



Leaving Las Vegas: Exposure to Las Vegas and risk of suicide

Matt Wray^{a,*}, Matthew Miller^b, Jill Gurvey^c, Joanna Carroll^d, Ichiro Kawachi^e

^a Department of Sociology, Temple University, 751 Gladfelter Hall, Philadelphia, PA 19122, USA

^b Department of Health Policy and Management, Harvard School of Public Health, Boston, MA, USA

^c Programmer Analyst, Philadelphia, PA, USA

^d Programmer Analyst, Santa Monica, CA, USA

^e Department of Society, Human Development and Health, Harvard School of Public Health, Boston, MA, USA

ARTICLE INFO

Article history:

Available online 18 October 2008

Keywords:

USA
Las Vegas
Suicide
Urban
Ecology
Relative risk

ABSTRACT

Residents of Las Vegas, Nevada have much higher suicide rates than residents of other metropolitan counties in the USA. Whether the risk of suicide among visitors to Las Vegas is also significantly elevated has been difficult to assess because person-time denominator information is not available. We used a case-control design to examine the association between exposure to Las Vegas and risk of suicide expressed as mortality odds ratios. We conceptualized four different types of potential suicide risk with respect to Las Vegas: (1) risk of suicide among usual residents of Las Vegas (“chronic risk”), (2) risk of suicide among temporary visitors to Las Vegas (“acute risk”), (3) risk of suicide among Las Vegas residents visiting elsewhere (“leaving Las Vegas risk”), and (4) risk of suicide among travelers in general (“traveler risk”). Controlling for age, gender, marital status, and year effects, the odds of suicide among Las Vegas residents was at least 50% greater than among residents elsewhere in each of the three decades we observed. Visitors to Las Vegas were at double the risk compared to those who stayed in their home county. Leaving Las Vegas was associated with a greater than 20% reduction in risk for suicide. Traveling to Las Vegas is associated with a twofold increase in risk compared to traveling elsewhere. We discuss three possible theoretical frameworks to help explain our observed results: ecological effects, whereby social factors unique to Las Vegas, or uniquely amplified in Las Vegas, result in increased risk to both residents and visitors; selection effects whereby those predisposed to suicide disproportionately choose Las Vegas to reside in and visit; and contagion effects, whereby high numbers of suicides tend to lead to even greater numbers over time, as people emulate the suicides of others. We compare our empirical evidence for each of the effects with existing sociological and historical scholarship on Las Vegas.

© 2008 Elsevier Ltd. All rights reserved.

Introduction

Everyday, about 85 Americans die by suicide—about 32,000 every year—and hundreds of thousands more make attempts on their lives. While a significant minority of

suicide studies over the past half century has attempted to account for suicide as a social fact in the tradition established by Durkheim (see Stack, 2000 for a review), the vast majority of studies have focused on identifying and quantifying proximal psychiatric risk factors for suicide (Conwell et al., 1996; Harris & Barraclough, 1997; Robins, Murphy, Wilkinson, Gassner, & Kayes, 1959) which in themselves fail to account for the spatial distribution of suicide risk across the United States (Wright, Sathe, & Spagnola, 2007). Accounting for this social and epidemiological fact – that

* Corresponding author. Tel.: +1 215 204 1445; fax: +1 215 204 3352.

E-mail addresses: mwray@hsph.harvard.edu, mwray@temple.edu (M. Wray).

suicide risk is unevenly distributed across geography – continues to pose problems of interpretation (Baller & Richardson, 2002).

In this article, we foreground some of these problems by describing the pattern of suicide in a single geographic area and comparing it to the rest of the U.S. Among the fifty largest metropolitan statistical areas in the U.S. for the years 1999–2002, the Las Vegas MSA (located primarily in Clark County, Nevada, but also incorporating portions of Mojave County, Arizona) had the highest suicide rate at 20.6/100,000. The second highest ranking MSA, Tampa/St. Petersburg/Clearwater, FL, had a mean suicide rate of 15.6, with the average rate for all fifty MSAs equaling 9.5 (McIntosh, 2005). Over the last five years for which mortality data are available (1999–2004) Clark County had the highest suicide rate among counties in the U.S. with over 1 million residents, with a mean suicide rate of 18.2. The next highest large county—Maricopa, AZ, home to Phoenix—had a rate of 13.4, with the average rate for all 35 large counties equal to 9.4 (Centers for Disease Control and Prevention, 2007). Whether measured at the county level or at the level of MSA, Las Vegas leads the nation in suicide risk by a very large margin.

