This essay employs a social constructionist perspective to reassess the gender gap in US suicide rates during the early 21st century. Male rates well exceed female rates. However, suicide is undercounted, and undercounting is nonrandom by gender and method. Female suicides frequently select drug intoxication and other poisoning, a less forensically overt method than the predominant male methods of shooting and hanging. Most drug-intoxication deaths are mischaracterized as “accidents” or unintentional in the vital statistics. Expanding self-injury mortality, to integrate these deaths with known suicides, reveals greater narrowing of the gender rate gap than evident from the suicide data alone.

Introduction

Paradoxically, “women are sicker and men die quicker” according to a provocative aphorism from medical sociology [Walters, 2004]. Higher mortality rates among men are substantiated by the fact that the United States (U.S.), as do other democratic more developed countries, credibly counts its dead [Rosenberg, 1999]. Mortality sands shift however, when accounting moves from unspecified deaths to differentiation by manner (homicide, suicide, accident, undetermined injury intent, or natural causes/disease) [Lapidus et al., 1990] and underlying cause, for example, alcohol cirrhosis of the liver and congestive heart failure [Hoyert, 2005]. Paralleling the general one, another gender paradox is reflected in this morbidity and mortality aphorism: U.S. females attempt suicide more frequently than do male counterparts but their suicide rates are far lower. Nonetheless, although remaining large, the gender suicide gap is contracting (Figure 1). Whereas between 2000 and 2014, the male suicide rate rose from 17.1 per 100,000 population in 2000 to 21.1 in 2014 — an increase of 23%, the female rate rose by 50%, from
Drawing primarily from research I have conducted with multidisciplinary colleagues, I will present the case that the real gender gap in suicide or self-injury mortality rates would be narrower if calculations factored in missed poisoning suicides. Moreover, I will demonstrate that the gender suicide gap would be even narrower if we utilized an enhanced category of self-injury mortality that encompasses nonsuicide deaths from drug self-intoxication, in addition to registered or known suicides. Pertinent to exploring probable artifactuality as a contributor to the gender gap, this article also will seek to enlighten a racial suicide paradox. I hope the article will be a source of encouragement to early career scholars who feel their work is outside the box (but so was Einstein’s), and under the radar of their administrators, peers, and funding agencies.

**Inconvenient Truth and Social Constructionism**

An inconvenient truth for researchers, policymakers, and preventionists is that suicide is both undercounted by officialdom and undercounted profoundly [Goldsmith et al., 2002; Rockett, 2010a;}

![Figure 1: Suicide rates by gender, United States, 2000-2014](image-url)
Rockett et al., 2011]. A report from the influential Institute of Medicine stated that “official suicide statistics are fraught with inaccuracies. Undetermined cases and open verdicts and under-reporting limit their strength” (Goldsmith et al., 2002: 55). Moreover, the evidentiary standards for classifying a death as suicidal are high where medical examiners need to assign a suicide diagnosis buttressed by ‘reasonable medical certainty’ [Hanzlick & Combs, 1998; Timmermans, 2005; Jentzen, 2009], and coroners need to show suicidal intent ‘beyond reasonable doubt’ in applying their legal burden-of-proof approach [Atkinson, 1978; Jentzen, 2009]. Further complicating prevention, undercounting of suicide is nonrandom by method or injury mechanism, with suicide by less active and more covert methods, such as drowning and poisoning, being much more prone to misclassification or miscategorization by medical examiners and coroners (ME/Cs) than suicide by more active and overt counterparts, such as firearm and hanging/suffocation [Warshauer & Monk, 1978; Rockett, Wang et al., 2010; Huguet et al., 2012; Haw & Hawton, 2016].

Although the gender suicide rate gap and not the gender suicide paradox is the focus of this article, I offer the hypothesis that the excess in suicide attempts among U.S. females is largely an artifact of poisoning being their preferred method of suicide — far less lethal than shooting and hanging, the methods predominantly employed by males — and their excess utilization of healthcare. Since females use more health services than do males [Travis et al., 2010], they plausibly are more likely to be diagnosed by physicians with depression and other mental health disorders that are documented risk factors for suicide (Harris & Barraclough, 1998). This is consonant with the notion that “women are sicker than men,” and increases the relative likelihood that females would be diagnosed in hospital settings as suicidal after true suicide attempts, as well as to be identified as attempters because they employ less lethal methods than males. However, I hasten to add that diagnosing or surveying suicidal behavior among survivors is a far cry from ME/Cs inferring suicidal intent on the basis of a corpse or residual remains.

