The Potential Impact of Changes in Burden of Proof to Determine Suicide in Ireland

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Abstract: This paper considers the potential impacts of changing the burden of proof for determination of death by suicide in Ireland. It reviews origins of the burden of proof standards for suicide, considers evidence and pathways of impact, and then estimates the potential impact empirically using a difference-in-difference (DiD) approach which exploits the quasi-experimental nature of the change in policy in England and Wales versus Ireland. Findings suggest estimated increases of about 8-20% in deaths attributed to suicide due to the change which would make suicide the leading cause of death for a number of age and gender groups.

Keywords: suicide, burden of proof, beyond a reasonable doubt, difference-in-difference

1. Introduction

Suicide is an important social and mental health issue across the globe. According to the World Health Organization (WHO), globally over 700,000 suicides occur annually.[1] Besides by scale, suicide impacts differ among groups, with a higher prevalence among lower income groups, males, and young age groups. In OECD countries, suicide represented 1% of all-cause mortality (2021), while suicide's share of mortality is larger in selected countries such as Ireland (1.5% in 2020) and England and Wales.

There are stark contrasts in suicide rates by gender with males universally having circa double the rates compared to women. These rates are again influenced by age. In Ireland, suicide represents nearly half (43%) of the deaths for young males 20-24 in 2020.[2]

Other unnatural causes of death such as road accidents have been dramatically reduced over time in the EU, Ireland, and the UK. However, in Ireland, while suicide rates have fallen recently, road accidents increases have dominated attention in the press with the increase from 155 to 184 (195) from 2022-23 receiving much attention, whereas provisional 2022 suicides in Ireland were 412 in 2022, while updated numbers were 504 in 2020 (CSO figures). These last figures illustrate a point of particular interest, i.e., the long lead-time to finalise suicide statistics.

From 2018 to 2021 suicide (intentional self-harm) was one of the leading causes of death in Ireland; indeed it was the leading cause for those aged 10-19 and was just behind the leading cause for those aged 20-29. Suicide was the 16th highest cause of death overall and it was 32nd for those over 60 (15th and 31st respectively excluding COVID-19). A classification change will likely reorder the table for some age categories. For example, for those age 20-29, 40-49 and 60+, there are very small gaps to the next highest cause. Changes are also possible in the categories of 30-39 and 50-59.

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[1] See https://www.who.int/news-room/fact-sheets/detail/suicide.

[2] Irish Times, https://www.irishtimes.com/ireland/social-affairs/2023/11/14/suicide-most-common-cause-of-death-among-people-aged-15-to-34/ "Seán O'Connor, "There were 74 deaths of males aged 20 to 24 years in 2020, and 43.2 per cent of these were due to suicide. This was the highest proportion of deaths due to suicide by age cohort for males."

Table 1. Leading causes of death(#) in Ireland 2018-21 by age group[3]

Rank	*10 - 19 years*	*20 - 29 years*	*30 - 39 years*	*40 - 49 years*	*50 - 59 years*	*60 years and over*
1	Intentional self-harm (92)	Accidents (289)	Accidents (472)	Malignant neoplasms (1,298)	Malignant neoplasms (3,677)	Malignant neoplasms (32,562)
2	Accidents (72)	Intentional self-harm (287)	Malignant neoplasms (378)	Accidents (603)	Ischaemic heart diseases (1,090)	Ischaemic heart diseases (15,306)
3	Malignant neoplasms (59)	Malignant neoplasms (101)	Intentional self-harm (320)	Ischaemic heart diseases (376)	Accidents (512)	Other forms of heart disease (7,413)
4	Cerebral palsy and other paralytic syndromes (13)	Ill-defined and unknown causes of mortality (24)	Diseases of liver (98)	Intentional self-harm (367)	Diseases of liver (400)	Organic, including symptomatic, mental disorders (7,323)
5	Other forms of heart disease (12)	Episodic and paroxysmal disorders (22)	Ischaemic heart diseases (89)	Diseases of liver (258)	Intentional self-harm (340)	Chronic lower respiratory diseases (6,410)
6	Metabolic disorders (10)	Other forms of heart disease (21)	Other forms of heart disease (50)	Other forms of heart disease (128)	Other forms of heart disease (263)	Cerebrovascular diseases (5,918)
7	Episodic and paroxysmal disorders (9)	Cerebral palsy and other paralytic syndromes (14)	Ill-defined and unknown causes of mortality (46)	Cerebrovascular diseases (127)	Cerebrovascular diseases (250)	COVID-19 (4,810)
8	Congenital malformations of the nervous system (8)	Cerebrovascular diseases (14)	Cerebrovascular diseases (33)	COVID-19 (65)	COVID-19 (193)	Influenza and pneumonia (3,654)
9	Ill-defined and unknown causes of mortality (8)	Ischaemic heart diseases (13)	Episodic and paroxysmal disorders (29)	Influenza and pneumonia (44)	Chronic lower respiratory diseases (165)	Other degenerative diseases of the nervous system (2,492)
10	Diseases of myoneural junction and muscle (7)	Influenza and pneumonia (11)	COVID-19 (26)	Pulmonary heart disease and diseases of pulmonary circulation (43)	Influenza and pneumonia (91)	Diabetes mellitus (2,167)

Source: Author's elaboration of CSO table VSA29

While suicide deaths overall may seem small relative to causes such as cancer and heart disease, a suicide is often perceived as a preventable death and the impacts can be greater using other metrics such as total life years lost, since suicide impacts groups such as young people more who are less likely to

[3] The table was generated by aggregating CSO data on deaths in Ireland (2018-21) into the second highest level of aggregation using ICD-10 classifications. This level of aggregation uses suicide (X60-X84 - intentional self harm) as entered. In this way, the level of aggregation is consistent with ICD-10 and compares 'causes' on like-for-like levels of aggregation for ranking purposes. The only change in aggregation was that COVID-19 (U07) was disaggregated from U00-U49.

have other significant co-morbidities. Considering subgroups of the population which are not likely to experience mortality associated with old age and major diseases (e.g., cancer, heart disease), gives a starker picture. In Ireland, suicide is one of the most common causes of death for people aged 15-34. Besides the various social and economic costs, suicide's impact on society is perhaps easily undervalued due to mental health and other impacts on the bereaved.

While prevention of major mental health and social issue such as suicide is challenging, evidence suggests a variety of approaches can have significant impacts. Extensive literature shows a variety of types of interventions, such as national awareness campaigns. Large (2018) [4] reviews the literature and classifies interventions by the scale of intervention group, but importantly considers risk factors. Large (2018) usefully classifies interventions as "universal" (targeting whole populations), "selective" (targeting higher-risk groups), and "indicated" (protecting individuals).[5] Large (2018) discusses various issues with the different approaches and some key conclusions on improving prevention include identifying risk-factors, problems with underestimating deaths, and 'false positives' in prediction.

The burden of proof to determine suicide arguably impacts numerous items in the nexus of data and prevention. Besides reducing the overall estimated number of suicides, it may shift the focus of risk factors, the order of importance of mortality among groups (e.g., young males' preventable accidental death), widen the confidence interval of prediction, or slow the rate of recognising official statistics and trends.

The nature of the burden-of-proof standard as an issue in suicide prevention and policy is complex, but the potential negative impacts of underestimating suicides, in aggregate or for particular sub-populations, are significant. Moreover, besides likely underestimating the totals, the socio-demographic make-up of the population may vary between the two standards, suggesting other prevention strategies. Suicide awareness and prevention groups have highlighted this issue. For example, Samaritans state, "Trustworthy data about suicide is essential for understanding the scale of suicide, identifying those most at risk and evaluating the effectiveness of interventions to prevent suicide."[6] They list as an action point, "Revision to standard of proof used by coroners in the Republic of Ireland to 'the balance of probabilities'."

Overly high burdens of proof can result in the number of suicides being underestimated, reducing the accuracy of suicide statistics. In the UK, the standard of proof required for a suicide conclusion is 'the balance of probabilities', whereas in the Republic of Ireland it is 'beyond reasonable doubt'.[7] Besides the differences in the standard of proof for a coroner, there are also differences in the reporting official statistics of suicide between the UK nations and Ireland.

The burden-of-proof differences across countries also impacts the difficulty of international comparisons. A very general problem exists in determining suicide versus accidental/unintentional death, but legal differences between countries make comparisons more challenging. Nonetheless, OECD countries such as Ireland, Australia, New Zealand, Canada, and the USA, share English common law principles of jurisprudence for burden of proof, namely, the civil standard (preponderance of the evidence) or criminal standard (beyond a reasonable doubt). The beyond-a-reasonable-doubt standard has its origins in legal doctrine related to criminal law and that suicide was considered (in the past) to be a form of self-homicide. Moreover, legal doctrine is intertwined with religious and moral-philosophical doctrine which previously created the beyond-a-reasonable-doubt standard.

