Article

Research outputs: developing a Crime Severity Score for England and Wales using data on crimes recorded by the police

The methods behind the proposed Crime Severity Score, initial findings and opportunity for users to provide feedback on the methods proposed and whether it should be incorporated in official statistics on crime in England and Wales.

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1 . Introduction

The Office for National Statistics (ONS) has been developing a weighted measure of crimes recorded by the police, the "Crime Severity Score". Existing official statistics on police recorded crime data are presented as counts of the number of offences or as a rate of offences recorded per head of population, broken into broad offence categories. However, even within a broad category, the counts take no account of the different levels of severity of the crimes within a category, or the demands these will place on the police.

This new measure of crime aims to address this by taking into account both the volume and the severity of offences, by weighting offences differently. By "severity", we are intending to reflect the relative harm of an offence to society and the likely demands on the police, given that the police resource requirements are likely to be greater for offences that are more serious and therefore weighted more highly. For example, it would be expected that the police response to a serious violent crime would be more resource intensive than their response to an incident of criminal damage.

Past reviews of crime statistics, including the National Statistician's Review of Crime Statistics: England and Wales, June 2011 have recommended the development of a weighted crime measure. The issue was taken to the National Statistician's Crime Statistics Advisory Committee (NS CSAC) who advised that the idea of a weighted crime measure should be explored by ONS[1]. To support ONS the Committee established a Task and Finish Group (with representation from other government departments, the police service and academia) to provide methodological advice. This report presents results of this first phase of development work and details of the methodology adopted based on advice from the Task and Finish Group. We are seeking your feedback on this work to help inform our plans for next steps and any further development of the Crime Severity Score.

The Severity Score is intended to complement existing police recorded crime data, providing additional data that better reflect the level of severity of the crimes recorded by the police. It is aimed principally as an analytical tool for expert analysts, to support analysis to help understand demand on the police from crime. In interpreting the findings it is important to bear in mind that, as with other measures based on police recorded crime, the Crime Severity Score is affected by variation in recording practices over time and between areas. This is particularly relevant given the recent focus on recording practices by Her Majesty's Inspectorate of Constabulary (HMIC) and the subsequent improvements in police crime recording.

This report provides detail on the methodology behind the Crime Severity Score and initial research findings. The report is accompanied by a "Crime Severity Score data tool", which allows you to explore data for police force areas and regions and make comparisons between areas within England and Wales. One of the potential values of this new approach is to provide local police force analysts with a new tool to better understand the crime mix in their area. To help enable this we have made available the underlying weights for each offence, making it possible for analysts to reproduce results at a more granular level.

We are keen to receive feedback and you are encouraged to consider the contents of this report alongside the accompanying material and send feedback by emailing crimestatistics@ons.gsi.gov.uk. You may wish to use the template provided. It would be helpful if feedback could be provided by the end of January.

Notes for introduction:

1. Papers from the National Statistician's Crime Statistics Advisory Committee are available.

2 . Background

The development of the Crime Severity Score follows a number of reviews of crime statistics, which included recommendations for a weighted crime measure. An independent review of Crime Statistics (2006) considered whether it would be better if crime statistics focused on a stable and representative basket of serious crimes. Following this review, the Home Office consulted on proposals for a "basket of serious crime" in 2007, before including it in their Crime in England and Wales 2007/08 bulletin.

There was general support for the "basket" of serious offences but little support for a weighted crime measure (although given the small number of responses that were actually received, it is difficult to draw any strong conclusions from this exercise) and therefore the "basket of serious crime" was not included in subsequent releases. Most recently, the National Statistician's Review of Crime Statistics: England and Wales, June 2011 considered the development of a weighted crime index, concluding that there were areas for further investigation, including confirming user need.

As with other weighted crime measures the Crime Severity Score is designed to reflect the relative harm of different types of crime, not just the volume, by giving more severe offences greater weight than less severe offences. Severity is measured using sentencing information, which has been used in the calculation of the weights. The Crime Severity Score aims to give further understanding of the crime mix and the demand on the police. A chart (Figure 5) showing the proportional composition of offences for the Crime Severity Score compared with that for the unweighted offence rate can be found in Annex 1.

While previously there has not been great demand for such a weighted crime measure, more recently in the context of a move away from simple numerical targets there has been growing interest in understanding and responding to demand on police resources. The value of a weighted measure of police recorded crime for the police has been demonstrated by interest from several forces in developing their own crime harm measures, often based on the Cambridge Harm Index.