Despite its elevated rate of suicide, there have been few studies examining suicide in Las Vegas. Previous studies have reached conflicting conclusions, with Phillips, Welty, and Smith (1997) finding a strong, significant elevation in risk for both residents and visitors to gambling areas, Chew et al. (2000) finding no elevation in risk for visitors to gambling areas (including Las Vegas), and McCleary, Chew, Merrill, and Napolitano (2002) finding only a very small elevation in risk for residents of gambling areas.

These studies did not attempt to capture the effects of exposure to Las Vegas per se, but rather used Las Vegas as one site among several that feature legal gambling. While Las Vegas is unquestionably one of the pre-eminent gambling and entertainment destinations in the world, analyses that focus on evidence of a link between suicide and gambling can obscure other ecological sources of suicide risk that may be associated with living in or visiting Las Vegas. (McCleary et al., 2002). For example, according to census data Las Vegas has for fifteen years or more been one of the fastest growing metropolitan areas in the U.S., a pattern of growth that may amplify social isolation, fragmentation, and low social cohesion that have long been identified as sociological correlates of suicide (Bearman, 1991; Congdon, 1996; Duberstein et al., 2004; Durkheim, 1951; Rezaeian et al., 2007; Trout et al., 1980). Additional risk factors that coexist in Clark County include higher than average mortality and morbidity related to alcohol abuse (Centers for Disease Control and Prevention, 2007); high levels of self-reported poor mental health (Kaiser Family Foundation, 2007); poor access to mental health care (Tondo, Albert, & Baldessarini, 2006); and several others explored by Wray (2006).

One recent study that departs from the gambling/suicide framework focuses on the large number of hotel rooms in Las Vegas (approximately 145,000), which may be a magnet for both non-residents and residents intent on self-harm who wish to diminish the chances of discovery and rescue (Gemar, Zarkowski, & Avery, 2008).

That study estimated visitor suicide rates based on hotel room occupancy rates and found that Clark County visitors were at lower risk for suicide than the general population of Clark County residents. It also found that Clark County residents who registered in local hotels were at much greater risk for suicide than were visitors, suggesting that local residents are more likely to use hotel rooms as a way to increase the lethality of their attempts than are visitors.

Methods

We conceptualized four types of risk: (1) risk of suicide among usual residents of Las Vegas compared to residents in other counties (“chronic risk”); (2) risk of suicide among temporary visitors to Las Vegas compared to people who stayed home (“acute risk”); (3) risk of suicide among usual residents of Las Vegas who were outside their home county (“leaving Las Vegas risk”) when they died compared to those who remained in Las Vegas; and (4) the risk of suicide among temporary visitors to Las Vegas compared to temporary visitors to any other county (“traveler risk”). This last category of exposure was examined to check whether travelers in general – not just those who visit Las Vegas – have a higher propensity to commit suicide.

Our study shares a design similar to some studies that have examined exposure to place as a risk factor for other forms of mortality—most notably a highly publicized study of heart attacks among tourists as a result of being “exposed” to New York city (Christenfeld, Glynn, Phillips, & Shrira, 1999). In the absence of denominator data (in this instance, the person-years of exposure to Las Vegas), one may still estimate exposure/outcome associations using a metric derived from only dead subjects (i.e., numerators). When the number of exposed subjects who died of the specific outcome of interest (in this case suicide) is compared with the number of unexposed subjects who died of suicide, the resulting proportional mortality ratio (PMR) provides an estimate of the association between exposure and outcome. According to Miettinen and Wang (1981), one can further consider proportional mortality studies as a variant of the case–control study in which the cases are all suicides (both exposed and unexposed), while controls are all other deaths. The resulting mortality odds ratio (MOR) has a methodological advantage over the more commonly used PMR because, unlike the PMR, it can be interpreted as a risk ratio. One of the advantages of treating the proportional mortality study as a case–control study is that study validity can be enhanced by applying the same principles of control selection as in traditional case–control studies, i.e. to select controls based on a presumed lack of association with the exposure of interest. In the present analyses, we excluded all cases of heart attack (“myocardial infarction” or MI) from the control series, based on a priori reasoning that exposure to some potential suicidogenic stressors in Las Vegas may also be associated with increased risk of death from that cause. By this same reasoning, one might also expect stroke death to be associated with the exposure, but excluding stroke deaths from our sample did not significantly change results for any of the four models and therefore we did not exclude them in the results presented here.

We empirically assessed the validity of our effect measure, the MOR, by examining how well our calculated, unadjusted MOR for model 1 (comparing the mortality odds for suicide among usual Clark County residents to that for rest of the U.S. population) predicts the actual ratio of suicide rates in Clark County compared to rest of the U.S. (i.e., the suicide rate in Clark County divided by the suicide rate for the rest of the U.S.). The correlation between results of the MOR and results obtained using traditional person-time denominator was 0.88.

