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Change in suicides during and after the installation of barriers at the Golden Gate Bridge

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ABSTRACT

Background Restricting access to means is a highly effective suicide prevention strategy for some methods. We evaluated the effectiveness of nets installed at the Golden Gate Bridge to prevent suicides by jumping at this site.

Methods We used Poisson regression analyses to model suicide before, during and after the installation of safety nets at the Golden Gate Bridge between January 2000 and December 2024. We also modelled the number of times a third party intervened with someone showing signs of imminent suicide risk on the bridge.

Results There were 681 suicides at the site. There were 2.48 suicides per month before installation of the safety nets, 1.83 during installation and 0.67 after installation. During the installation of the nets, suicides declined by 26% (rate ratio (RR)=0.74, 95% CI 0.60 to 0.90) and after installation by 73% (RR=0.27, 95% CI 0.13 to 0.54). There were 2901 instances where a third party intervened, 8.22 per month before installation, 14.42 during installation and 11.00 after installation. The number of interventions by a third party increased during installation by 75% (RR=1.75, 95% CI 1.62 to 1.90) and after installation by 34% (RR=1.34, 95% CI 1.12 to 1.60).

Conclusions The early evidence indicates the installation of safety nets on the Golden Gate Bridge is associated with an immediate and substantial reduction in suicides at the site. This finding highlights the value of installing nets on this bridge and the importance of barriers as a strategy to prevent suicides by jumping.

INTRODUCTION

The Golden Gate Bridge is a San Francisco landmark, but the bridge is also well-known as a location for jumping suicide. Between its opening in 1937 and 2008, there have been at least 1700 suicides.¹

The installation of safety nets to prevent suicide by jumping from the bridge was recently completed. Construction of the nets began in April 2017 and was completed in January 2024. The nets span 6.1 m (20 feet) below the sidewalks on either side of the bridge, extend horizontally 6.1 m over the bay, and cover 95% of the 2.7 km (1.7 mile) bridge.

Installation of the safety nets was controversial. Proponents argued that restricting access to means is a highly successful suicide prevention strategy, and that the installation of safety nets would therefore reduce the number of suicides on the bridge. Those against the nets argued they would do little to reduce the overall suicide rate in San Francisco and that the money spent on the installation

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Safety barriers are known to be an effective means of restricting access to sites where people die by jumping suicide. There is strong evidence that barriers can reduce suicides by 80%–90% at the installation site.

WHAT THIS STUDY ADDS

⇒ The Golden Gate Bridge is an iconic landmark, but the installation of nets to prevent suicides was highly controversial. This study provides early evidence that the safety net that was installed is highly effective at reducing suicide by jumping.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ There are many high-risk places around the world where people die by jumping from heights. Our study provides further evidence to policymakers that barriers are highly effective means of reducing suicide at bridges.

(US\$400 million) would be better spent on mental health services.²

While limited literature has investigated the epidemiology of suicidal behaviours on the Golden Gate Bridge, no studies have examined the effectiveness of interventions.^{1,3,4} Articles published in the media soon after the safety nets were completed suggested that they were already preventing suicides, but the magnitude of their effectiveness varied depending on the articles. To evaluate whether the safety nets were working as intended, we studied the change in suicide rates at the bridge during three periods: before, during and after their installation. Because staff and volunteers at the Golden Gate Bridge are trained to intervene when someone is displaying signs of a suicidal crisis, we also examined whether the three periods were associated with changes in the number of instances where a third party intervened to prevent suicide.

METHODS

The information used in this study was obtained from monthly incident reports by the Golden Gate Bridge Highway and Transportation District, the government body responsible for operating and maintaining the Golden Gate Bridge. Each report includes the numbers of confirmed suicides, unconfirmed suicides and successful interventions by third parties per month. We used confirmed suicides and interventions by third parties for our analyses.