Currently, Ireland and New Zealand retain the beyond-a-reasonable-doubt standard, while Australia, Canada and the USA maintain a preponderance-of-the-evidence standard. Canada changed their standard in 2009 from the criminal standard to the civil standard. England and Wales recently changed their standard by way of Maughan (2018)[8]; Maughan subsequently applied throughout the UK.

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[4] Large, M. M. (2018), "The role of prediction in suicide prevention." Dialogues Clin Neurosci. 2018 Sep;20(3):197-205. doi: 10.31887/DCNS.2018.20.3/mlarge. PMID: 30581289; PMCID: PMC6296389.
[5] *Op Cit,* page 1.
[6] Samaritans (2023), "Understanding Suicide Statistics for the UK and Republic of Ireland", page 10.
[7] *Op Cit,* page 11.
[8] R v Maughan (Northern Ireland), Case ID: 2020/0103.

Charitable organisations such as HUGG, Samaritans, and others have been advocating for a lowering of the burden of proof to preponderance of the evidence. A proposition of charitable agencies and stakeholders is that lowering the burden of proof in Ireland would have a positive policy benefit to raise the 'official' rate in the country and focus policy and minds and funding, and further promote better comparability of data across countries, better comparability over time within the country (e.g., potentially reducing lags to obtain official counts), and thus have a positive impact overall on reducing suicide rates. While this is a debate *per se*, it is notable that research suggests universal/broad-based national campaigns on awareness and prevention have been successful in reducing suicide rates.[9]

Nonetheless, the implications in costs and benefits of a change in the burden of proof should be considered carefully. Families of the deceased and insurance providers may have competing economic interests in the burden-of-proof standard which applies, while aspects of grief and bereavement may be exacerbated by one verdict versus another (e.g., intentional vs. accidental).

Given the importance of suicide globally and in Ireland; the differences across countries and the policy levers of the burden of proof; and the potential trade-offs and different interests/points of view in adapting one burden vs another, it is important to conduct careful study of the problem and use any existing evidence or comparisons across countries to inform decisions. Difficulty in making policy-relevant conclusions and interpreting statistics across time and space requires careful use of non-experimental and/or quasi-experimental econometric methods. While this paper is far from a full cost-benefit analysis, the main purpose is to review and understand the antecedents of the standard and then empirically estimate the potential impacts of a change.

A key aspect of the paper is to exploit the change in the burden of proof from the criminal to civil standard in England and Wales while no change occurred in Ireland.[10] This represents a classic set-up of the difference-in-differences (DiD) model. The method is used where one group or area receives a 'treatment' (policy change), while the other does not (no policy change). If the assumptions of the model are met, most importantly parallel trends (the time trends in outcomes must be similar before the policy), then causal inference can be made.

We use both aggregate suicide registrations/rate data by sex and year, and data classified by International Classification of Diseases (ICD) category by age, sex, and year, and consider the estimated impacts of the policy change on both deaths and undetermined causes.

The remainder of the paper is organised as follows. The next section reviews the literature, starting with the legal and historical origins of the standard. Then consideration of the current legals status and existing prior studies are examined. Finally, the DiD analysis is presented and then discussion and conclusions are made.

2. Review of literature

2.1 Legal origins

Debating the burden-of-proof standard for suicide determination requires understanding of the origins and evolution of the standard. The beyond-a-reasonable-doubt standard has its roots in criminal law. A brief review of why suicide was considered a crime *and* the basis of the standard of proof is thus needed. As Whiteman (2008) argues, "In order to make sense of our law, we have to dig deep into its past."[11]

Suicide was considered a crime in western Christian society likely due to three reasons: Greco-Roman philosophy that guided Christian theology; the political philosophy that guided feudal sovereign power; and the economic needs of feudal society. The origins of social, legal and political thinking on suicide in western society begin with Socrates, Plato, and Aristotle. All viewed suicide as potentially of two

[9] Ishimo M-C, et al. (2021), "Universal interventions for suicide prevention in high-income Organisation for Economic Co-operation and Development (OECD) member countries: a systematic review" *Injury Prevention* ;**27**:184–193. doi:10.1136/injuryprev-2020-043975

[10] We also compare to NI using the same method, but NI-RoI did not satisfy the parallel trends assumption.

[11] James Q. Whitman What Are the Origins of Reasonable Doubt?, History News Network, George Mason University, February 25, 2008. http://hnn.us/articles/47018.html.

types: one bad, one acceptable. Socrates' thinking of why suicide was socially negative rested on the notion that man "…one of the god's possessions, should not kill himself 'until the god sends some compulsion upon him…"[12] Condemned to death by the State, Socrates drinks hemlock, but Plato and Aristotle saw this as not socially contemptable, as his suicide was consistent with the concept of acceptable suicide.

The Roman and Hebrew views of suicide were similar to the Greeks, in that it was acceptable in some circumstances, such as to avoid capture by the enemy, in allegiance to a Military leader, avoid dishonour in certain circumstances, but otherwise against God. The Old and New Testament give instances of acceptable forms of suicide."[13]

Sovereign kings and lords had divine right absolute dominion over their subjects and thus suicide was considered a crime against the king or lord. The gradual decline of the Roman Empire and path to the Dark Ages, and dearth of labourers and soldiers, led to further thinking that suicide was not socially acceptable, as it was viewed that soldiers, labourers, serfs, those sentenced to death, who committed suicide committed an offence against master, military, king, the state, etc.).[14]

Rooney (2023) reviews the origins of the legal doctrine for Britain (Ireland) and finds that suicide was considered a crime as early as the 13th Century—the idea being that suicide was against God/religious beliefs but also against the King, to whom the person was a subject.[15] Additionally, a felon in medieval Britain, upon conviction, would have all his property including his land confiscated by the King, while someone who died by suicide would only have goods and property confiscated. This led to the circumstance that if sentenced to death for say, murder, one could avoid having their land also confiscated via suicide. Recognising this perverse incentive, and potential loss of confiscated land, the feudal powers changed the law.

Besides the economic incentives, ecclesiastical and social 'honour/dishonour' incentives were strong in the Middle Ages. It was not til 1823 that the "Burial of Suicide act forbade the practice of burying those who had committed suicide at a crossroads with a stake through their heart."[16] Curiously, in the mid-19th Century, the difference between the legal and religious beliefs (since the act changed the law but beliefs still remained) led coroners and juries to typically determine suicide to be the result of temporary insanity (Rooney 2023). This led to the vast underestimation of the number of suicide deaths versus deaths by self-inflicted harm due to temporary insanity. Rooney (2023) cites "…Dr Strahan noting that it was impossible that 98% of successful suicides were ruled temporarily insane, while only 4% of attempts at suicide were deemed to be so;"[17] perhaps the earliest reference where public health practitioners were raising questions about the burden-of-proof standards to determine suicide and its impact on statistics.

The *beyond a reasonable doubt* standard has its own history. The principle has references in Roman, Hebrew and Islamic law. Roman origins are attributed to jurists Antonius Pius (first century) and Julius Paulus (second/third century) by the *Corpus Juris Civilis* of Justinian I of circa 530. Similar origins in both Talmudic and Islamic law exist.[18,19,20] In Genesis18:32, Abraham asks God, who affirms, he would

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[12]Rist, J.M. Stoic Philosophy. Cambridge: Cambridge University Press, 1969. Print. (cited from https://en.wikipedia.org/wiki/Suicide_in_antiquity#cite_note-rist-6)

[13] Chang, H, "A Brief History of Anglo-Western Suicide: From Legal Wrong to Civil Right"46 S.U.L.Rev. 150 (2018).

[14] Op cit.

[15]https://theucdlawreview.com/2023/04/01/grave-consequences-the-societal-rationale-behind-the-medicalisation-and-secularisation-of-suicide-as-reflected-in-the-burial-of-those-who-died-by-suicide-in-ireland-and-england-in-the-19th-centu/.

[16] Op cit,

[17] Op Cit, Rooney (2023), citing, SAK Strahan, 'Suicide and Insanity: A Physiological and Sociological Study' (1894) 40 Journal of Mental Science 433, pg 436.

[18] Wikipedia-- https://en.wikipedia.org/wiki/Presumption_of_innocence#cite_ref-14; Bury, J. B. (1893). A History of the Roman Empire from its Foundation to the Death of Marcus Aurelius.

[19] Wikipedia-- https://en.wikipedia.org/wiki/Presumption_of_innocence#cite_ref-14;The Talmud states, "every man is innocent until proved guilty.." Aaron Kirschenbaum, Double Jeopardy and Entrapment in Jewish Law, 3 Israel Yearbook on Human Rights, Rts. 202 (1973), p. 211.

