**Rethinking one of criminology's 'brute facts': Age and the Crime Drop in Scotland**

**7,361 words (not including bibliography)**

**Introduction**

Much previous empirical research into the age crime curve (see Gottfredson and Hirschi 1983, Steffensmeier et al. 1989) has focused on generalization and abstraction to in an attempt to understand the empirical relationship between age and crime. As a consequence, these studies have typically adopted research designs which have sought to maximize the potential variation in the observed data by examining age crime curves covering disparate time-points and/or countries(see Farrington 1986, Greenberg 1985, Steffensmeier et al 1989, Steffensmeier and Streifel 1991). However, such approaches are unable to explain the apparent paradox between the short-term stability in the age crime curve which led to its discovery (Quetelet 1831/2003), and observed long-term change in this distribution (Farrington 1986, Steffensmeier et al 1989, Steffensmeier and Streifel 1991).

This article argues that switching from a purely nomothetic focus – seeking to make generalizable statements about the shape of the age crime curve – to adopting a more idiographic, case-study approach provides an alternative way in which to interpret the observed relationship between age and crime. With this approach the question under investigation moves from being 'what is the relationship between age and crime?' to 'what is the relationship between age crime in this particular time and place?' This perspective helps to move past the impasse of the variance/invariance debate (see Tilley 1988), recognizing that there is sufficient similarity in the age distribution of crime over time to recognize these distributions as age-crime curve but also sufficient difference to make their comparison valuable. Understanding the variance of the age crime curve in this fashion lends itself to a research design examining year on year change in the age-crime curve, rather than seeking to maximize variation in the age distribution of crime by selecting disparate time points. With such a research design observed change in the age crime curve can then be more closely related to possible social factors driving this empirical change. This approach, given appropriate data, can potentially help to understand changes in aggregate crime rates. This is particularly important given the current interest in declining aggregate crime rates in much of Europe and the English-speaking world (see for example **van Dijk and Tseloni 2012**).

Using this approach, this article presents the results of an investigation of the year-on-year change in the age crime curve for men and women in Scotland between 1989-2012. This covers the period of declining recorded crime rates from 1991 (van Dijk and Tseloni 2012). The article begins by reviewing the previous research into the variation of the age crime curve, with a particular focus on the research designs of past studies and the impact that this has had on their findings. The data and methods used in the current study are then outlined, followed by a presentation of the study results and discussion of its implications for the study of age and crime and for our understanding of the crime drop in Scotland.  
  
**Should we think of the age crime curve as variant or invariant?**

The stability of the aggregate[[1]](#footnote-1) age crime curve – the observed 'inverted J' (Tittle and Grasmick 1998) distribution of age and crime which shows that the prevalence of offending increases during the early teens, peaks during adolescence and then declines in adulthood – across time and social conditions was hotly debated in the 1980s (see amongst others Hirschi and Gottfredson 1983, Gottfredson and Hirschi 1986, 1987 and 1988; Greenberg 1985; Blumstein, Cohen, Roth & Visher, 1986; Farrington 1986; Blumstein, Cohen and Farrington 1988). On one side of this debate, Hirschi and Gottfredson (1983) proposed an ‘invariance thesis’ as one of six related theses regarding age and crime. This thesis claims that “the age distribution of crime is invariant across social and cultural conditions” (1983:554).

Hirschi and Gottfredson based this assertion on the similarity of aggregate age crime curves between the USA in the 1990s, the UK in the 1840sand Argentina in the 1960s(1983; although their interpretation of these data have been questioned by Greenberg 1985). Importantly, Hirschi and Gottfredson do not deny that there is some empirical variation in the age crime curve. However, “in particular cases the age effect may be to some extent obscured by countervailing social processes” (1983:561), and so the *observed* age crime curve may vary, this variation should not be understood as implying that these changing social conditions explain the shape of the age crime curve. Rather, their thesis relates to the explanation of the age crime curve; as the shape of the age crime curve is due to a direct effect of age on propensity to offend it cannot be accounted for by sociological variables (1983:554). They suggest that “whether the peak age is 17 or 19 … may be quite insignificant in contrast to the stability of the major parameters of the age-crime distribution. In other words, variation in the location of the curve on the age axis across time [and] place … may say little or nothing about the impact of age on criminality” (1983:572 footnote 13). Hirschi and Gottfredson’s interest, then, lies less in observing specific values of the age crime curve to assess its stability, but rather in a more general description of its shape, and interpretation what this suggests about the underlying *theoretical* impact of age on crime. As a result, Gottfredson and Hirschi dismiss changes in the age crime curve as “meaningless variation” (Gottfredson and Hirschi 1990:133).

*The age crime curve as variant*

In contrast to Hirschi and Gottfredson, a number of contemporaneous scholars emphasised the empirical variation in the age crime curve over time. Farrington (1986) and Steffensmeier et al. (1989) using data from the UK and the USA respectively, compare age crime curves across a number of decades[[2]](#footnote-2). Both studies found that there had been substantial changes in the observed age crime curves over the periods of their respective investigations – periods when aggregate crime rates were also rising in both countries (Tonry 2014). Both Farrington (1986) and Steffensmeier et al. (1989) seek to explore the variation in the age crime curve using data drawn from cases which maximize the potential amount of temporal variation in this distribution. Indeed, Steffensmeier and Streifel (1991) and Ulmer and Steffensmeier (2014) suggest that changes in the age crime curve can only be detected over long periods.