constructionist perspective on accumulation and quantification of scientific knowledge has guided my intermittent 25-year quest to comprehend and improve suicide data quality. Manifest in the psychiatric, epidemiologic, sociological, and criminal justice literature, social constructionism cautions users of official data, such as state and national suicide data, against uncritically adopting them at face value [Armstrong, 1986; Burr, 1995; Pescosolido & Mendelsohn, 1986; Platt et al., 1988; van de Voorde et al., 1993; Whitt, 2006; Värnik et al., 2010; Klugman et al., 2013; Neuilly, 2013; Hsieh & Neuilly, 2016]. Applied to suicide, social constructionism holds that accurate recording is an inverse function of social condemnation and stigma toward suicide and local and state support for medicolegal death investigations. In this vein, one social constructionist opined that “Facts strongly suggest that the relationship between statistical organizations and the suicide rates they produce is subject to the following principle: other things being equal, suicide rates vary directly with the degree of professional medical training of the categorizers, the average rate of man-hours devoted to cause of death categorization, and the independence of the categorizers from interested parties” [Douglas, 1967: 379]. Similarly, another stated that “Proper diagnosis of suicidal death rests upon adequate personnel, appropriate legislation, and financial and community support” [Davis & Spelman, 1968: 453]. Perhaps the most egregious example of suicide misclassification emerged from a study of the declining suicide rate in the New York City borough of Manhattan during the 1980s [Whitt, 2006]. Not evident in the other boroughs, the investigator concluded the rate diminution was an artifact of scarce resources and policy changes that had influenced medical examiners to assign ‘accident’ as the manner of death in many true suicide cases.

Suicide is susceptible to misclassification and undercounting for a constellation of reasons. Suppressants of suicide counts include the long-term decline in the combined clinical and forensic autopsy rate [Kapusta et al., 2011; Hoyert, 2011]; a stagnating economy since the Great Recession of 2008 [Summers, 2014] and severe under-resourcing of death investigation [Committee on Identifying the Needs of the Forensic Science Community, 2009] and emergency healthcare systems [Institute of Medicine, 2006a, 2006b]; the epidemic of pharmaceutical opioid, heroin, and other illicit opioid-intoxication
deaths [Rockett, Hobbs et al., 2010; Skinner et al., 2016; Stone et al., 2016]; lack of psychiatric and psychological input into medicolegal manner-of-death determinations (Rockett, Smith, Caine, et al., 2014); rarity of psychological autopsies for helping ME/Cs resolve equivocal intent cases [U.S. Public Health Service, 2001; Botello et al., 2013]; punitive life insurance provisions [Yip et al., 2010]; political pressure [Timmermans, 2005; Whitt, 2006; Carpenter et al., 2011]; and the fact that assignment of an injury death as suicide, a highly stigmatized phenomenon, is not a default option for ME/Cs in their manner-of-death determinations [Fisher, 2000; Timmermans, 2005].

Writing this suicide research autobiography evoked for me the avocationary tales of Charles Dodgson, an excellent 19th century Oxford University mathematician, still best known under his pseudonym of Lewis Carroll. My journey into the proverbial rabbit hole even exposed me to a few mad hatters, although I concede this sentiment is colored by the numerous grant and paper rejections accompanying the concerted effort to legitimate my line of inquiry. Such rejections are an integral and necessary feature of the academic landscape, and the reactions they elicit from recipients presumably range from a salutary shot in the arm to indifference to contempt to paralysis of analysis.

Into the Rabbit Hole of Misclassification

A bountiful beneficiary of serendipity, I firmly believe in the value of comparative research. My initial questioning of suicide data quality stemmed from cross-national research on injury mortality, which I conducted with a colleague using data from the World Health Organization (WHO) [Rockett & Smith, 1989]. Study countries were the U.S., United Kingdom, France, West Germany, Japan, Australia, and New Zealand [Rockett & Smith, 1989a and 1989b]. Injury mortality was distinguished by five external causes of death: namely, homicide, suicide, and fatal ‘accidental’ or unintentional motor vehicular trauma and falls. One outlier was an excessively high suicide rate among Japanese females aged 75 years and older. Another was the peaking of American female suicide rates in middle age. I subsequently learnt that contemporaneous middle-aged peaking manifested among Canadian and Scandinavian women. Middle-aged self-injury mortality resurfaces in an expanded context towards the end of this article.
Recognition that elderly Japanese female suicides constituted an outlier lingered in my consciousness. One day, I was perusing adjacent charts of cross-national female suicide and ‘accidental’ or unintentional drowning rates, respectively. The two sets of rates looked concordant for the Japanese women aged 75 years and older. I then experienced my first ‘aha’ moment as a researcher, one which prompted me to question whether drowning was an important method of suicide in Japan, a question I could not answer from the WHO data alone. Fortunately, the Japanese Ministry of Health and Welfare expeditiously fulfilled my request for suicide data disaggregated by method, and, in so doing, enabled my tentative debut as a forensic epidemiologist and demographer or population scientist [Rockett & Smith, 1993]. Drowning did emerge as an important method of suicide among Japanese females, especially the elderly.