Our data are drawn from the multiple cause of death (MCD) files from the National Center for Health Statistics, a widely used dataset for researching suicide (National Bureau of Economic Research, 2007). Due to privacy concerns, county of residence is unavailable for residents of counties with populations less than 100,000 from 1989 onward, so we have excluded all counties with less than 100,000 residents from all time periods.

To assess relative suicide risk, we compare the odds of dying by suicide to the odds of dying by other means (excluding MI) for both residents and non-residents who died in Clark County. For each death record, we compared county of residence to the county where the death occurred. We coded those who died in their home county as residents and coded those who died in a county other than their home county as non-residents. While these categories are subject to some misclassification—e.g. the category “non-resident” (sometimes referred to as “visitor” below) probably includes a number of people who relocated to a new county but died prior to setting up legal residence—they are sufficiently distinct enough to serve as proxies for exposure (Christenfeld et al., 1999), especially since we are working with large numbers of death records.

Controlling for calendar year, age, and marital status, we conducted four basic analyses using logistic regression and the resulting mortality odds ratios and confidence intervals estimate the *relative suicide risk* for each exposure group. We present overall suicide risk and because suicide is known to be characterized by large gender disparities, we also stratified our analyses by gender. Given very small cell sizes for most non-white groups, we do not present results stratified by race. All analyses were conducted using proc logistic in SAS 9.1 (SAS Institute, 2004).

Results

Descriptive data for 1975–2004 are presented in Table 1. There were 39,595,933 deaths (excluding deaths by MI) of which 608,250 (1.5%) were suicides. In 1995–2004, among residents of Las Vegas who died in Las Vegas ($n = 94,278$), suicides ($n = 2452$) accounted for 2.6% of the total deaths. Among visitors to Las Vegas who died in Las Vegas ($n = 5504$) in those same years, suicides ($n = 255$) represented 4.6% of the total deaths. These numbers reflect the relatively low base rate of suicide compared to other causes of mortality. Suicide remains a relatively rare form of death in the U.S. (1 in 10,000) and readers should keep in mind that the risk ratios presented here are measures of relative, not absolute, risk.

Results of the logistic regressions are presented in Table 2. For model 1 (“chronic exposure”), we compared the suicide risk for usual residents of Las Vegas to residents elsewhere. The population examined here is all those who died in their home county, separated into two different exposure groups: Las Vegas vs. non-Las Vegas. The question we ask here with respect to suicide is

Table 1
Deaths in the U.S., 1975–2004, among residents of counties with population >100,000

	Total deaths		Death by suicide		Death by myocardial infarction		All other deaths	
	N	%	N	%	N	%	N	%
Total								
All	44,250,697		608,250		4,654,764		38,987,683	
Male	22,648,542	51.18	467,598	76.88	2,551,653	54.82	19,629,291	50.35
Female	21,602,155	48.82	140,652	23.12	2,103,111	45.18	19,358,392	49.65
Model 1^a								
All	38,789,357		548,825		4,105,775		34,134,757	
Male	19,633,179	50.61	419,852	76.50	2,222,683	54.14	16,990,644	49.78
Female	19,156,178	49.39	128,973	23.50	1,883,092	45.86	17,144,113	50.22
Model 2^b								
All	38,622,902		544,359		4,096,795		33,981,748	
Male	19,540,337	50.59	416,416	76.50	2,217,306	54.12	16,906,615	49.75
Female	19,082,565	49.41	127,943	23.50	1,879,489	45.88	17,075,133	50.25
Model 3^c								
All	188,447		5274		11,203		171,970	
Male	107,477	57.03	4155	78.78	6965	62.17	96,357	56.03
Female	80,970	42.97	1119	21.22	4238	37.83	75,613	43.97
Model 4^d								
All	5,446,081		59,138		547,765		4,839,178	
Male	3,005,376	55.18	47,520	80.35	328,133	59.90	2,629,723	54.34
Female	2,440,705	44.82	11,618	19.65	219,632	40.10	2,209,455	45.66

^a Compares residents of Clark County to all residents elsewhere.

^b Compares visitors to Clark County to all residents elsewhere.

^c Compares residents of Clark County who died in Clark to residents of Clark County who died elsewhere.

^d Compares visitors to Clark County to visitors elsewhere.

