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Article

The Cambridge Crime Harm Index: Measuring Total Harm from Crime Based on Sentencing Guidelines

Lawrence Sherman*, Peter William Neyroud** and Eleanor Neyroud***

Abstract The logic of simply summing crimes of all kind into a single total has long been challenged as misleading. All crimes are not created equal. Counting them as if they are fosters distortion of risk assessments, resource allocation, and accountability. To solve this problem, Sherman (2007, 2010, 2011 and 2013) has offered a general proposal to create a weighted 'Crime Harm Index (CHI).' This article provides and explicates a detailed procedure for operationalizing this idea in UK: what we call the 'Cambridge CHI.' The new elements of the Cambridge CHI presented here are (1) the use of the 'starting point' in the national Sentencing Guidelines to define the number of days in prison for each offence type; (2) the exclusion of proactively detected, previously unreported offences, and (3) a comparative analysis of the Cambridge and other approaches to weighting crime harm, judged by a three-pronged test of democracy, reliability, and cost.

Introduction

A count of all crimes has no specific meaning unless all crimes are created equal. All crimes are not created equal. Counting them as if they are fosters distortion of risk assessments, resource allocation, and accountability. Integrating all crimes in a weighted index represents a far more useful approach for resource allocation and crime prevention. Yet any change in a politically sensitive task such as measuring and weighting the harm from crime cannot be undertaken without a detailed methodology. At the same time, the method cannot be too complex to understand, too changeable to provide comparisons

over time, nor too expensive to be widely used. A new tool for comparing the overall harm of crime across times, places, and people requires a method that is democratic, reliable, and inexpensive: a three-pronged test we develop below.

The basic principle for a meaningful measure of crime is to classify each crime type according to how harmful it is, relative to all other crimes. This argument has already been made in general terms (Sherman 2007, 2010, 2011, 2013). Even if one accepts that proposal, the question remains of how to operationalize such a Crime Harm Index (CHI). The challenge this article addresses is to present

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and justify a method of adopting Sherman's proposal in UK, in comparison to other possible ways of doing so. To clarify the new methods we propose here, the article includes a demonstration of how a crime 'count' report can be supplemented by a crime 'harm' report that offers a very different picture of crime harm. What we offer is a low-cost, easily adoptable barometer of the total impact of harm from crimes committed by other citizens, as reported by witnesses and victims.

The basic method of this approach is to calibrate the harm of each crime reported to police, but only those reported at the initiative of crime victims or witnesses. Although [Sherman \(2013\)](#) was silent on this point, we propose here to create a Cambridge CHI that excludes proactively generated crime detection by police and organizational victims. The reason for that exclusion is that such crime reports (with 100% clearance by arrests) do not reliably measure harms experienced by the population. Rather, they measure the resources invested in catching offenders in predictable times and places in the act of predictable crimes with no specific complainants. The higher the arrest rates, the higher the crime rate. It is a perverse logic that would show crime is increasing solely because police succeed in making more arrests. On the principle that policing is an independent variable, which cannot be, simultaneously, a dependent variable, the Cambridge CHI excludes drug arrests, traffic arrests, shoplifting detected by store security officers, and similar detections.

Working only with offence types that police count reactively on the basis of citizen reports, the Cambridge CHI multiplies each crime event in each crime category by the number of days in prison that crime of that category would attract if one offender were to be convicted of committing it—as [Sherman \(2013\)](#) recommended. Crucially, what he did not specify in that recommendation is which part of the sentencing guidelines in each specific jurisdiction should be consulted to find the number of days imprisonment. No doubt this detail was omitted because the answer would be different in each

nation. Hence, the present proposal, by focusing only on UK, can specify and demonstrate the application of the general idea of a CHI.

For reasons explained below, the Cambridge CHI proceeds to define the number of days imprisonment based on the 'starting point' for sentencing. This means that the 'harm' value of the crime is associated solely with the offence type *per se*, without adjustment for prior criminal history or the circumstances of the particular offence (either aggravating or mitigating). The latter element is recommended solely on the basis of cost, since any other approach would cost tens or hundreds of millions to compute. It also means that the measure of crime harm to victims and society can be reliable from year-to-year, without regard to who is committing the crime or the criminal records of the offenders.