I compiled circumstantial evidence that drowning suicides among Japanese females aged 75 years and older were being misclassified in the ‘accident’ category. More specifically, interpretation and an ex post facto explanation rested on age-gender differentials in the ratio of drowning suicides to ‘accidental’ or unintentional drownings and speculation that implicated period and cohort effects, as well as age. This group matured prior to the post-World War II American occupation of Japan, when suicide was unstigmatized and even glorified, but died during the final quarter of the 20th century as suicide faced increasing social stigma as modern Western values were being superimposed, if not invariably displacing, traditional ones. Moreover, at the time of death these women likely had often been living alone, in light of the ascendancy of the nuclear family, the large gender gap in life expectancy favoring females, and their typical younger age at marriage. Adherence to traditional values, coupled with sensitivity to new or modified ones, may have motivated some elderly Japanese females to conceal stresses, crises, and, ultimately, an elected manner of death from their progeny. It is this study that alerted me to the possibility that females were more prone than males to suicide misclassification.

My awareness of discrepancies in gender data differentials had previously been activated in a statewide, population-based, hospital department study I had conducted on motor vehicular trauma [Rockett et al. 1990a, 1990b]. Again outside the realm of suicide
research, it was subsequently reinforced in a statewide, population-based study of caffeine addiction among high school students [Rockett & Putnam, 2002]. A persisting empirical question from that study is whether youth addiction or dependence on caffeine, my drug of choice, is a gateway to more harmful drug use and abuse.

Adapted from the world of disease screening program evaluation [Rockett, 1999], the validity of suicide certification has two complementary aspects, sensitivity or true positivity and specificity or true negativity [O’Carroll, 1989]. Only sensitivity appears problematic for suicide research and prevention in democratic more developed countries, such as the U.S. and Japan. The Japanese study marked the first time I employed ratio measures to inform suicide data quality. However, in this instance I confined the application to accidental or unintentional drowning, as the lone cause-of-death reservoir for hidden suicides, pun intended. The literature implicates unintentional poisoning [Breiding & Wiersma, 2006; Donaldson et al., 2006; Rockett, Hobbs et al., 2010], unintentional drowning [Haw & Hawton, 2016], injury of undetermined intent [Platt et al., 1988; Cooper & Milroy, 1995; Linsley et al., 2001; Jougla et al., 2002; Ohberg & Lonnqvist, 2007; Värmik et al, 2012; Palmer et al., 2015], and ill-defined and unknown causes [Phillips & Ruth, 1993; Jougla et al., 2002; Reseland et al., 2008] as the manner or cause-of-death categories most susceptible to suicide misclassification. In my second foray into suicide data quality, I utilized all of the aforementioned categories in computing ratio measures.

I was invited to present a paper in 1994 at the inaugural meeting of the International Collaborative Effort (ICE) on Injury Statistics [Rockett & Smith, 1995]. My ICE paper comprised a review of the literature on suicide data quality, and expanded ratio data for 29 selected countries that were mainly located in Europe and North America. I concluded Hungary, Austria, and The Netherlands had excellent suicide data in the late 20th century. Plausibly grossly deficient, however, were corresponding Portuguese, Mexican, and Greek data. Although falling much closer to the top of the quality continuum than to the bottom, the U.S. appeared much more susceptible than the three ‘star’ countries to misclassifying true suicides.

My next paper, co-authored with one of my doctoral students, reported suicide rate sensitivity and reliability estimates for the U.S.
and 19 other democratic more developed countries, and also estimates of rate lower and upper limits [Rockett & Thomas, 1999]. Gender and age were differentiated, and potential serious undercounting of suicide manifested among U.S. females aged 75 years older, as well as for some other groups, most notably younger male and elderly female Israelis. The results for the elderly raise the specter of suicide misclassification under natural causes (disease) because not only are older people typically multimorbid, but as decedents less subject to autopsy [Hoyert, 2011], and hence to a comprehensive manner-of-death investigation. Spearman’s rank-order correlation coefficients for suicide rates and combined death rates of suicide, unintentional poisoning, unintentional drowning, and other violence were 0.93 or higher across gender and age. These results supported the notion that international suicide data were generally reliable (if not sensitive). More recent calculations reinforced the reliability of official suicide statistics, but not when ill-defined and unknown causes were an integral element [Rockett & Kapusta, 2015]. Then, even Dutch suicide data appeared to lose their luster, Austrian data to a lesser extent, but not Hungarian suicide data.

My acceptance of administrative roles in one university, and then another, propelled my suicide research into dormancy and generally retarded my scholarship. Although these duties and responsibilities slowed production of three resulting articles, colleagues and I had conducted a statewide, population-based, hospital emergency department study in the mid-1990s in Tennessee. The purpose was to estimate and analyze unmet substance abuse treatment need among adult patients [Rockett et al., 2003]. Excess costs and utilization of hospital services were also estimated [Rockett et al., 2005]. Twenty-seven percent of patients had unmet need for substance abuse treatment [Rockett et al., 2003], an estimate matched by that for need itself [Rockett et al., 2005]. This congruence revealed dire deficits in the clinical detection of substance abuse and referral to appropriate treatment. Denial or failure to declare substance use was common [Rockett, Putnam, et al., 2006], and hospital records only showed 1% of adult ED patients having a substance abuse problem [Rockett et al., 2003]. A morbidity example of social constructionism, the gross data deficits revealed in this study were plausibly nationwide. Prevalence estimation involved application of 14 criteria that blended
self-report and confirmatory toxicological data, and toxicology is central to my most recent research on suicide data quality. The high-risk patients represented ages 18 to 64 years, but males were more than twice as likely as females to have substance abuse treatment need [Rockett et al., 2003]. During study design and data collection through paper publication, I sensed no connection between the emergency department study and my interest in suicide undercounting. Never the twain shall meet, or so it seemed then.

