

Would a Suicide Prevention Barrier on the Cold Spring Bridge Save Lives? A Review of the Evidence

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With support from mental health workers, elected officials, the California Highway Patrol, and the local community, Caltrans has announced their intention to install a suicide prevention barrier on the Cold Spring Bridge by 2010 at a cost of \$605,000. During the course of the debate a number of people have claimed that such a barrier would not only deter suicides at the Cold Spring Bridge, but actually prevent suicides and thus save lives. This claim is unfounded. A review of the evidence presented in favor of building the barrier and my own research reveals that there is *no* evidence that installing a suicide prevention barrier on the Cold Spring Bridge would save lives.

Preventing Suicides at a Particular Location versus Saving Lives

First, note that there is a distinction between preventing suicides and preventing suicides *at a particular location*. Numerous studies have shown that installing a suicide prevention barrier on a bridge deters suicides at that location. Thus, there is little doubt that a suicide prevention barrier on the Cold Spring Bridge would reduce suicides at that location.¹

However, deterring suicides at a particular location is *not* proof that we have saved lives. We must consider the possibility of *displacement* – that is, will placing a barrier on the Cold Spring Bridge simply lead those intending to commit suicide to jump at another location? We must also consider the possibility of *substitution* – that is, will placing a barrier on the Cold Spring Bridge lead those intending to commit suicide to substitute a different method of suicide, such as poison or a handgun? If installing a suicide prevention barrier on the Cold Spring Bridge simply leads suicidal individuals to kill themselves in another place or in another way, we are not saving lives.

This point appears to have been ignored or misunderstood by many who are advocating the construction of a suicide prevention barrier on the Cold Spring Bridge. For instance, one handout made available at the July 25th meeting listed the number of suicides by year from the Coronado Bay Bridge in San Diego County, noting that 99 people committed suicide using the bridge since call boxes and signs were installed in 1990. This handout makes the claim that “99 deaths could have been prevented if barriers had been installed at that time,” but there is no basis for this claim.² Again, we must consider displacement

¹ It should be noted that in some cases suicides do still occur at locations that have suicide prevention barriers. For instance, the most recent suicide from the Colorado Street Bridge in Pasadena was July 2, 2007, even though a suicide prevention barrier was installed in 1993.

² Similarly, there is no basis for the claim that alternatives such as call boxes and signs don't save lives. Although people still jump from bridges with call boxes and signs, we don't know if other individuals may have decided *not* to commit suicide because of these safety features. In other words, we know call boxes and signs don't prevent *all* suicides, but it does not follow from this that they don't work at all.

and substitution – would the installation of barriers on the Coronado Bay Bridge in 1990 have simply lead to those 99 people jumping from another location, or using a different method of suicide? More generally, does the installation of a suicide prevention barrier on a bridge simply lead to displacement and substitution, resulting in the same number of suicides as if the barrier had not been built? Many suicide researchers claim the answer is “no,” but of course we should not accept this claim without evidence.

A Review of Existing Research on Suicide Prevention Barriers

What kind of evidence should we look for in order to know if suicide prevention barriers save lives? We cannot simply look at the numbers who jump from a bridge before and after the installation of a suicide barrier for the reasons discussed above. Instead, we must look for changes in the *suicide rate* in the communities surrounding the bridge.³ If suicide prevention barriers are saving lives, then this means that there will be some individuals who would have committed suicide if there had been no barrier, but instead choose to live – all else equal, this will lead to a reduction in the overall suicide rate. Conversely, if suicide prevention barriers do not save lives, individuals deterred from jumping from the bridge in question will simply commit suicide in another place (displacement) or in another way (substitution) – all else equal, this will leave the overall suicide rate unchanged.

A number of studies were presented at the Caltrans public information meeting of July 25th that claim to have evidence that suicide barriers on bridges do save lives. Perhaps the most prominent of these is a study that tracked 515 people who were restrained from committing suicide from the Golden Gate Bridge between 1937 and 1971, finding that about 94% of these people did not go on to commit suicide in the 7 years in which they were tracked.⁴ This study is frequently interpreted as evidence of the likely effectiveness of suicide prevention barriers, but this is misleading.

First, it should be noted that this study suffers from what is known as a *self-selection bias*. That is, there are many reasons to believe that the individuals tracked in this study are not representative of individuals that actually commit suicide by jumping from bridges.⁵ Simply put, were the people in this study serious about committing suicide, or did they go to a highly visible public place and threaten to commit suicide as a “cry for

³ The majority of suicide victims who jump from bridge come from communities close to the bridge. The Marin County Coroner’s office recently released a study showing that 85% of people jumping from the Golden Gate Bridge are San Francisco Bay Area residents. Similarly, statistics gathered by the Santa Barbara County Sheriff-Coroner show that 86% (37 of 43) suicide victims from the Cold Spring Bridge lived in Santa Barbara County. Thus, any effect of a suicide prevention barrier on the suicide rate should primarily be observed in the area around the bridge in question.