Whether a first time offender or a serial killer murders someone, the murder creates the same harm to the victims, his or her families, and communities. The actual punishment each offender 'deserves' to receive is a very different question from how much harm the crime has caused. It is that concept of harm, independent of culpability, which we aim to measure in the Cambridge CHI.

A long tradition of harm measurement

This approach to a metric based purely on the crime, without reference to the criminal, builds on a long intellectual tradition in criminology of identifying the issue. It also seeks to avoid past failures of that tradition in creating a practical enough solution to be adopted by governments.

[Sellin and Wolfgang \(1964\)](#), [Rossi *et al.* \(1974\)](#), and [Wolfgang *et al.* \(1985\)](#) used panel and public survey ratings of offence narratives to construct a weighted severity index that could be used to assess the community, victim, and offender harm of crime. The Home Office ([Pease, 1988](#); [Brand and Price, 2000](#)) produced research evaluating the

seriousness of crime and its costs. Citizens who rated Wolfgang *et al.*'s severity scale provided scores for minor crimes with low harm through to major crimes with high harm in such a way that the difference in the scale—72.1 to 0.2—amounted to a factor of more than 300 times the harm from top to bottom. Although this research was influential and important, none of the approaches were ever adopted by police or other agencies for operational use or (with a few exceptions) for official statistics.

There has been fresh interest in crime harm in the last few years for three main reasons. One is a continuing intellectual and philosophical search for a better basis for reflecting the harm caused to victims (e.g. Greenfield and Paoli, 2013). Another is the post-2009 climate of fiscal austerity and criminal justice budget cuts, as well as changing crime patterns; both have forced police to reassess their focus on 'traditional' crimes and crime counts and look for new ways to select priorities (Neyroud, 2015). A third reason is a renewed emphasis on the importance of harm reduction as a goal for law enforcement, equal to if not more important than justice, or order maintenance for its own sake (Sparrow, 2008). These three drivers suggest a number of different methods and rationales for answering the question 'how should we assess harm?'

Several specific approaches have been proposed, each of them with limitations:

- The 'assessment of harm' framework; Greenfield and Paoli (2013) have presented the most complex and comprehensive taxonomy and assessment process, but acknowledged that the challenge of implementing their approach is 'daunting' (p. 883). Their work delineated the potential direction for future research and provided a theoretical underpinning, but, even in their own analysis, did not provide a practical tool capable of use in an operational setting.
- The 'court records' approach: Francis *et al.* (2005), The Canadian Crime Severity Index

(Statistics Canada, 2015), and the New Zealand Justice Sector Seriousness Score (Sullivan and Su-Wuen, 2012) have all employed methods based on the court records of actual sentences handed down to offenders. However, as Sullivan and Su-Wuen pointed out, the severity of sentences passed will reflect many more factors, such as individual offender mitigation, than the pure harm of the individual offence.

- The 'crime victim survey' score: Ignatans and Pease (2015, this volume) have turned instead to victim judgments of seriousness derived from the Crime Survey for UK. They argue that this approach is better able to reflect the weight of harm in repeatedly victimized households. Although we agree that this would be a very useful addition to all victimization surveys, the major limitation of any survey is that it does not capture rare events of great seriousness, including homicide. It is therefore not possible to use any victimization survey as an overall bottom line for crime that shows differences across offenders and communities and times in how much harm from crime is associated with them.
- The 'sentencing gravity score': Ratcliffe (2015) sought to overcome this problem by using the offence gravity scores provided to judges by the Pennsylvania Commission on Sentencing. He argued that this method has the benefit of being both independent of the police (and, therefore, not subject to manipulation) and specific enough to allow weighting of individual offence categories. His analysis provided a compelling illustration of the potential of crime weighting in police prioritization and performance assessment. However, the weighting range proposed, between 14 points for a murder and 1 for a minor misdemeanor, is quite truncated when compared, for example, with Wolfgang *et al.* (1985), which ranges from 1 to 200. With this aside, Ratcliffe's

suggested model is closest to our own approach set out below. It demonstrates an aspiration we share to find an operational model that can meet a three-pronged test of suitability.

These are all important approaches, offering significant advantages over raw crime counts. Yet none of them pass a three-pronged test for making a rapid transition to standard practice, in which all three answers must be ‘yes’:

1. Does the metric reflect the resolution of conflicting viewpoints by a process adopted by a democratic government reflecting the will of the people (the ‘democracy test’)?
2. Does the metric provide a reliable measure that can be consistently applied to each unit of analysis—time, place, people—with the same results for the same levels of harm (the ‘reliability test’)?
3. Is the metric readily available at virtually no cost to be adopted without any new budgetary appropriation? (The ‘cost test’)?

