PREVENTING SUICIDE BY JUMPING FROM BRIDGES OWNED BY THE CITY OF ITHACA AND BY CORNELL UNIVERSITY

CONSULTATION TO CORNELL UNIVERSITY

"EXTENDED REPORT"

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INTRODUCTION

The City of Ithaca and Cornell University are faced with a challenge unlike any encountered elsewhere in the world. The settings that are essential identifying features of the community – and symbols that have been embraced universally as attractions – also are the sites of suicide, one of the least understood and most meaning-laden of all human actions. Rather than having one site for suicide – a so-called "hotspot" that has become iconic – Ithaca's bridges and gorges collectively stand as the points of concern. Moreover, while there has been intensive attention to scientifically designing and testing public health and individually oriented approaches to preventing suicide, this is a young science where results are preliminary and definitive evidence is lacking.

It is within this context that we were asked to consult on both immediate and intermediate-term response to the recent deaths of students who jumped from bridges on or adjacent to the Cornell campus. The focus of this report necessarily emphasizes the matters of the moment, maximizing safety to save lives, considering the continuance of temporary barriers that are offending in appearance to all eyes, and suggesting steps that can facilitate a safe transition to a more settled set of outcomes – built on collaborative discussion among the diverse groups that ultimately must have a "say." Such collaborative and collective responses are essential for any efforts, if they are going to have a chance of proving effective.

BACKGROUND

Ithaca is a city of 30,000 people situated at the south end of Cayuga Lake, the longest of the Finger Lakes of Central New York. It is famed for its natural beauty, with steep and spectacular wooded gorges and dramatic waterfalls. Ezra Cornell, in founding the University on the heights above downtown Ithaca and Cayuga Lake, decided 150 years ago to tie the identity of the school to its gorges, purposefully building the new campus between these magnificent landmarks. Cornell University registered 20,633 students this past academic year – 13,931 undergraduate and 6,702 graduate students.

To this day, students and faculty choose Cornell because of its scenery and surroundings, and its offer of a vibrant intellectual culture outside of a dense urban environment. The campus area includes seven bridges that cross the main gorges, and members of the Cornell community, including students, faculty, and staff, traverses these bridges daily, often on foot. The University owns four of the bridges, while the City of Ithaca owns the other three. Four of the seven have served as significant sites for suicides, considering deaths over the course of decades, with the most from the two Stewart Avenue bridges, which are owned by the City.

The rate of suicide over time at Cornell University has been consistent with national suicide data in higher education, despite Cornell's reputation as having had an elevated rate. However, six Cornell students died by suicide during this immediately past (2009-10) academic year, five of these on or near the campus, including three who jumped from bridges or an adjacent gorge edge in close temporal proximity during February and March, the last two within two days. These six deaths constituted a statistically significant ($p<.001$) as well as a clinically meaningful suicide cluster [1] [2] The cluster generated substantial and persisting local, national, and international media attention. This news coverage, in turn, served to raise the risk level for further suicides among Cornell students – and among vulnerable people living in Ithaca and Upstate, or for those who might come to Ithaca from distant places to die.

In response, the University, with the City's consent, installed temporary chain link fences across all seven bridges. The erection of the temporary barriers over the spring break prompted extensive public discussion, both supportive and acrimonious, including protests that the barriers were a blot on the landscape, that they would not deter anyone with a strong intent to kill him/herself, or that their presence might be regarded by vulnerable individuals as so depressing that they might become more distressed.

The initial agreement to place the barriers included a time-certain deadline in early June for removal on the City-owned bridges, which recently has been extended another 10 weeks. It was within this context that we visited Ithaca on 3-4 May 2010 to view each bridge, and talk with students, faculty, administrators, and Ithaca leaders. Our group included three suicide researchers: Dr. Eric Caine, Chair of Psychiatry, University of Rochester Medical Center, and an alumnus of Cornell; Dr. Madelyn Gould, Professor, Departments of Psychiatry and of Public Health (Epidemiology), Columbia University/New York State Psychiatric Institute, and Dr. Annette Beautrais, Senior Research Scientist, Department of Emergency Medicine, Yale University School of Medicine. In addition to our data gathering, we were asked to provide education about suicide and suicide prevention for Cornell faculty, staff, and students, and for Ithaca city leaders and community, and to add expert input to the discussions of policy makers.

This extended report includes the key issues conveyed at the consultation meetings, and the major findings and recommendations of the consultants. It includes detailed summaries of the literature and in-depth commentary note included in the Executive Summary and the "Basic Report," though the recommendations and much of the pertinent text are identical.

KEY ISSUES AND RELEVANT DATA

As part of its urgent response to the deaths in February and March 2010, in particular, the University initiated a series of coordinated steps to augment its already considerable efforts devoted to mental health promotion and suicide prevention. Central to these, temporary barriers were placed on six of the seven bridges over local gorges, and the seventh was closed. *This action was an essential demonstration of the University's commitment to safety above all else*, and it was entirely in keeping with what has been shown to work in other settings. It is important to underscore that this was not the only aspect of the University's response.