Adopting a similar approach, Greenberg (1985) employs a number of cross-national and cross-temporal comparisons and also demonstrates changes in a number of the parameters of the age crime curve, contrary to the assertions of Hirschi and Gottfredson (1983). This case selection reflects Greenberg's assertion that the age crime curve should be understood as relating to the position of young people within society (1977). In a similar vein Ulmer and Steffensmeier (2014:381) present three possible explanations as to why some observed age crime curves may appear 'flatter' than others: greater integration of youths into legitimate (as opposed to criminal) adult society, the presence of groups who do not become integrated with adult society as they age, and increased opportunities for some types of crime with age.

In addition to temporal and cross-sectional variation, Farrington (1986) and Steffensmeier and Streifel (1991) note the importance of differences in the magnitude of age crime curves between men and women and across crime types. However, despite the observation of different magnitudes of arrests Steffensmeier and Streifel (1991) found that that shape of age-arrest curves for men and women in the USA were similar in 1935, 1960 and 1985. Across this time age-arrest curves had become increasingly skewed and peaked – that is, more dominated by youth offending. Whilst Farrington (1986) does not delve as fully into differences in the changes in the shape of the age crime curve for men and women in England and Wales, there are some notable differences in, for example, change in the peak and mean ages of offending for men and women between 1938 and 1983[[3]](#footnote-3). Given these somewhat equivocal findings, further work is required to understand potential differences and similarities in patterns of change in the age crime curve for men and women.

**Reconciling the two sides of the debate**

How then, can we reconcile these two perspectives? In part, this debate can be seen a hinging on semantics (see Tittle and Grasmick 1998 and Britt 1992) and different interpretations of the same data; as Gottfredson and Hirschi suggest, where their opponents see difference they see similarity (1990:133). Both sides accept that there is empirical variation in the age crime curve, but understand this variation differently. Tittle (1988) suggests that it is focusing on this empirical variation that is key to resolving this impasse; making abstract statements about whether the age crime curve is variant or invariant of little value and rather focus should be placed on observed variation.

With variation in the age crime curve recast as an empirical issue, a different approach to its study becomes possible. Rather than seeking to generalize about the relationship between age and crime across all times and places, a case study approach can seek to produce more context-specific knowledge (Gerring 2004). In doing so, the question under investigation shifts from being 'is the relationship between age and crime variant or invariant?' to 'how has the distribution of age and crime changed in this particular case?' Focusing on describing the observed variation in the age crime curve side-steps the seemingly intractable problem of how much variation (and of what type) needs to be observed before it is considered significant.

This approach has the additional benefit of being able to use the observed variation in the age crime curve as a lens through which to understand the potential impact of “countervailing social processes” (Hirschi and Gottfredson 1983:561) on patterns of crime. We agree with Gottfredson and Hirschi (1990:133) that examination of variation in the age crime curve “absent theoretical interest” is unlikely to produce results of much substantive value. However, the widely-observed crime drop (see *inter alia* van Dijk and Tseloni 2012) provides theoretical interest in how the age crime curve has changed in recent years, especially as a number of putative explanations for the crime drop have some relation (for example Blumstein and Rosenfeld 2008, O’Brien and Stockard 2009). Change in age crime curve can thus be an important avenue through which to understand the mechanisms underlying the crime drop. It is in this vein that Farrell et al. (2014) examined age crime curves in the USA from 1980, 1994 and 2010 to assess which part of the age distribution had seen declines in arrests over the course of the crime drop in the USA. Doing so revealed declines in adolescent arrest rates (Farrell et al 2014, see also Butts 2000) over the period of the crime drop. However, by once again adopting the approach of adopting a comparison between disparate time points, the study conducted by Farrell and colleagues cannot examine how these long-term trends emerge from year-on-year change, or to what extent these trends can be generalized to other countries. Moreover, Farrell et al. (2014) do not consider changes in the age crime curve separately for men and women**.** As discussed above, this is an issue which requires investigation. It is important not to overstate the value of analysing change in the age crime curve to the understanding of the crime drop. This kind of descriptive, aggregate analysis should not be interpreted as a test of any particular theory. However, this type of analysis can highlight empirical patterns which theories of the crime drop must be able to explain. For example if marked differences in patterns of change emerge across ages or between men and women theories of the crime drop must be able to account for these differences.

It is also worth noting that, when examining these trends in a single case, the relationship between age and crime in that case may have distinctive features which cannot be generalized to other jurisdictions. This is especially important when seeking to relate these trends to potentially international mechanisms underlying the crime drop (Farrell 2013). In Gerring’s (2004) terminology, there is a trade-off between comparability within units (for example, examining a single country over time) and of the representativeness of data drawn from a single unit to others units (generalizing from an analysis of the crime drop in one country to other countries). As such analysing these trends in a single country would provide a starting point for further research in a previously unexplored area, but any generalization of these results from that country to other units of analysis must be made based on an understanding of the ways in which the country to which the findings are generalized is similar or different from the case studied, and in what respects (Sartori 1991).

Having made the case for analysing change in the age-crime curve in a single case drawing on time-series data covering consecutive years over the period of the crime drop, this paper now presents the results of a study into changes in the age crime curve covering the period of the crime drop in Scotland.

**Research Design**

*Case selection*

As implied by the international nature of the crime drop, research into changes in the age crime curve over the crime drop could be undertaken in any country which has seen the crime drop (see van Dijk et al. 2012). Given the constraints on generalization from a single case as outlined above, there is no reason to consider any country as a more suitable case than any other. As a result, having an available source of data becomes a key criterion for case selection and is a greater limiting factor. Steffensmeier and Streifel (1991) suggest that few data sources are available to examine the age crime curve over time. One previously unexplored dataset which contains appropriate data is the Scottish Offenders Index (SOI), a dataset which contains details of every individual convicted in Scotland between January 1st 1989 and August 31st 2013. As time series of police recorded crime data show that Scotland has seen a crime drop (**Figure One**), van Dijk et al (**2012?)** show that Scotland has also seen comparable declines in victimization. In combination these factors make a study of changes in the age crime curve over time in Scotland ideal, utilizing a previously unexplored dataset and allowing comparison with the findings of Farrell et al. (2014) in a different country.