Why are these three tests all essential? The gravamen of the argument is that passing these tests makes it more likely that the index will be adopted than if any of these tests cannot be met. While only time will show whether our hypothesis is correct, there is good qualitative evidence for claiming that each test is essential.

Democracy test

We suggest that in the absence of a legislated endorsement of the metric in some way, justice officials will be reluctant to accept any metric of severity. We have been told by police officers across Britain, Australia, and Latin America that they cannot use the CHI openly until government has approved it. These same police, however, have often gone to Ministers to request approval to do so. Their argument has been strengthened by the claim that elected legislators had already set in place a process that resulted in the metrics proposed. In UK, this means that Parliament decided to delegate

to the judges (and other experts) who constitute the Sentencing Council. That fact has made the argument far more palatable than if the metrics had been derived solely from academic research or public opinion without legislative digestion of those views.

Reliability test

The statistical principles of consistent measures across units are fundamental to the ‘accounting’ of crime harm. Although Canada may have violated those principles as a matter of law, there is no evidence that Canada has actually deployed its severity index (based on punishments actually imposed) in any practical or operational way. If the CHI is to be used in the ways we illustrate below, and as [Bland and Ariel \(2015\)](#) have already used it, there is an inescapable requirement of reliability of measures across units, without bias as to the demographic or other characteristics of each unit.

Cost test

As the UK enters its seventh year of ‘Austerity,’ little more needs to be said about any proposal than that it requires no new funding whatsoever. The Cambridge CHI can be calculated by citizens and officials alike with a pocket calculator, using only data that are already collected and published on a regular basis. Obtaining new money for a new system of crime statistics would require taking money away from preventing crime. A decision to do so seems highly implausible.

Using this three-pronged test, we show below how to use the robust process of developing sentencing guidelines (or statute) tariffs to incorporate multiple opinion polls, studies of economic and psychological costs of crime, sentencing precedents, and even a threat of legislative intervention. Once the idea of an official price-list of harm from crime is enshrined as the law of the land, it gains legitimacy beyond the reach of any social science research. That is why we recommend sentencing guidelines, at least in jurisdictions that have adopted them, and the midpoint of statutory ranges where that is the

only national mandate. Furthermore, that is why we recommend that UK be used as a model for all other nations, since it provides a pure measure of harm in its 'starting point' tariffs.

In making this recommendation, we take particular note of the 'court records model' set out above, in which actual sentences are used, rather than recommended sentences based on guidelines. Although there are other issues with the 'court records' approach, the major obstacles to its widespread adoption are costs, complexity, and reactivity. The cost and delays associated with measuring actual sentencing practice across a large country will always make it more difficult than simply applying a menu price list that has been hammered out for years by a sentencing commission, or even a legislature setting statutory sentences. At the same time, the pattern by sentencers of reacting to shifting news media attention on specific kinds of crimes shakes the year-to-year reliability of actual sentences as a consistent metric of suffering caused by criminal conduct.

The case for regulatory or statutory sentencing guidelines rests on their origins in a democratic compromise on both the symbolic and instrumental harm of each crime type. The legitimacy of the processes producing those compromises should allow public officials to employ it widely as a supplement, or even a substitute, for crime counts. The use of a fixed legal framework should also simplify the task of policy analysts examining the costs and benefits of different crime policies.

Our prediction that this approach can be widely adopted is supported by the rapid application of this approach in numerous crime analyses in the UK in recent years, especially by police agencies, including those in Suffolk, West Midlands, Hampshire, and Durham and London. Its recent use in the analysis of domestic violence patterns in Suffolk (Bland and Ariel, 2015) is instructive: 1.77% of couples coming to police attention over 6 years generated 80% of all of the CHI values in the population of some 25,000 couples with some 36,000 callouts. There is no other feasible way by

which such a conclusion could have been reached without massive funding; the study was actually done without any funding beyond a master's degree bursary from the College of Policing and Suffolk Constabulary.