[20] Wikipedia-- https://en.wikipedia.org/wiki/Presumption_of_innocence#cite_ref-14 "the principle that the onus of proof is on the accuser or claimant is strongly held", Imam Nawawi. 1977. An-Nawawi's Forty Hadith (Second Edition English Translation by Ezzedin Ibrahim). Damascus: Holy Koran Pub. House, Hadith No. 33

spare Sodom if there were at least 10 righteous within the city. The fundamental idea rests on the need to have a measure of certainty when answering questions under uncertain situations, and that to convict an innocent person is a more egregious error than to let a guilty one go free.

Clear articulation of the principle in English law is commonly attributed to Blackstone and his 10:1 principle stating, "It is better that ten guilty persons escape than that one innocent suffer" *Commentaries on the Laws of England* (1760s).[21] *Commentaries* goes into details comparing practices of trial by ordeal or battle versus juries and illustrating some of the preposterous implications such as in some capital cases, where only a "miracle" would allow for acquittal.[22]

There is debate as to whether the standard of beyond a reasonable doubt was to the better protection of king or commoner, with the interaction of ecclesiastical versus civil obligation also being the crux of the matter, for jurors had both a civil duty and a religious duty not to convict an innocent person. As Whiteman writes, "the Juryman who finds any other person guilty, is liable to the Vengeance of God upon his Family and Trade, Body and Soul, in this world and that to come." and "[i]n every case of doubt, where one's salvation is in peril, one must always take the safer way…"[23] Whiteman argues it was in reaction to these religious fears that "reasonable doubt" was introduced in the late 18th century to English common law, thereby allowing jurors to convict more easily. Therefore, the original use of the "reasonable doubt" standard was opposite to its modern use of limiting a juror's ability to convict."

Contrary to Whiteman, Blackstone asserts that the basis of jury trial and beyond a reasonable doubt standard were the same for peers and common men (freeholders) and compares the civil and criminal standards.

"V. THE trial by jury, or the country, per patriam, is also that trial by the peers, of every Englishman, which, as the grand bulwark of his liberties, is secured to him by the great charter, "nullus liber homo capiatur, vel imprifonetur, aut exulet, aut aliquo alio modo deftruatur, nifi per legale judicium parium fuorum, vel per legem terrae…..THE antiquity and excellence of this trial, for the settling of the civil property, has before been explained at large. And it will hold much stronger in criminal cases; since, in times of difficulty and danger, more is to be apprehended from the violence and partiality of judges appointed by the crown, in suits between the king and the subject, than in disputes between one individual and another, to settle the metes and boundaries of private property. Our law has therefore wisely placed this strong and two-fold barrier, of a presentment and a trial by jury, between the liberties of the people, and the prerogative of the crown. It was necessary, for preserving the admirable balance of our constitution, to vest the executive power of the laws in the prince."[24]

On the other hand, other authors noted that the purposes of jury trials were mainly to absolve the judge of the need to convict.

"Pre-modern judges, too, were provided with chances to disclaim their moral responsibility for their acts. In particular, there were two types of common moral comfort procedures for judges. First, there are *responsibility-shifting* procedures—rules that aimed to comfort the judge by forcing some other agent to assume all or part of the responsibility for making the final judgment. Stephen interpreted jury trial in exactly this way: It is hardly necessary to say that to judges in general the maintenance of trial by jury is of more importance than to any other members of the community. It saves judges from the responsibility—which to many men would appear intolerably heavy and painful—of deciding simply on their own opinion upon the guilt or innocence of the prisoner."[25]

Whitman (2008) argues:

"The rule emerged over the course of the seventeenth- and eighteenth centuries. The full history of this moral comfort rule begins, though, well before the seventeenth century. The theology that underlay the "reasonable doubt" rule that had emerged by the 1780s was very old, dating back into the central Middle Ages. This medieval theology was applied to the case of English criminal juries only at a very late date. For a simple reason: Until the sixteenth century, English criminal juries were never forced to take moral responsibility for condemning the accused. Medieval criminal juries were not compelled to perform the most spiritually dangerous act: entering the general verdict of "guilty." It was only in the early modern period, after the Tudor Crown began to coerce criminal juries into entering guilty verdicts, that the moral dangers for English jurors began to become acute." [26]

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[21] https://en.wikisource.org/wiki/Commentaries_on_the_Laws_of_England

[22] Blackstone, Commentaries, (PUBLIC WRONGS. BOOK IV. Ch. 27); available at https://avalon.law.yale.edu/18th_century/blackstone_bk4ch27.asp

[23] Whitman, J., *op cit*.

[24] Blackstone Commentaries, " .P 343 PUBLIC WRONGS. BOOK IV. Ch. 27."

[25] James Fitzjames Stephen, A History of the Criminal Law of England (London: Routledge, repr. 1996) (orig. 1883), 1: 573. Cited in, "The Origins of "Reasonable Doubt" James Q. Whitman, Yale Law School"

[26] Whitman, James Q., "The Origins of "Reasonable Doubt" Yale Law School, 2005.

The purpose was thus either to protect the accused of abuse by the State or to insulate the state, church, judges, etc, from being seen as unjust, a moral, or having made a mistake. Whether theses purposes still apply or should be given weight in the current debate is another question.

2.2 Modern Law

Ireland

The Coroners Act 1962 (Rev 2022) governs the classification and reporting of all deaths. Any deaths as the result of unnatural causes must be subject to a coroner's inquest:

> "17. Subject to the provisions of this Act, where a coroner is informed that the body of a deceased person is lying within his district, it shall be the duty of the coroner to hold an inquest in relation to the death of that person if he is of opinion that the death may have occurred in a violent or unnatural manner, or unexpectedly and from unknown causes or in a place or in circumstances which, under provisions in that behalf contained in any other enactment, require that an inquest should be held."

The Coroners Act does not define the level of proof or enumerate the evidence required for a classification of suicide, but leaves it to the coroner and/or a jury to make that determination. Suicide was classified as a criminal offense under Irish law until the 1993 Amendment to the Coroners Act.[27] Thus it would appear that there is no statutory basis for the 'beyond a reasonable doubt' standard but rather it being understood from criminal law and case law and precedent.

England and Wales

The Coroners and Justice Act 2009 is the legislation underpinning coroners' responsibilities and proceedings in the England and Wales. Similarly to the Irish Coroners Act 1962 (Rev 2022), this requires reporting of all deaths and the investigation of facts and circumstances surrounding deaths by unnatural, unexpected, and/or violent means. It allows coroners to provide a "short form conclusion" (i.e., single word) and/or a "narrative conclusion" as to cause of death. It is relevant to note that suicide was decriminalised in 1961 under section 1 of the Suicide Act 1961.[28]

Coroners (Inquests) Rules 2013 (SI 2013/1616) governs the format of recording inquest results, at which Note (iii) indicates that the standard of proof for narrative conclusions is "on balance of probabilities", which is the standard used in civil proceedings; and the standard of proof for short form conclusions of "unlawful killing" or "suicide" is the criminal standard, i.e., "beyond a reasonable doubt".

The coroner must decide whether the short form or narrative conclusion is appropriate and this is based on the relative sufficiency and veracity of available evidence. [29, 30] The coroner, where evidence is clear and convincing, uses the short form cause of death; and where evidence is sufficient for a jury to make a determination, the coroner may use the narrative form cause of death to describe circumstances surrounding the death. Additionally, the coroner must not leave a jury to make determinations where there is insufficient evidence to make a determination.

The standard of proof required was altered in July 2018, notably via case law rather than legislation.[31] A case was brought to the Supreme Court challenging the results of an inquest involving a young man who was found dead in his prison cell with a bed sheet tied around his neck attached to the bedframe. Application of the criminal standard "beyond a reasonable doubt", which found against suicide, was challenged on the basis that a coroner's inquest is not a criminal proceeding. There were some factual issues surrounding the deceased's state of mind and whether the requisite fatal intent was proven. The court determined that the civil standard of "balance of probabilities" was appropriate, and reasoned that

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[27] https://www.irishstatutebook.ie/eli/1962/act/9/enacted/en/html, accessed on 3.1.2024
[28] https://www.legislation.gov.uk/ukpga/Eliz2/9-10/60, accessed on 3.1.2024
[29]https://www.judiciary.uk/guidance-and-resources/chief-coroners-guidance-no-17-conclusions-short-form-and-narrative/ accessed on 3.1.2024
[30] https://www.judiciary.uk/wp-content/uploads/2016/02/law-sheets-no-2-galbraith-plus.pdf, accessed on 3.1.2024
[31] ONS, 2020, "Change in the standard of proof used by coroners and the impact on suicide death registrations data in England and Wales.

the original purpose for the higher standard of proof (beyond a reasonable doubt) was linked to the fact that suicide had been classified as a crime in past, and is no longer a valid support for use of the higher standard.[32] Since Maughan, the standard of proof for suicide in a coroner's inquest is "balance of probabilities" in England and Wales (and subsequently the rest of the UK).