There are a number of reasons why a measure of crime that is weighted according to severity could be a useful addition to the existing measures of crime already published in the official statistics:

- by looking at the trend in the Severity Score over time it provides an indication of whether there has been a change in the severity of crime; trends in unweighted measures are largely driven by high volume crimes like criminal damage, and low-level incidents of theft and violence that typically cause low harm to society

- the Severity Score, at police force area level, can be used to help understand the "crime profile" of an area and demand on police, by showing the severity of crimes, not just the volume of crime recorded

- the Severity Score would provide a further means of comparing crime between police force areas, taking account of the varying crime profiles seen in areas with different characteristics

A literature review was carried out to obtain an understanding of the methodology used in existing weighted crime measures. Statistics Canada publishes a Police-reported Crime Severity Index alongside their main police recorded crime data[1]. New Zealand has developed a Justice Sector Seriousness Score for quantifying the relative seriousness of offences based on the sentences imposed for each offence[2]. The University of Cambridge has developed the Crime Harm Index, which uses sentencing guidelines to calculate weights[3]. We have drawn and built on elements of these existing measures in the development of the Crime Severity Score.

Notes for Background:

1. Further information can be found in [The methodology of the Police-reported Crime Severity Index](#) (2009) and [Measuring crime in Canada: introducing the Crime Severity Index and improvements to the uniform crime reporting survey](#) (2009).

2. Further information can be found in [Justice Sector Seriousness Score (2012 revision): FAQs](#).

3. Further information can be found in [The Cambridge Harm Index: Measuring Total Harm from Crime Based on Sentencing Guidelines (2016)](#).

3 . Methodology

The Crime Severity Score gives more severe offence categories a higher weight than less severe ones. To do this, weights have been calculated for each offence in the published police recorded crime series based on sentencing information. Weights have been applied to the most detailed breakdown of offence types in order to provide a better degree of accuracy than using aggregate categories, since the types of offence within these broader categories can be vastly different in terms of severity. The method for deriving weights is described in this section and a list of weights has been provided within the [Crime Severity Score data tool](#).

In order to establish the relative severity of different types of crime, an objective measure needed to be found. Sentencing data, sourced from the Ministry of Justice (MoJ) have been used as the primary source for calculating offence weights. It was decided that sentencing would provide an appropriate metric for determining the seriousness of offences. It can be argued that sentencing is an objective measure, reflecting how society views crimes differently, given that it is based on legislation set by Parliament on behalf of the public. Sentencing guidelines were considered, however, for disaggregated police recorded crime categories, there were too many omissions in the guidelines to adequately match them with the detailed breakdown of offences in the police recorded crime series.

Sentencing data or guidelines can change over time to reflect changing perceptions of crime and to reflect policy set by government. For example, the Criminal Justice and Courts Act 2015 introduced a minimal custodial sentence for those aged 16 or over who are convicted of a second offence of possessing an offensive weapon or bladed article. It will also be the case that sentences reflect other factors beyond the severity of the crime, for example the offending history of the perpetrator. A number of other different metrics – such as costs of crime or public perception data from the Crime Survey for England and Wales (CSEW) – were also researched and considered, but were not deemed appropriate. This was either due to the complexity of the methods involved, which would make it difficult for users to understand how the measure has been derived, or the lack of sufficiently detailed data.

An average of the latest 5 years of available sentencing data for England and Wales as a whole has been used, covering the year ending December 2011 to year ending December 2015.This ensures that the weights were calculated from a sufficient quantity of data, minimising the impact of any fluctuations for low-volume offences while also ensuring that the most up-to-date sentencing data were used. For a small number of offence types, few offenders have been sentenced in the latest 5 years and therefore weights for these offences have been calculated based on a small number of cases. A possible solution to this, which we are considering, is to use a greater number of years of sentencing data for offences with few offenders. For example, an average of 10 years of sentencing data could be used for offence categories where over the 5 years fewer than 10 offenders were sentenced.

Custodial sentences, community orders and fines have been included in the construction of the weights. This was necessary given that for a number of offences a range of outcomes are possible and very few or no people are given a custodial sentence – which would result in zero weights if only custodial sentences were considered. Other sentencing outcomes in the MoJ sentencing data (namely: suspended sentences, absolute or conditional discharges, compensation and "otherwise dealt with") are not included in the calculation of the offence category weights, either due to a lack of available data or because it does not seem appropriate to include them. For example, where an offender is given an absolute or conditional discharge they will receive a criminal record but no further punishment will be given. Indeterminate sentences for public protection (IPPs) have not been incorporated since these were abolished in 2012.

The weights were calculated as the proportion of offenders receiving the type of punishment multiplied by the average sentence length in days; for custodial sentences this is the average custodial sentence length, for community orders and fines this is a prison length equivalency.