The further attraction of this approach is its offer of far greater clarity for evidence-based policies. The sentencing metrics provide a standard 'bottom line for crime' in a wide range of cost-effectiveness comparisons of alternative strategies. The clarity applies equally to targeting, testing, and tracking resource allocation by police, prosecutors, sentencers, offender managers, and a wide range of government bodies and decisions—from education and social services to housing construction codes.

The wide potential application of CHI values can also measure national trends in public safety year-on-year, making annual comparisons in safety and performance across police forces, cities, and neighbourhoods. The CHI can also provide consistent comparisons across individual offenders being arrested, prosecuted, and sentenced, and the match (or mismatch) of police and justice resources between investments in areas or offenders of differing CHI values. It could, for example, drive the allocation of funding to police, prosecutors, and probation based on the CHI value of their caseloads. In the process, it could foster more crime reduction per pound or dollar spent.

Admittedly, the use of CHI values in resource allocation might alter the incentives to 'game' and distort crime data. To the extent that CHI emphasizes a smaller number of highly visible crimes, such as murder and rape, it would increase the risk of fraudulent misclassifications in those offence types. On the other hand, the high weight and low volume of those offence types could make it cheaper to audit crime reporting integrity. If officials knew that they ran a much higher risk of being audited for more serious crimes (such as rape), they might well bend over backwards to avoid any gaming. This question should certainly be studied in a force in which a CHI is adopted, but there is no

certainty that it will make temptations to game crime reports any different.

The problems of weighting crimes equally

Whatever the imperfections of a CHI approach, the greatest argument for it is its improvement over raw crime counts. The problems of the present system of counting police-recorded criminal events as if they are equal have several separate dimensions:

1. There is no meaningful, 'bottom line' indicator of whether public safety is higher or lower in any year, place, offender's record, or agency caseload.
2. High volume, low seriousness crimes are disproportionately influential in driving crime counts up or down. The impact of shoplifting on total crime in UK in 2012/2013 was 560 times greater than the influence of murder (308,325 recorded shop-thefts compared with 551 murders).
3. Total counts of crimes, as distinct from crimes reported solely by individual victims and witnesses, include crimes detected solely or mostly by proactive police or corporate enforcement (e.g. shoplifting arrests by private retail detectives), which can be driven up or down by state action rather than by the behaviour of criminals. In 2012/2013, for example, over 15% of recorded crimes were proactively detected thefts or minor drug possession arrests, none of which were reported to police by personal victims or unpaid witnesses.
4. If the economy leads police agencies or large private sector organizations to reduce investments in proactive enforcement, it can indicate a decline in crime counts even when crime harm may be rising precisely because of such reductions in proactive enforcement.
5. The management of offenders may be distorted by the tendency of prolific offenders to have relatively modest levels of seriousness, while very

serious offenders may have very few convictions. Prosecutors, judges, and offender managers may be misled by a 'blink' reaction to volume, without a valid means of assessing seriousness by looking at the bottom line for crime for each offender's life to date.

6. Police face identical problems with counts in comparing areas within their jurisdictions at the same point in time, or changes over time within areas.

The logic of any CHI

This article builds on the logic of a hypothetical construct: the number of days in prison that crime would attract if one offender were to be convicted of committing each crime. The fact that this hypothetical has never happened anywhere is irrelevant to the logic of the proposal. What is relevant is the consistency obtained from a single metric to reliably estimate a harm level in any unit for comparison to the harm level in any other unit.

An index approach

Combining crime in this way would create what statisticians call an 'index' that yields a single bottom line of overall value, rather than of the number of components of different values. In a business context, it is comparable to replacing a count of sales transactions with the total revenue from all sales of items with widely varying prices. From a taxpayer-as-consumer standpoint, the index approach to crime reporting is more like a Consumer Price Index (CPI). That index takes the cost of consumer goods in different categories (food, housing, transportation), then assigns a weight to those costs based on the average household's budget proportions for each category. If housing costs rise 10%, but housing is only 33% of family's budget, then the housing increase of 10% becomes a 3.3% increase in the total CPI. Similarly, a CHI is a tool for creating just such a

bottom line for the harm caused by crime (Sherman, 2007, 2010, 2011, 2013).

