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Short report

Do local landmark bridges increase the suicide rate? An alternative test of the likely effect of means restriction at suicide-jumping sites

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ABSTRACT

A number of recent studies have examined the effect of installing physical barriers or otherwise restricting access to public sites that are frequently used for suicides by jumping. While these studies demonstrate that barriers lead to a reduction in the number of suicides by jumping at the site where they are installed, thus far no study has found a statistically significant reduction in the local suicide rate attributable to a barrier. All previous studies are case studies of particular sites, and thus have limited statistical power and ability to control for confounding factors, which may obscure the true relationship between barriers and the suicide rate. This study addresses these concerns by examining the relationship between large, well-known bridges ("local landmark" bridges) of the type that are often used as suicide-jumping sites and the local suicide rate, an approach that yields many more cases for analysis. If barriers at suicide-jumping sites decrease the local suicide rate, then this implies that the presence of an unsecured suicide-jumping site will lead to a higher local suicide rate in comparison to areas without such a site. The relationship between suicides and local landmark bridges is examined across 3116 US counties or county equivalents with negative binomial regression models. I found that while exposure to local landmark bridges was associated with an increased number of suicides by jumping, no positive relationship between these bridges and the overall number of suicides was detected. It may be impossible to conclusively determine if barriers at suicide-jumping sites reduce the local suicide rate with currently available data. However, the method introduced in this paper offers the possibility that better data, or an improved understanding of which potential jumping sites attract suicidal individuals, may eventually allow researchers to determine if means restriction at suicide-jumping sites reduces total suicides.

Introduction

A growing body of literature has examined the effectiveness of limiting access to the means of suicide as a method of suicide prevention (Clarke & Lester, 1989; Daigle, 2005; Florentine & Crane, 2010; Hawton, 2007). Interviews with suicide attempt survivors have shown that in many cases suicide attempts are impulsive, with only minutes passing between the first thought of suicide and the suicide attempt (Diesenhammer et al., 2009; Simon et al., 2001; Williams, Davidson, & Montgomery, 1980). This suggests that some suicidal individuals may be saved by restricting access to particular lethal agents, allowing time for a suicidal crisis to pass before a substitute suicide method is found (Clarke & Lester, 1989; Daigle, 2005). Changes in the rates of suicide and self-poisoning following the detoxification of domestic gas (Kreitman, 1976) and restrictions on the pack sizes of dangerous drugs such as paracetamol (Hawton et al., 2001) are frequently cited as examples of the beneficial effects of means restriction (although some of this evidence has recently been challenged (Bateman, 2009)).

Would means restriction be an effective method of suicide prevention at public sites that are frequently used for suicide by jumping, such as large bridges and other structures? Past work on the effectiveness of means restriction on other methods of suicide has led some researchers to conclude that means restriction measures at suicide-jumping sites, such as installing physical barriers or fences, may also be effective (Gunnell, Nowers, & Bennewith, 2005).

However, there are also reasons to doubt that means restriction will be an effective suicide prevention method at public suicide-jumping sites. Means restriction is most likely to be effective with household suicide methods that are quickly accessible, such as firearms, dangerous medications, and toxic substances (Hawton, 2001). The additional effort and time required to travel to a jumping site in comparison to household suicide methods may indicate

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that suicides in these locations are less impulsive, and thus less likely to be prevented through means restriction. Further, individuals who commit suicide by jumping from bridges and other high public places appear to be more likely to suffer from severe psychiatric illnesses than most other people who commit suicide (Beautrais, 2007; Cantor, Hill, & McLachlan, 1989; De Moore & Robertson, 1999; Reisch, Schuster, & Michel, 2008), making it unclear how comparable the populations in previous means restriction studies are to the population of concern in this case.

A number of recent studies have examined the effect of installing physical barriers or otherwise restricting access to suicide-jumping sites (Beautrais, 2001; Beautrais, Gibb, Fergusson, Horwood, & Larkin, 2009; Bennewith, Nowers, & Gunnell, 2007; Berman, O'Carroll, & Silverman, 1994; Pelletier, 2007; Reisch & Michel, 2005; Sinyor & Levitt, 2010; Skegg & Herbison, 2009). While these studies demonstrate that barriers lead to a reduction in the number of suicides by jumping at the site where they are installed, thus far no study has found a statistically significant reduction in the local suicide rate attributable to a barrier. Thus, it remains unknown whether restricting access to suicide-jumping sites prevents suicides, or leads suicidal individuals to substitute another suicide location or method.

Previous studies of the effectiveness of means restriction at suicide-jumping sites have been case studies of particular sites that test for a decrease in the local suicide rate after access to the jumping site is restricted. This approach has two weaknesses that may obscure the true relationship between barriers and the suicide rate. First, since suicide by jumping is relatively rare, a case study of a single site will most likely never have the statistical power to determine if a barrier has led to a reduction in the suicide rate, a point openly acknowledged in previous work (Beautrais, 2007; Sinyor & Levitt, 2010; Skegg & Herbison, 2009). Second, a case study of a single site is unable to control for confounding factors (such as national level trends) that may obscure the effect of a barrier on the local suicide rate. Studying a large number of cases simultaneously could address these problems, but this is not a viable approach because barriers at suicide-jumping sites are rare.