Table 2
Association between exposure to Las Vegas and suicide

	Model 1 ^a (chronic exposure)	Model 2 ^b (acute exposure)	Model 3 ^c (leaving Las Vegas)	Model 4 ^d (traveler risk)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Overall				
1979–1984	1.62 (1.50, 1.76)	2.09 (1.69, 2.59)	0.61 (0.50, 0.75)	1.99 (1.79, 2.22)
1985–1994	1.66 (1.57, 1.74)	2.36 (2.05, 2.72)	0.83 (0.74, 0.94)	1.96 (1.83, 2.11)
1995–2004	1.54 (1.47, 1.60)	2.20 (1.94, 2.51)	0.87 (0.77, 0.97)	2.01 (1.89, 2.15)
Men				
1979–1984	1.62 (1.48, 1.78)	2.31 (1.85, 2.89)	0.55 (0.43, 0.69)	2.08 (1.86, 2.33)
1985–1994	1.65 (1.55, 1.74)	2.42 (2.09, 2.82)	0.80 (0.70, 0.91)	1.99 (1.84, 2.14)
1995–2004	1.52 (1.45, 1.59)	2.24 (1.96, 2.57)	0.84 (0.74, 0.96)	2.03 (1.90, 2.18)
Women				
1979–1984	1.52 (1.30, 1.78)	0.74 (0.35, 1.57)	0.78 (0.53, 1.15)	1.25 (0.86, 1.82)
1985–1994	1.56 (1.39, 1.74)	1.09 (0.67, 1.77)	0.89 (0.69, 1.15)	1.42 (1.11, 1.81)
1995–2004	1.44 (1.31, 1.57)	1.02 (0.65, 1.59)	0.89 (0.69, 1.15)	1.40 (1.12, 1.75)

^a Compares residents of Clark County to all residents elsewhere.

^b Compares visitors to Clark County to all residents elsewhere.

^c Compares residents of Clark County who died in Clark County to residents of Clark County who died elsewhere.

^d Compares visitors to Clark County to visitors elsewhere.

whether and to what extent living in Las Vegas is riskier than living elsewhere. During the most recent period (1995–2004) the overall odds ratio of 1.54 (95% CI: 1.47, 1.60) indicates that suicide risk among those living in Las Vegas is significantly higher than among persons living elsewhere.

For model 2 (“acute exposure”), we compared the suicide risk for visitors to Las Vegas to the risk of people who stayed home (i.e., those who died in their home county). The population examined here is all non-residents of Las Vegas, separated into two different exposure groups: those who died in Las Vegas and those who died in their county of residence. The question we ask here with respect to suicide is whether and to what extent visiting Las Vegas is riskier than staying home. The overall results for the most recent decade indicate that among those visiting Las Vegas the risk of suicide is 2.2 (95% CI: 1.94, 2.51) times higher than the risk of suicide among those who died at home. The relative suicide risk is higher among males visiting Las Vegas (MOR = 2.24, 95% CI: 1.96, 2.57), but not for female visitors. Note that the comparison group in model 2—U.S. residents who died in their home counties, excluding residents of Clark County—is the same as the comparison group in model 1. This indicates that the increased risk borne by visitors to Las Vegas in model 2 is greater than the already elevated risk borne by residents in model 1 and that chronic exposure risk is associated with both sexes, whereas acute exposure risk is limited to males.

For model 3 (“leaving Las Vegas”), we compared the suicide risk among Las Vegas residents who were out of Las Vegas at the time of their death compared to those who remained in Las Vegas. The population examined here is all residents of Las Vegas, separated into two different exposure groups: those who died outside Las Vegas and those who died in Las Vegas. The question we examine here is whether or not and to what extent suicide risk among Las Vegas residents who leave Las Vegas is different from risk among those who do not leave. The answer is that the risk of suicide among those leaving Las Vegas is significantly lower than among those who stay in Las Vegas. Our results suggested a changing magnitude of this protective association

over time. During the earliest period (1979–1984), Las Vegas residents who were out of their home county at the time of their death saw a nearly 40% reduction in suicide risk compared to those who remained in Clark County (MOR = 0.61, 95% CI: 0.50, 0.75). Between 1985 and 2004, this benign association weakened in magnitude, but remained statistically significant. For the most recent period (1995–2004), leaving Las Vegas was associated with a 13% reduction in relative suicide risk (MOR = 0.87, 95% CI: 0.77, 0.97). Significant reduction in risk was observed only among men.

Finally, for model 4 (“traveler risk”), we compared the suicide risk for those visiting Las Vegas to those visiting elsewhere. The population examined here is people who died in a non-home county (i.e., they died away from home) separated into two different exposure groups: non-Las Vegas residents who died in Las Vegas (acute exposure to Las Vegas) and all those—including Las Vegas residents—who died in a non-home county (acute exposure to someplace else). Here we wanted to know whether or not and to what extent visiting Las Vegas was riskier than visiting someplace else. Results for the most recent decade indicate that people who visit Las Vegas are twice as likely to die by suicide in Las Vegas (MOR = 2.01, 95% CI: 1.89, 2.15) than are people who die while visiting other counties and that the risk is greater for men (MOR = 2.03, 95% CI: 1.90, 2.18) than for women (MOR = 1.40, 95% CI: 1.12, 1.75).