The fine equivalency is based on the length of time it would take to earn the fine amount. This uses a "rule" in the sentencing guidelines that says if no information can be determined about an offender's income (a fine is based upon weekly income) it should be assumed to be £440, which is derived from national median pre-tax earnings using projected estimates from the Survey of Personal Incomes for financial year ending 2013 – this equates to an amount of £88 a day. Our fine equivalency for each offence is therefore calculated as the average fine divided by £88.

Community order equivalences have been calculated based on the length of the unpaid work, or equivalent, an offender receives. Sentencing data do not provide information on the length of community orders given; it has therefore been necessary to use sentencing guidelines for this. The sentencing guidelines set out 3 levels of community order an offender can receive: low, medium and high, and specifies for each level a range of hours of unpaid work. These are:

Low: 40 to 80 hours unpaid work - Mid-point: 60 hours

Medium: 80 to 150 hours unpaid work - Mid-point: 115 hours

High: 150 to 300 hours unpaid work - Mid-point: 225 hours

Using the current average hours worked by full-time workers (approximately 7.5 hours a day) and the mid-point for the 3 levels, we have calculated that a low community order is equivalent to 8 days in prison, a medium community order to 15 days in prison and a high community order to 30 days in prison. For each offence, to establish whether a high, medium or low community order equivalency is most appropriate, the starting point according to the sentencing guidelines has been used. The starting point could be a custodial sentence, level of community order (low, medium or high) or fine amount; for each of these types the equivalency that has been used is as follows:

- community orders – the corresponding community order equivalency; the guidelines will state the level of community order (low, medium, high)

- custodial sentence – high community order equivalency

- fine – low community order equivalency

Where sentencing guidelines are not available for an offence, then guidelines for similar offences have been used to indicate the appropriate community order equivalency.

The calculation for the production of the offence weights is:

Offence weight equals (Custody rate multiplied by Average custodial sentence length)

plus (Community order rate multiplied by Community order equivalency based on guideline band)

plus (Fine rate multiplied by Fine equivalency based on average fine)

where the custody, community order or fine rate is the proportion of sentences that resulted in a custody, community order or fine outcome.

Once the weights have been calculated for each individual offence, these are multiplied by the number of incidents recorded by the police. For each year this is then summed and divided by the mid-year population estimate[1], to give the Crime Severity Score.

An example of the weight calculation is provided in Annex 3.

For some offence types, offenders have received life sentences. The MoJ sentencing data provided information on the number of offenders who received life sentences; however, they do not include detail on the length of time offenders served. This is because, as the latest 5 years of sentencing data have been used, offenders who have been sentenced to life will not have completed their serving sentence and therefore it is not yet known how long their sentence will be.

To incorporate life sentences data into the weights, additional data supplied by MoJ on average length of sentences served by offenders have been used. Unfortunately it has not been possible to break these data down to the same offence level used to derive weights, owing to inconsistencies in the way that these data are recorded across different systems during the 5 years of sentencing data used. Therefore, it has been necessary to use aggregate data on average length of life sentences. The following aggregated offence groups were used: violence against the person, sexual offences, robbery and other. To reflect the severity of the offence, for murder, which is currently the only offence that carries a mandatory life sentence, a fixed sentence of 30 years has been used; this is the longest non "whole life" sentence outlined in the sentencing guidelines for murder.

Fraud has been included in the Crime Severity Score for England and Wales; this includes fraud offences recorded by the police or Action Fraud[2] and frauds reported to the National Fraud Intelligence Bureau (NFIB) by 2 industry bodies: Cifas and Financial Fraud Action UK (FFA UK). As we do not currently have complete time series data for fraud at police force area level, it has not been possible to include fraud within the calculation of scores for police force areas; therefore a national level score that does not include fraud has also been calculated so that comparisons can be made.

For some offence types, no sentencing data were available for the years ending December 2011 to December 2015 due to no offenders having received a custodial sentence, a community sentence or a fine. For these offences a proxy weight has been used, by using the weight of a similar offence. A list of offences where a proxy offence has been used can be found in Annex 2.

In the police recorded crime series some sexual offences are broken down by the sex and/or age of the victim. For the purposes of deriving weights we have aggregated into the following groups:

- rape

- indecent assault

- sexual assault

- sexual activity involving a child

- unlawful sexual intercourse with a girl (there is not a separate category for "unlawful sexual intercourse with a boy" these offences would be recorded within another offence).

For transparency, a full list of weights has been provided, which includes both the aggregated and disaggregated sexual offence weights that can be found in the [data tool](#) and we welcome feedback on this aspect of the methodology.

The weights are a reflection of the legislation set by Parliament on behalf of the public and the courts in passing the sentences in line with this legislation and sentencing guidelines. This list of weights is not intended to be a pure ranking of severity of offences. It provides the basis for deriving a severity score rather than comparing weights for individual offences.