An alternative approach to analysis is to examine the effect of suicide-jumping sites without barriers on the local suicide rate. Comparing the suicide rate in areas with unsecured suicide-jumping sites to the rate in areas that do not have such sites may reveal whether exposure to these sites increases the suicide rate, and thus whether restricting access to this means of suicide though barriers would be expected to reduce the suicide rate. A similar approach has uncovered a statistically significant relationship between local suicide rates and access to other means of suicide, such as firearms (Miller, Lippmann, Azrael, & Hemenway, 2007), suggesting that restricting access to these means might reduce the suicide rate. Some studies suggest that increased access to a means to commit suicide by jumping (high-rise residences) leads to an increase in the suicide rate (Lester, 1994; Marzuk et al., 1992), but these studies focus on a single community, and do not control for possible confounding factors.

This study examines the relationship between suicides and exposure to large, notable bridges ("local landmark" bridges) of the type that are often used as suicide-jumping sites. By comparing areas with and without these sites over a large region the number of cases to examine is greatly increased, addressing concerns with statistical power and allowing for controls for confounding factors. This study is a cross-sectional ecological design in which the units of analysis are 3116 US counties (or the equivalent in each US state, including independent cities and Census Areas) observed from 1990 through 2006. The hypothesis tested is whether the presence of a large, notable bridge (a potential suicide-jumping site) in a county increases the number of suicides in that county.

Data and methods

Suicide-jumping sites

The primary difficulty in this study was in identifying those bridges most likely to be local suicide-jumping sites. There are no official statistics on suicides from individual bridges in the US, and media reporting of such suicides is not systematic. Instead, this study examines "local landmark" bridges that share the characteristics of those bridges known to be suicide-jumping sites though a measure that captures both the size and the aesthetic and symbolic qualities of the bridge.

Not all large bridges become frequent targets for suicide attempts. Interviews with survivors of suicide attempts from bridges reveal that accessibility plays a role in the choice of a bridge used for a suicide attempt (Blaustein & Fleming, 2009; Rosen, 1975).

Perceptions of aesthetic and symbolic qualities also appear to play a role in the choice of bridge used for a suicide attempt (Daigle, 2005). Survivors of suicide attempts from bridges have described their choice of suicide location as "romantic," "majestic," "scenic," and possessing "a certain grace and beauty" (Blaustein & Fleming, 2009; Rosen, 1975). A study of individuals who jumped from either the Golden Gate or San Francisco-Oakland Bay Bridges found numerous instances of individuals crossing the Bay Bridge to jump from the equally high but more famous Golden Gate Bridge, but no instances of travel in the reverse direction (Seiden & Spence, 1983), although this finding may be partially explained by the relatively low population north of the Golden Gate Bridge (the starting point for a trip across the Golden Gate Bridge to the Bay Bridge) and the fact that the Golden Gate Bridge is the only major bridge in the San Francisco Bay Area with pedestrian access. Other studies have shown that in many cases suicidal individuals prefer to jump into open water rather than onto land or ice (Cantor & Hill, 1990; Lindqvist, Jonsson, Eriksson, Hedelin, & Björnstig, 2004). This preference may be driven by a symbolic meaning attached to a bridge over water, or a widely-held belief that suicide by leaping into water is painless (Rosen, 1975; Seiden, 1978).

It is interesting to note that, rather than describing their choice of suicide location as a "landscape of despair," survivors of suicide attempts from bridges describe their choice of bridge in much the same language that is used to describe "therapeutic landscapes," or environments thought to promote physical, mental, or spiritual well-being (Gesler, 1992). Therapeutic landscapes are often described as possessing beautiful or dramatic scenery (Gesler, 1992, 1996, 1998; Palka, 1999; Tonnellier & Curtis, 2005). The presence of water is also an important component of many therapeutic landscapes (Gesler, 1992, 1996, 1998). The contradiction inherent in selecting a suicide location that has therapeutic qualities may be explained by the fact that ambivalence about suicide is common among suicidal individuals, as revealed in a study of suicidal individuals who used hotline telephones installed on bridges (Glatt, 1987). This suggests that some individuals may view the bridge not only as a place for suicide, but also a place to seek solace or help. However, it should be noted that much of the research on the relationship between suicide and the aesthetic and symbolic qualities of a bridge has focused on the Golden Gate Bridge (a world-famous cultural icon), raising the possibility that these factors may be less important at other suicide-jumping sites (Sinyor & Levitt, 2010).

Identification of those bridges that were most likely to be local suicide-jumping sites began with an examination of the 2009 National Bridge Inventory (NBI), maintained by the US Federal Highway Administration (United States Federal Highway Administration, 2009). The NBI contains information on the location and structural properties of the nearly 600,000 US bridges located on public roads. As shorter bridges are unlikely to have