Choosing the best metric

The logic of a legally fixed judgment about the severity of crime can be found from different sources in different countries. Our proposal for UK is to use the simplest, most transparent and stable metric that is also the least expensive. It costs only the time to add two more columns to every crime spreadsheet. That metric is the sentencing guidelines' 'starting point' recommendations of the number of days in prison for a first offender convicted of that offence. This would give an approximation of the weight of harm of the offence itself, in contrast to the actual sentence length an offender may receive—the latter being influenced by the number of prior convictions of the offender, the offender's willingness to indicate an early guilty plea and any specific mitigating and aggravating factors.

Most important, the use of sentencing guidelines as the metric for a CHI offers the lowest cost and greatest speed. It is readily available to be applied to any set of crimes, whether for an individual, a community, or a nation.

CHI based on guidelines in UK

The central requirement for applying sentencing tariffs to the crime weighting for a CHI is consistency. This means, at minimum, that the weighting should not consider the characteristics of the offenders who commit the crime. Public safety is harmed just as much by a robbery committed by a first offender or a robber with 50 prior convictions. We have therefore considered two different options to achieve consistency without new costs. One is to use the highest available sentence for each crime as the weighting factor; the other is to use the 'starting point.' We reject the first and recommend the second.

There are several problems with using maximum penalty. One is that the maximum is very rarely used, and is driven by rare cases, not typical ones. The maximum would therefore not reflect the mean or median seriousness of an individual offence. In some ways, this model would replicate some of the criticisms of the unweighted model: a milk bottle theft would still be a relatively serious offence given a weighting for the maximum tariff for all theft.

Our proposal is to use the 'starting point' guideline for each offence. The choice of this point is made on the assumption that each crime is committed by a previously unconvicted offender with no aggravating or mitigating factors. Although that is also a distortion of the characteristics of the offenders and offences, the advantage of this approach is that it provides a more consistent metric for each offence type. Supporting that claim requires a brief explanation of how these guidelines are applied by sentencers.

English–Welsh sentencing guidelines provide sentencers with a table with three ranges of sentencing, one reflecting the basic offence without aggravation or mitigation, a second reflecting a mid range offence with some aggravation, and a third embracing the most serious manifestations of the offence. The tariffs are described without reference to the offender's prior crimes, on a presumption of sentencing without a prior record or any aggravating or mitigating factors. These are only added once the sentencer has decided where the facts of the offence place the offender on the 'starting points.' Using the first rung of the ladder as the weighting point for the offence means that a CHI would reflect the nature of the offence, rather than the offender, and would allow a substantial differentiation between, for example, a murder and a bicycle theft.

On this basis, we propose—and illustrate below—the Cambridge CHI constructed as follows:

- For each offence, we have identified the lowest starting point for an offence for a previously unconvicted offender.

- The number of years or days imprisonment has been converted in to a total number of days. Thus for murder, 15 years has been converted in to a weighting derived from the number of days until the offender must serve in a minimum tariff before eligibility for parole.
- Where the minimum tariff is a period of days or hours Community service, the days/ hours have been converted into number of days.
- Where, as with theft, the starting point is a fine, we have calculated the weighting by assessing the number of hours/days it would take to earn the money to pay the fine while working for the minimum wage for an adult.

This 'Beta' version of the Cambridge CHI that we have developed so far for demonstration purposes has applied these weightings to a set of aggregated crime categories. The accuracy and discrimination of the approach could be enhanced in future versions by:

- Applying the same approach to more disaggregated categories; for example, dividing assaults, sexual crimes, and theft in their crime recording sub-categories.
- Adding a banding similar to the sentencing guidelines (serious, mid-range, and least serious) to the sub-categories. This would allow a greater discrimination between the most serious types of a particular category of offences and the least serious.
- Separating out specific kinds of victims, such as in crimes comprising domestic violence or crimes against children, applying a separate weighting from the sentencing guidelines.

Example

In order to demonstrate the difference between measuring changes in public safety, [Tables 1 and 2](#) show how a selected list of crime types (covering

almost all counted crimes) compares over 10 years between crime counts and the Cambridge CHI. The tables show that from 2002/2003, the crime count for those types dropped by 37% (from 5,151,767 to 3,229,586). The CHI, in contrast, only dropped by 21% (from 147,835,399 imprisonable CHI days to 117,835,466). If harm is our metric, then the crime count over-estimated the drop in crime impact, or the increase in public safety, by 76% relative to the proportional drop in CHI.