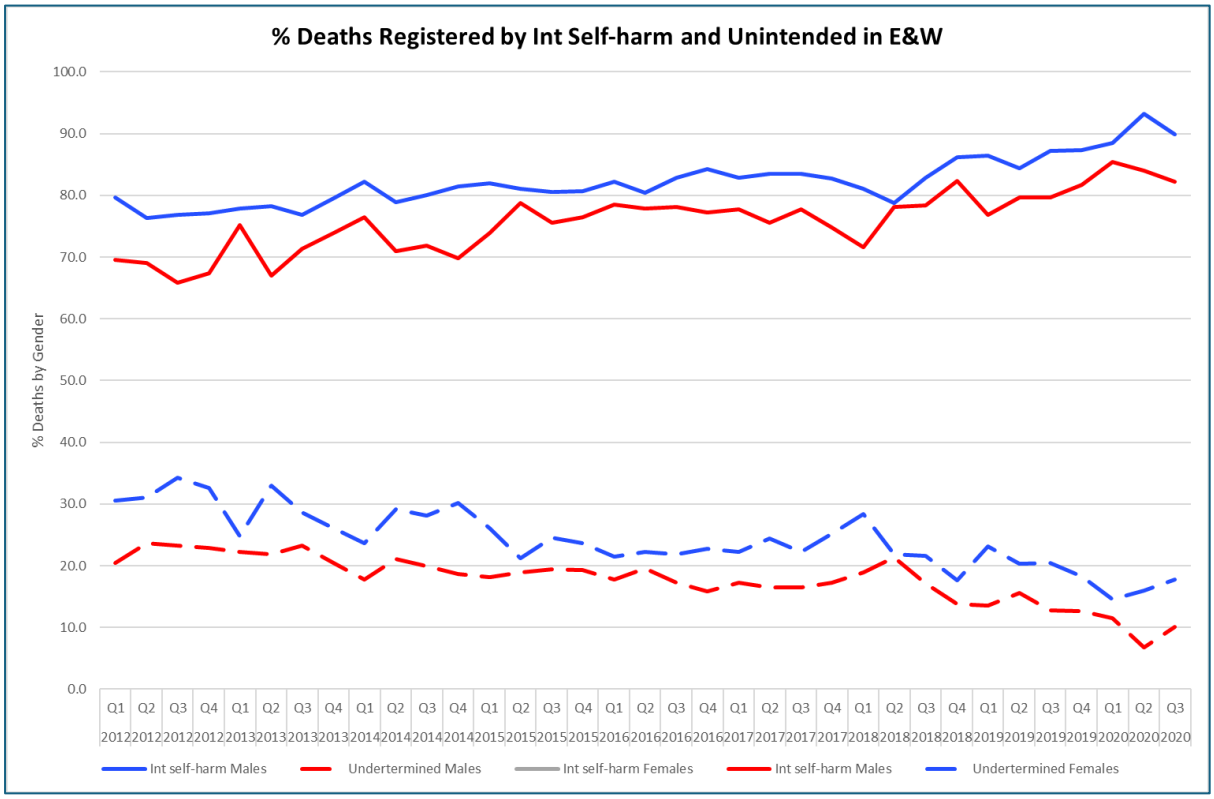
In conclusion, the legal origins of the beyond-a-reasonable-doubt standard have to do with the prior legal doctrine seeing suicide as a crime. Under this view there were both moral/ecclesiastical and economic impacts from determination of suicide, such as dishonourable burial or confiscation of property. The importance or applicability of the standard could be seen in two lights: the Blackstone view or the Whiteman view. Under the Blackstone view, the appropriateness of the application of the higher standard for suicide is to protect the innocent from either social/ecclesiastic condemnation and economic confiscation; under the Whiteman view, application of the higher standard to suicide is to provide a level of moral comfort to jurors or coroners to be willing to make such determinations. The two views offer insight into why statutes and coroners or other stakeholders are reluctant to change, but also perhaps suggest testable predictions as to which way a change might impact determinations, or perhaps a prediction that the expected change is ambiguous. Notably, the UK Supreme Court found that the rationale for the higher standard no longer applied. Using the civil standard with the Blackstone view predominating should yield higher measured rates while the reverse might hold under the Whiteman view.

2.3 Studies on suicide classification

The ONS gave a detailed initial study into the impact of the classification change on suicide statistics in England and Wales. The method was to study trends and rates before and after the change. They also looked at data on undetermined deaths for causes which might be particularly hard to classify. Interestingly, male unintentional rates are lower than female rates, while suicide rates are higher. Notably, such trend comparison studies suffer from merely observing changes and correlations, with sufficient specificity to the assumptions that would allow attribution of causality. Overall, they concluded that the changes were broadly consistent with the lower standard of proof, i.e., that this may have increased the measured rates of suicide. Notably, certain official suicide statistics (of England and Wale) already include certain accidental deaths. The report gives substantial presentation of data, but a summary figure which illustrates the trends is:

[32] https://www.supremecourt.uk/cases/uksc-2019-0137.html, accessed on 3.1.2024

Figure 1. Deaths registered by intentional self-harm and unintended, England and Wales



Source: Author's elaboration of ONS data; Standard of Proof Suicide Data

The report further finds that accidental deaths by drowning and hanging have been reduced, while poisoning has been substantially increased. The mechanism for the former is arguably that some of these deaths are being reclassified as intentional self-harm. The mechanism for the increase/decrease in various types of death is unclear, but ONS notes in recent years drug poisoning deaths have been increasing rapidly.[33]

In conclusion the ONS finds that the data are consistent with the expectations of changes in the burden of proof making some death registrations changing from being recorded as unintentional versus intentional self-harm and notes that the registrations data already includes certain unintended deaths as suicide. "As such, when interpreting recent suicide death registration statistics, we cannot conclude that the change in the standard of proof is solely responsible for the recent increase in suicide rates. Whenever a change in suicide rates occurs, the reasons are complex and will seldom be because of one factor alone. The Office for National Statistics will continue to monitor over the coming years to further understand the impact of the change in the standard of proof on suicide rates."[34]

The Northern Ireland Statistical Research Agency (NISRA) recently considered a number of aspects regarding suicide measurement, data and changes.[35] Notably, NISRA revised statistics and there was a break in the series in 2014-2015. The rates post the break were about 11.5 deaths per 100k, or 3.5 percentage points lower, and NISRA notes the need for caution in comparing rates over time. Despite this, NISRA also notes that the Coroners Service was centralised in 2006, and while rates appear to rise after 2006, otherwise no clear trend seems evident.

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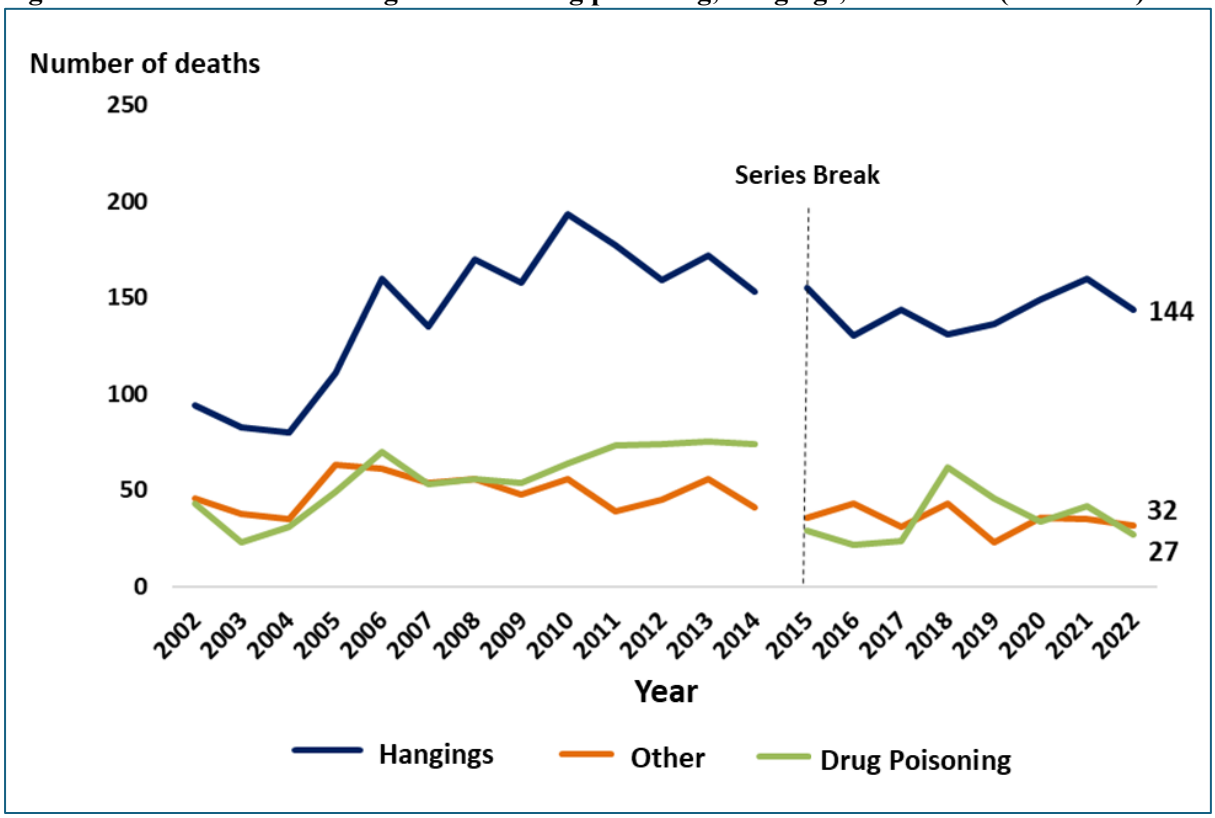
[33]https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/bulletins/deathsrelatedtodrugpoisoninginenglandandwales/2018registrations.