Artifactuality in Race and Gender Differentials

Negotiating a precarious balance between my teaching and administrative duties and my research aspirations, I returned to the topic of suicide data quality by means of a rudimentary attempt to enlighten a racial gap in official suicide rates for both genders [Rockett, Samora, & Coben, 2006]. U.S. blacks registered rates less than half those of whites, an anomaly in the mind of this skeptic. Fueling my skepticism, I then knew of no other important health indicator where blacks fared better than whites (but stay tuned for another); consonant with their vulnerable minority status and associated marginality in the healthcare system. Implicating artifactuality in observed suicide rate differences, estimation of lower and upper limits for the true rates, especially the upper limits, diminished racial gaps among both males and females. The upper bounds embraced all but one of the categories I previously identified as misclassification prone. The notable absentee was ill-defined and unknown causes, omission dictated by an unwelcome editorial mandate; a conservative decision that previous research would suggest was misguided [Phillips, 1993; Jougla et al., 2002]. My subsequent study of potential artifactuality in the racial suicide gap also intensified my curiosity about the magnitude of the gender gap. More to come.

Among questions prompted by my study of observed racial differences in suicide rates was whether potential data disparities included discrepant reporting in psychiatric and disease comorbidity on death certificates by gender and race. Fortuitously, an unanticipated cyberlink led me to a new methods paper on the utility of multiple-cause-of-death (MCOD) analysis [Wall et al., 2005]. My research had been confined to underlying cause-of-death data, but death certificates also contain information on contributory causes.
The methods paper proved critical to my work. Shortly after reading it, I found a MCOD study on suicide conducted in Australia, my country of origin [Ruzicka et al., 2005]. At the time, Australia and the U.S. registered identical suicide rates of 11 per 100,000 population, and their rates remain similar. Colleagues and I conducted two replications of the Australian study [Rockett et al., 2007; Rockett et al., 2009]. These replications not only permitted comparisons between the two countries, but spawned insights into U.S. suicide data deficits across gender and race. Although I had no a priori reasons for believing that Australians dying by suicide had been in poorer health than American counterparts, females than males, and whites than blacks, there was excess psychiatric and disease comorbidity reported on Australian versus American death certificates, female versus male certificates in Australia and the U.S., and U.S. death certificates for whites versus blacks. A systematic review and a meta-analysis indicated that up to 90% of people dying by suicide in Western countries had a diagnosable mental health disorder [Cavanaugh et al., 2003; Arsenault-Lapierre et al., 2004]. This prevalence dwarfed corresponding comorbidity reported on the death certificate data that were analyzed in each of the three MCOD studies [Ruzicka et al., 2005; Rockett et al, 2007; Rockett et al., 2009] — discrepancies auguring negatively for accurate suicide case ascertainment by ME/Cs.

Up next on my research agenda was a multivariable analysis aimed at enlightening the racial or minority suicide paradox [Rockett, Wang et al., 2010]. This study focused on race/ethnicity rather than race, and included Hispanics as well as whites and blacks (or more precisely, African Americans). It utilized predictors that reflected lessons I had learned from my preceding studies on suicide data quality. Table 1 provides the results for application of four models ranging from a univariable model to the full one. The dependent or outcome variable was the likelihood pooled suicide and undetermined intent deaths were classified as undetermined, the manner-of-death category most relatively prone to suicide misclassification, and our misclassification surrogate. Consistent with our hypothesis, blacks were 2.3 times more likely than whites to be classified as undetermined, and Hispanics 1.2 times — evidence of health data disparities. Implementation of Models 2 and 3 showed that females were respectively 2.3 and 2.4 times more likely than
Table 1
Logistic regression models of the association between race/ethnicity, other individual characteristics, and potential suicide misclassification.*
United States, 2003-2005