The pie charts that follow the tables also reveal the different composition of crime counts versus CHI days as indicators of public safety. [Figure 1](#) shows that the 16% of the crime count in 2003/2004 consisted of nonviolent offences. [Figure 2](#) shows that the 76% of the CHI for the same period consisted of violent offences. This does not suggest a new choice in what the justice system designates as threatening to public safety. This difference merely reflects the existing guidelines that have been agreed on the basis of extensive consultation and research on public opinion.

Benefits

A focus on CHI values rather than crime counts would provide far greater clarity for evidence-based policies, ensuring a standard 'currency' for cost-effectiveness comparisons of alternative strategies of targeting, testing, and tracking resource allocation by police, prosecutors, sentencers, offender managers, and a wide range of government policies—from education and social services to housing construction codes.

The targeting of scarce resources against crime can be compared with an investment portfolio. Like police and justice agencies, investors have a variety of objectives, such as growth, income, and security. Like police, investors make a variety of investments to accomplish these different objectives. Like police, investors face an endless array of choices about how to invest scarce resources. But investors have one great advantage over police

Table 1: Crimes in UK 2002/2003

Crime type	Subtype	Total number	Starting point sentence days	Total CHI sentence days
Homicide		1,047	5,475	5,732,325
GBH	Intent	18,016	1,460	26,303,360
ABH		347,353	20	6,947,060
Assault		237,549	1	237,549
Rape		12,925	1,825	23,588,125
Sexual Assault		29,407	365	10,733,555
Robbery		110,271	365	40,248,915
Burglary	Dwelling	437,583	20	8,751,660
	Non-dwelling	452,516	20	9,050,320
Vehicle	Theft of	306,947	20	6,138,940
	Theft from	663,679	2	1,327,358
Theft	Theft from Person	148,488	20	2,969,760
	Shop	310,881	2	621,762
	Other	647,827	2	1,295,654
Criminal Damage	Arson	53,552	33	1,767,216
	Other	1,060,920	2	2,121,840
Fraud		312,806	20	6,256,120
Total		5,151,767		147,835,399

Table 2: Crimes in UK 2011/2012

Crime type	Subtype	Total number	Starting point sentence days	Total CHI sentence days
Homicide		553	5,475	3,027,675
GBH	Intent	17,777	1,460	25,954,20
ABH		301,223	20	6,024,460
Assault		202,509	1	202,509
Rape		16,038	1,825	29,269,350
Sexual Assault		22,057	365	8,050,805
Robbery		74,688	365	27,261,120
Burglary	Dwelling	245,312	20	4,906,240
	Non-dwelling	255,736	20	5,114,720
Vehicle	Theft of	85,803	20	1,716,060
	Theft from	300,377	2	600,754
Theft	Theft from person	100,588	20	2,011,760
	Shop	308,326	2	616,652
	Other	491,559	2	983,118
Damage	Arson	27,219	33	898,227
	Other	598,798	2	1,197,596
Fraud		181,023	20	3,620,460
Total		3,229,586		117,835,466

that makes the investors' job much easier: a common currency. Police can have a common currency as well, but only if the governmental framework allows them to use one. The specific ways in which it can be used are illustrated below.

Specific uses

CHI values can more meaningfully measure national trends in public safety year-on-year, annual comparisons in safety and performance across police forces, cities, and neighbourhoods, across individual offenders being arrested, prosecuted, and sentenced, and the match (or mismatch) of police and justice resources between investments in areas or offenders of differing CHI values. It could, for example, drive the allocation of funding to police, prosecutors, and probation based on the CHI value of their caseloads.

Example: home office grants to 43 agencies

The current system for allocating national revenues to local policing lacks both transparency and

consistency. Recent attempts to change the model using ACORN data were extremely controversial (Police Professional, 2015) and illustrated the volatility, complexity, and low transparency of such approaches. Introducing a CHI would provide an opportunity to debate and adopt new principles for those allocations. The basis of a reallocation of police funding, but not the final decision, could be the CHI total or trends for each force. This metric of the level of harm in the force area each year could be averaged over 5 years, in order to increase reliability of the estimates despite large effects from small fluctuations in certain high-tariff crimes such as robbery. In order to be clear about the current state of harm in each area, the CHI calculations should be based only on events that occurred within the time-frame. That rule would prevent an estimation bias from a spike of reports about crimes alleged to have occurred decades earlier.