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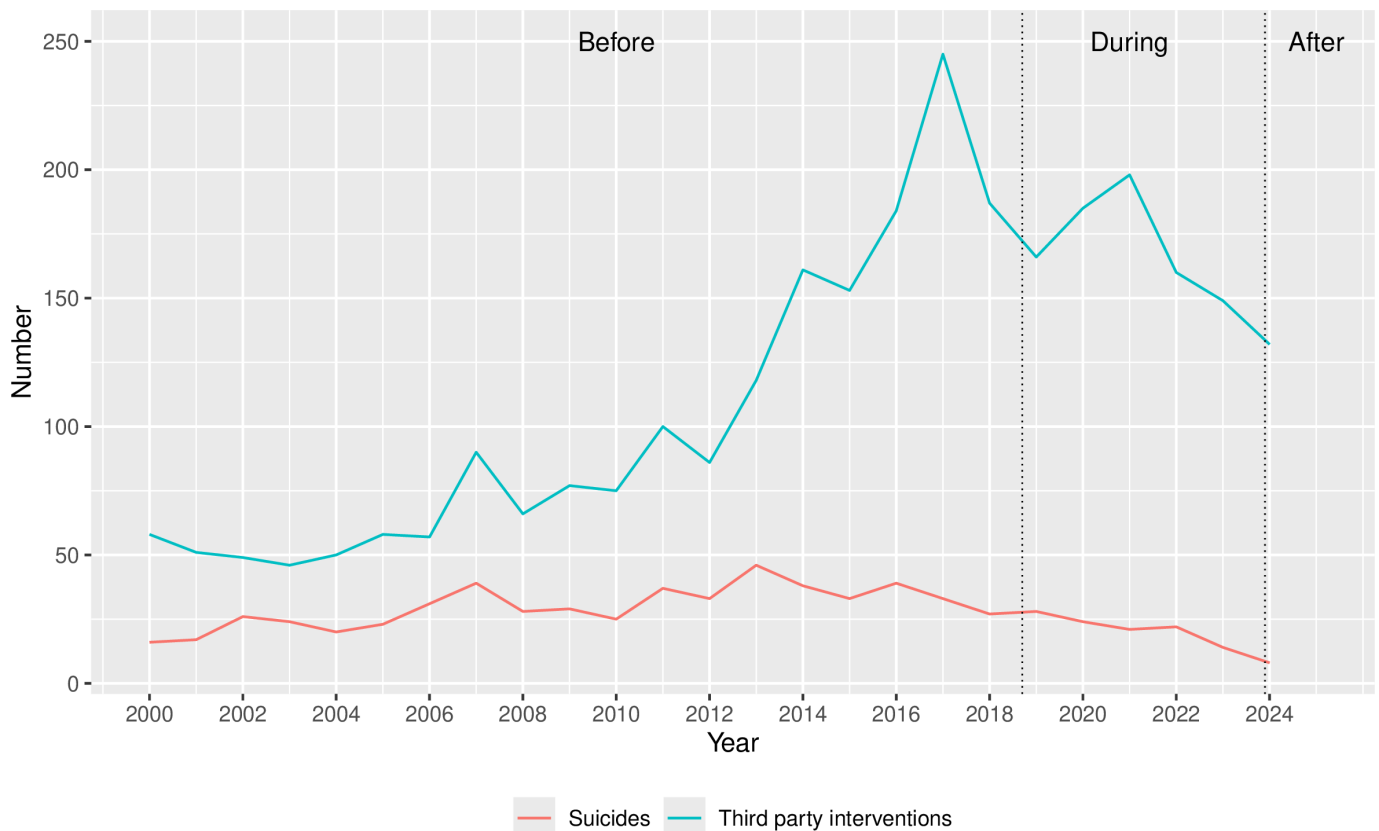


Figure 1 Annual number of confirmed suicides and interventions by third parties at the Golden Gate Bridge.

We considered three periods: pre-installation (January 2000 to July 2018), installation (August 2018 to December 2023) and post-installation (January 2024 to December 2024). We calculated the suicide rates in these three periods and undertook Poisson regression to model any change in rates between periods.⁵ We undertook a similar analysis of the number of interventions by a third party. Data management and analyses were undertaken in R.

RESULTS

During the entire study period, there were 681 confirmed suicides and 2901 interventions by a third party. **Figure 1** shows the annual numbers of confirmed suicides (blue line) and interventions by a third party (red line) since 2000. The annual number of suicides peaked in 2013 and then declined. The annual number of interventions by a third party increased each year until 2017 and then declined.

Prior to the installation of the safety nets, there were 2.48 suicides per month (**table 1**). During installation, there were 1.83 suicides per month, and post-installation there were 0.67 suicides per month. Relative to the pre-installation period, suicides declined by 26% (rate ratio (RR)=0.74) in the installation period and by 73% (RR=0.27) in the post-installation period ($p<0.001$).

For interventions by a third party, there were 8.22 interventions per month before installation, 14.42 per month during the installation period and 11.00 per month in the post-installation period (also **table 1**). Relative to the pre-installation period, the number of interventions by a third party increased by 75% (RR=1.75) in the installation period and by 34% (RR=1.34) in the post-installation period ($p<0.001$).