[34] ONS, 2020, op cit, page 17.

[35] NISRA, Final statistics Statistical bulletin Suicide Statistics in Northern Ireland, 2002 – 2022 Published: 13th December 2023.

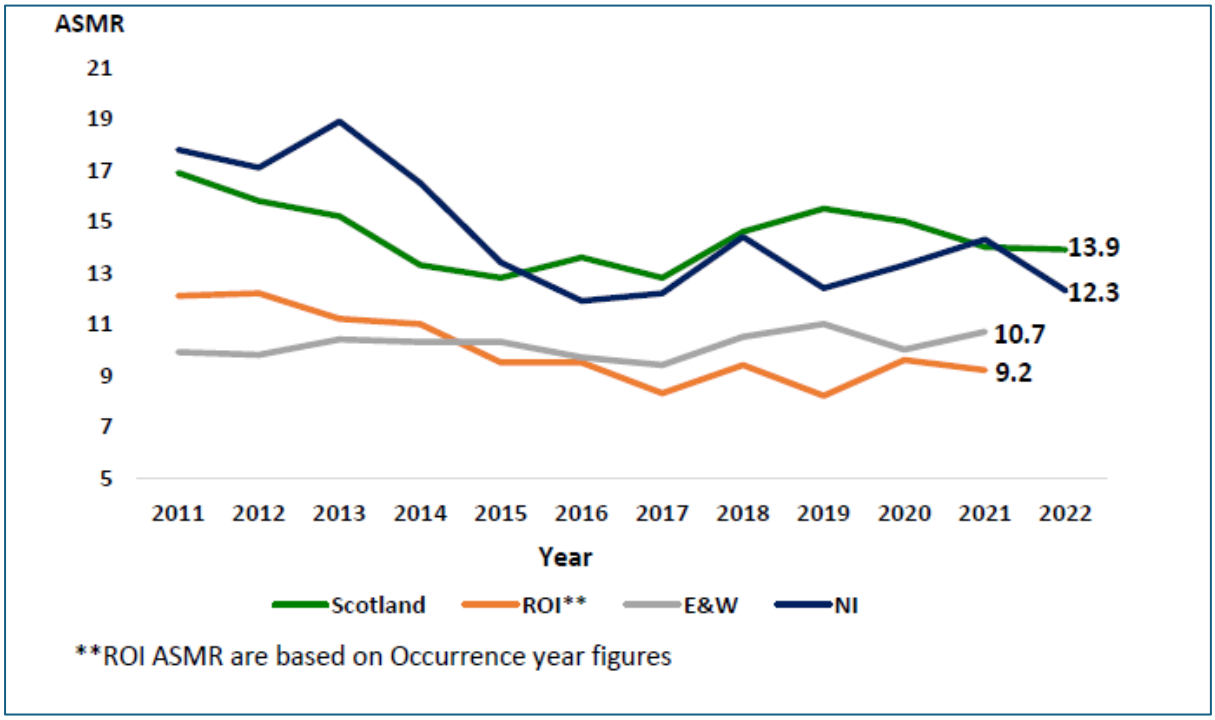
Figure 2. Number of Deaths registered as drug poisoning, hangings, other in NI (2002-2022)



Source: NISRA (2023), Figure 7.

Notably, the definition of suicide and rates vary between NI and ROI. NISRA also compares the rates in NI based on the ROI definition, which excludes unintended deaths for those over 15 by certain causes such as poisoning. They find this would lower NI registered suicide rates from 12.3 to 10.1 deaths/100k, still above the 9.2/100k from 2021 cited for the RoI. Notably, the change of the burden of proof in NI was later than in England and Wales, where ONS states July 2018 and NISRA states its applicability to NI was confirmed in November 2018. Casual observation of the trends does not seem to suggest any clear change.

Figure 3. Age-Standardized Mortality Rates



Source: NISRA (2023) Figure 10.

Canada

We briefly review recent studies in countries with English common law legal systems. Canada changed their burden of proof for suicide in 2009. Observing rates in Canada over time and taking five years average before and after the change indicates this had seemingly little impact on overall measured death rates (11.16 vs 11.44 deaths per 100k).[36, 37]

Skinner et. al (2017) considered the Canadian experience and possibilities that suicide rates are still being under reported in Canada despite the change in burden of proof with a particular focus on rising drug poisoning death rates in Canada.[38] They use a variety of methods of comparing trends in ratios of unintentional, unintended, and intentional-self-harm ratios for poisonings. They find increasing rates but that unintentional rates seem to rise even relative to suicide rates overall for women (contrary to the expectation that unintentional rates might fall relative to intentional rates after the change in burden of proof). Finally, their data only cover to 2011, so any clear indication of trend impacts from the change in burden might be masked by the rapid rises in poisonings and the lack of data post change. They note that the rates of autopsy fell in Canada and issues of differences across provinces with standards to find suicide persist. "It is difficult to ascertain if there have been changes over time in the C/ME assessments, as procedures and standards differ by province. No standard protocol is followed."[39] They conclude, "Canadian poisoning suicide rates declined, in contrast to rising unintentional and undetermined poisoning mortality rates. This trend is similar to that of the United States, supporting the hypothesis that misclassification of poisoning deaths may also be an issue in Canada."[40]

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[36] Ladouceur, Roger (February 2011). "Suicide among men". Canadian Family Physician. 57 (2): 148. PMC 3038797. PMID 21321162. Cited by Wikipedia: https://en.wikipedia.org/wiki/Suicide_in_Canada.

[37] Statistics Canada. Table 13-10-0801-01 Leading causes of death, total population (age standardization using 2011 population).

[38] Skinner R, McFaull S, Rhodes AE, Bowes M, Rockett IRH. Suicide in Canada: Is Poisoning Misclassification an Issue? Can J Psychiatry. 2016 Jul;61(7):405–12. doi: 10.1177/0706743716639918. Epub 2016 Mar 23. PMCID: PMC4910407.

[39] Skinner et. al op cit, page 410.

[40] Skinner et. al op cit, page 405.

United States

The work in Canada was partly motivated by experience in the United States. Previous authors had found in the United States the large increase in accidental drug poisoning deaths may have masked suicide deaths. The United States represents a more difficult area and ability to interpret evidence as variations in States, coroners and Medical Examiners, and legal standards abound; the Center for Disease Control (CDC) operates national mortality statistics.[41] While the standard of proof in the US is not the criminal standard, a higher burden is often required for suicide determination by examiners, and the CDC has made efforts to give guidance to regularize reporting. Rockett and Caine (2015) considered the context of the rapid rise in drug poisoning and related undetermined and suicide deaths and the potential underreporting.[42] Pergolizzi et al. (2021) explore opioid poisoning and intentionality of the facts and implications, stating that the rapid rise of opioid poisoning deaths leaves an open and widening question as to how many of such deaths should actually be classified as suicide.[43] They propose an alternative category of 'passive' as well as 'active' intent as merely classifying as accidental many drug poisoning deaths may be masking certain aspects or importance of the problem and thus potential solutions.