When viewing the weights, the definitions of offences in the [Home Office Counting Rules](#) should be taken into consideration, as some offences that appear closely related are distinctive in important ways; "Kidnapping" and "Child abduction" provide an example of this. "Kidnapping" captures incidents where there is evidence of people, including children, having been taken away unwillingly by the use of force, while "Child abduction" covers incidents where the child is taken by a parent or other person without appropriate consent but without the use of force.

It is intended that the offence weights will be updated every 5 years to ensure that they reflect changes in sentencing patterns or new legislation introduced. The new set of weights would be applied to the whole time series.

Notes for Methodology:

1. This is so that the Severity Score is relative to the population of the area, it is important to note that that this only takes into account the resident population of the area, not the transient population.

2. Action Fraud took over the recording of fraud offences on behalf of individual police forces. This process began in April 2011 and was rolled out to all police forces by March 2013.

4 . Research findings

Data on crimes recorded by the police in each financial year since the year ending March 2003 have been used in the calculation of the Crime Severity Score; the earliest financial year following the introduction of the National Crime Recording Standard (NCRS) in April 2002. Data presented for England and Wales include fraud, however, as explained in the methodology section, regional level data do not include fraud.

The findings presented here illustrate some types of analysis that can be conducted using the Crime Severity Score. In interpreting these data it is important to bear in mind that recent trends will have been affected by improvement in crime recording processes following a critical inspection by Her Majesty's Inspectorate of Constabulary (HMIC). This is likely to impact in particular on some offence categories which carry relatively higher weights in the Severity Score.

Over the past 14 years the police recorded crime rate and the Crime Severity Score have shown similar trends (Figure 1), both generally decreasing but showing slight increases in recent years. The two measures cannot be compared in terms of the level of crime because they are represented on different scales. The similarity between the trends indicates that the Severity Score does not provide much additional information to help us understand crime at a national level. The value of the Severity Score can be seen more clearly when looking at the data at a lower geographical level, such as police force area. A [data tool](#) has been published alongside this report which allows you to explore the data for police force areas and regions and compare these with other areas within England and Wales. Within the data tool we have also made available the underlying weights for each offence, making it possible for analysts to reproduce results at a more granular level.

Figure 1: Trends in police recorded crime offence rate and Crime Severity Score for England and Wales, year ending March 2003 to year ending March 2016
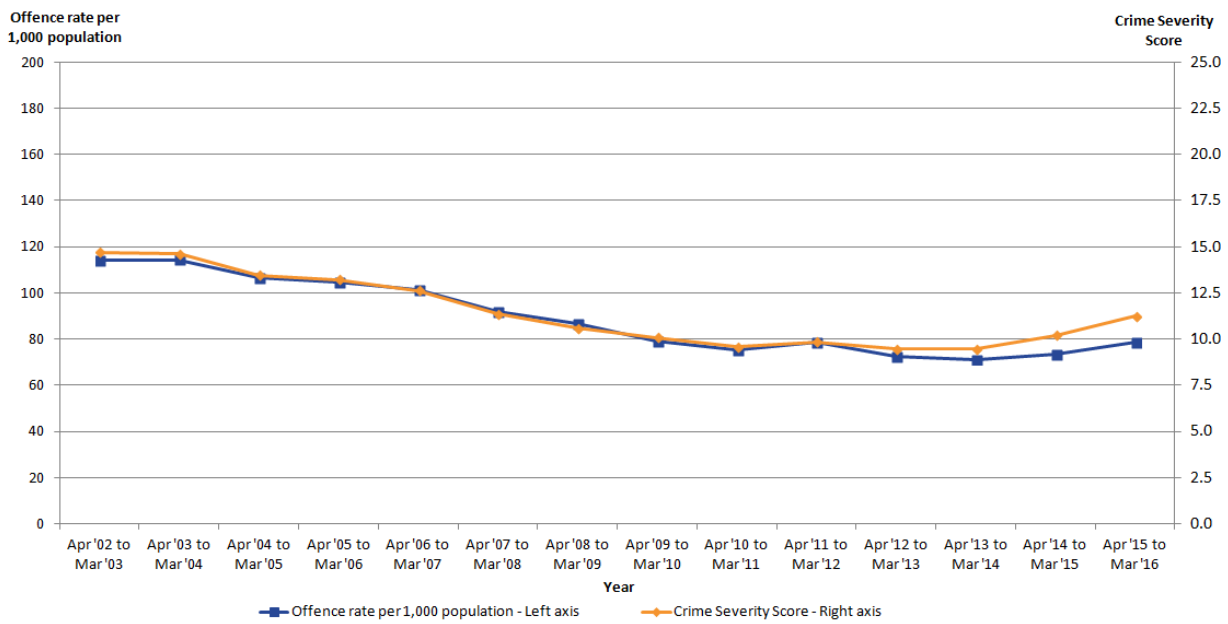