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n=105,946)</td>
<td>(n=105,946)</td>
<td>(n=105,946)</td>
<td>(n=105,946)</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
<td>OR (95% CI)</td>
</tr>
<tr>
<td>White (referent)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Black</td>
<td>2.38 (2.25, 2.52)</td>
<td>2.26 (2.13,2.39)</td>
<td>2.28 (2.21, 2.36)</td>
<td>2.38 (2.22, 2.57)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.08 (1.00,1.16)</td>
<td>1.00 (0.93,1.08)</td>
<td>1.28 (1.24, 1.32)</td>
<td>1.17 (1.07,1.28)</td>
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<tr>
<td>Gender</td>
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</tr>
<tr>
<td>male (referent)</td>
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<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>female</td>
<td>2.36 (2.27,2.45)</td>
<td>2.29 (2.25, 2.34)</td>
<td>1.01 (0.97, 1.06)</td>
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</tr>
<tr>
<td>Age (years)</td>
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<td></td>
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</tr>
<tr>
<td>15-34 (referent)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
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<td>35-54</td>
<td>1.40 (1.34,1.46)</td>
<td>1.37 (1.34,1.40)</td>
<td>0.88 (0.84, 0.93)</td>
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</tr>
<tr>
<td>55-74</td>
<td>0.61 (0.58,0.66)</td>
<td>0.85 (0.82,0.87)</td>
<td>0.52 (0.49, 0.57)</td>
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<tr>
<td>75+</td>
<td>0.44 (0.40,0.48)</td>
<td>1.47 (1.42,1.52)</td>
<td>0.51 (0.46, 0.57)</td>
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<td>Education (years)</td>
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<tr>
<td>0-8</td>
<td>1.82 (1.66,2.00)</td>
<td>1.82 (1.75, 1.90)</td>
<td>2.34 (2.10, 2.62)</td>
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</tr>
<tr>
<td>9-12</td>
<td>1.51 (1.45,1.58)</td>
<td>1.43 (1.40,1.46)</td>
<td>1.66 (1.58, 1.74)</td>
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<tr>
<td>13+ (referent)</td>
<td>1.00</td>
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<tr>
<td>unknown</td>
<td>1.84 (1.70,1.99)</td>
<td>1.37 (1.32, 1.43)</td>
<td>2.08 (1.89, 2.28)</td>
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<td>Psychiatric Documentation</td>
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<tr>
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</tr>
<tr>
<td>no</td>
<td>6.56 (6.16, 6.99)</td>
<td>3.12 (2.78, 3.51)</td>
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<tr>
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</tr>
<tr>
<td>more active (referent)</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>less active**</td>
<td></td>
<td></td>
<td></td>
<td>46.33 (43.32, 49.55)</td>
</tr>
</tbody>
</table>

* Potential suicide misclassification was operationalized as a binary outcome measure of manner of death: undetermined intent (1) and suicide (0).
** Deaths classified under ICD-10X60-69, X71, X75-77, X79, X81-84, Y10-19, Y21, Y25-27, Y29, and Y31-34. Residual injury deaths were classified as more active.

males to be classified as undetermined. Model 4 added the predictor, less active versus more active injury mechanism (suicide method), with poisoning deaths dominating the former group. Although this final addition did not eliminate racial/ethnic, age, or education differentials in potential suicide misclassification, it eliminated the gender differential — a finding that convinced me females were far more prone than males to suicide undercounting. This finding later influenced my thinking about mismeasurement of suicide in the context of a category of self-injury mortality even broader than a hypothetical one comprising both manifest and latent suicides
In Models 3 and 4, absence of psychiatric documentation was a strong predictor of the likelihood of an undetermined classification, but did not impact the magnitude of the gender differential in Model 3.

From Poisoning to DDSI and SIM

Concurrent with the prior study, another of our investigations explored the question of whether the upward trends in U.S. suicide and so-called ‘accidental’ or unintentional poisoning mortality rates were independent during the opening years of the 21st century [Rockett, Hobbs et al., 2010]. Qualifiedly reminiscent of the high-risk patients in the Tennessee Hospital Emergency Department Study, the answer appeared to be no among the population under age 65 years — but irrespective of gender in this particular instance. Collectively, these two studies heightened my interest in drug-intoxication deaths, and especially in the opioid-intoxication component of poisoning mortality as a determinant of differential suicide misclassification by gender. However, follow up was delayed for a few years as I pursued a national injury mortality study (which, atypically for me, took suicide data at face value) [Rockett et al., 2012], collaborated on European suicide projects [Kapusta et al., 2011; Hofer et al., 2012; Blüml et al., 2013; Vyssoki et al., 2015] and numerous Chinese smoking and stress studies [e.g., Yang et al., 2012a, 2012b; Wu et al., 2016], and became embroiled in the fallout from my discovery of academic fraud — where my personal and intramural professional life imitated my public science [Willis-Aronowitz & Dokoupil, 2014]. Blessings and a curse. C’est la vie.

