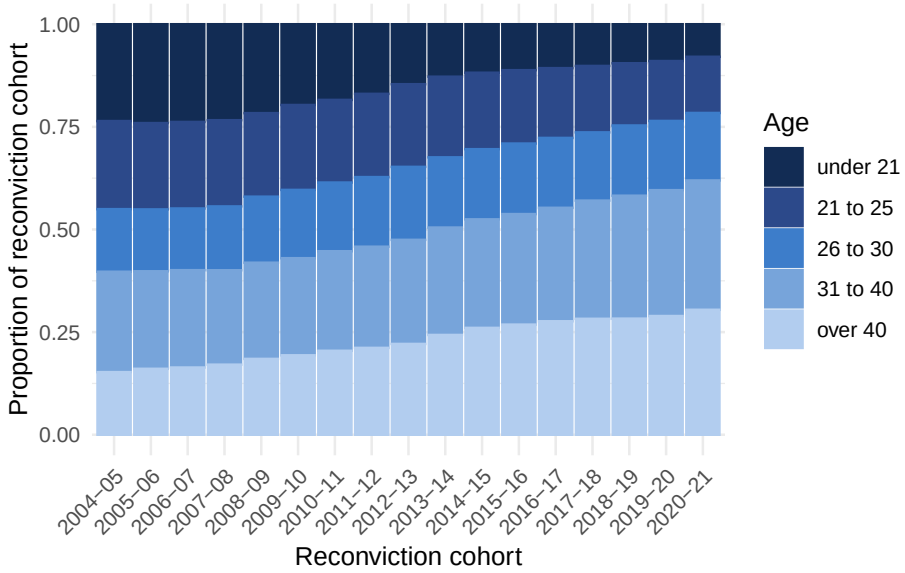
Results

- Change in reconviciton rate by age group
- Change in the relative sizes of age groups
- Time series standardized rates
- Decomposition of reconviction rates in 2004/05 and 2020/21

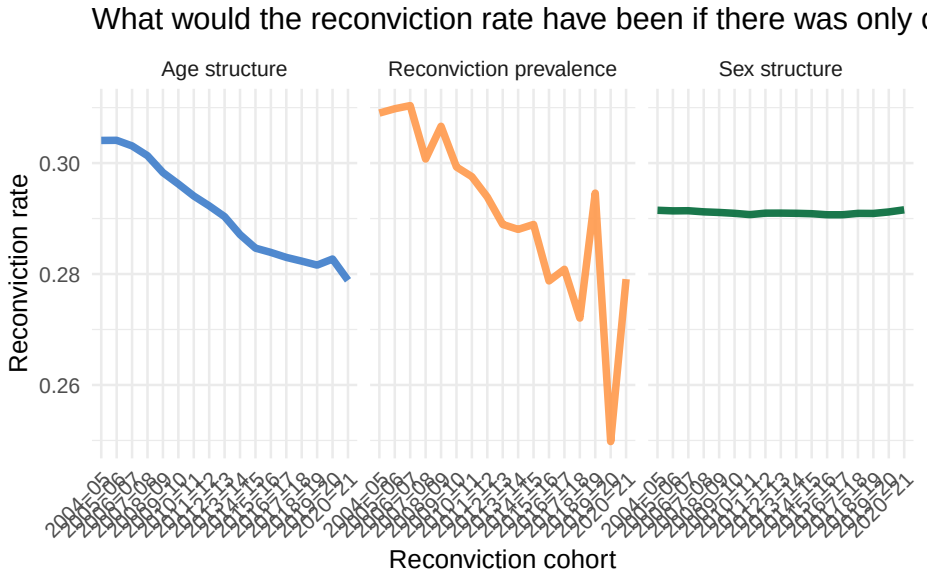
Change in reconviciton rate by age group



Change in the relative sizes of age group



Changing demographic mix



Standardization and Decomposition of reconviction rates in Scotland

	Year			
Impact of...	2004-05	2020-21	Difference in rates	% of crude difference
Age	0.31	0.28	-0.03	49.06
Sex	0.29	0.29	0.00	-0.22
Reconviction	0.31	0.28	-0.03	51.16
Crude rate	0.32	0.27	-0.06	100.00

Data from Scottish Government (2024). Calculations authors' own.

How much change in the reconviction rate is due to demographic mix?