For most police force areas the offence rate and the Severity Score increased in recent years. As an example, for Nottinghamshire the Severity Score and the offence rate have shown a very similar trend over the past 14 years, decreasing over most of the period but increasing between the year ending March 2013 and the year ending March 2016 (Figure 2). The increase in the Severity Score was of greater magnitude than the increase in the rate over this period; the offence rate increased by 5% (from 62 offences per 1,000 population to 65 offences per 1,000 population) while the Severity Score increased by 30% (from 8.2 to 10.6). These increases can be explained by rises in violent and sexual offences recorded by the police, alongside falls in some of the higher volume theft offences. For the crime rate the increases in violence and sexual offences are larger than the falls in theft offences, but for the Crime Severity Score the increases are more pronounced since violent and sexual offences are typically more serious than theft offences and hence tend to have larger weights.

The increases in both the rate and Severity Score for most police forces are likely to reflect recent improvements in recording practices, following critical inspections of forces by HMIC published in 2014 which identified that an estimated 1 in 5 offences (19%) that should have been recorded as crimes were not [1]. This has resulted in a renewed focus on crime recording practices and processes, which are thought to have led to improved compliance with the NCRS and the recording of a greater proportion of crimes that come to the attention of the police. These trends highlight that, like other statistics based on crimes recorded by the police, the Crime Severity Score is affected by changes in police recording practices. In fact, since recent recording improvements have focused particularly on violent crime and sexual offences (for which weights are typically higher), increases in crime recorded by the police are likely to be more pronounced in the Crime Severity Score than in standard crime counts.

Figure 2: Trends in police recorded crime offence rate and Crime Severity Score for Nottinghamshire, year ending March 2003 to year ending March 2016
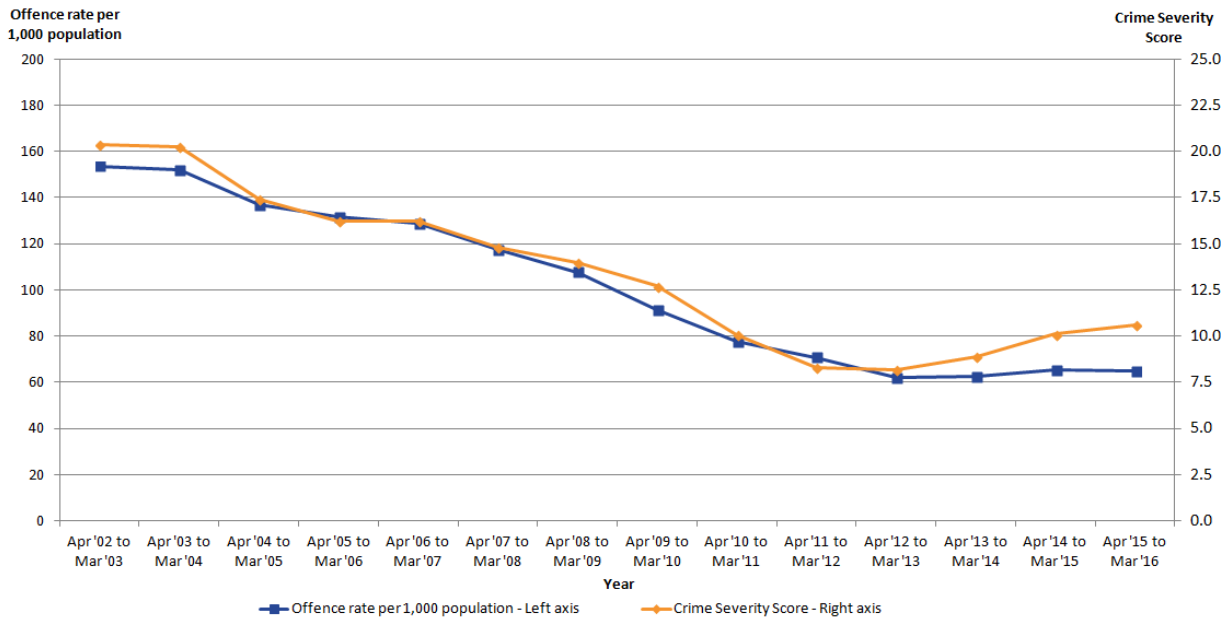
The Severity Score can be used to obtain a further understanding of the crime profile and demand on a police force over time. For example, between the year ending March 2003 and the year ending March 2016, Suffolk's offence rate decreased by 17% (from 73 offences per 1,000 population to 61 offences per 1,000 population) but the Severity Score increased by 12% (from 8.0 to 8.9) (Figure 3). The difference in these measures shows that although the relative volume of crime in this area decreased, the overall severity of the crime profile increased (though it should be noted that recent recording improvements are likely to have been an important factor in this).