⁴ Seiden, Richard H. 1978. “Where Are They Now? A Follow-Up Study of Suicide Attempters from the Golden Gate Bridge.” *Suicide and Life-Threatening Behavior*, Vol. 8, pp. 203-216.

⁵ Note that we have seen another type of self-selection bias in the debate over the suicide prevention barrier on the Cold Spring Bridge – treating the opinions of those that choose to attend the Caltrans public information meetings as representative of the community at large. See for instance http://www.dot.ca.gov/dist05/projects/sb_cold_springs/mtg06may22.pdf.

help”? If it is the latter, it would be a mistake to count them as examples of the lives suicide prevention barriers could save if they never intended to die in the first place.

More importantly, this study simply assumes away the displacement and substitution problems. The individuals in this study were prevented from committing suicide at their preferred location, and then chose to live – but if suicide prevention barriers made suicide at the Golden Gate Bridge impossible, would it still be their preferred suicide location, or would they simply substitute another bridge or another method? In order to regard this study as evidence that suicide prevention barriers save lives then we must assume these individuals would *only* have attempted suicide on the Golden Gate Bridge – in other words, these studies assume away the problem we must solve.

Studies based on interviews with those who survived a jump from a bridge are similarly flawed.⁶ Survivors often report they only planned to jump from a specific bridge, but one factor that likely influenced this preference was the fact that it was *actually possible* to commit suicide at this location. If a suicide prevention barrier had made suicide at their preferred location impossible, would these individuals have simply formed a suicide plan involving a different location or a different method? Many survivors also claim that they would not have attempted suicide if a barrier had been in place, but can we really believe this, given that a barrier does nothing to solve the mental and emotional problems that led these individuals to attempt suicide in the first place?

Another study often cited as evidence of the likely effectiveness of suicide prevention barriers is a comparison of the number of suicides from the Ellington and Taft Bridges in Washington, D.C.⁷ After a suicide prevention barrier was installed on the Ellington Bridge, there were no further suicides from that bridge, and the number of suicides per year from the Taft Bridge remained roughly constant. In the meeting on July 25th this study was presented as evidence that the suicide prevention barrier on the Ellington Bridge was saving lives, as it did not appear that suicide victims were being displaced to the Taft Bridge. However, this is not actually proof that the suicide prevention barrier on the Ellington Bridge is saving lives. In the words of one of the authors of the study:

Are the data provided sufficient to substantiate the effectiveness (or lack thereof) of bridge barriers as a means to prevent suicide? The answer is no, the data are not sufficient to answer that question, because they do not touch on the issue of whether persons who would have committed suicide by jumping from the Ellington Bridge went on to commit suicide by other means. ... [P]ersons frustrated in their efforts to commit suicide by jumping from the Ellington Bridge are in no sense restricted to committing suicide by jumping from the Taft Bridge. (p. 92)

⁶ See for instance Rosen, David H. 1975. “Suicide Survivors: A Follow-up Study of Persons Who Survived Jumping from the Golden Gate and San Francisco-Oakland Bay Bridges.” *The Western Journal of Medicine*, Vol. 122, pp. 289-294.

⁷ O’Carroll, Patrick W., Morton M. Silverman, and Alan L. Berman. 1994. “Community Suicide Prevention: The Effectiveness of Bridge Barriers.” *Suicide and Life-Threatening Behavior*, Vol. 24, pp. 89-99.

Besides these studies, I reviewed all of the other studies cited during the meeting on July 25th, and every other study of the effectiveness of suicide prevention barriers I was able to locate. Nearly all of these studies show that installing a suicide prevention barrier on a bridge reduces suicides at that location. However, *not one* finds a statistically significant⁸ change in the suicide rate in the surrounding community after the barrier is installed, meaning that none of these studies can rule out the possibility that suicide prevention barriers simply lead people to commit suicide in another place or in another way.

Thus, despite an extensive search I have been unable to locate any evidence that suicide prevention barriers save lives.

Suicide Prevention Barriers only Work if Bridges Cause Suicides

Many suicide researchers realize there is no statistical evidence that suicide prevention barriers save lives. However, they argue that suicide prevention barriers *could* be saving lives, but since suicide prevention barriers on bridges are rare, we do not yet have enough evidence to prove it. For instance, one recent study of suicide prevention barriers wrote:

It should be remembered that although the impact of any intervention [suicide prevention barriers] on what is a relatively unusual method of suicide such as jumping may be difficult to measure in statistical terms, it may be of immeasurable benefit in human terms.⁹

A useful analogy here might be the study of the health benefits of smoking prevention programs in the 1950s. Smoking prevention programs were extremely rare at this time, and had not existed for very long, so it would have been difficult to find any statistical evidence of the health benefits of these programs given the limited evidence available. Of course, we now know that smoking prevention programs *do* have public health benefits – it would have been a mistake to conclude that smoking prevention programs did not work based on the limited evidence available in the 1950s.