A further issue in comparing across and within jurisdictions over time is adjustment for population size. Biases for or against larger jurisdictions

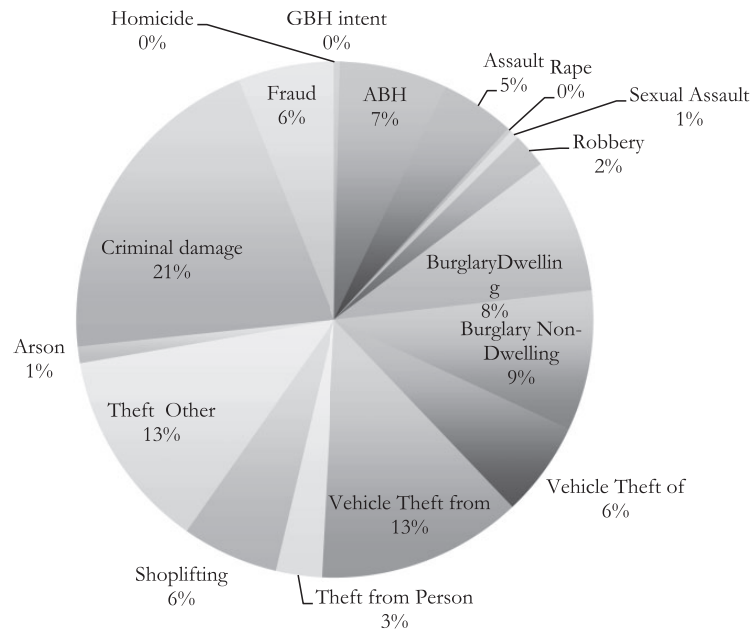


Figure 1: Crime in UK 2002/2003 by number of crimes.

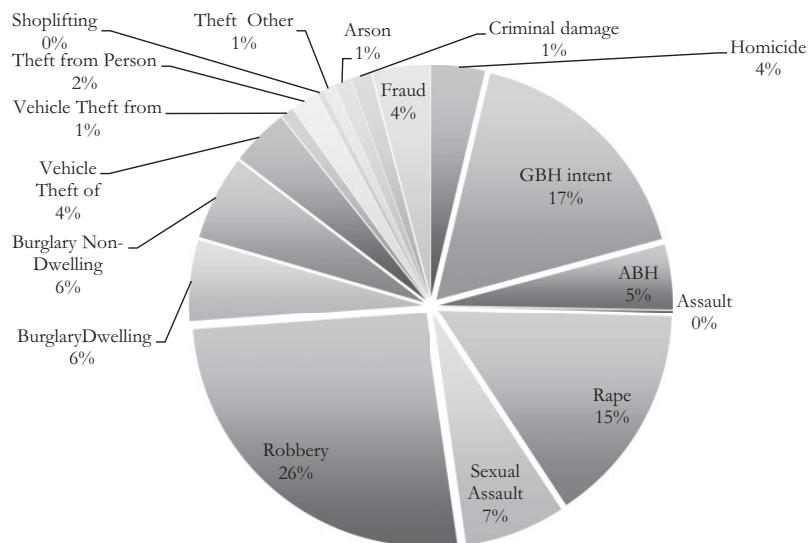


Figure 2: Crime in UK 2002/2003 weighted using the CHI.

can be avoided by dividing CHI values by the number of persons resident in each jurisdiction in each year, based on Census data and recent trends.

CHI per 100,000 population would be an appropriate metric for these, if not all, community-level purposes.

Geographic analysis of CHI versus patrol delivery

This analysis can now be done in every force using GPS monitors in radios or cars, showing the ratio between the CHI distribution across all land in the force area and the patrol time distribution. Crime mapping and GPS systems would make this a low-cost analysis to perform, and could also encourage police forces to allocate patrols more precisely in order to apply the conclusions of over 25 hot spots policing experiments, including 3 in UK, showing that the greater the time police and PCSOs spend patrolling high-crime places, the lower the crime rate.

Temporal analysis of CHI versus patrol delivery

This would be a similar analysis based on time of day and day of the week, without regard to location. That could reveal what HMIC has already identified as the widespread problem of under-staffing high CHI times and days, while over-staffing low-CHI weekday times. The research evidence suggests a closer match in time would reduce crime.

Investigative analysis of CHI by investigative time

The use of CHI could encourage a controversial discussion of how best to allocate investigative time. While there is good evidence that crimes differ in their solvability, there is not yet evidence that more time on solvable, or high-CHI, cases will increase convictions or help reduce crime. Using CHI to assess investigative resource allocation could stimulate further research on cost-effective investigations for crime reduction.