**Figure One: Police recorded crime in Scotland, 1989-2012. Source: Scottish Government (1997, 2002, 2013)**

**Justice policy in Scotland between 1989 and 2012**

One consequence of conducting this research in Scotland, given the case study approach adopted, is that it necessitates an understanding of how other changes in Scotland over the period of the crime drop may have impacted upon the age crime curve. In particular, given the focus of this research on convictions data (see data section below), understanding how justice policy in Scotland has changed is necessary to account for changing justice system practices which may in turn affect the data produced, and in particular, policies affecting prosecution of young adults (Francis et al. 2004). The account provided here is necessarily brief, and as such is a simplification of a wide and often heterogeneous policy area where changes are often complex (see McAra and McVie 2010; Mooney et al 2014).

Perhaps most important to note is the distinctive nature of the youth justice system in Scotland. Central to this is distinctiveness is the Children's Hearing System, a tribunal to which children (up to age 16) who offend, and also those considered at risk of harm, are referred to determine appropriate action. Whilst the data to be used in this study relate only to offending after the age of 16, the impact of the way in which children are processed by the Hearing System, and how they transition into the adult justice system, can have a significant impact on their subsequent convictions patterns (McAra and McVie 2007).

With these caveats in mind, in broad terms Scottish youth justice policy between 1989 and 2012 can be considered as comprising of three main periods. The first period ran from the start of the period until the devolution of justice policy to the new Scottish Government in 1998/9 and broadly speaking entailed a focus on the needs of offenders and taking action to remedy adverse social conditions, in particular for young offenders who are handled by the Children's Hearing System (McAra 2006). Second was a period between 1998 and 2007, marked by increased focused on 'what works' to reduce offending (McAra 2006) and a move away from considering the potential welfare needs of offenders. Away from youth justice, this period also saw a shift in probation in Scotland focusing on assessment and management of risk (McNeill et al 2009:422). Finally, the election of the SNP administration in 2007 led to a third phase in Scottish youth justice policy (McAra & McVie, 2010:182-183) with a which displays commitment to both universal services focusing on child well-being but also targeted risk-assessment and intervention.

Interpreting changes in justice policy and understanding its potential impact on the age crime curve is not straightforward. This complicates an attempt to trace the potential impact of policy change on convictions patterns. Further complicating this picture is the “governmentality gap” between policy and implementation (McNeill et al. 2009), and so changes in policies may not lead to changes 'on the ground'. As a result, it should always be remembered that the distinct periods described above are a simplification of a complex process of policy change. Given this uncertainty and the inductive approach adopted in the research design for this study, the findings of this research cannot be considered a 'test' of whether these changes in policies have caused changes in the age crime curve. To make such a statement would require a closer understanding and investigation of the mechanisms of any hypothesised change. However, and similarly to the mechanisms theorized to be driving the crime drop, the results of this study can suggest areas which would benefit from further investigation if there are distinctive trends in the data across different periods.

**Data**

*Data requirements*

Analysing how the age crime curve over has changed over the course of the crime drop requires repeated cross-sectional data over the period of the crime drop with information about age and sex and a measure of offending. Typically this necessitates the use administrative data, given the need for consistently collected data without significant change in coding or data collection practices to allow comparison over time (Steffensmeier et al 1989).

*Data source*

For this investigation data comes from the Scottish Offenders Index (SOI). SOI is a record of convictions served in Scottish courts between January 1st 1989 and August 31st 2013. SOI contains information about offenders’ age, sex and the date of their offence, as well as the details of their conviction. The data cover all convictions for serious violence, indecency, dishonesty, fire-raising, malicious mischief and other “serious” offences, omitting more minor criminal convictions such as some crimes against the court and most motoring offences. Importantly, data in the SOI only relate to offences which have been convicted by courts in Scotland. As such, data relate only to those convicted over the age of 16. This prevents this study from analysing changes in convictions during adolescence over the course of the crime drop, and is a limitation of this study. However the SOI has the distinct benefit of breadth of coverage, containing records for every individual convicted in Scottish courts over the period of the crime drop, including data on the individual's sex.

Offences and convictions are connected by a long and complex process of handling by the criminal justice system[[4]](#footnote-4). Given the changes in policy outlined above, as well as potential changes which may have occurred at any of the intervening stages between offence and conviction, observed changes in convictions patterns may not relate to changes in offending behaviour but in the nature of punishment.

**I could speak to Fiona Jamieson about her research into whether judges are more punitive?**

**Crime recording standard change in 2004?**

To maximize the data available this study examines all individuals convicted of an offence which took place between January 1989 and 31st December 2011 for which a conviction was served between January 1st 1989 and August 31st 2013 (the latest date for which data are available). Considering more recent offences (for example, those committed in 2012) would bias the data for the last year covered by this study as a number of individuals who have committed offences in 2012 are likely to have been convicted by 31st August 2013.

**Do I need a graph showing typical time between offence and conviction to substantiate this?**

**Figure Two: Comparison of recorded crime and number of individuals convicted in SOI**

Figure Two shows the trends in the number of individuals convicted in the SOI and for a comparable sub-set[[5]](#footnote-5) of police recorded crimes and offences. This shows notable similarity between the two trends.