Three critical issues served to drive the urgency of the needed decisions and to shape future discussions – 1) the nature of youth suicide, suicide contagion, and clusters; 2) documented jumping from iconic sites, most especially bridges; and overshadowing these, 3) the extent of media coverage of the recent suicides and its lasting impact. The latter issue has been deeply intertwined with all that we consider.

Nature of youth suicide

Youth suicide represents a preventable cause of premature death, claiming approximately 250,000 lives worldwide annually between the ages of 10-24.[3] After motor vehicle crashes and homicide, suicide remains the third-leading cause of death in the U.S. between the ages of 10 and 24 years.[4] Each year, suicide accounts for more than 4000 deaths among 15-24 year olds in the US - one youth suicide every 2 hours.

During the last three decades an extensive body of research has accumulated about the individual, genetic, psychiatric, social, cultural and contextual factors associated with youth

suicidal behavior.[5-7] Risk factors and characteristics of youth suicidal behavior show remarkable congruency across countries and cultures. Risk factors for suicidal behavior range from micro-level genetic factors, to meso-level family influences to macro-level social influences (e.g., unemployment rates) and global issues (e.g. Internet-supported social networking), all of which can lead directly or indirectly to suicidal behavior.

Individual vulnerability is strongly influenced by genetic susceptibility to mental health problems, especially to mood disorders, substance abuse, anxiety disorders and antisocial and offending behaviors. [6, 8] Contextual factors (means of suicide; media climate) and life stresses are additional influences. Only a subgroup of those at risk of suicide, because of psychiatric illness and local and broader social adversity ever attempt or die by suicide because there is variability in the diathesis or predisposition to suicidal behavior.

Demographic risk factors. The suicide rate in the US rises gradually during the late-teens.[9] Rates are four times higher for males yet attempt rates are far higher in females, suggesting both a different pattern of risk factors for suicide and nonfatal suicidal behavior, and that preventive approaches may need to be tailored to the two sexes. The "developmental nature" of risk factors differs across the lifespan, again pointing to the need for distinctive preventive interventions that are tailored to address the specific challenges of different age groups.

Family history of suicidal behavior. A family history of suicidal behavior is a strong risk factor for suicide and suicide attempt[17]; up to 45% of the variance in suicidal behavior is genetic in origin.[17, 10] Suicidal behavior is also associated with a family history of aggression and anger. [11]

Personality/cognitive factors. Certain personality factors and cognitive styles (including self-esteem, hopelessness, neuroticism, impulsivity, aggression, perfectionism, self-consciousness, social disengagement, cognitive rigidity) may predispose youth to suicidal behavior by framing perceptions and reactions to stressful situations in negative ways. [12, 13]

Sexual orientation. Risks of suicide attempt and suicidal ideation, and of developing mood, substance use and anxiety disorders, are increased among gay, lesbian, bisexual and transgendered youth.[14-17]

Physical illness. Neurodegenerative and chronic illnesses (including diabetes, Huntington's disease) increase risk of suicide attempts and suicide; even the *perception* of physical illness in young males confers risk. SSRI medications have been associated with increased suicidal behaviors – not suicides – during clinical trials, and may point to increased real-world idiosyncratic risks, and more recently similar iatrogenic adverse effects have been suggested for antismoking, obesity, acne and anti-epilepsy drugs as well as anabolic steroids abused by young athletes. [18]

Psychiatric illness. Mood or substance use disorders, schizophrenia, anxiety, conduct and antisocial behaviors and/or personality disorders (borderline or antisocial personality disorders) are present in most youth who attempt suicide or die by suicide.[6, 8, 19-30] Mood disorders are the single disorder most commonly linked to suicidal behavior. Alcohol and substance use disorders increase risk of suicidal behavior, especially in older male youth; binge drinking increases suicide risk, especially in those with depression and stressful events.[31] Anxiety disorders, including panic disorder and PTSD, increase risk of suicidal behavior; risk is greatest for GAD (generalized anxiety disorder) in association with depression.

Psychosocial factors and exposure to adversity, trauma and stress. Some young people with suicidal behavior have been exposed to childhood and family adversity (sexual, physical or emotional abuse or neglect, poor parental care; family violence; parental separation or divorce; parental psychopathology, impaired parent-child relationships, and institutional or welfare

care).[32, 33] Stressful life events (relationship and interpersonal problems and losses, disciplinary or legal crises; financial problems; academic or work-related problems, and bullying) may precipitate suicidal behavior in young people who are already vulnerable to suicide.[21, 28, 30]

Media reporting. The ways in which traditional print and tele-media report suicide can influence vulnerable young people who are susceptible to contagious effects of knowing family or associates who have died by suicide.[6, 34] Cautious, muted reporting can help reduce risk of imitative single and cluster suicides, especially when specific sites or methods are repeatedly involved.[35]

Access to means of suicide. Access to lethal means of suicide such as firearms and pesticides increases risk of suicide and may convert ambivalent and impulsive suicide attempts into deaths, particularly in rural areas.[36] Restricting access to means and sites of suicide is an effective, but often under-valued, approach to suicide prevention.[37]

Protective factors. Strong religious, family and/or cultural ties tend to protect against suicidal behavior with protective effects likely exerted by proscription against suicide and promotion of social linkages, with these linkages and prohibitions also decreasing the risk of psychiatric disorders (including depression, substance abuse, offending and antisocial behaviors), with which suicide is associated. Colleges and universities have lower suicide rates among their student populations than rates among non-matriculated peers. Whether this reflects admission-related 'selection factors' versus campus-based protective effects (e.g., cohesive community, available mental health services), or a combination of effects, has not been studied empirically in a fashion that would allow disentangling these potential protective influences.