Figure 3: Trends in police recorded crime offence rate and Crime Severity Score for Suffolk, year ending March 2003 to year ending March 2016
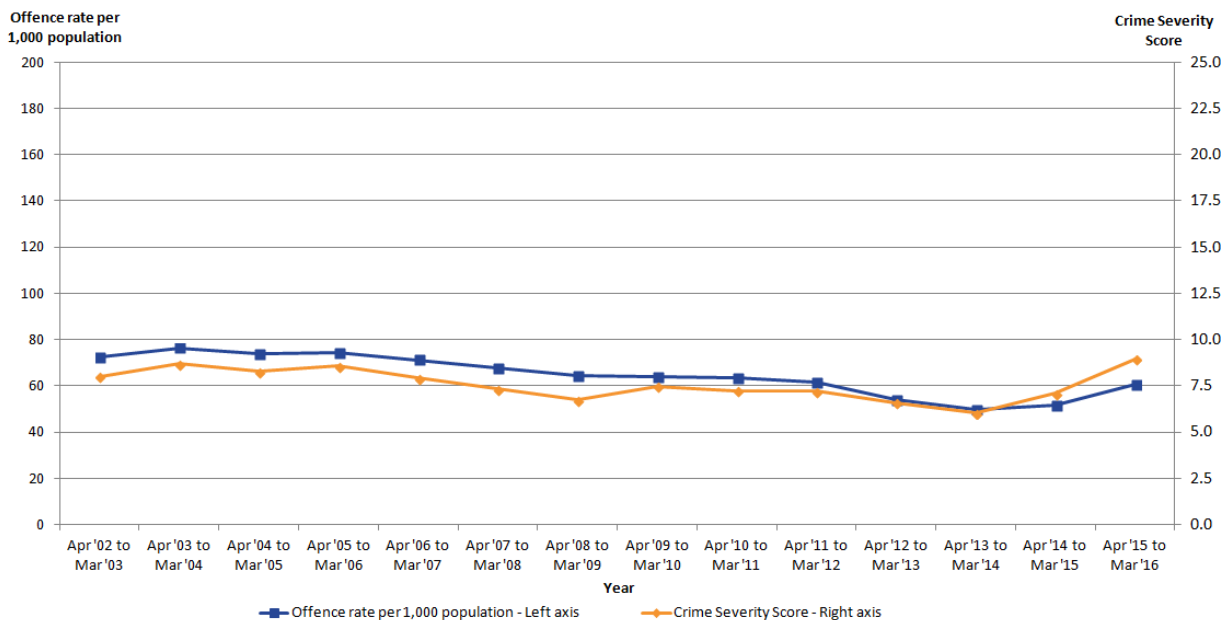

The Severity Score can also be used to make comparisons between areas. It is important to stress though that such comparisons should be interpreted with caution, as they may reflect variation in recording practices between areas (for example, a force may show a more marked rise in severity compared with others as a result of a drive to improve recording) and this should be born in mind when interpreting results.

In the year ending March 2003, West Yorkshire had one of the highest Severity Scores (21.6) compared with other police forces, but between the year ending March 2003 and the year ending March 2016, this had decreased by 37% to 13.6. Other areas had smaller decreases, for example, the Severity Score for Durham decreased by 7% (from 8.9 to 8.3) during this period. These trends have caused a reduction in the difference between the forces in terms of severity, with the difference between the 2 scores dropping from 12.6 to 5.3 (Figure 4).

In particular, there were large decreases in the Severity Score for West Yorkshire between the year ending March 2003 and the year ending March 2006, down 28% (from 21.6 to 15.4). In contrast, over the same period the Severity Score for Durham increased by 21% (from 8.9 to 10.8). For both forces, the conventional offence rates showed similar trends but the changes were of smaller magnitudes. While, without further contextual information, the Crime Severity Score data only enable fairly unsophisticated comparisons between the 2 areas, they do suggest that the difference in the severity of the crime profile has become less pronounced over time.