**More comparison of SOI trends and recorded crime trends?**

*Population data*

To account for changes in demographics over the period under investigation, convictions rates for different ages in different years are weighted by the mid-year population estimates for the appropriate age and year (Farrington 1986). Data on population estimates comes from National Records of Scotland (2014).

*Methodology*

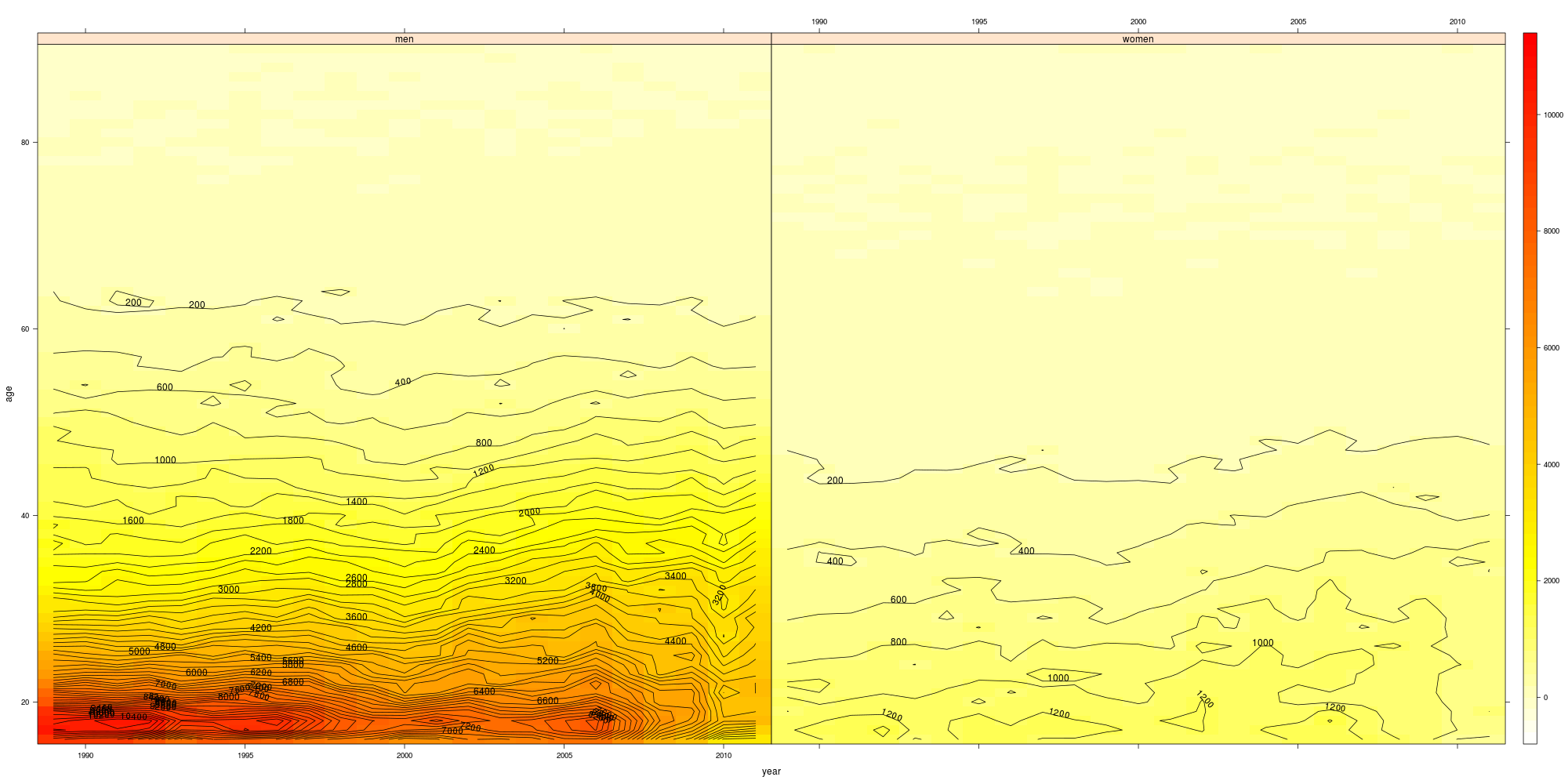
Trends in the change of the age crime curve are primarily analysed visually. As the data for this investigation are population data, rather than being a sample drawn from a population, there is no need for inferential statistical analysis to assess whether the age crime curve in the SOI accurately reflects that of the population from which the sample was drawn. Given the case study approach described above and the acknowledgement that generalization must be on the basis of substantive comparison rather than statistical testing, there is little to be gained substantively by comparing distributions from different years with each other based on statistical significance tests. To echo Gottfredson and Hirschi (1990:134) in citing Louis Guttman, “a test of statistical significance is not a test of scientific importance” (1977:92).

*Methods*

The primary method of data visualization used in this study is shaded contour plots (Minton et al. 2013; Vaupel, Gambill and Yashin 1987). Developed in visual demography, shaded contour plots provide a way to analyse changes in a particular variable (*z*) across age (*x*) and year (*y*). By arranging age and year as a surface, the dependent variable (*z*) – in this case, the prevalence of offending leading to convictions – for a particular age in a particular year can be read as the 'height' of the 'surface'. Change in height across this surface – that is, changes in the prevalence of offending leading to convictions across ages and years – can thus be rendered as contours linking like values together. As on a map, these contours can be labelled to show the values which are connected and the surfaces can be shaded to help distinguish between high and low values (Minton 2014). The value of visualizing data in this way for this analysis is that it is able to incorporate across a large number of ages and years in a single plot. This facilitates comparison of data across multiple years in the same chart, allowing the informal examination of age, period and cohort effects (**Minton 2014**). Age effects can be seen when taking vertical 'slices' across the plot and period effects can be seen in horizontal 'slices'. Cohort effects can be seen by comparing diagonal lines in the plot. To complement the analysis based on the shaded contour plots, data are also visualized using more typical line charts to highlight particular features of interest.