New communication technologies. New communications technologies (including cell phones and the internet) now exert a dominant and global influence on young people's educational and social lives. The Internet is a leading source of information for young people about suicide and readily accessed sites encompass suicide prevention, both antisuicide and prosuicide promotional materials, and factual information.[38] Internet sites are implicated in inciting and facilitating suicidal behavior; however, the internet holds promise for providing support, [39] individual email counselling[40] and screening and therapeutic programs to address depression.[41]

In sum, the evidence about risk and protective factors provides an empirical background for considering interventional and preventive approaches, and clearly indicates that suicide is multifactorial and complex. However, not all risk factors are equally supported by evidence, nor are all equally important. Studies that have generated Population Attributable Risk (PAR) estimates suggest that mental health factors (mood, substance abuse, anxiety and antisocial disorders, and previous suicidal behavior) make the strongest and most consistent contribution to risk of suicidal behavior. These results imply that the major, but not sole, focus of suicide prevention efforts should be directed at minimizing rates of psychiatric disorders and addressing the risk factors and life pathways that lead to these disorders. Compounding the lack of data, few of the programs that purport to prevent youth suicide have been subjected to systematic evaluation to establish efficacy, effectiveness or cost-effectiveness.
These general considerations serve to 'frame' the issues now confronting Cornell and Ithaca, which specifically relate to the *clustering of suicides, contagion, and jumping from iconic sites*. The latter has been a prior focus for discussions, as we learned during our visit, but the powerful forces of recent events have again spotlighted a phenomenon that has long existed in Ithaca and the surrounding region.

Clusters and Contagion

While individual risk factors, such as depression, anxiety, and substance abuse, have long been shown to exert a significant role in the etiology of suicide, mounting evidence also supports the role of imitation and modeling in suicide. The importance of modeling on suicide behavior has been suggested primarily by two areas of research: 1) clusters or "outbreaks" of suicide defined by temporal-spatial proximity; and 2) media influence on subsequent suicide related behavior. A brief review of these two sources of evidence as they relate to the current apparent suicide cluster at Cornell University is presented.

Terminology. A succinct review of nomenclature is presented to facilitate an understanding of information presented since the terms "clusters" and "contagion" are often used indiscriminately in the literature.[42] A suicide "cluster" refers to an excessive number of suicides occurring in close temporal and/or geographical proximity. Suicide "contagion" is the process by which one suicide facilitates the occurrence of a subsequent suicide. Contagion assumes either direct awareness through contact or friendship with the suicide victim, word of mouth knowledge, or indirect transmission through the media.

"Cluster Suicides." Early research provides descriptive accounts of suicide "epidemics" that rely heavily on anecdotal accounts of suicide behavior, usually case history methodology (see Gould and Davidson, 1988 [43]). Suicides that appear to be clustered or related (cluster suicides) have been noted in a variety of populations, including community samples, such as college students, and selected samples, such as incarcerated individuals and psychiatric inpatients. [44] Collectively, these studies reinforce the concept that exposure to another person's suicide can precipitate *imitative* suicidal behavior, related to *temporal, geographic, and/or interpersonal proximity* as well as individual vulnerabilities.

Nevertheless, the interpretability of case history studies [45-47] has been seriously hampered due to the presence of selection bias and frequent lack of a comparison group. During the past two decades, research in suicide clusters has shifted methodologically and qualitatively from descriptive to inferential studies, reflective of the development and application of statistical techniques, such as the Scan statistic, the Knox procedure, and Poisson distribution modeling [42, 48] to detect statistically significant clustering effects. These techniques most typically examine *discrete time intervals* to define a *unit of frequency of suicide* within a *finite assessment period*, within specific *geographic boundaries* to delimit spatial variables, and *comparing observed and expected frequencies*. Of the inferential statistical studies (see [44, 49]), several clearly provide evidence of time-space clustering [50-58], while others have found no such effects, [59-63] or offer mixed results. [59, 64-66]

Cluster suicides appear to be predominantly a phenomenon of adolescents and young adults. [52, 53, 67-69] An inferential study employing stratified samples to investigate age-related effects among large-scale national populations has found that the cluster suicides are observed primarily among teenagers and young adults (15-19 and 20-24 year olds). [52, 53, 67] In these studies, the relative risk of suicide following exposure to another individual's suicide was 2 to 4 times higher among 15-19 year olds than among other age groups, and was also significantly increased among college-aged individuals. This might explain why the majority of studies involving adolescents found significant clustering of suicide, whereas clusters have not been as prevalent or clearly evident among adult populations.