I have a personally rewarding story to share from the injury mortality study [Rockett et al., 2012], whose implications might be a boon for others. The subject is resolve in the face of the humiliation and fear that manuscript rejection can render. Historically, I passively accepted paper rejection from journal editors, beyond rare venting to fellow faculty who lent me an ear. Inspired by the example of a China-based colleague, Tingzhong Yang, I finally wrote an unsolicited rebuttal to an editor-in-chief in which I invoked international data coding conventions on a bed of logic and reason. This dense rebuttal was my response to the rejection of the injury mortality paper that only referenced a sole but negative review. The reviewer had objected to the deviation that my co-authors and I made
from Federal government prescriptions for addressing intentionality in manner and cause-of-injury death categorization. The editor generously permitted us to respond to the critique and resubmit. Then, despite the fact that we held firm to our recategorization, the paper was accepted for publication. Icing on the cake, the reviewer remarkably and most graciously commented that “we should agree to disagree.” Conversion from rejection to publication legitimated our basic approach, with our recoding of injury mortality categories enabling us to be the first to report that suicide had surpassed unintentional motor vehicle traffic crashes as the leading cause of fatal injury in the U.S. Harboring strong implications for the gender gap, this positive outcome emboldened me to advance the notion of recategorization in a new context.

I now introduce readers to two novel mortality concepts: ‘death from drug self-intoxication’ (DDSI) and an enhanced category of ‘self-injury mortality’ (SIM) that transcends suicide. The reconceptualized SIM is aimed at circumventing the twin problems for injury epidemiologists, suicidologists, and preventionists posed by the undercounting of drug-intoxication suicides and the mischaracterization of most drug-intoxication deaths on death certificates as ‘accidents.’ Demanding fresh approaches, the well-documented drug-intoxication mortality epidemic in the U.S. shows no signs of abatement. Quite the contrary, and the epidemic is dominated by deaths from use, misuse, and abuse of pharmaceutical and illicit opioid painkillers [Rossen et al., 2016; Compton et al., 2016], from oxycodone to heroin to newer ‘kids on the block,’ such as the even more lethal street fentanyl and carfentanil in powder and counterfeit pill form [Green & Gilbert, 2016; CDC Health Alert Network, 2016].

Accident is the manner of death to which ME/Cs assign most drug-intoxication deaths [Warner et al., 2013]. For some years, this seemed a mischaracterization to me, and motivated me to prepare a position paper. The paper became my starting point for recruiting a formidable multidisciplinary team to prepare a polished and precise essay on DDSI [Rockett, Smith et al., 2014] that avoided or minimized tensions between the sometimes competing functions of the epidemiologic and medicolegal paradigms, with the first representing scientific inquiry and the second statutory obligations. A number of the co-authors had worked with me on the injury
mortality study [Rockett et al., 2012], and some also on earlier projects. They included psychiatrists, medical examiners, and emergency physicians, professionals who work at ground level or face-to-face, and not five miles high as I do. Not contingent upon modifying extant manner-of-death categories, we conceived DDSI to cut across three of them; namely, suicide, accident, and undetermined [Rockett, Smith et al., 2014]. Even if ME/Cs frequently appear inappropriately resourced to determine drug-intoxication suicides accurately [Rockett, Hobbs et al., 2015], or most drug-intoxication deaths are not missed suicides, we consider that the overwhelming preponderance of these drug deaths ensue from deliberate misuse and abuse of drugs. We believe that ME/Cs can, in theory anyway, readily discern proximal self-harming behavior through tangible signs like syringe needle track marks, toxicological evidence of illicit drug use, and confirmation of nonmedical use of pharmaceuticals in the form of doctor and/or pharmacy shopping via reference to fully functioning prescription drug monitoring programs [Patrick et al., 2016]. I note that interviews with survivors of near fatal ‘unintentional’ overdoses have documented their ambivalent attitude towards potential death at time of overdose [Rossow & Lauritzen, 1999; Neale, 2000].

My co-authors and I recommend standardization of death certificates across the U.S., with provision for reporting qualitative and quantitative information on substance use, misuse, and abuse [Rockett, Smith et al., 2014]. Without these data, nuanced and accurate DDSI accounting is out of reach for researchers, interventionists, and preventionists. But undeterred, Eric Caine and I conducted a small study in which we utilized an enhanced category of SIM that comprised estimated DDSIs and registered suicides by any method [Rockett and Caine, 2015a]. Whereas suicide alone had ranked as the tenth leading cause of death in the U.S. in 2013, reconfigured SIM would have ranked eighth among the top 10 behind diabetes and superseded influenza and pneumonia and kidney disease. This preliminary SIM study and the DDSI essay became the foundation for a more important comparative study using a burden of disease and injury approach.