Figure 4: Trends in Crime Severity Score for West Yorkshire and Durham, year ending March 2003 to year ending March 2016
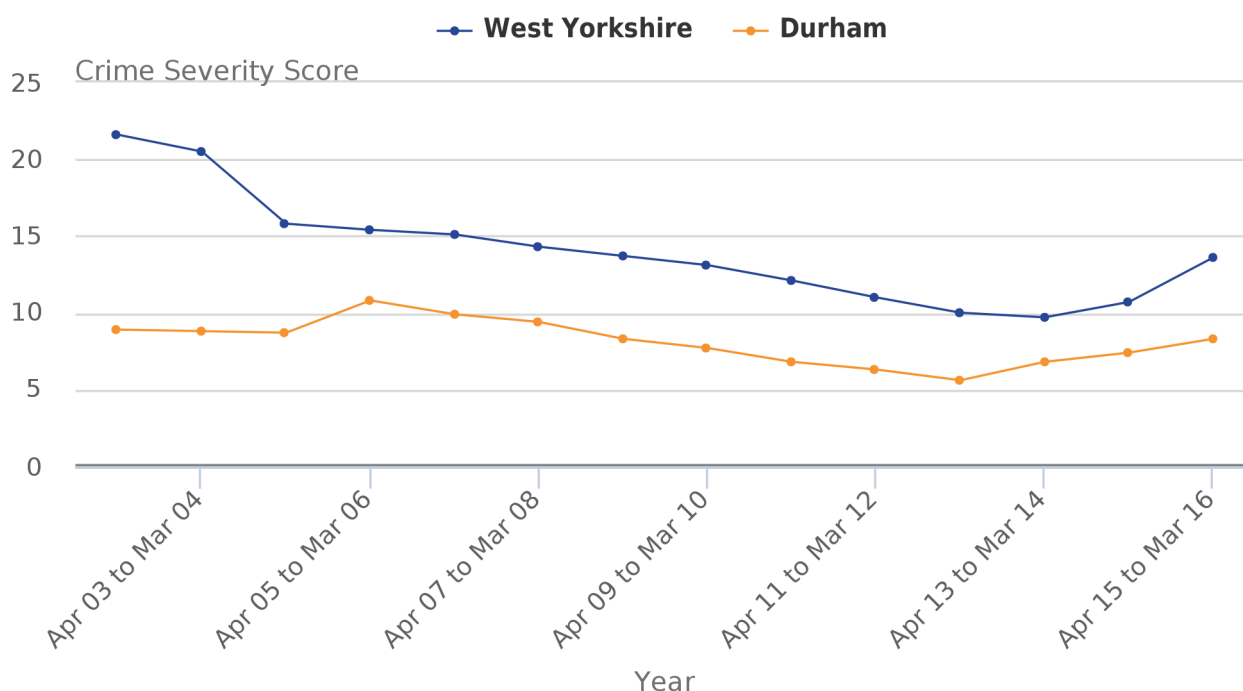
Source: Police recorded crime, Home Office

Notes:

1. Data based on police recorded crime are not designated as National Statistics.

The findings presented provide examples of the types of analysis that can be conducted using the Crime Severity Score. The tool published alongside this release enables you to explore that data for police force areas and regions. The underlying offence weights have also been provided, making it possible for analysts to reproduce results at a more granular level.

Notes for Research findings:

1. The Public Administration Select Committee (PASC) inquiry into crime statistics also highlighted concerns about the quality of crime recording processes and practices and following an assessment of crime statistics by the UK Statistics Authority, published in January 2014, the statistics based on police recorded crime data have been found not to meet the required standard for designation as National Statistics.

5 . Feedback

We are keen to receive feedback from users of our statistics on the Crime Severity Score; in particular we would be interested in responses to the following questions:

- Would the Crime Severity Score be a useful addition to the crime data published by ONS?

- Do you think there should be any changes to the methodology that has been used? Please explain your response.

- Would you use the Crime Severity Score? If so, how would you intend on using it?

- Is the data tool helpful in its presentation of the data?

- Should the Crime Severity Score
    - be published alongside existing measures as another headline measure

    - be made available alongside the existing measures but not as a headline measure

    - or not be included as a measure at all?

- Do you have any suggestions for further development of the Crime Severity Score?

- Do you have any other comments?

Please provide feedback by emailing crimestatistics@ons.gsi.gov.uk. You may wish to use the template provided . It would be helpful if feedback could be provided by the end of January.

6 . Annex 1: Proportional composition of unweighted offence rate and Crime Severity Score