An ongoing national psychological autopsy study of youth cluster suicides (Gould et al., in progress) has yielded important findings that inform the current discussion regarding the pattern of youth suicide clusters, including the average size and duration of clusters, demographic characteristics of cluster suicide decedents and their communities, the nature of the suicide method, as well as the relationships among decedents. This research has involved a case-control study of 208 decedents, 13-20 years of age, who died as part of 53 suicide clusters across the U.S. identified between 1988 and 1996; they were compared with a matched sample

of 105 "singleton" suicides. 1) Clusters ranged in size from three to 11 cases (mean = 3.9, sd = 1.6). Two-thirds of the clusters consisted of three cases. 2) The duration of clusters varied from one to 357 days (mean = 80 days; sd = 58.1 days); the interval between the first and second cases in the cluster varied from two to 103 days, with one cluster deemed to be an extension of another one that occurred two years earlier in the same community. 3) The relationships among individuals who died in a suicide cluster were relatively distant – victims were not likely to be close friends. 4) The deaths of the first cases in the suicide clusters, in comparison to the singleton controls, were more likely to have occurred in public locations. 5) There was significantly more publicity surrounding the deaths of the first cases in the cluster compared to that of the singleton controls. 6) The first cases in the cluster took fewer precautions to minimize interference during the suicide acts than the singleton controls. 7) The first cluster cases were more likely to be impulsive (i.e., planning for less than one day) than the singleton suicides.

Media Influences. The association between exposure to media coverage of real-life suicides and subsequent self-injurious behavior has been investigated for more than three decades. While research on cluster suicides indicates the plausibility of direct modes of transmission (e.g., person-to-person) of suicide clustering, studies investigating media influences on subsequent suicides point to alternative pathways of transfer.

Reviews of nonfictional suicidal stories [49, 70-72] provide substantial evidence for a suicidal imitative effect. Consistently, the magnitude of the increase in completed suicides following a suicide story has been shown to be proportional to the amount, duration, and prominence of media coverage. Moreover, a publicized method of suicide has been shown specifically to increase the subsequent use of that particular method. [73, 74] There is also some evidence that the impact of suicide stories is greatest for teenagers, [75, 76] though recent experiences in Hong Kong and Southeast Asia now suggest that this can be potent across middle adulthood as well, and spread by both print media and the Internet. [77]

In the past decade, investigators have begun to acknowledge the potential impact of the Internet. While research on the Internet and adolescent suicides is in its inchoate stage, it demonstrates the disturbing power of the Internet. Case reports underscore that youths as well as adults have turned to the Internet for detailed instructions on suicide methods and have received encouragement to commit suicide or made suicide pacts; [78-80] indeed, the Internet has given rise to the phenomenon of "cybersuicide" pacts, the formation of suicide pacts that involves strangers meeting over the Internet and acting together, including meeting one-another to kill themselves together. [81, 82]

In conclusion, teenagers and college-aged students are particularly vulnerable to suicide contagion. It appears that cluster suicides may be more impulsive than other suicides, at least at their onset, and the factors that may precipitate a suicide cluster include a public location of the death followed by a large amount of publicity. Moreover, publicity of a particular suicide method appears to lead to subsequent increases in the use of that method. Of increasing concern, the Internet has the potential to rapidly amplify such exposure. Case reports underscore that youths as well as adults have turned to the Internet for detailed instructions on suicide methods and have received encouragement to kill themselves or have made suicide pacts.

Considering the research evidence as a whole, the public nature of deaths from bridges in Ithaca increased the likelihood that the 2009-10 suicide cluster would continue unabated without protective actions. More jumping deaths in Ithaca would have added further to community trauma and international notoriety, which together could have had an even greater impact on the perceived serenity and beauty of the local gorges and parks.

Jumping to Death from Iconic Sites

Jumping is a violent, highly lethal method of suicide. Case fatality percent (the fraction who die of all those who attempt suicide using this method) is estimated at over 30% for jumping from all structures and buildings, [83] and *is far higher (over 90%) for higher bridges* [84] [85-87] Death is usually inevitable from jumps from five stories. The incidence of suicide by jumping varies markedly around the world, and tends to be much higher in places which provide opportunities for jumping, such as cities with extensive high rise housing. Paradoxically, however, it is the far less common suicides by jumping from iconic sites which attract a disproportionate media attention and coverage.

Characteristics of individuals who die by jumping. A series of studies has attempted to characterise those who jump from bridges. However, results from these studies are not consistent. Some studies suggest that younger individuals, predominantly male, and those with more severe mental illnesses (including schizophrenia and psychotic disorders) are over-represented amongst those who jump, while other studies have not found the same features.

This inconsistency in findings might be explained by such factors as the small numbers of suicides in some of these descriptive studies, the proximity of some jumping sites to psychiatric hospitals, the notoriety of the site in question, and the frequency of suicide by jumping in the countries of study. It may be that sites near psychiatric hospitals attract individuals who are, or have recently been, inpatients at the hospital, while those sites that have widely known reputations as suicide sites (such as the Bristol Suspension Bridge, or the Golden Gate Bridge) attract individuals from a wider geographic area and a range of different (including non-psychiatric) backgrounds with these people choosing the site largely because of its reputation rather than because of proximity and accessibility.