Analysis

- Young people used to have the highest reconviction rate of all age groups, but this is has fallen
- Those over 40 have consistently lower reconviction rates, but these have not fallen
- Young people also used to make up more of the reconviction cohorts
- In terms of the overall reconviction rate, a group of people with high levels of reconviction have been replaced by people with lower levels of reconviction

Analysis

- We can attribute about 49% of the fall in the reconvictions rate in Scotland between 2004/05-2020/21 to demographic change in the population of people convicted, rather than falls in the reconviction rate *per se*.
- If you want to use the reconviction rate as a measure of sentencing effectiveness or similar, you would think the justice system is doing about twice as a good a job as it is
- In an optimistic reading the change in the mix of people being reconvicted could still be due to criminal justice practices (e.g. more diversion from prosecution for young people), but *is not attributable to the 'effectiveness' of the criminal justice system in rehabilitating offenders* - it is purely due to changes in the demographic mix of people being convicted in the first place
- An alternative perspective: the criminal justice system is benefiting from the impacts of wider societal change where young people are less likely to be involved in offending, as well as lots of other 'risky' behaviours (Ball et al. 2023)

Limitations

- Coarse age categories could underplay the impact of changing age mix as a form of 'measurement error' (I think?)
- There might be other demographic or offence characteristics we are interested in (ethnicity; type of offence; type of sentence etc etc)
- The time periods selected are arbitrary and due to data availability
- Both of these would be resolvable with access to the underlying Scottish Offenders Index data

In summary

- The crime drop in Scotland has led to a profound shift in the demographics of the people coming through the criminal justice system
- This shift is so pronounced that it affects our capacity to understand the 'effectiveness' of punishment through aggregate measures such as the overall reconviction rate
- A perspective which focuses on aggregate measures of the criminal justice *system* rather than the *people involved with the system* will be mislead by measures of system 'performance'
- There are lots of other possible ways that demographic changes in crime may impact the functioning of the criminal justice system and public perceptions of crime

Coda

What do to about this?

- If we wanted to make a 'so here's what the Sentencing Council/Scottish Government should do now' recommendation there are two possible paths:
- Option one: The Sentencing Council/Scottish Government/whoever should abandon a single overall measure and instead should use reconviction rates (or an alternative measure of your choice) for each demographic sub-group as well as overall reconviction rates
- Option two: [see above] should use some standardization and decomposition method to construct an 'improved' performance measure
- I don't think either of these are good recommendations

Reconviction rates for each group

- Suggesting that policy-makers/whoever analyse trends for all groups runs counter to the logic of quantification - the whole point is to reduce the amount of information required to understand the thing you care about and have an 'objective' and apolitical measure (Porter 1996)
- Requiring reconviction rates for pre-defined population groups raises the question of which groups would make the cut, and how they would be defined

- This is famously the paradoxical bit of Simpson's paradox - the hard part is identifying the subgroups you need to stratify by (Pearl 2014); it is paradoxical because you need to choose what story to tell about the data, not because of anything inherently statistical

"Following consultation with key users"

- For the same reason a technical 'fix' in terms of constructing a standardized reconviction rate would be adding 'politics' (in terms of deciding what to standardize by and how) into measuring reconvictions
- Also, in practice there might be limited appetite for an esoteric and tricky to understand measure amongst 'key users'

> In bulletins prior to 2017/18, reoffending figures were provided alongside adjusted reoffending rates for adults and the overall cohort, to help provide an estimate of change in reoffending. Following consultation with key users, the decision was taken to exclude this from future publications to avoid confusion in the interpretation of findings.

(Browne 2024, p19)

- Moreover, as Kitagawa said sixty years ago that no single summary measure - whether it is a standardized rate as we have calculated here, or the overall reconviction rates as currently used - can be a substitute for examining how rates vary across different groups in the population (**?**)

So what to do?

- If you really want to use reconviction rates as a performance indicator, I would say that measuring reconviction rates for each group that you care about is probably preferable than coming up with a standardized measure
- It is useful information to know if there are groups who are not seeing the same overall decline in reconvictions and whether this is masked by the overall rate

Thank you!

Bonus slides

Percentage change by group

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category	comp_ce	rate_ce	tot_ce
gender			
Female	2.14	3.82	5.96
Male	-2.36	21.76	19.40
age			
21 to 25	47.26	9.39	56.66
26 to 30	-7.21	6.03	-1.18
31 to 40	-37.16	-0.27	-37.43
over 40	-54.01	-1.54	-55.55
under 21	100.17	11.97	112.15

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