However, despite the lack of statistical evidence of the effectiveness of smoking prevention programs, researchers in the 1950s were still confident that these programs would have some health benefits. The reason for this is because at that time there was a growing body of statistical work that demonstrated that smoking had negative health consequences. That is, while there was not enough evidence to show that smoking prevention programs would *save* lives, there *was* evidence that smoking was *costing* lives.

⁸ Even if nothing else changed, we expect the suicide rate in a community to have some amount of natural variation from year to year. A change in the suicide rate is *statistically significant* if a statistical test shows that we can be reasonably sure that the change we observe is not simply due to this kind of natural variation.

⁹ Nowers, Mike, and David Gunnell. 1996. "Suicide from the Clifton Suspension Bridge in England." *Journal of Epidemiology and Public Health*, Vol. 50, pp. 30-32.

If we extend this analogy to our current research question, this means that the way to determine if suicide prevention barriers prevent suicides given our limited experience with these barriers is to determine if bridges *without* barriers *increase* the suicide rate. If we believe suicide prevention barriers *save* lives, then logically it *must* be the case that bridges without suicide prevention barriers are *costing* lives. In other words, we must believe that bridges without barriers help *cause* suicides.¹⁰

If this is the case, rather than examining changes in the suicide rate in the few areas where a suicide prevention barrier has been installed on a bridge, we can examine how the suicide rate in different communities across the United States is related to exposure to bridges without suicide prevention barriers. If we find evidence that bridges help cause suicides, this would suggest that suicide prevention barriers are likely to be effective in saving lives.

In order to determine if exposure to bridges increases the suicide rate, I examined the relationship between the suicide rate and the number of bridges likely to attract suicidal individuals in all 50 states plus Washington D.C. from 1979 through 2004 (the only years for which complete data was available).¹¹ Bridges likely to attract suicide victims were defined as those bridges over 30 meters (about 98 feet) high with pedestrian access.¹² In order to statistically test the relationship between the number of bridges and the suicide rate in a state in a given year, I use a technique known as linear regression. Essentially, this is the process of fitting a trend line to a scatter plot of data, and then testing to see if the trend line has a positive, zero, or negative slope. If increased exposure to bridges leads to more suicides, we would expect to see more suicides in states that have more bridges, and thus a positively sloping trend line.

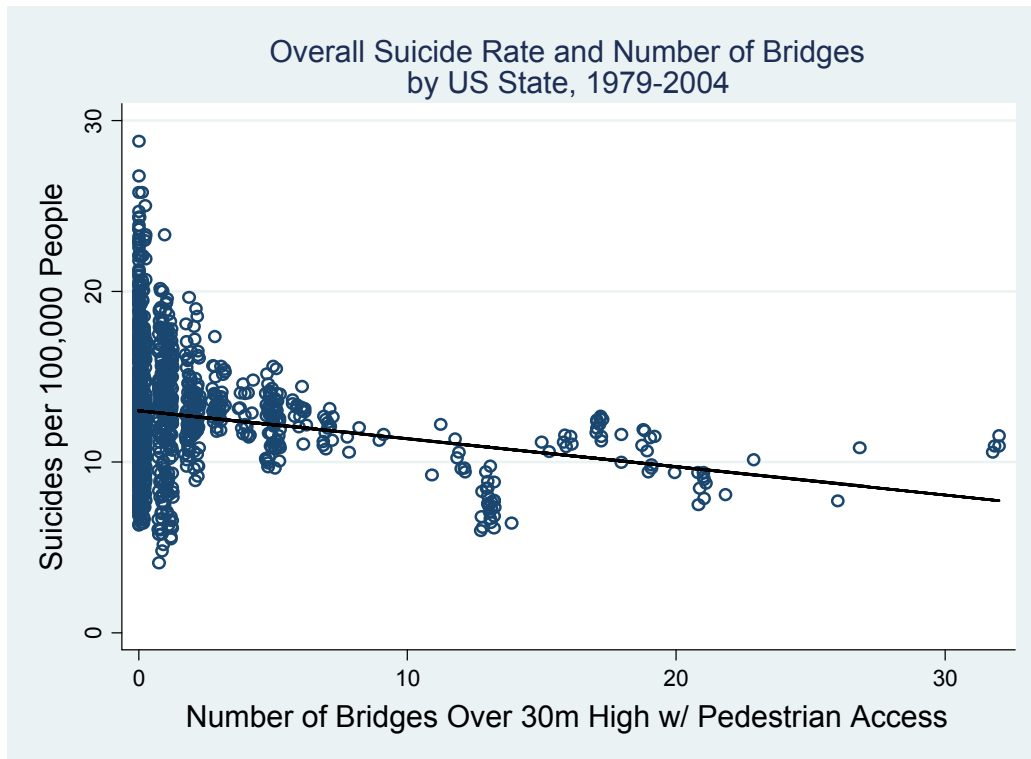
The relationship between the number of bridges and the suicide rate in each state from 1979 though 2004 is presented on the following page. Each dot in the graph indicates a particular state in a particular year, and the line running through the dots is the trend line estimated by linear regression.