Features of sites where suicides by jumping occur. "Suicide hotspot" is a term that is loosely defined but typically used to describe a specific site, usually in a public location, which is used frequently as a location for suicide, has easy access, and which gains a reputation and media attention as a place for suicide.[88, 89] All the world's leading suicide hotspots appear to be jumping sites. The Golden Gate Bridge in San Francisco is a readily apparent example of an iconic suicide hotspot.

Sites may acquire reputations for suicide in spite of relatively small numbers of suicides from these sites. For example, Grafton Bridge in Auckland had a local reputation as a site for suicide despite having only one suicide per year.[90] Similarly small numbers were associated with other iconic sites – the Bern Muenster Terrace in Switzerland with 2.5 deaths per year,[89] and the Bristol Suspension Bridge in the UK with an average of eight suicides each year. [84]

The process by which a site attains iconic status as a place from which to jump is not clear. It may, in part, be a consequence of media reporting. Despite recommendations to the contrary, journalists persist in asserting that suicides from public sites are newsworthy. This newsworthiness may be argued in light of the relatively unusual method of death: Jumping is an uncommon method of suicide in many countries, and jumping from bridges is especially rare in comparison to other more accessible methods – *in most settings*. There are many potential attractions to jumping for some individuals: The public aspect of the suicide and the site, the beauty or aesthetic appeal of the structure (e.g., the Golden Gate Bridge), the cultural significance or social meaning of the setting (e.g. Mt. Muhara in Japan), or the hazard that the suicide may pose for the public (which exists, for example, if a bridge extends over an expressway with the risk that other lives may be endangered when someone jumps).

There is some evidence, albeit conjecture for those who have died, that people tend to make their choice of method of suicide based upon their perceptions of what they understand to be

certain to achieve death, to be quick, to be readily available, and to avoid risk of disfigurement (as conveyed by survivors of settings such as the Golden Gate Bridge). [91] Jumping fulfills these conditions. However, the symbolism and romanticism associated with an iconic or symbolic suicide site appear to play a decisive additional role for those who choose to jump from such sites. [92]

Thus, while there is no clear account of the mechanisms by which particular sites acquire iconic status as places for suicide, it seems likely that this process involves a combination of a public place, an attractive location, an aesthetically pleasing structure, the nature and persistence of media reporting of suicides from the site, and the development of local history, tradition and myth. All these features likely combine to render Ithaca as "an iconic site" for suicide. Unlike other settings in the United States or internationally, this attribution appears to relate to the region and its gorges generally, rather than to one specific bridge, promontory, or park.

COMPREHENSIVE APPROACHES TO SUICIDE PREVENTION

The field of suicide prevention research field is confronted by challenges not faced in other areas of public health or clinical care. Reiterating our earlier point, this is a young science where results are preliminary and definitive evidence is lacking. To achieve success, prevention efforts must grapple with:

1) An inability to discriminate the relatively few 'true cases' from the large numbers of 'false positive' cases of psychiatrically ill or emotionally distressed individuals who describe many of the same thoughts and plans as those who seriously injure or kill themselves. No doubt, a failure to discriminate is compounded by the low base of suicide in the general population in the face of common complaints, symptoms, and signs of psychopathology. To date, available data reveal virtually no clinical characteristics that can be used at the individual level to distinguish those who will go on to die by suicide from those who will not.

2) The large number of 'false negative' individuals who escape preventive detection by family, and physicians or other professionals, and proceed to kill themselves.

3) The difficulty of clinical and social services to *reach* potentially lethal individuals in settings not *designed* for preventive or treatment interventions (e.g., the courts, schools), even when it is known that they bear many indicators of elevated risk.

4) The *lack of a coordinated strategy* of suicide prevention that can deal effectively with myriad local, regional, state, and national agencies and organizations that could, in theory, play a role in preventing suicide.

5) Our paucity of understanding about how best to define and mobilize protective factors that may diminish the impact of risk factors.

In its response to challenge #1, the University inevitably will have to 'overestimate' its approach by making many services generally available, as *it is not possible to determine with individual precision which ones of many distressed people ultimately will die by suicide*. While this can be viewed as a dilemma, it also should be seen as the opportunity to greatly benefit the health and mental health of the community of students, faculty, and staff.

For the second, increased training and vigilance are useful, in addition to vigorously combating the social and personal stigma of seeking care for emotional problems. These already have been the targets for many of the University's activities that were begun during the past decade. But there will be times when suicidal people continue to be unrecognized or actively seek to avoid detection. *It is specifically for those individuals, and for the times when people at risk cannot be reached*

(#3), for whom "means control" is especially important! Regarding challenge #4, Cornell together with the City of Ithaca can take leadership in defining a coordinated strategy; they are relatively defined communities where clear, visionary leadership will be essential. And finally, the steps that Cornell already has undertaken to build a "caring community" are central to the health and mental health promotion that is the essence of the final challenge. Framed this way, it is easier to begin to discuss specific measures.