**Results**

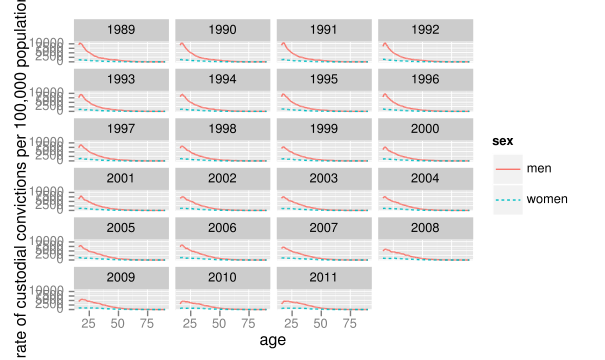
**Figure Three** displays the prevalence of men and women convicted between 16 and 65 in Scotland for offences committed between 1989 and 2011. This figure presents results for men and women on the same scale. As anticipated from the results of Farrington (1986) and Steffensmeier and Streifel (1991), this figure shows that the prevalence of offending for men is much higher than that for women at every age. In the contour plot, this is reflected in the dark red shading for the contours showing conviction rates for young men in the 1990s. In comparison the plot for women has no red shading at all, showing the lower prevalence of offending leading to convictions for women. Assessing the change in this distribution over time, this figure also shows that the majority of the decline in convictions is attributable to declines in convictions for offences committed by young men. In 1989 the conviction rate for 17 year old men was 0.104[[6]](#footnote-6). By 2011 it was 0.039**.** In contrast, in 1989 the convictions rate for 30 year old men was 0.031, and was 0.037 in 2011. Whilst in 1989 the convictions rate for 17 year old men was around two and a half times greater than 30 year old men, by 2011 the convictions rates for 17 and 30 year old men are incredibly similar. This shows the disparity in the change in prevalence of convictions for men of different ages over the crime drop across age. However, this trend is not the same for women. In contrast to the above, the convictions rate for 17 year old women in 1989 was 0.012. By 2011 it was 0.007**.** In contrast, in 1989 the convictions rate for 30 year old women was 0.005, and was 0.008 in 2011. The relative declines in convictions rates for 17 year old women (a decline of just over 40%) are substantially less than for 17 year old men (a decrease of just over 60%). Relative increases in convictions rates for 30 year old women (a relative increase of 60%) are far larger than for men (a relative increase of just below 20%). This shows the disparity in the changes in age crime curves over the crime drop between men and women. Numerically, these can be seen in changes in the skewness and kurtosis of the age crime curve (Figure Four)



**Figure Three: Shaded contour plot of prevalence of offending leading to convictions for men and women in Scotland 1989-2011**

From Figure Four we can see that the age crime curve in the SOI is positively skewed throughout the period covered by the data. This shows that between 1989 and 2011 the mass of the age-crime curve is closer to the left-hand side of the distribution. The amount of skew in the age-crime curves for men and women has converged between 1989 and 2012. The skew of the age-crime curve for men declines steadily after 1992 from a high value of 2.01 to 0.78 by 2011. There is less change in the age-crime curve for women between 1989 and 1999, remaining between 1.43 and 1.17, then declining from 1.32 in 1999 to 0.63 in 2011. Whilst for men there is reasonably steady decline in the skew of the age-crime curve, for women this decline only occurs after 2000. The kurtosis of the distribution of age and crime for men has dropped from a high of 2.89 in 1992 to a low of -1.06 in 2011. For women the starting value for the kurtosis of the age-crime curve is much lower, at 0.44. This shows that the age-crime curve for women is substantially less peaked than that for men at the start of the crime drop. This value to a peak of 1.02 in 1992, then dips to 0.09 in 1994, before returning to close to its original value and remaining stable at around 0.5 until 1999. After this point the kurtosis of the age-crime curve for women declines, reaching a low point of -1.34 in 2011.

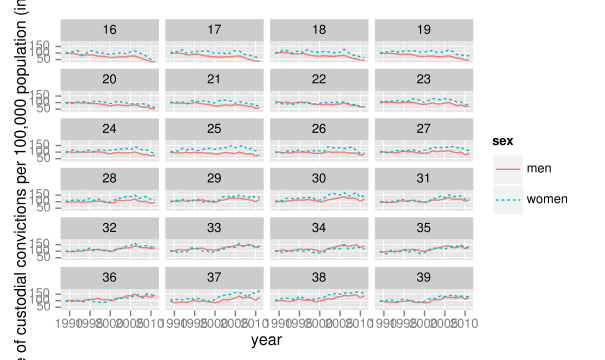
**Figure Four: Skewness and kurtosis in the age-crime curves of men and women in Scotland 1989-2012**

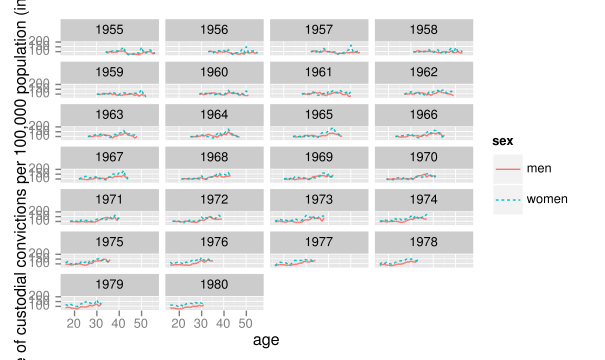
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**Figure Five Age crime curves for men and women in Scotland 1989-2011**