¹⁰ This is in fact the claim made by many suicide researchers who argue for suicide prevention barriers. For instance, Clarke and Lester explicitly claim “lethal agents in the environment pla[y] a causal role in suicide...” (Clarke, Ronald V., and David Lester. 1989. *Suicide: Closing the exits*. New York: Springer Verlag Press, p. 12).

¹¹ Data on the suicide rate by jumping and the overall suicide rate in each state was obtained from the Center for Disease Control (CDC) mortality database, available at <http://wonder.cdc.gov/mortSQL.html>. Data on the number and date of construction of bridges in each state was obtained from the Department of Transportation Federal Highway Administration National Bridge Inventory, available at <http://www.fhwa.dot.gov/bridge/britab.htm>.

¹² Alternative definitions of bridges likely to attract suicide victims (over 20 meters and over 15 meters high, with and without pedestrian access) were also tested, and yielded nearly identical results to those presented here.

¹³ This finding also serves as a cautionary note for the interpretation of some other suicide prevention studies that have examined the relationship between a single factor and the suicide rate. For instance, one study found that the suicide rate in the United Kingdom declined as domestic gas became less toxic (Clarke and Lester, p. 30), but as with the simple statistical test presented here, this study did not consider other factors that could influence the suicide rate.



This figure reveals that there is a *negative* relationship between the overall suicide rate and the number of bridges in a state, exactly the *opposite* of the relationship we would expect to see if bridges helped cause suicides and suicide prevention barriers saved lives. It does not seem plausible that increasing the number of bridges in a state would directly reduce the suicide rate – instead, the number of bridges in a state may be a proxy for some other factor that reduces the suicide rate (such as a robust state economy).¹³ At any rate, there is no evidence to suggest that increased exposure to bridges increases the suicide rate.¹⁴

I also undertook more complicated statistical analyses of the relationship between the overall suicide rate and exposure to bridges, controlling for differences in the baseline suicide rate across states, differences in the variability in the suicide rate across states over time, and including the unemployment rate as an additional factor that could influence the suicide rate.¹⁵ These further analyses did not find any statistically significant relationship between the number of bridges in a state and the suicide rate, no matter which definition of bridge was used.

Thus, there is no evidence that increased exposure to bridges increases the suicide rate, which logically suggests that suicide prevention barriers on bridges will not save lives.

¹⁴ Note there is a *positive* relationship between the number of bridges in a state and the suicide rate *by jumping*. This suggests that substitution is occurring – individuals wishing to commit suicide in an area with a tall bridge may choose that method, while other methods are substituted in areas without tall bridges.

¹⁵ In technical terms, these analyses were fixed-effects linear regression models with heteroskedasticity-robust standard errors.

Conclusion

A review of all of the available evidence and my own statistical study reveals that there is no evidence that a suicide prevention barrier on the Cold Spring Bridge would save lives.

Despite this, some may say that we should still build the barrier, arguing that if it saves even one life it is worth it. This is mistaken – if we are serious about saving lives, the question we must ask is whether we could save *more* lives by spending the \$605,000 we would spend on the barrier elsewhere.

For instance, in 2005 two people jumped to their deaths from the Cold Spring Bridge. In that same year, 4,304 people died in traffic accidents on California highways, 71 of them in Santa Barbara County.¹⁶ In 2004 there were 3,349 suicides in California, 35 of them in Santa Barbara County.¹⁷

Whether our goal is highway safety or suicide prevention, we must question the decision to spend \$605,000 on a project with no evidence of effectiveness at a location averaging one death per year.

¹⁶ California Highway Patrol 2005 Annual Report of Fatal and Injury Motor Vehicle Traffic Collisions, Table 8E, available at <http://www.chp.ca.gov/switrs/pdf/2005-sec8.pdf>.

¹⁷ Calculated from the CDC mortality database, available at <http://wonder.cdc.gov/mortSQL.html>. 2004 was the latest year of data available.