Overview: Settings and strategies for current and potential youth suicide prevention activities

SETTINGS	STRATEGIES
Individuals	▪ Pharmacotherapy, pharmacogenomic therapy ▪ Psychological/behavioral treatments ▪ Psychosocial interventions ▪ Combinations of pharmacotherapeutic / psychological / psychosocial therapies
Families	▪ Early intervention programs ▪ Parenting support ▪ Support / mentorship programs for at-risk youth ▪ Family-based therapy (e.g. MST)
Schools & universities	▪ Screening and risk monitoring ▪ Treatment programs ▪ Curriculum based education ▪ Skills building ▪ Peer education and support ▪ Faculty and gatekeeper education ▪ Case finding ▪ At-risk group support / mentoring ▪ Cyber-based screening, therapy, skills building and wellbeing promotion ▪ Institutional support and protocols ▪ Means restriction ▪ Promotion of positive mentally healthy, caring community
Health care systems	▪ Emergency Departments screening and ED-initiated treatment programs ▪ GP education, screening, treatment and management ▪ Hospital based inpatient /outpatient programs
Communities	▪ Community gatekeeper programs ▪ Telephone crisis lines ▪ Faith-based programs ▪ Safe storage programs ▪ Cyber-based screening, education, treatment ▪ Media suicide reporting resources ▪ Promotion of positive mentally healthy, caring communities ▪ Means restriction, including barriers for iconic

	bridges or subways
National/state	▪ Means restriction ▪ Mental health literacy and public education/destigmatization ▪ Mental wellbeing promotion ▪ Alcohol legislation ▪ Social welfare policies

When considering the published literature for approaches to prevention, it is essential to consider the 'young' nature of the field. Very little work, with the potential exception of studies involving the US Air Force [93] and initiatives at a broad society level (e.g., changes in drug packaging or the composition of cooking gas), have shown *sustained effects as measured by lower rates of suicides.*

Individual-level Strategies

Pharmacotherapy. Strong linkages between depression and suicidal behaviors have led to substantial investments to prevent suicide by treating those deemed at-risk with antidepressant medications. Published data at the population level have reported decreases in suicide rates related to their administration, but the aggregate nature of the observational data precludes firm conclusions. [94, 95, 96, 97] Clinicians, patients, and families often attest to the powerful impact of effective treatments. However, the role of antidepressants in reducing youth suicide became controversial after the FDA 'black box' warning following concerns about higher rates of suicide-related adverse event reports in pediatric clinical trials of SSRIs, even as there were no deaths. Taken together, the findings of these reviews suggest that fluoxetine has a favorable risk/benefit ratio; other antidepressants may confer a short-term, modest risk of increased non-fatal suicidal behavior for those ages 24 years and younger. Overall, based on observations of the relationship between SSRIs prescription rates and suicide, they will likely benefit most young people to whom they are prescribed under expert guidance. [98] Anecdotally it is clear that many of the cases reported in FDA hearings related to a general lack of supervision by PCPs after prescribing what they thought were relatively benign compounds (being unaware of reported adverse events). Suicide while taking antidepressants is *extremely* uncommon in young people. Indeed, the clear majority of suicides (including youth) occur in those who are not on medication, as reported in post-mortem toxicology studies, and the results of psychological autopsy studies have repeatedly emphasized a lack of appropriate psychiatric treatment, not an over-prescription of medications.

Psychotherapy. A range of psychological and psychological therapies has been shown to reduce suicidal ideation, and suicide attempts. [99] Therapies include individual psychological therapies (cognitive behavioral therapy, CBT; interpersonal behavioral therapy, IPT; problem-solving therapy, PST; individual dialectical behavioral therapy, DBT, multisystemic therapy, MST, and group-delivered DBT). These results have been demonstrated under carefully controlled experimental or research-supported conditions, and their real-world implementation has yet to be studied in any depth.

Institution-based Strategies.

Schools and universities. Schools, colleges, and universities often are viewed as institutional settings that provide good organizational contexts for screening and intervening for suicide risk. A wide range of school-based programs has been developed including: screening programs to identify and refer those at risk; didactic suicide and depression awareness programs; gatekeeper programs for adults who have contact with young people; combined peer support and gatekeeper programs, and skills-based and competency-promoting programs.

Some programs combine more than one of these approaches. However, few programs have been systematically evaluated for short or long-term efficacy, effectiveness, safety or fidelity, or suicide outcomes, and the widespread implementation of some programs, such as suicide awareness programs, has been controversial. The awareness programs have found no gains, a lack of behavioral changes despite positive changes in attitudes, or have reported undesirable effects including more maladaptive behavior, reluctance to refer friends for help, potentially harmful changes in attitudes, and iatrogenic effects resulting from bonding amongst deviant peers grouped together for program delivery.[100, 101] Positive or promising effects have been reported for some screening programs, some skills building programs, and programs that combine gatekeeper and peer education with screening and referral. [102, 103] Properly developed programs can be promulgated without fears of contagion. [104] Case-finding approaches which screen for depression, substance abuse and/or suicide risk and refer at-risk young people for treatment have been shown to effectively enhance the likelihood that students at risk for suicide will get into treatment [105] and offer safe [106] alternatives to the risks associated with didactic suicide awareness programs. Nevertheless, screening programs need further study to improve the specificity of screening tools, and to explore the extent to which those identified as being at risk have a short or longer term subsequently reduced risk of suicidal ideation or attempt.