DISCUSSION

Our study provides early but clear evidence that the safety nets installed on the Golden Gate Bridge are associated with a reduction in suicides at that site. In the 12 months since the nets were completed, suicides have declined by 73% relative to the number before the net installation began. This finding is consistent with other studies that have found barriers at sites where jumping suicides occur are associated with large and immediate reductions in suicides.⁶

Table 1 Suicides and third-party interventions by installation period: counts, exposure period, rates, rate ratios and 95% CIs

Outcome	Period	Count	Time (months)	Rate per month	Rate ratio	95% CI
Suicides						
	Before	554	223	2.48	1.00 (ref.)	
	During	119	65	1.83	0.74	0.60 to 0.90
	After	8	12	0.67	0.27	0.13 to 0.54
Third-party interventions						
	Before	1832	223	8.22	1.00 (ref.)	
	During	937	65	14.42	1.75	1.62 to 1.90
	After	132	12	11.00	1.34	1.12 to 1.60

Means restriction is an effective strategy in reducing physical availability to a jump site. The Golden Gate Bridge is an interesting case study of this strategy. The nets on the bridge are 6 m below the main structure. It is possible to jump directly onto the nets, and then jump off the nets into the water, which is approximately 60 m below. This is different to many other barriers that completely reduce access to the jumping point, and the fact that the nets have substantially reduced suicides is interesting. It may be that anticipation or the experience of the first jump to the nets is a psychological deterrent to the second jump. Interviews with 63 individuals who had indicated that they would go to the Golden Gate Bridge to attempt suicide revealed that the main reasons for choosing the bridge were access to means, the location itself and a perceived painless death.¹ Jumping to the nets is unlikely to be fatal but could result in significant bruises, sprains and broken bones.⁷ Therefore, the presence of the nets might alter the imagined scenario of directly jumping into open water. These mechanisms could further contribute to reducing the cognitive availability of suicide by jumping at this site, as over time the bridge's reputation as a site where others have gone to take their own lives will diminish.

Our study also found that the number of interventions by third parties increased during the installation of the safety nets but then attenuated once the nets were complete. It is unclear why there was an attenuation. One possibility is that the removal of this suicide method from the site resulted in fewer people visiting the site with the intention to jump, and therefore there were fewer opportunities for a third party to intervene.⁸ This highlights that changes in the number of interventions by a third party can be hard to interpret. Increases might reflect an increase in the number of people going to the bridge with the intention of jumping, but it might also reflect staff and volunteers being more aware of the need for suicide prevention and taking steps to help someone in crisis. A final point to make is that it is possible that both interventions—the nets and intervention by third parties—are working together in concert. It is possible that the presence of nets at the Golden Gate Bridge creates further opportunities for staff regularly deployed on Golden Gate Bridge to intervene to prevent people from jumping from the bridge or the nets.

To the best of our knowledge, this is the first study on the effectiveness of the newly installed safety nets at the Golden Gate Bridge. A strength of our study is that we were able to estimate the effectiveness of partial and complete nets on suicides using near real-time surveillance data. We were also able to examine interventions by third parties, which have been understudied in the literature. The study also has several limitations. First, although we used data from the responsible government body, it is possible that the data exclude some suicides (eg, deaths misclassified as accidental drownings). Second, we could not adjust for external factors such as the impact of the COVID-19 pandemic or overall trends in suicide mortality. Third, we were only able to use a year of post-installation data. Fourth, we were not able to evaluate potential displacement effects (eg, suicide at a nearby jumping site) or substitution to other suicide methods. Finally, the study does not address the criticism regarding the impact on the overall suicide rate in San Francisco. Understanding displacement effects and changes in the overall suicide rate is only possible when all suicides are captured in a city-wide or state-wide surveillance system that records both incident location and suicide method. One example of this type of surveillance is a recent study of jumping suicides at the West Gate Bridge in Melbourne, Australia⁹ based on data from the Victorian Suicide

Register.¹⁰ Another example is a study on Ellington Bridge in Washington DC using data from the city's Office of the Medical Examiner.¹¹

In conclusion, the early evidence indicates that the installation of safety nets at the Golden Gate Bridge has been successful in reducing the number of suicides at the bridge. A moderate reduction occurred during installation, when partial restrictions were in place, and a much larger reduction occurred after the installation of the safety nets was completed. Further research should continue to examine suicides at this site over a longer time frame.

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