In our new SIM study, my multidisciplinary team and I assumed that 80% of accidental drug-intoxication deaths and 90% of undetermined drug-intoxication deaths in the 15 years and older
age group were DDSIs [Rockett et al., 2016]. We used the years 1999 to 2014 as our observation period. In 1999, the rate ratio of SIM to suicide was 1.4, rising to 1.8 in 2014. The male-female SIM rate ratio was 3.7 in 1999 versus 2.6 in 2014 — a 30% decline. The estimated SIM rates for males and females, respectively, were 22.9 and 6.3 per 100,000 population in 1999 and 34.6 and 13.6 in 2014 (Figure 2). Harking back to actuarial or life table measures I had employed in much earlier research [Rockett & Pollard, 1995; Rockett, 1998b], our reconfigured SIM showed that relative losses for females were even greater when SIM incorporated drug-intoxication deaths than when comparisons with males were confined to known suicides. Expressed in terms of life expectancy, females dying in 2014 from SIM lost an estimated 36.6 years of life compared to 32.2 years for male counterparts. In 1999, corresponding losses were less than half of those at 17.3 and 15.8 years, respectively. At both ends of the observation period, years of life lost by both genders were more than double those lost to diabetes and the two other comparative disease groups, influenza and pneumonia and kidney disease. Moreover, in 2014 the SIM rate converged with the hitherto higher diabetes mortality rate. A bottom line: prevention programs cannot be optimally designed, targeted, and implemented in high-risk populations, if suicide and other self-injury mortality is
mischaracterized and nonrandomly undercounted by injury mechanism in official vital statistics.

Yes, females still attempt suicide more than do males, and males continue to exhibit far higher suicide rates [American Foundation for Suicide Prevention, 2016]. However, to reiterate a prior proposition, the true suicide rate gap by gender is smaller than the observed one because of the greater propensity of females to employ the ‘covert’ method of poisoning. For example, poisoning officially accounted for 34.1% of female suicides in 2014, with the drug-intoxication component being 30.8% [CDC, 2016b]. Corresponding male figures were much lower at 10.6% and 7.4%, respectively. A further gender contrast, shooting and hanging/suffocation, as more forensically overt and obvious methods, collectively accounted for 82% of male suicides versus 57% of female suicides. Our incorporation of DDSI into SIM accounting showed rapid erosion of the protection afforded by female gender, especially in middle age [Rockett et al., 2016]. On a more positive note, marginality in the healthcare system may have inadvertently conferred a measure of protection against the opioid menace to vulnerable minorities, particularly blacks and Hispanics, through lower prescription rates of these hazardous painkillers [Anderson et al., 2009; Rockett & Caine, 2015b; Singhal et al., 2016]. There is a pronounced need for extreme vigilance and routine monitoring of the poor among all racial-ethnic groups as healthcare becomes more accessible to them under recent reforms.

SIM arguably qualifies as the most pressing public health problem of our day in the U.S. because of the enormous toll it is exacting in premature mortality across gender [Rockett et al, 2016]. Societal failure to nip the pharmaceutical opioid addiction problem in the bud, during the 1990s and early 2000s, has unleashed wildcats from the bag. Resurrection of a major heroin problem, for example, is rooted in this failure and implicated liberal prescribing by physicians and aggressive marketing by a drug company [Brody & Light, 2011; Compton et al., 2016; Meldrum, 2016]. Many who became addicted to prescription opioids, such as oxycodone and hydrocodone, have migrated to heroin because of much lower cost and easy access. These pharmaceuticals are commonly, although not invariably, the gateway to heroin use and addiction or dependence.
My hope is that if DDSI gains acceptance as a descriptor in the healthcare system and from the public and government at all levels, more expertise, equipment, healthcare facilities, and other resources will materialize to combat both suicide and nonsuicide SIM and elevate the status of mental health as a major clinical and public health problem. There already is enthusiasm for the DDSI concept in the National Center for Injury Prevention and Control at CDC [Stone et al., forthcoming 2016], and DDSI is being translated for clinical audiences [Connery & Rockett, 2016]. Although evaluation of their effectiveness is crucial, drug treatment facilities are mushrooming in response to the implementation of the Patient Protection and Affordable Care Act (Obamacare) of 2010 and the Mental Health Parity and Addiction Equity Act of 2008 [Wen et al., 2013].

**Autopsies and Toxicology**

The two fundamental tools that are variably used in medicolegal investigations of manner of death are the autopsy and toxicology. Autopsies generally are important in helping investigators determine injury mechanism and intent in suspicious deaths, and may also be an important marker for the fastidiousness of death investigations [Shojania et al., 2003]. Implying less fastidiousness in suicide versus homicide accounting, 97% of U.S. homicides in 2007 were autopsied compared with just 60% of suicides and 81% of undetermined-intent deaths [Hoyert, 2011]. By comparison, for example, Finnish medicolegal authorities conducted forensic autopsies in 99% of suicides, 98% of homicides, and 97% of undetermined-intent deaths for the period 2000-2003 [Lunetta et al., 2007]. Toxicology can be crucial in revealing poisoning as a mechanism in suicide and other injury mortality [Croft et al., 2006; Committee on Identifying the Needs of the Forensic Science Community, 2009; Bennett et al., 2009]. Poisoning homicides are extremely rare in the U.S. [Shepherd & Ferslew, 2009; Muazzam et al., 2012; Warner et al., 2013]. Poisoning suicides are 68 times more common [CDC, 2016b], and there is increasing concern about their susceptibility to misclassification by ME/Cs [Breiding & Wiersma, 2006; Rockett, Hobbs et al., 2010; Bohnert, Roeder et al., 2010; Bohnert, McCarthy et al., 2013; Rockett, Smith et al., 2014]. Pertinent to a much higher likelihood of misclassification of suicides than homicides, most police in the U.S.
are not trained in suicide investigation and there is no equivalent agency to help ME/CS ascertain such deaths [U.S. Public Health Service, 2001]. In addition, the bar is much lower for homicide ascertainment [Lester, 2009; Rockett, 2010].