Irish studies of impact of change

Recently the Irish Probable Suicide Deaths Study (IPSDS) estimated the potential impact of the burden of proof standard in Ireland.[44] The main goals did not focus on the change of the burden; they were: "to improve understanding of socio-demographics of suicide, to identify risk factors for probable suicide and to inform the planning, implementation and evaluation of suicide prevention measures in Ireland."[45] The study notes that coroners may be reluctant to determine suicide and also that this was found to be the case in England and Wales.

The study pooled data on potential and/or likely suicide deaths in Ireland from 2015-2018 and was a "collaborative project involving the HSE National Office for Suicide Prevention (NOSP), Irish coroners and the Health Research Board (HRB)." Observations were included in the study based on a determination of 'probable suicide' using a variety of criteria, such as history, a note, where 'probable suicide' was defined as "deaths with a coronial suicide verdict *and* deaths that are more likely than not, based on the weight of evidence, to have been a suicide. The study then used an expert panel and analysis of secondary data, taking on board, coroners', autopsy, toxicology, and Garda reports and data available. They estimate what percent of probable suicides would have changed under a potential change in the burden of proof.

The findings related to change in the burden are summarize below. Suicide numbers based on the balance of the probabilities versus the current standard would increase about 29% for men, 36% for women and 31% for all persons. There were not large differences by age group save for children<15, where the increase would be 60%.

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[41] Notably, "The Centers for Disease Control and Prevention use "unintentional injury" in lieu of the term *accident* for surveillance and prevention purposes. However, medical examiners and coroners remain bound by statutes in using "accident" as 1 of 6 manner-of-death entries (homicide, suicide, accident, undetermined, natural causes, and unknown) that alternatively appear on death certificates", Rockett IRH, Caine ED. Self-injury Is the Eighth Leading Cause of Death in the United States: It Is Time to Pay Attention. *JAMA Psychiatry.* 2015;72(11):1069–1070. doi:10.1001/jamapsychiatry.2015.1418

[42] Rockett IR, Caine ED. Self-injury Is the Eighth Leading Cause of Death in the United States: It Is Time to Pay Attention. JAMA Psychiatry. 2015 Nov;72(11):1069-70. doi: 10.1001/jamapsychiatry.2015.1418. PMID: 26374953.

[43] Pergolizzi J, Breve F, Magnusson P, Nalamasu R, LeQuang JAK, Varrassi G. Suicide by Opioid: Exploring the Intentionality of the Act. Cureus. 2021 Sep 18;13(9):e18084. doi: 10.7759/cureus.18084. PMID: 34692299; PMCID: PMC8523441.

[44] Cox, G., Munnelly, A., Rochford, S., & Kavalidou, K. (2022). Irish Probable Suicide Deaths Study (IPSDS) 2015–2018. HSE National Office for Suicide Prevention (NOSP). Dublin.

[45] Cox et al (2022), *op cit*.

Table 2. Classifications of suicide and coroner's verdict by gender IPSD (Ireland, 2015-18)

Suicide Classification	Coroner's Verdict	Men %	Women %	Total %
Beyond reasonable doubt	Suicide or equivalent verdict	71%	64%	**69%**
Balance of probabilities	Undetermined/open verdict	10%	16%	**12%**
	Accident/Misadventure	3%	6%	**3%**
	No formal verdict recorded	16%	15%	**16%**

Source: IPSDS

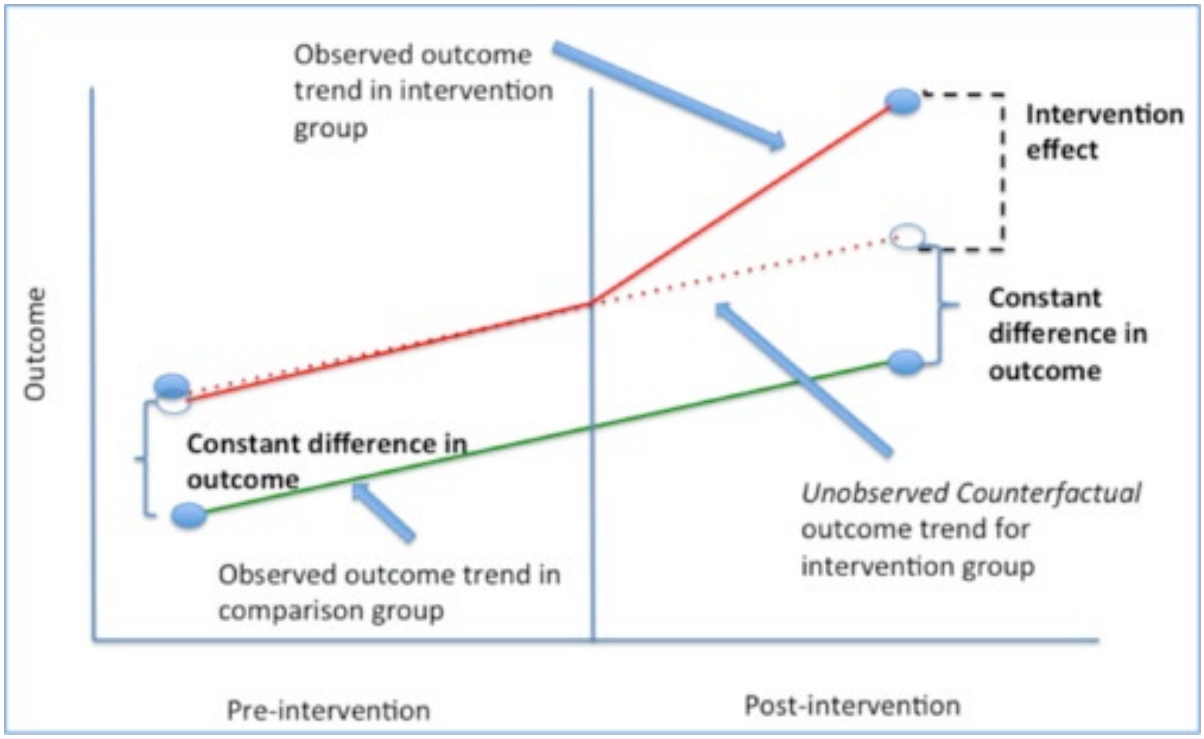
3. DiD study

3.1 The DiD Method

DiD is one of the 'most venerable' workhorses for estimating causal impacts and has spanned economics, law, and public health research.[46] The method's origins are attributed to Snow, an 1850s London physician studying Cholera.[47] Snow (1849) established evidence of contaminated water sources among poor districts in London correlated with Cholera; he then collected data several years later when the contaminated sources were closed.[48] A formal seminal study was Card and Krueger (1994), who studied impacts of changes in minimum wages between adjacent US States.[49] Recently, Dow *et al*. (2020) used DiD methods to estimate the impacts of various policies including the minimum wage on both drug-related deaths and non-drug suicides (where they found such policies reduced non-drug suicides).[50] DiD is illustrated graphically below.

[46] STATA 18, Reference Manual, "Introduction to difference-in-differences estimation", page 22.
[47] Tulchinsky TH. John Snow, Cholera, the Broad Street Pump; Waterborne Diseases Then and Now. Case Studies in Public Health. 2018:77–99. doi: 10.1016/B978-0-12-804571-8.00017-2. Epub 2018 Mar 30. PMCID: PMC7150208.
[48] Snow, J. 1849. On the Mode of Communication of Cholera. London: Churchill. (Cited in STATA 18 Reference Manual). Snow, 1855. On the Mode of Communication of Cholera. 2nd ed. London: Churchill. (Cited in STATA 18 Reference Manual)
[49] Card, David & Krueger, Alan B, 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," American Economic Review, American Economic Association, vol. 84(4), pages 772-793, September. <https://ideas.repec.org/a/aea/aecrev/v84y1994i4p772-93.html>
[50] Dow WH, Godøy A, Lowenstein C, Reich M. Can Labor Market Policies Reduce Deaths of Despair? J Health Econ. 2020 Dec;74:102372. doi: 10.1016/j.jhealeco.2020.102372. Epub 2020 Sep 13. PMID: 33038779; PMCID: PMC8403492.

Figure 4. Illustration of DiD



Source: Columbia University School of Public Health Website[51]

DiD can be estimated via ordinary least squares (OLS) using fixed effects for countries, time periods and an interaction with time and treatment-group. The model estimated was:

$$SR_{it} = \sum_{i=1}^{N} \alpha_i c_i + \sum_{j=1}^{T} \alpha_j t_j + \delta T + \beta X + \varepsilon$$

Where SR is suicide rate in country i at time, t_j; α_i are the country fixed effect, c_i; α_j are the time fixed effects.[52] T, is a dummy variable coded for the treatment *and* country effect; it takes a value=1 if year>2018 (Maughan was July 2018) *and* country was England or Wales, and zero otherwise (the interaction of the time-controls and treatment). δ is the treatment effect and ε is a random error. It is possible to add control variables, X, and coefficients β. These can be for gender, or age category, and these vary by the particular models estimated.