In college-aged students online web-based screening can be delivered via personal computers. School and college group-delivered social problem solving and interpersonal therapy have shown reductions in suicidal behaviors, albeit in small samples, and online real-time CBT shows effectiveness for all ages.

Primary Care. Programs that support primary care practitioners to recognize, treat and manage psychiatric disorders related to suicidal behavior, particularly major depression, are amongst the most promising approaches to suicide prevention but few have focussed on youth. [107, 108] Brief screening tools for use in primary care settings show promise in identifying at-risk youth and in managing adolescents with depression,[109] but their impact on suicidal behavior has not been assessed. [110, 111]

Emergency Departments (EDs). EDs are sites where young males who might not visit other health care facilities seek treatment for trauma, alcohol and violence-related injuries. Increasing numbers of young females are also being seen at EDs for binge drinking and alcohol intoxication. Young males and females who make suicide attempts are typically seen at EDs and discharged home without admission. Reductions in suicide attempts are reported for low cost psychosocial interventions of sending friendly letters from mental health services attached to EDs to patients in the months following their ED visit for a suicide attempt to provide contact and remind people that assistance is available,[112, 113] patients given a token to allow re-admission whenever they choose,[114] skills-based and supportive therapy[115] specialized ED care and family therapy (which included training workshops for emergency room staff, a videotape aimed at modifying families' treatment expectations, and an on-call family therapist);[116, 117] brief problem solving to enhance outpatient treatment adherence,[118] and rapid response treatment.[119]

Community-level Strategies

Media guidelines. Efforts to educate and encourage the media to report suicide accurately, responsibly and in a muted manner have reduced mortality.[120] However, media guidelines in their current form are inappropriate for youth-relevant Internet sites. Suitable guidelines are needed, and currently being prepared.

Telephone crisis services ("hotlines"). Hotlines have been shown to reduce callers' suicidal ideation,[121-123] but their impact on community suicide rates has yet to be demonstrated unequivocally. Among youth, the low utilization of hotlines and the negative attitudes toward

them [124] is particularly distressing in light of recent evidence of the short-term efficacy of hotlines for youth who use this resource. [125] Efforts are continuing to optimize hotlines' effectiveness and outreach to suicidal individuals by expanding them to include on-line and texting capabilities. Such services may provide intervention if counselors are trained and empathic, and may act as a conduit to specialist assistance by providing information and referral.

Restricting access to means of suicide. Restricting access to means of suicide reduces suicidal behavior. [126] These efforts include reducing the availability of toxic pesticides, minimizing the toxicity of vehicle exhaust gas and domestic gas, erecting safety barriers at jump sites, reducing the pack size and points of sale of analgesics which are toxic in overdose, legislative restrictions on access to, and safe storage of, firearms, and, in institutional settings, modification or removal of potential ligatures and ligature points. For this consultation, the specific questions pertain to using *barriers to restrict access and prevent jumping from multiple bridges into gorges, where collectively the community and the settings are "iconic."*

Measures to Prevent Suicide by Jumping

In this context communities can consider a variety of approaches to enhance suicide prevention through interceding in jumping. First we will summarize these, followed by greater elaboration.

Barrier approaches to deter individuals from jumping include:

- Install additional permanent safety barriers.
- Retain temporary barriers until permanent safety barriers are installed.
- Proposed barrier options need to be designed to take into account the following issues.
  - Barriers must deter and impede an individual from jumping from a bridge.
  - Barriers must have a minimal visual and aesthetic impact on the bridges.
  - Barriers must have a minimal visual and aesthetic impact on the surrounding geography and natural environment.
  - Barriers should not significantly impede current pedestrian access to and over bridges.
  - Barriers must be structurally and aerodynamically stable.
  - Barriers must be easy, and not costly, to maintain and clean.
  - Barriers should be cost-effective to construct and install.
  - Barriers should not risk presenting a physical challenge to be overcome in daring (not suicidal) activities.

Augmenting non-barrier approaches that buttress primary barrier-based efforts to deter individuals from making suicide attempts by jumping from specific sites include:

- Signage and telephone access to crisis lines, with telephone "help" boxes placed at bridge accesses or on bridges.
- Surveillance measures.
- Security patrols on bridges.
- Closed circuit television cameras (CCTV) on bridges.
- Restricting pedestrian access to jumping sites.
- Improved rescue and response efforts.
- Prudent building codes for bridges, applied to new constructions and repairs.
- Muted media reporting.

- Training gatekeepers to pre-emptively identify individuals at-risk of self-harm.

Complementary community approaches to deter individuals from making suicide attempts by jumping include:

- Strengthen and promote mentally healthy and caring university and Ithaca communities.
- Improve student access to mental health services.
- Promote student help-seeking in times of crisis or stress.
- Promote faculty, staff, and student recognition of at-risk students, and student peer support.
- Improve after-hours access to emergency mental health services.
- Educate students, faculty, staff, and the local community about suicide risk, and best practices in suicide prevention, in general, and in preventing suicide by jumping from bridges, in particular.
- Address misperceptions and misinformation about suicide in campus and city communities.