However, these declines are not evenly distributed over the period. Declining conviction rates for young men occurring throughout the 1990s and then again after 2007. For young women there are no declines until after 2007. This finding is highlighted by Figure Four which shows the aggregate age-crime curve for offences committed between 1989 and 2011. These graphs show, in effect, vertical slices from the contour plot shown in Figure Three. Representing convictions served to men and women index so to compare the rate for each age in each year with the rate for that age in 1989, this shows the substantial decline in youth offending by young men over the period of the crime drop. Declines in the overall rate of convictions in Scotland (Figure Two) most closely resemble the trends for ages 16 to 23. In some respects this is not surprising, given that this group (young men) had by some margin the highest convictions rate at the start of the period as shown above. What is surprising is the divergence in trends between younger and older men. Prevalence of offending leading to convictions shows no decline for those over the age of 28 and for those over 30 there are *increases* in the prevalence of convictions over the period of the crime drop in Scotland.

These increases in convictions for older adults represent a combination of period and cohort effects. Figure xxx shows the prevalence of offending leading to convictions for members of different birth cohorts at different ages. These plots show distinctive raises for six year horizontal stretches in the six year period covering the years 2000-2006 for those born between 1963 and 1970. This corresponds to the ages of 37 and 43 for the 1963 birth cohort and 30 and 37 for the 1970 birth cohort. As these data are indexed, this represents increases in the rates of convictions relative to the baseline convictions rate for individuals of that age in 1989.

**Figure Five plot of prevalence of offending leading to convictions for different ages in Scotland 1989-2011 (index)**

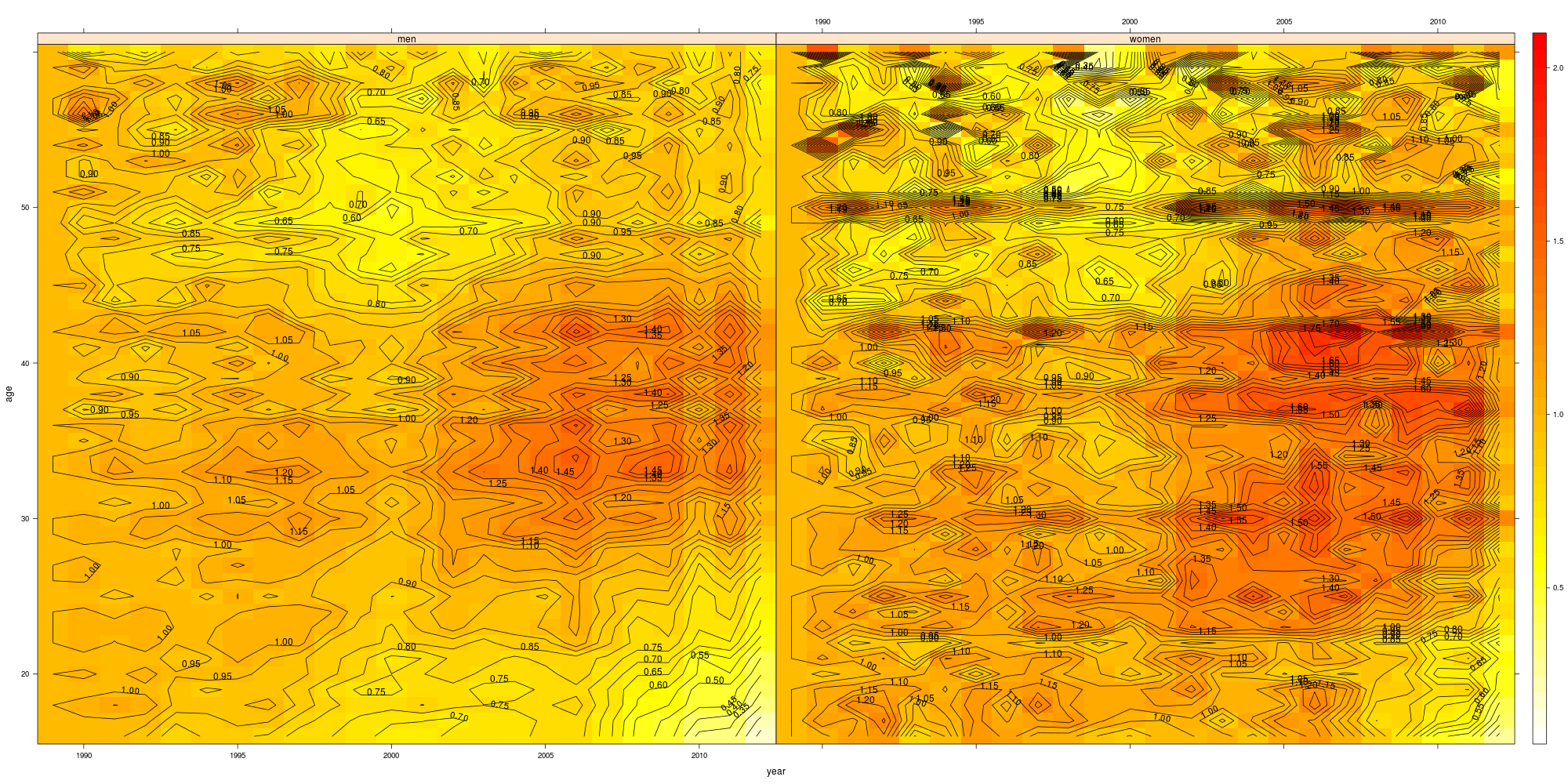
**Figure XXX plot of prevalence of offending leading to convictions for birth cohorts (1955-1980) in Scotland 1989-2011 (index)**