It is important to discuss the assumptions of DiD and how they pertain to our model; the assumptions are:

no-treatment assignment endogeneity – treatment assignment does not impact outcome; this is not an issue, as treatment assignment was determined by England and Wales Supreme Court decision and the implementation is by coroners.

parallel trends – this is the most important assumption – there must be similar trends in the treatment and non-treatment groups pre-treatment. This assumption we subject to empirical testing via an F-test that the fixed-time effects are the same across countries. In general, the test is satisfied.

SUTV – Stable Unit Treatment Values:

[51] https://www.publichealth.columbia.edu/research/population-health-methods/difference-difference-estimation
[52] In the second set of models the dependent variable is deaths.

a) No spillover effects: We argue that this is unlikely between countries.[53]

b) No hidden variations/unambiguous definition of treatment: We argue this is satisfied by the clear definitions of the policy change.

3.2 Data

Data for the DiD study were obtained from the Office of National Statistics (ONS), the Central Statistics Office (CSO), and the Northern Ireland Statistics and Research Agency (NISRA), respectively the national statistical agencies in England and Wales, Ireland, and Northern Ireland.[54] Two yearly data sets by gender were obtained; one on aggregate suicide rates and one on deaths by ICD-10 cause, age and gender category. The second dataset was only available for England, Wales, and Ireland.

The first models used thus used data on aggregate suicide rates by year and sex. As the CSO data was not particularly up-to-date, data on total suicides and population predictions from CSO were also obtained, along with data on late registrations over time. We then used historical late registrations and the aggregate data to predict late registrations for the years 2020-2022 for Ireland.[55]

The ONS data was taken from tables 1 and 2 of Suicide Registrations in England and Wales, where registrations are broken down by sex and year from 1981 to 2022. The CSO data was taken from tables VSD32 which provides deaths and rates by gender and year from 2000 to 2022, but where 2022 data is provisional, VDSD33 which provides registrations and late registrations by gender and year to 2020, and also population annual projections. The NISRA data is from Suicides in Northern Ireland, table 4, which gives standardized rates to 2022. Data across countries was then merge-appended to form a panel by sex, country and year.

The second dataset consisted of detailed number of deaths by ICD-10 classification. Data were obtained from ONS[56] and CSO[57] websites. The usefulness of this second dataset is it enables us to compare official death statistics controlling for potential differences between classification of unintended deaths, as noted by Samaritans.[58] The data are fully disaggregated and coded by 4-digit ICD-10 code. We specifically coded separate group variables for ICD X60–X84 as intentional self-harm and ICD Y10–Y34 as unintended for further analysis.

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[53] The potential outcomes for any unit do not vary with the treatments assigned to other units and a subject's potential outcome is not affected by other subjects' exposure to the treatment. See Imbens, Guido W, and Donald B Rubin. 2015. Causal Inference for Statistics, Social, and Biomedical Sciences: An Introduction. Cambridge University Press.

[54] Data was accessed from public online sources and downloaded around end January 2024.

[55] The results and details can be provided in the annex. We did sensitivity testing and in general the DiD results are not sensitive to the assumptions of this modelling. This only applied to the aggregate rate data for Ireland.

[56] 21st Century Mortality dataset, England and Wales, 2000 to 2022 Information Source: Office for National Statistics, Released: 15 December 2023

[57] CSO, table VSA29, Deaths Occurring, 31/10/2023 11:00:00

[58] *Op Cit*.

3.3 Econometric results

Estimation was via OLS with adjustments for clustering of standard errors as per STATA 18,[59] which forms the country-specific and year-specific dummy, or fixed effects, variables automatically, and usefully provides estimates of the average treatment effect on the treated (ATET), tests of parallel trends, and graphics, along with adjustment of standard errors for clustering. Results are presented in the tables below.

Table 3. DiD results, aggregate annual suicide rates, E&W, ROI, and NI

DiD Results Aggregate Annual Suicide Rates								
Sample Countries	**Dep Var**	**Time dummy**	**Gender**	**Ages**	**ATET**	**p-value**	**Obs**	**P-Trends F**
E&W, RoI, and NI	Suicide rate	yearly	All	All_aggregate	2.50	0.001	131	F<F*
E&W, RoI, and NI	Suicide rate	yearly	M/F	All_aggregate	2.41	0.001	262	F<F*
E&W, and RoI	Suicide rate	yearly	All	All_aggregate	2.44	0.006	110	F<F*
E&W, and RoI	Suicide rate	yearly	M/F	All_aggregate	2.55	0.003	220	F<F*
E&W, and RoI	Suicide rate	5-year	M/F	All_aggregate	2.59	0.002	220	F<F*
Wales and RoI	Suicide rate	yearly	M/F	All_aggregate	2.39	0.012	136	F<F*
RoI and NI (as treated)	Suicide rate	yearly	M/F	All_aggregate	0.135	0.978	94	F>F*

Source: Author's own estimates

The table presents results from DiD regressions on aggregate annual suicide rates and treatment being the change in proof standard. Various combinations of England and Wales, Northern Ireland and Republic of Ireland were tested. The hypothesis is that there is a +treatment effect of the policy change in E&W—i.e., ATET>0; the rate increases. The full sample including rates by male/female and NI comprised 262 observations. This model allows interactions between the dummies for country and sex. Including interaction controls does not impact the ATET but does impact the standard errors. The ATET was 2.50 (p-value 0.001) and R^2 of 94%. The estimate on combined population (i.e., male and females aggregated) had 131 observations and the estimate of the ATET was 2.41 (p-value 0.001) with R^2 of 53%. In all the models, the F is less than the critical value (F<F*), indicating we do not reject the parallel trends null hypothesis.

While NI might be a good comparator for RoI, the two-way DiD between NI and ROI did not satisfy parallel trends, F>F*. We thus ran the DiD without NI. DiD comparing only England & Wales and Ireland had 220 observations and yielded an estimated ATET of 2.55 (p-value 0.004) and R^2 of 96%.

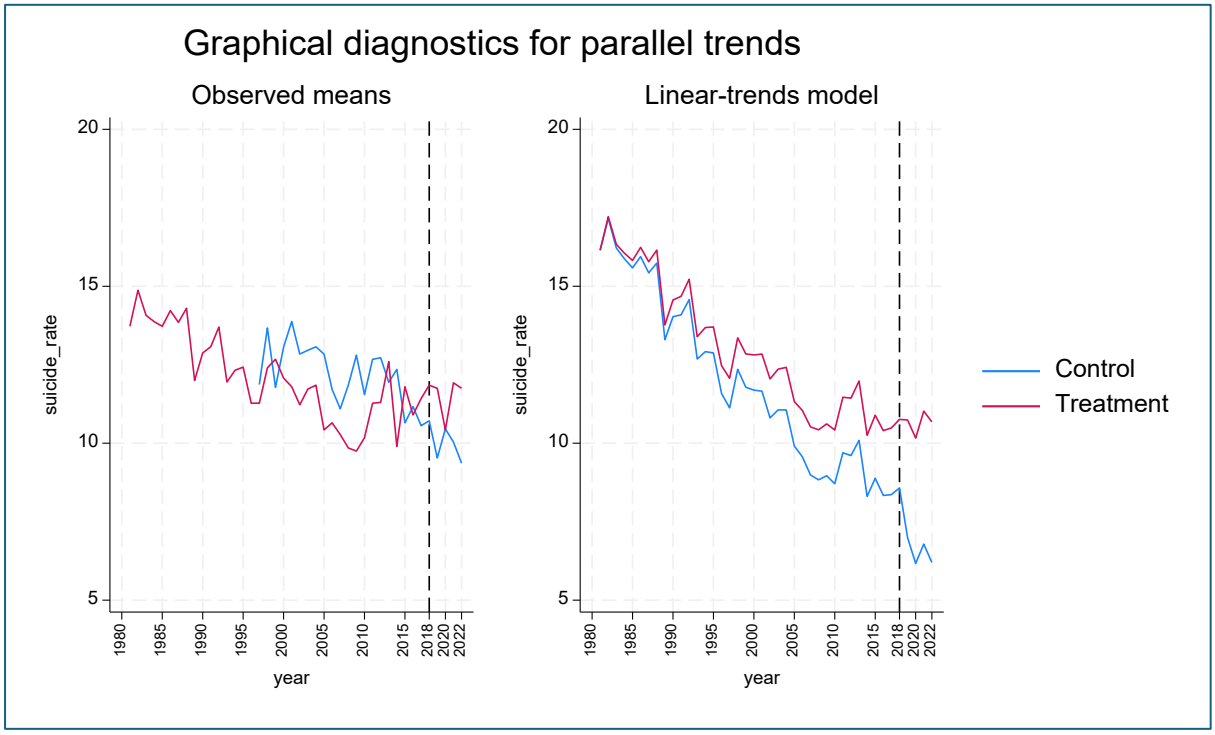
Inclusion of interactions with gender did not largely change these estimates and using parallel trends was not sensitive to any of these changes.