Discussion

Both residents and non-residents who die in Clark County experience an increased risk for suicide compared to living in and visiting other places in the U.S., respectively. Residents of Las Vegas face greater risk than other Americans do. Visitors to Las Vegas are at greater risk than those who stay home or visit elsewhere. For both visitors and residents, the relative risk is greater for men than women.

How do we make sense of these patterns of suicide risk? When it comes to explaining geographical suicide clusters, there are three common (and not mutually exclusive) kinds of causal explanations: it is the ecology, it is selection, and it

is contagion. The ecological explanation is that there is something about Las Vegas that is suicidogenic. Our study design is partially reflective of this idea, conceptualizing residence and non-residence in Las Vegas as categories of exposure to some unspecified feature of the urban environment that promotes suicide. In this scenario, it is something about the place that causes elevated risk. One limitation of ecological or area-level arguments is that causes of individual suicides cannot be reliably inferred from ecological data.

The second kind of explanation—the selection argument—is that those who are attracted to Las Vegas, either as residents or as visitors, bring an increased propensity for suicide with them to the city. In this scenario, it is something about the people, not something about the place, that causes elevated risk. Perhaps those who select Las Vegas as a residential or travel destination are more impulsive or more attracted to risks than are those who settle or visit elsewhere and perhaps this greater impulsivity is a source of increased suicide risk (Brown & Linnoila, 1990; Zouk et al., 2006). In fact, the high elevation in risk for visitors found in model 2—a doubling of risk compared to those who stayed in their home counties—may indicate that, as some have reported anecdotally, a small percentage of visitors are actually selecting Las Vegas as a suicide destination (Goldman, 2004). Further evidence for this scenario might be found through interviews with visitors to Las Vegas who make serious suicide attempts. How many came to Las Vegas intent on self-destruction? And, given the gender differences we observe, does the selection effect vary by sex as we would predict?

One limitation of the selection argument is that while it focuses on individual level choice and behavior, it rarely if ever attempts to explain *why* individuals would choose one area or place over others. In our view, it is incumbent upon those who argue the selection viewpoint to offer explanations about how, for instance, a place like Las Vegas comes to be selected by suicide-prone people so often over other cities. Answering that question requires attending to the social significance and meanings of place.

A third explanation is that the greater suicide risk is a result of a kind of social contagion—an imitation or so-called “Werther effect” whereby the suicides of residents and non-residents in Las Vegas gives rise to more suicides. In this scenario, it is something about the interaction between people and place that causes elevated risk. To date, no studies of suicide in Las Vegas have explored this social contagion, geographic imitation, or “copycat” effect, whereby both visitors and locals may be induced to select Las Vegas as an appropriate, meaningful, or strategic place to take their lives (Goldman, 2004; Gould, Wallenstein, & Davidson, 1989; O’Carroll & Potter, 1994; Phillips, 1974; Seiden, 1978; Tarde, 1903). This third type of explanation seems to be the logic behind recent speculations about “suicide tourism” in Manhattan (Gross et al., 2007), although the authors of that study do not specify a contagion model. Limitations of contagion explanations are that they are not well-suited to explaining declines in suicides over time, nor do they offer compelling explanations of the ways in which people become aware of and are induced to imitate the suicides of others. As a result, suicide contagion

theory remains a highly undeveloped, weaker theoretical alternative to ecological and selection theories.

Given the limitations of the common explanatory frameworks and our data and study design, we cannot determine the extent to which these competing explanations inform our results. However, our findings touch on two claims that sociologists, economists, and urban historians studying Las Vegas have been arguing for decades. The first claim is that Las Vegas has had and continues to have a unique urban ecology and economy, one which leaves its residents at increased risk for a wide variety of social ills—including early mortality and poor health outcomes—compared to residents of other cities (Cooper, 2004; Denton & Morris, 2001; Fuchs, 1975; Moehring, 2000; Ostrander, 1966; Rothman & Bramwell, 2007; Rothman & Davis, 2002; Shalin, 2006). Our findings that the relative suicide risk for Las Vegas remains high despite long-term declines in the county suicide rate lends empirical support to this view, as does the fact that for Las Vegas, leaving the city appears to reduce suicide risk.