Recidivism analysis of CHI per offender

Compared with the baseline offending scores prior to police intervention, this analysis could combat the historic perverse incentives of giving police a 'tick' for making arrests that are often cautioned or given No Further Action. If incentives existed to handle each case in a way that reduced the CHI level of each

offender's recidivism, the entire performance regime would turn towards crime reduction in a far more nuanced way. The Turning Point Project in West Midlands is an excellent example of this approach, in which police can take credit for not prosecuting first offenders by negotiating offender management plans under threat of prosecution as an alternative (Neyroud and Slothower, 2015). In addition to standard measure of recidivism, the experiment compared CHI levels of recidivism between those handled in that manner versus those randomly assigned to be prosecuted (from a pool of cases that are 100% approved by CPS for prosecution). If police learn how to reduce CHI levels of recidivism, that evidence can provide further guidance for responding to a CHI-based assessment process by HMIC, PCCs, or any other authority.

Any individual-level analysis of CHI, of course, must be adjusted for time at risk, just as jurisdictional CHI rates should reflect population size. Individuals cannot be compared on their CHI values very fairly unless their time at risk since age 18 years is held constant. If records can or will be computed from age 10 years, then that age would be the benchmark for any adjustment. The point is to avoid comparing absolute CHI values between older and younger offenders, when the older ones have had far many more days in which to commit crimes. By comparing the CHI values per 100 days since turning age 18 years, the comparisons will show a meaningful difference (if any) between offenders with fewer or greater convictions.

CHI arising from repeat domestic violence incidents

Much the same can be said about protecting victims of domestic violence. The use of predicted versus actual CHI in police handling of domestic abuse cases would change incentives away from a mere 'tick' to a focus on how to make life better for victims, or at least to reduce serious harm. No current system of monitoring domestic abuse in this country even compares police units based on CHI levels in recidivism, let alone comparing predicted to

actual levels. Such a change in incentives and measurement could encourage police to put greater emphasis on evidence-based strategies for reducing harm to victims.

CHI arising from repeat anti-social behaviour calls

Some police forces have identified their repeat ASB cases. Yet the metric for success is crude: whether or not further calls occur. The issue is not whether police must return to a location. The issue is whether someone gets hurt, and how much harm they may suffer. Using a CHI, rather than a count, will offer police the right kind of encouragement for trying to find more effective solutions and not just manage the risk of criticism if high harm events do occur.

Completing the funding process

The complexity of the analyses suggested above demonstrates that no single funding formula is likely to make sense without field-testing the process. Just as heart surgeons negotiated the criteria for publishing their risk-adjusted patient death rates in open-heart surgery in New York in the early 1990s, chief constables and Police and Crime Commissioners would want to be consulted about how this radically new framework would work. Consultation can be about how, rather than whether, to deploy this toolkit of analyses. Even if that consultation occurs over 5 years, it would result in substantial progress towards focusing on CHI levels rather than crime counts. That, in turn, could sharpen the issues and choices around the settlement on a final funding formula that could guide the HMIC or Home Office in assessing the efficiency and effectiveness of each police agency.

Conclusion

This article is the first published specifications for how to operationalize Sherman's (2013) general proposal for a CHI. Our statement of methods for the Cambridge CHI can be put into immediate

practice in UK, as they have been already in a growing number of British police agencies connected to the Cambridge [Police Executive Programme](#). Bland and Ariel (2015), Weinborn et al. (2015), and other researchers have already put the Cambridge CHI to good use. Even studies in other countries have applied the Cambridge CHI in the absence of a well-developed local CHI—and in the process, stimulated the development of local CHIs in Uruguay, Western Australia, and elsewhere. Addressing issues as diverse as patterns of repeat domestic violence and the concentrations of CHI values in 'harm spots' (that can supplement 'hot spots' of crime counts), they have shown the clarity of using a single index rather than displaying multiple crime types. This clarity may not always be welcomed, especially when it is convenient to pick and choose crime types to shape a story about whether crime is better or worse. Yet both police and criminologists may find this clarity irresistible. It is only with a weighted index, in the form of the Cambridge CHI, that UK may finally be able to reach conclusions about crime that other methods cannot reach.

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