These trends can also be seen in Figure Six which shows a shaded contour plot using the same index data as in **Figures Five and XXX.** Close analysis of this chart reveals three reasonably distinct periods. The first period runs from 1990 until 2000. As discussed above, this period is marked by declines in the rate of convictions for offences served to men under the age of 23. In contrast there is no such change for women of the same ages, and very little systematic change in convictions rates for older individuals of either sex. Relating these findings to aggregate convictions rates, this period includes decline in recorded crime observed during the 1990s (**Figure One**). Second is the period between 2000 and 2006. During this time the declines in youth convictions for men is halted. After showing, on the main, stability throughout the 1990s, convictions rates for men in their thirties and early forties increase during this periods. Similar trends are apparent for young women during this period, with little changes in convictions rates for those between 16 and those in their early twenties. However, the increases in convictions to older adult women begins in the mid-twenties, rather than in the late twenties for men and the relative increase in convictions rates for women are higher than for men of equivalent age. During this period rates of recorded crime stabilize, as do the overall numbers of individuals convicted. This can be explained by the greater magnitude of youth convictions to adult convictions. Stability in youth convictions masks increases for older individuals.

The final period spans from 2007 until 2011. This period is marked by rapid declines in convictions rates for both men and women under twenty. However, unlike in the period of declines in recorded crime between 1990 and 2000, between 2007 and 2011 both young men and young women show declines in convictions rates. In contrast, the elevated convictions rates for both men and women over thirty remain high, relative to the 1989 baseline. Convictions rates for women throughout their twenties show declines in this final period, as does recorded crime. Compared to the initial period of declining crime and convictions during the 1990s, this period shows a similar decline in convictions to young men, but also displays declines in convictions served to young women which are not present during the first period.

**Discussion**

The results presented above, we contend, have important implications for both the study of age and crime and for understanding the crime drop in Scotland.



**Figure Six: Shaded contour plot of prevalence of offending leading to convictions for men and women in Scotland 1989-2011**

*Understanding the age crime curve*

First, these findings agree with the assessment of Tittle (1988) that there is merit in seeing both stability and change in the age crime curve. The results of this study show what we argue to be substantial and substantively interpretable changes in the shape of the age crime curve in Scotland between 1989 and 2011. That said, the distribution of convictions with age as evident in 2011 is still recognizable as an 'age crime curve; it is unimodal and positively skewed, for example. That said, the scale of the change in the age crime curve in Scotland over the course of the crime drop should not be undersold. Convictions rates for men in their late teens are now much the same as for men in their late twenties; this is a remarkable reversal. The findings presented here re-emphasise that, as Greenberg (1985) and Cullen (2011) attest, that understanding crime beyond adolescence is more pressing than ever, and, in Scotland at least, is becoming increasingly so.

Second, the divergent patterns of change reveals a different picture than that identified by Steffensmeier and Streifel (1991) who found no difference in the pattern of change in age arrest curves for men and women between 1935, 1960 and 1985 in the USA. As the methods adopted by the study and Steffensmeier and Streifel (1991) are very different, thus complicating direct comparison. However, it seems that in Scotland at least the distribution of age and crime for men and women has changed in very different ways in recent years. It may be the case that, as with the age crime curve itself, whether systematic differences exist between the age crime curves of men and women should be considered an empirical matter.

Third, by analysing year on year change in the age crime curve this study has demonstrated distinct periods of change in its shape. This type of change is obscured in previous studies (Farrington 1986, Steffensmeier et al. 1989, Steffensmeier and Streifel 1991) which have examined the age distribution of crime at disparate time points in order to maximize the potential observed variation. Far from being ‘meaningless variation’ (Gottfredson and Hirschi 1990), examining year-on-year variation in the age crime curve can reveal distinct periods which provide a useful tool to reflect upon the potential ‘countervailing processes’ which have driven this change. Valuable analysis of change in the age crime curve over time does not rely on selecting disparate time points (Steffensmeier and Streifel 1991, Ulmer and Steffensmeier 2014), but rather analysis of year-on-year change can help unpick more subtle changes in convictions patterns and relate these to factors affecting change in the age crime curve.

*Using the age crime curve to understand the crime drop in Scotland*

Relating the findings of this study to the potential mechanisms hypothesised to drive the crime drop, these results most importantly show that the crime drop – or at least, the convictions drop – in Scotland has a strong age component. This raises the possibility that the crime drop itself is to a large extent an age effect, or an age-localized period effect. The results of the above analysis show notable similarity with Farrell et al.'s (2014) examination of changing arrest rates in the USA over the course of the crime drop. Farrell et al. (2014) note that declines in arrest rates over the course of the crime drop are concentrated in declining arrest rates for adolescents and young adults. In contrast, arrest rates increase for adults in their forties. Whilst in Scotland those in their 30s have shown greater increases in conviction rates than those in their 40s, broadly speaking this patterns displayed in the two countries are similar. It would, however, appear that the data in the SOI show much more marked decline in youth offending than the arrest analysed by Farrell et al. (2014). Given the differences in measure – arrests compared to convictions – the focus on this study of convictions for all types of offences rather than split by crime type and the aggregation of data for men and women in the analysis by Farrell et al. (2014) direction comparison is complex. In these two cases declining recorded crime is associated with declining offending by young people and increases in offending by some older people. It bears repeating that the results of this analysis cannot be considered a test of different theories of the crime drop. Whilst Farrell et al. (2014) suggest that declining youth arrests but increases in arrests for those in their forties are commensurate with their securitization thesis – and the same logic can be applied to the results of this study – it is worth remembering, however, that not contradicting a theory is not the same as supporting it. Further work is required in other jurisdictions to assess how far these patterns of declining youth convictions can be generalized and so to better understand their potential value in helping to understand the crime drop.