The second claim is that Las Vegas now attracts as residents people who are more like other Americans than were those attracted to Las Vegas prior to the 1980s. This is the driving idea behind the interpretation of Las Vegas as an increasingly normal, middle-America urban destination, one that was tamed and “Disneyfied” for family entertainment in the late 1980s and one that began catering in the early 1990s to middle-class and upper middle-class residents’ desires for cultural amenities and community standards found in other American cities and suburbs (Gottdiener, Collins, & Dickens, 1999; Rothman, 2002).

This “normalization” argument might lead us to expect to see decline in relative suicide risk among the average chronically exposed resident (model 1) from the earlier to the later period. Indeed, model 1 analyses that did not control for age and marital status found a trend of declining risk over time, but that trend disappeared when we adjusted for age and marital status. Therefore, the normalization argument, as far as it is related to the marital status and age distribution among Las Vegas residents, appears to have had the expected effect. However, controlling for age and marital status did not eliminate a trend we observed in uncontrolled model 3 analyses. For that model, leaving Las Vegas risk, men leaving Las Vegas between 1979 and 1984 were 45% less likely to die by suicide whereas men leaving Las Vegas after 1984 were only 20% less likely (compared to those who remained in Las Vegas).

Why might this be? Why does the protective benefit of leaving Las Vegas weaken over time? One explanation is that normalization processes in Las Vegas were most dramatic prior to 1985, an explanation that is roughly consistent with the historical and sociological literature. But an equally plausible (and not mutually exclusive) explanation is that the normalization argument may actually cut both ways. Perhaps it is not Las Vegas which is becoming more like the rest of America. Perhaps the rest of America is becoming more like Las Vegas. This counterargument is supported by sociological studies that show social isolation has increased across the U.S during this same era (McPherson, Smith-Lovin, & Brashears, 2006;

Putnam, 2000) and, perhaps more to the point, by the fact that Las Vegas no longer controls a near-monopoly on legalized gambling (Volberg & Wray, 2007). If gambling is significantly linked to suicide risk, then the geographic expansion of legal gambling opportunities outside of Las Vegas over the last 25 years may mean that, in terms of reducing suicide risk, leaving Las Vegas no longer makes as much of a difference for its residents as it once did. Enthusiasm about this countervailing hypothesis should be tempered by the empirical observation that for the U.S. as a whole, rates of suicide declined (rather than increased) by approximately 15% between 1985 and 2004.

In addition to contributing to the interpretive debates around the meanings and functions of Las Vegas, our study has potentially important clinical, policy, and research implications. First, from a public health perspective, simply knowing that residents and visitors face significantly elevated suicide risk is vital. Suicide remains shrouded in stigma (Cvinar, 2005; Lester & Walker, 2006). No community wishes to be designated the “suicide capital” of America or to be host to the highest suicide rate among residents or visitors, especially when the community is in the business of selling itself as the “entertainment capital of the world.” Nevertheless, our study confirms what local suicide prevention advocates and experts have long held to be true: Las Vegas has a major public health problem on its hands and more action and resources are needed at the local, county, and state level to address the issue. Politicians, business leaders, and governmental and civic organizations should acknowledge the magnitude and extent of the problem and use evidence-based strategies to intervene in the crisis among both residents and visitors. Decreasing access to lethal means and training primary care physicians to better diagnose depression are two public health approaches to suicide prevention that have been deemed to be effective elsewhere (Mann et al., 2005). They might well prove effective in Las Vegas if tried.

Second, from a diagnostic and clinical perspective, it is important for health care professionals to be aware of the elevated risks for patients who are contemplating visiting or relocating to Las Vegas and to know how these risks differ by gender. If a patient has a history of previous suicide attempts, or of psychiatric illness, or other significant risk factors for suicide, visiting or relocating to Las Vegas may compound these risks and health care professionals should urge caution in such circumstances. Finally, while our study design and our data do not enable us to offer causal explanations for the relationships we observe between Las Vegas and increased suicide risk, the risk is significant enough to warrant further study into all possible causes, including historical forces of social change. We should aim to better understand their relation to selection, contagion, or ecological factors so that prevention and intervention efforts may be guided by the best available evidence.

Acknowledgements

The authors thank the Robert Wood Johnson Foundation Health & Society Scholars program for its financial support and Paul Duberstein for helpful comments on an

earlier draft. Additional thanks go to Michael Green of the Community College of Southern Nevada and to Michael Murphy and John Fudenberg of the Clark County Coroner's Office.