A sensitivity ran the DiD with five-year block time dummies (as opposed to each individual year) and a linear trend variable (year) which was interacted with sex, thus allowing linear trends to be variable overall and by gender. The overall resulting ATET showed almost no sensitivity to this, with an ATET of 2.59 (p-value 0.002). With a further confirmation via the F-test for parallel trends in both cases.

The panel overleaf gives a graphic depiction of the parallel trends assumption. The first panel is the just the mean differences, with blue (Ireland-control) and red (E&W – treated). The second panel uses a linear trends prediction model. The null hypothesis is that the trends year-on-year are not jointly different.

[59] STATA 18 xtdid command reference manual. Stata Corporation. (2023).

Figure 5. Illustration of parallel trends



Source: Author's elaboration using STATA and ONS and CSO data

As there are differences in suicide classification between England and Wales and Ireland, a model using ICD-10 classified data is used. The next models and results use the disaggregated data by ICD-10 classification, five-year age bands, and gender. Combining over all causes, years, countries (2001-2022 E&W) and (2007-2021 IRL) age and gender gave over 1.3 million observations. A variety of models using DiD were estimated by both intentional self-harm and unintended death as per the ICD-10 categories described. We further looked into separate estimates by narrower age bands and by male and female only. Finally, we considered both intentional self-harm and unintended ICD categories. The results are found in the table below.

Table 4. Difference-in-Difference results for International Classification of Diseases, All causes of death by age cohort

DiD Results for ICD_All_cause_by 5yr age cats							
Sample Countries	**Dep Var**	**Gender**	**Ages**	**ATET**	**p-value**	**Obs**	**P-Trends F**
E&W, and RoI ICD X60-X84 (Int self-harm)	Deaths	M/F	All_5yr_cats	1.27	0.033	22,129	Prob > F = 0.8271
E&W, and RoI ICD X60-X84 (Int self-harm)	Deaths	M/F	15-29	2.015	0.056	3,210	Prob > F = 0.0875
E&W, and RoI ICD X60-X84 (Int self-harm)	Deaths	M	15-29	2.744	0.021	1,701	Prob > F = 0.0984
E&W, and RoI ICD X60-X84 (Int self-harm)	Deaths	F	15-29	1.505	0.021	1,509	Prob > F = 0.0114
E&W, and RoI ICD Y10-Y34 (undet intent)	Deaths	M/F	All_5yr_cats	-0.981	0.001	19,946	Prob > F = 0.0846
E&W, and RoI ICD Y10-Y34 (undet intent)	Deaths	M/F	15-34	-0.805	0.012	4,263	Prob > F = 0.9935
E&W, and RoI ICD X60-X84 & Y10-Y34	Deaths	M/F	All_5yr_cats	1.144	0.039	42,075	Prob > F = 0.2396

Source: Author's own estimates

The first row of the table is all deaths included with controls for age, sex and the DiD. Only England and Wales, and Ireland are included as these were the only countries with published ICD data. The ATET is 1.27 deaths for the ICD-10 intentional self-harm categories, X60-X84, in the first model. The

total number of observations is over 22,000 (ages 15 and over). The F-statistic for parallel trends is well below the critical value indicating evidence the hypothesis of parallel trends is valid.

The ATET should be interpreted relative to the mean of the categories, which was an average of 16.3 deaths across all ages for males and females, so 1.27 is a 7.8% increase in England and Wales. We did not try and convert these into rates per head of population by each category, as this level of population detail over time and age/sex is not available and would have involved attempting to predict age/sex categories over time and matching them to the ICD statistics/categories. The overall scale differences between E&W and RoI do not matter for our DiD, although we convert deaths into a percentage-change for E&W to make inference about the scale of the effect.

Observing the next rows of the table, we focused on the three younger age categories covering ages 15-29 and estimated models pooling sex and separately for males and females. All the models indicate statistically significant ATETs. Again, for interpreting %-change, the pooled model indicates 9.8 deaths for both males and females across all ICD-10 self-harm categories for ages 15-29 from 2019 to 2022. Thus, the ATET of 2.015 represents a 20.5% increase in the number of deaths. For the next models, average deaths for males was 12.8, and so the ATET of 2.74 represents a 21.5% increase. For females of the same ages the average was 6.16 and the ATET was 1.505, indicating an estimated increase of 21.4%. Of note is that for the pooled and male models, parallel trends is weakly accepted (reject at 10% level) but acceptable at 5% level. However, for the female model on younger ages, parallel trends is rejected. We conclude that the importance of the change in burden of proof was proportionally larger for young people, but additional evidence would be required to conclude the impact on young females was indeed larger.

The third-last row of the table contains the results for deaths of undetermined cause, ICD 10 Y10-Y34.[60] The hypothesis is that for E&W and Ireland undetermined deaths are a substitute for suicides statistically and the policy change impacted this. The expectation is a negative and significant impact of the change in E&W--which is what we find. The ATET is -0.981, which is significant as indicated by the p-value near unity. Parallel trends holds at <5% significance. The estimated reduction represented a 34% reduction in undetermined deaths. We repeated the undetermined DiD for ages 15-34 and pooled sexes; parallel trends holds and the ATET is significant. For younger ages, this was a reduction of -0.805, or about a 25% reduction.

The final row of the table estimates the ATET of the two combined ICD-10 categories of intentional self-harm and undetermined. The estimated ATET is still positive and significant albeit not-surprisingly smaller, with an ATET estimate of about 1.44 deaths. The results of the pooled deaths across ICD self-harm and undetermined categories indicated an ATET of 1.144 or a 9.4% increase.

[60] As noted in Samaritans and previously, it could be important to calculate the impacts of this separately as there are differences is official statistics between ONS and CSO.

4. Discussion and Conclusions

The legal origins of the burden of proof as beyond a reasonable doubt and its application to suicide determinations gives insight into a number of factors which formed antecedents to our empirical study, such as why legal and other institutions are reluctant to change to a lower standard, but also why the empirical estimates found here might be lower than estimates such as found in the Irish Probable Suicide Deaths Study.

It also is important to consider the comparison between the various other empirical studies and our results. While very few previous studies exist in the area, England, Wales, and Canada recently changed their burdens, but clear impacts or trends do not emerge from casual observation. A number in countries such as Canada and the USA considered trade-offs and policy implications of suicide determinations for drug poisoning, but these studies only shed light on the difficulties of classification and policy implications.

Of particular relevance, the Irish Probable Suicide Deaths Study found a 31% of suicides to be in the 'balance of the probabilities' category, and this might be considered the possible change which could be attributed to a change in the burden of proof standard. This was the percentage of deaths *included in their sample* which did not satisfy the beyond a reasonable doubt standard. Our estimates were on rates and deaths and the impacts estimated on England and Wales from the change. The Average Treatment Effect on the Treated values were about 2-2.5 (rates per 100k). Given rates of about 10-12 in England and Wales, and Ireland, these estimates are a 20-25% increase in the rate, which given about 500 deaths per year, would be about 100-125 deaths increase by change in the classification. The estimates using International Classification of Diseases (10^{th} Revision) deaths were slightly more modest, but were generally between 10-20% increase, indicating a predicted change in Ireland of 50-100. There are likely differences across age groups but definitive estimates using Difference-in-Difference on subpopulations by gender and age group yielded mixed results in part because of violation of parallel trends. Nonetheless considering Table 1 it is safe to predict the policy change would move suicide up the ranking of causes of death for certain age groups.

Limitations should be noted. Besides the normal caveats that the method's assumptions may have been satisfied but the results still invalid (e.g., type 1 or 2 error, model form invalid, etc.), a key proposition is that the estimated impact for England and Wales is a reasonable predictor for the impact of a potential change for Ireland. The conclusion, that a change in the standard might similarly raise measured suicide in Ireland similar to the UK, is arguably corroborated by the Irish Probable Suicide Death Study's work, which categorized deaths which were in the 'balance of probabilities' category to be about 31%. The empirical results' finding the actual increase in measured suicides might be somewhat lower is consistent with the legal review and the study's stated view that factors such as coroners' reluctance to conclude suicide, or the likelihood that more ambiguous cases may not have been included in the Irish Probable Suicide Deaths Study.

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