Combined clinical and forensic autopsy rates have fallen sharply in the U.S. [Hoyert, 2011] and many other countries over recent decades. In 2010 and 2011, I collaborated with Austrian and German researchers in a correlational or ecological study of the association between autopsy rates and suicide rates, using Eurasian data for 35 Eurasian countries [Kapusta et al., 2011]. Data deficits precluded inclusion of the U.S. The lead author, Nestor Kapusta, told me this project was motivated by ideas I had expressed in my 1995 ICE conference paper [Rockett & Smith, 1995]. Associations between the national autopsy and suicide rates manifested spatially and temporally. Cross-sectionally, a 1% difference in the autopsy rate was associated with a rate difference of 0.49 suicides per 100,000 population. Longitudinally, a 1% decline in the autopsy rate was associated with suicide rate decline of 0.42 per 100,000. Individual and county level, multivariable research I am currently pursuing, using the restricted access data (RAD) from the National Violent Death Reporting System, will help inform what differential autopsy practices mean for the gender suicide gap and the minority suicide paradox. The same pertains to toxicological testing. In a state-based correlational study, colleagues and I found a positive association between specification of one or more drugs on the death certificate and the prevalence of nonhomicide drug-intoxication deaths classified as suicide [Rockett, Hobbs et al., 2015]. This finding speaks to an imperative for ME/Cs to conduct a fastidious forensic investigation in resolving manner of death in poisoning cases beyond ruling homicide in or out.

Conclusion

I do not study the determinants of suicide, but rather the determinants of suicide case ascertainment by ME/Cs. Furthermore, I believe there is much more scientific knowledge of the former [e.g., Harris & Barraclough, 1998] than the latter [Stone et al., forthcoming 2016]. However, accurate characterization and measurement of suicide and other self-injury mortality and morbidity are essential for evidence-based prevention and evaluation. My evolving research
The agenda on suicide data quality has taken me from the international arena to a largely domestic one, and revealed to me the importance of factoring in variables based on discrepancies and deficits in reported health and other personal characteristics of decedents, as well as heterogeneity in the forensic armamentarium that ME/Cs can summon for their manner-of-death determinations. Routine autopsies and toxicological testing in injury mortality cases, in concert with in-depth follow-up interviews with family, friends, and acquaintances of the decedents, would markedly improve accounting and documentation of suicides and DDSIs across age, gender, race/ethnicity, educational attainment, and injury mechanism. Similar benefits would also accrue with sociological or contextual autopsies of the areas or jurisdictions where suicides and other SIM occur [Scourfield, 2011; Neuilly, 2011; Scourfield at al., 2012]. Meanwhile, shrinkage in the gender suicide gap, and more appropriately the gender SIM gap, is put into stark relief through the incorporation of DDSIs into the estimation of national SIM rates, and highlights the inadequacy of confining gender comparisons to known or registered suicides. However, much remains to be done in research, surveillance, and prevention of suicide and other SIM.

This article is dual purpose. My principal purpose was to re-examine and reinterpret the gender suicide gap from a social constructionist perspective, while relaying a cautionary yet optimistic tale for users of government statistics and statistical data of any ilk. In employing a research autobiography as the vehicle, my secondary purpose was to encourage scholars, especially newer ones, to follow their passion or ‘rock the boat’ even as the corporatization of tertiary educational institutions may foster less attractive and more conservative paths. That said, as a person in my sunset years, I run the very real risk of sounding glib. My own career has been professionally and geographically disjointed, hardly a model worth emulating. Nonetheless, I appreciate the enriching opportunities that percolated from interdisciplinary education and training, mentoring and teaching students, conferencing, overseas travel, serving on panels and as an external examiner and reviewer, and more recently from conducting webinars. Such opportunities primarily emanated from working at Australian and Canadian high schools, the United Nations, a British consulate, a state health department, one American college, and six domestic and foreign
universities. This diverse occupational history has nurtured and sustained my passion for comparative research.

To paraphrase the late Nobel laureate physicist, Richard Feynman, I like finding things out. In closing, I quote from Mina Bissell’s presidential address at the 1997 annual meeting of the American Society of Cell Biology: “…if research is truly what you want to do, then you must be willing to pay the price... It takes time, patience, stubbornness, years and years of seven-day weeks and eighteen-hour days, years of poverty-level wages, predictions of doom and failure, rejections of papers and grants, depression and self-doubt...But one persists. One continues because this is what one must do. This is what you want to do.” [Snyder, 2008: 1].

References