References

- Baller, R. D., & Richardson, K. K. (2002). Social integration, imitation, and the geographic patterning of suicide. *American Sociological Review*, 67(6), 873–888.
- Bearman, P. S. (1991). The social structure of suicide. *Sociological Forum*, 6(3), 501–524.
- Brown, G. L., & Linnoila, M. I. (1990). CSF serotonin metabolite (5-HIAA) studies in depression, impulsivity, and violence. *Journal of Clinical Psychiatry*, 51(4 Suppl.), 31–41.
- Centers for Disease Control and Prevention, National Center for Health Statistics. (2007). Compressed mortality file 1999–2004. CDC WONDER On-line Database, compiled from Compressed Mortality File 1999–2004, Series 20, No. 2J. <http://wonder.cdc.gov/cmfi-icd10.html>. Accessed 28.04.08.
- Chew, K., McCleary, R., Merrill, V., & Napolitano, C. (2000). Visitor suicide risk in casino resort areas. *Population Research and Policy Review*, 19(6), 551–570.
- Christenfeld, N., Glynn, L. M., Phillips, D. P., & Shrira, I. (1999). Exposure to New York City as a risk factor for heart attack mortality. *Psychosomatic Medicine*, 61(6), 740–743.
- Congdon, P. (1996). Suicide and parasuicide in London: a small-area study. *Urban Studies*, 33(1), 137–158.
- Conwell, Y., Duberstein, P. R., Cox, C., Herrmann, J. H., Forbes, N. T., & Caine, E. D. (1996). Relationships of age and axis I diagnoses in victims of completed suicide: a psychological autopsy study. *American Journal of Psychiatry*, 153(8), 1001–1008.
- Cooper, M. (2004). *The last honest place in America: Paradise and perdition in the new Las Vegas*. New York: Nation Books.
- Cvinar, J. G. (2005). Do suicide survivors suffer social stigma: a review of the literature. *Perspectives in Psychiatric Care*, 41(1), 14–21.
- Denton, S., & Morris, R. (2001). *The money and the power: The making of Las Vegas and its hold on America, 1947–2000*. New York: Alfred A. Knopf.
- Duberstein, P. R., Conwell, Y., Conner, K. R., Eberly, S., Evinger, J. S., & Caine, E. D. (2004). Poor social integration and suicide: fact or artifact? A case-control study. *Psychological Medicine*, 34(7), 1331–1337.
- Durkheim, E. (1951). *Suicide: A study in sociology*. Glencoe, IL: Free Press.
- Fuchs, V. (1975). *Who shall live? Health, economics, and social choice*. New York: Basic Books.
- Gemar, K., Zarkowski, P., & Avery, D. (2008). Hotel room suicide: Las Vegas and Clark County. *Social Psychiatry and Psychiatric Epidemiology*, 43(1), 25–27.
- Goldman, A. (9 February 2004). *The suicide capital of America*. Associated Press.
- Gottdiener, M., Collins, C. C., & Dickens, D. R. (1999). *Las Vegas: The social production of an all-American city*. Malden, MA: Blackwell.
- Gould, M. S., Wallenstein, S., & Davidson, L. (1989). Suicide clusters: a critical review. *Suicide and Life-Threatening Behavior*, 19(1), 17–29.
- Gross, C., Piper, T. M., Bucciarelli, A., Tardiff, K., Vlahov, D., & Galea, S. (2007). Suicide tourism in Manhattan, New York City, 1990–2004. *Journal of Urban Health*, 84(6), 755–765.
- Harris, E. C., & Barraclough, B. (1997). Suicide as an outcome for mental disorders. A meta-analysis. *British Journal of Psychiatry*, 170, 205–228.
- Kaiser Family Foundation. (2007). Kaiser state health facts. <http://www.statehealthfacts.org>. Accessed 28.04.08.
- Lester, D., & Walker, R. L. (2006). The stigma for attempting suicide and the loss to suicide prevention efforts. *Crisis*, 27(3), 147–148.
- Mann, J. J., Apter, A., Bertolote, J., Beautrais, A., Currier, D., Haas, A., et al. (2005). Suicide prevention strategies: a systematic review. *Journal of the American Medical Association*, 294(16), 2064–2074.
- McCleary, R., Chew, K. S., Merrill, V., & Napolitano, C. (2002). Does legalized gambling elevate the risk of suicide? An analysis of U.S. counties and metropolitan areas. *Suicide and Life-Threatening Behavior*, 32(2), 209–221.
- McIntosh, J. L. (2005). *Suicide in the 50 largest U.S. metropolitan areas: 1999–2002 Means*. South Bend, IN: Indiana University South Bend. <http://mypage.ius.edu/~jmcintos/Metro9902RatesTop50.pdf>. Accessed 07.11.07.
- McPherson, M., Smith-Lovin, L., & Brashears, M. (2006). Social isolation in America: changes in core discussion networks over two decades. *American Sociological Review*, 71(3), 353–375.