In addition to this distinctive age pattern, trends for convictions for men and women across age are markedly different. Theories of the crime drop must be able to explain this difference in the change in the age crime curve between men and women. Whilst there is certainly value in assessing situational drivers of declining aggregate crime rates (see Farrell et al 2014), the findings presented in this paper suggested that theoretical attention must also be paid to individuals as well as situations, including both age and sex. Ulmer and Steffensmeier's (2014:381) suggestions that flatter age rime curves may be attributable to greater integration of youths into adult society and the presence of groups who do not become integrated with adult society as they age may be fruitful areas for subsequent work. When seeking to use these findings to explain changes in aggregate crime rates, it is also be noted that the results of this study act as the inverse of the findings of Farrington (1986) and Steffensmeier et al (1989) who observed an increasingly peaked age crime curve over periods marked by increases in aggregate crime rates (Tonry 2014). It may be that the use of the age crime curve as a lens through which to understand aggregate crime rates should also account for changes in the shape of the age crime curve during periods of aggregate increases in crime.

The periods identified in this analysis also show notable similarities to the policy periods identified by McAra and McVie (McAra 2006; McAra and McVie 2010), and are consistent with the possibility that these periods have led to changes either in offending behaviour or in the ways in which individuals are processed by the justice system in Scotland. Once more, we reiterate that these findings cannot be considered a test of whether these policy periods have led to changes in offending behaviour. They do suggest though that this would be worthy of further exploration. More work is required to relate these two findings by, for example, assessing the *rate* of offending rather than just the prevalence of offending, and also a closer examination of particular policies which may have affected convictions patterns. The results presented here suggests that either these policy periods have led to a distinct change in offending or in the operation of the criminal justice system in Scotland. Worryingly, this has led to increases in convictions for a group – older adults, and in particular women – during the 2000s. It also raises the possibility that the decline in convictions served to young people since 2007 may be the effect of policies related to diversion from conviction. Examining changes in the age crime curve over the course of the crime drop in other jurisdictions may help to assess if there are effects particular Scotland which may be explained by such Scotland-specific factors such as policy change.

**Do I need to look at research about how people are integrating into society?**

**And justice system processing?**

**Limitations and areas for further research**

This paper has not sought to examine changes in the distribution of age and crime across different crime types. As it is known that there are observed differences in age crime curves across different crime types (Farrington 1986), and given the importance of type of crime to some theories of the crime drop, particularly the securitization thesis (Farrell et al 2014), this is an area which could be fruitfully investigated in the future. Given the limited generalization that can be made from this study given its research design, replication and comparison are key to understanding how generalizable these results are. The comparison of trends in Scotland and America based on the work of Farrell et al 2014 provide intriguing areas of both similarity and difference which would benefit from further examination.

Furthermore, as this study has only sought to examine aggregate trends of crime across age, period and cohort, the results can tell us nothing about potential heterogeneity within the population of offenders. A great deal of interest has been paid into disaggregating the population of offenders into different groups based on their convictions patterns (see Moffitt 1993, Nagin and Land 1993), and future work could assess whether these observed declines in convictions rates for young people hold for all young people, or whether they represent changes in convictions patterns for some groups – for example changes in the number of adolescence-limited offenders (Moffitt 1993) – but not others.

**What happens to these cohorts with lower peaks of convictions in teens? Will they continue to show lower prevalence of offending? What will this mean for the justice system in years to come?**

**Conclusions**

This paper has demonstrated the value of analysing year-on-year variation in the age crime curve. Adopting such an approach and moving away from a focus on making generalizable statements about the relationship between age and crime can still produce substantively meaningful results which can be used as one lens through which to understand trends in aggregate crime rates. Examining change in the age crime curve over the course of the crime drop in Scotland has shown substantial change in the distribution of age and crime, with the age crime curve showing a sharply declining skew and kurtosis. Substantively, this means that declining convictions are not universal, but are concentrated in declines in convictions at the younger part of the age spectrum; the previous peak of the age crime curve. These trends are not, however, the same for men and women; convicted offences rates for men under twenty-five decline throughout the 1990s and again after 2007, but for women of the same age only decline after 2007. Theoretical explanations of the crime drop must be able to account for these changes.

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1. Age crime curves can also relate to cohorts (Farrington, 1986). The focus of previous research has predominately been the aggregate age crime curve. [↑](#footnote-ref-1)
2. Farrington (1986) draws on data from 1938, 1961 and 1983 to compare the aggregate age crime curve, whilst Steffensmeier et al. (1989) use data from 1940, 1960 and 1980. [↑](#footnote-ref-2)
3. For men the peak age of offending was 13 years in 1938 and 15 years in 1983, whilst the mean age was 25.3 years in 1938 and 24.9 years in 1983. For women, the 1938 peak age of offending was 19 years, declining to 14 years by 1983, with the mean age declining from 31.5 to 26.3 years over this period (Farrington 1986:196). [↑](#footnote-ref-3)
4. For a summary of the process leading to convictions in Scotland see the Audit Scotland Report (Audit Scotland 2012). [↑](#footnote-ref-4)
5. This was created by removing recorded crimes against public justice, which are not recorded in SOI, and motor vehicle offences. [↑](#footnote-ref-5)
6. All figures to three decimal places. [↑](#footnote-ref-6)