Figure 5: Proportional composition of offence rate and Crime Severity Score for police recorded crime in England and Wales, year ending March 2016
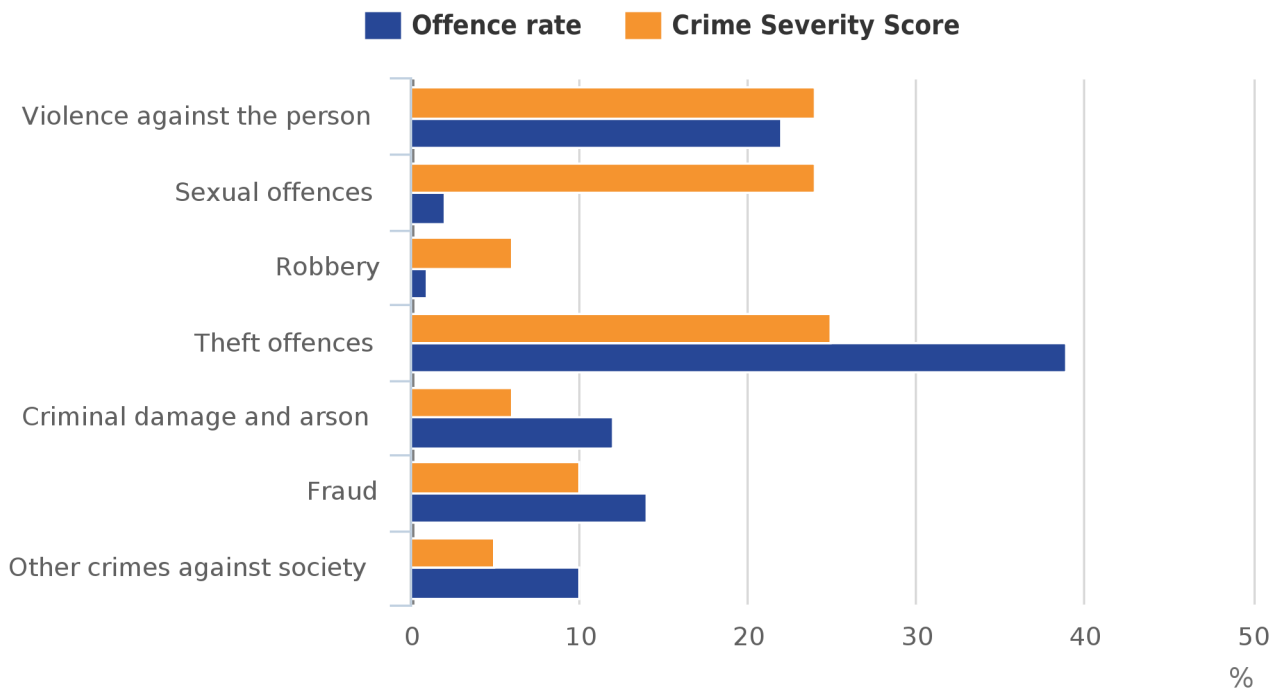
Source: Police recorded crime, Home Office

Notes:

1. Data based on police recorded crime are not designated as National Statistics.

7 . Annex 2: Proxy offences

For the following offences in Table 1, no sentencing data are available for the years ending December 2011 to December 2015 and proxy offences have been used; that is, the weight of a similar offence.

Table 1: List of offences requiring a proxy offence

Offence	Proxy offence
4.3 Intentional destruction of viable unborn child	4.2 Infanticide
90 Other knives offences	10D Possession of article with blade or point
62 Treason	62A Violent disorder
63 Treason felony	62A Violent disorder
68 Libel	67 Perjury (indictable only)

8 . Annex 3: Example of weight calculation: Shoplifting

Sentencing data, sourced from the Ministry of Justice (MoJ), have been used as the primary source for calculating offence weights.

In the MoJ sentencing data between 2011 and 2015, there were 358,955 people sentenced for "Theft from shops". Three groups can be identified from these data, according to the type of sentence they received:

Group A: 69,053 were given custodial sentences

Group B: 87,219 were given community orders

Group C: 62,731 were given fines

(other offenders received sentences which are not included in the calculation of the weights for the Crime Severity Score).

Group A

Total number of custodial days equals 3,898,541

Average custodial sentence length (days) is 56 (3,898,541 divided by 69,053)

Group B

In the sentencing guidelines the starting point for "Theft from shops" is a Band A fine; therefore we have set the community order equivalency as low, equivalent to 8 days in prison.

Group C

Total fine amount is £5,302,730

Average fine is £85 (£5,302,730 divided by 62,731)

Fine equivalency is 0.96 days in prison (85 divided by 88*)

*Daily income derived from national median pre-tax earnings using projected estimates from the Survey of Personal Incomes financial year ending 2013.

Sentencing rates, Groups A, B and C

A: Custody rate is 0.19 (69,053 divided by 358,955)

B: Community order rate is 0.24 (87,219 divided by 358,955)

C: Fine rate is 0.17 (62,731 divided by 358,955)

Calculating a weight using groups A, B and C

Weight equals (A: Custody rate multiplied by Average custodial sentence length)

plus (B: Community order rate multiplied by Community order equivalency based on guideline band)

plus (C: Fine rate multiplied by Fine equivalency based on average fine)

Weight equals (0.19 multiplied by 56) plus (0.24 multiplied by 8) plus (0.17 multiplied by 0.96)

The weight for shoplifting is 13.