- Miettinen, O., & Wang, J. (1981). An alternative to the proportionate mortality ratio. *American Journal of Epidemiology*, *114*(1), 144–148.
- Moehring, E. P. (2000). *Resort city in the Sunbelt: Las Vegas, 1930–2000*. Reno: University of Nevada Press.
- National Bureau of Economic Research. (2007). Mortality data – vital statistics NCHS's multiple cause of death data, 1959–2004. <http://www.nber.org/data/multicause.html>. Accessed 28.04.08.
- O'Carroll, P. W., & Potter, L. B. (1994). Suicide contagion and the reporting of suicide: recommendations from a national workshop. United States Department of Health and Human Services. *MMWR Recommendations and Reports*, *43*(RR-6), 9–17.
- Ostrander, G. M. (1966). *Nevada, the great rotten borough, 1859–1964*. New York: Knopf.
- Phillips, D. P. (1974). The influence of suggestion on suicide: substantive and theoretical implications of the Werther effect. *American Sociological Review*, *39*(3), 340–354.
- Phillips, D. P., Welty, W. R., & Smith, M. M. (1997). Elevated suicide levels associated with legalized gambling. *Suicide and Life-Threatening Behavior*, *27*(4), 373–378.
- Putnam, R. (2000). *Bowling Alone: The collapse and revival of American community*. New York: Simon & Schuster.
- Rezaeian, M., Dunn, G., St Leger, S., & Appleby, L. (2007). Do hot spots of deprivation predict the rates of suicide within London boroughs? *Health & Place*.
- Robins, E., Murphy, G. E., Wilkinson, R. H., Jr., Gassner, S., & Kayes, J. (1959). Some clinical considerations in the prevention of suicide based on a study of 134 successful suicides. *American Journal of Public Health and the Nation's Health*, *49*(7), 888–899.
- Rothman, H. (2002). *Neon metropolis: How Las Vegas started the twenty-first century*. New York: Routledge.
- Rothman, H., & Bramwell, L. (2007). *Playing the odds: Las Vegas and the modern West*. Albuquerque: University of New Mexico Press.
- Rothman, H., & Davis, M. (2002). *The grit beneath the glitter: Tales from the real Las Vegas*. Berkeley: University of California Press.
- SAS Institute. (2004). *SAS/STAT software: The logistic procedure*. Version 9.1 (Computer Software). Cary, NC: SAS Institute Inc.
- Seiden, R. H. (1978). Where are they now? A follow-up study of suicide attempters from the Golden Gate Bridge. *Suicide and Life-Threatening Behavior*, *8*(4), 203–216.
- Shalin, D. N. (Ed.). (2006). *The social health of Nevada: Leading indicators and quality of life in the Silver State*. Las Vegas: CDC Publications. <http://www.unlv.edu/centers/cdclv/healthnv>. Accessed 28.04.08.
- Stack, S. (2000). Suicide: a 15 year review of the sociological literature, parts I and II. *Suicide and Life-Threatening Behavior*, *30*(2), 146–176.
- Tarde, G. (1903). *The laws of imitation*. New York: Holt.
- Tondo, L., Albert, M. J., & Baldessarini, R. J. (2006). Suicide rates in relation to health care access in the United States: an ecological study. *Journal of Clinical Psychiatry*, *67*(4), 517–523.
- Trout, D. L. (1980). The role of social isolation in suicide. *Suicide and Life-Threatening Behavior*, *10*(1), 10–23.
- Volberg, R., & Wray, M. (2007). Legal gambling and problem gambling as mechanisms of social domination? Some considerations for future research. *American Behavioral Science*, *51*(1), 56–85.
- Wray, M. (2006). Suicide trends and prevention. In Dmitri N. Shalin (Ed.), *The social health of Nevada: Leading indicators and quality of life in the Silver State*. Las Vegas: CDC Publications. <http://www.unlv.edu/centers/cdclv/healthnv/suicide.html>. Accessed 28.04.08.
- Wright, D., Sathe, N., & Spagnola, K. (2007). *State estimates of substance use from the 2004–2005 national surveys on drug use and health*. (DHHS Publication No. SMA 07-4235, NSDUH Series H-31). Rockville, MD: Substance Use and Mental Health Services Administration, Office of Applied Studies. <http://www.oas.samhsa.gov.states.htm>. Accessed 10.12.07.
- Zouk, H., Tousignant, M., Seguin, M., Lesage, A., & Turecki, G. (2006). Characterization of impulsivity in suicide completers: clinical, behavioral and psychosocial dimensions. *Journal of Affective Disorders*, *92*(2–3), 195–204.