Table 1 lists the range of approaches that have been suggested in efforts to reduce suicides by jumping from specific sites or structures. [88, 127] Each is described in further detail.

Barriers. Physical safety barriers may exert their effect by averting impulsive attempts, by preventing access to sites which have symbolic significance for suicide (for which other less attractive sites are not substituted), by forcing attempters to substitute less lethal methods or by providing suicidal people with evidence that people care enough to try to prevent suicide.

While barriers may take various forms (railings, glass screens, mesh screens), to be effective they need to be at least 250 cm or higher and built in such a way that they do not offer a foothold for potential jumpers. [128, 129]

Restricting access to jump sites. Some bridges and other sites have instituted measures to restrict pedestrian access. While this action may be thwarted by people who drive cars onto the bridge or take taxis which they then leave, it may prevent some suicides and may make the task of surveillance easier. Pedestrian access is restricted to the Bosphorus Bridge in Istanbul, for example. However, reports suggest that a significant number of suicidal individuals take taxis onto the bridge and then leave the taxi and jump [130].

Signs and telephones offering help. Signs providing contact details of telephone help lines have been installed at some sites favoured for jumping. In some cases telephones are provided to allow suicidal individuals to make direct calls to crisis help lines. There are few evaluations of this intervention. However, Glatt reported that hotlines on the mid-Hudson Bridge in the US which were linked to an emergency psychiatric service were used by 30 of 39 potential jumpers. While one of the 30 callers went on to die by suicide, five of the nine non-callers subsequently jumped and died [131]. Reductions in suicides by vehicle exhaust gas have been reported when similar signage and hotline measures were employed in isolated car parks in the New Forest in the United Kingdom [132]. Concerns exist, however, that such signs and phones may risk promoting suicide to individuals who might not otherwise think of it [131].

Training gatekeepers. A further approach is to train local gatekeepers (such as bridge staff, police, traffic officers, security guards, ambulance personnel) who might, in the course of their day to day work, encounter suicidal individuals about to jump. This is a "sentinel approach," but the likelihood of meeting an individual about to jump is low and the cost-effectiveness of such training, accordingly, is low as well. There appear to be no evaluations of this approach.

Surveillance measures. A range of surveillance measures including closed circuit surveillance cameras at both ends of a bridge, police patrols, dedicated suicide patrol officers or self-appointed or unpaid volunteers, lighting systems providing the equivalent of full daylight, and loudspeakers allowing two way communication in real-time with anyone on the bridge, have been introduced at some popular sites. For example, the Golden Gate Bridge has security cameras and has been patrolled by a team of dedicated suicide prevention officers since 1996 [133]. While there are claims that 30 suicides are prevented each year and that suicides have reduced following the introduction of these patrols, 20 people (one each fortnight) each year still elude these patrols and jump to their death. The failure of these methods undoubtedly contributed to the recent decision to build barriers on the Golden Gate. More generally, there have been few formal evaluations of surveillance measures and in many places in which they have been implemented, suicides have not been eliminated. These measures may be ineffective because patrols cannot monitor all parts of a structure (for example, a long bridge) at one time, even with the assistance of security cameras and other measures.

Improved rescue and response efforts. Enhanced response and rescue times for both water rescue and emergency medical response may improve survival rates for those who do jump. Some of those who jump survive the impact but drown before they are rescued. However, there do not appear to be any reports describing the implementation and evaluation of such measures.

Muted media reporting. All media guidelines for reporting about suicide recommend that reporting be muted in general and that method and site information in particular not be reported. [134] It is also recommended that media not report on preventive measures implemented at specific sites since such reports may serve to advertise both suicide and the site [135]. In Britain these risks have been explicitly acknowledged by editors, and guidelines against reporting excessive details of method of suicide have been incorporated into the Editors' Code of Practice [136].

Cautious, muted reporting has been shown to be effective in reducing suicides. For example, the introduction of muted media reporting of subway suicides in Vienna was followed by significant reductions in such suicides [120]. Two recent studies imply that the introduction of barriers (at the Clifton Suspension Bridge in the UK) and a safety net (at the Bern Muenster Terrace in Switzerland) which reduced suicides from these sites, have had a flow–on effect of reducing suicides by jumping in the surrounding area, presumably because of reduced media reports of suicide from these sites [89, 137].

Prudent building codes for buildings and structures. Most of the measures discussed above have been developed and framed as efforts to prevent the relatively small number of high–profile suicides from iconic sites. However, most of these measures (including muted media reporting, barriers, signage, hotlines, surveillance, gatekeeper training) could be applied in various degrees in efforts to prevent suicides from a range of structures and high-rise buildings. For some sites, there is also the option of enhancing building codes to encourage the incorporation of safety features (such as barriers, safety glass in rooftops, enclosed stairwells, restricted access to rooftops and balconies, restricted window apertures) into designs of new buildings, particularly residential housing, but also institutions such as hospitals, prisons and juvenile detention centres, and other structures which might be expected to become attractive sites for jumping (for example, those near high schools, youth centres, universities, psychiatric hospital units). There are a series of informal accounts of the effectiveness of such measures applied to high rise residential units in some Asian cities, but no published accounts of the clear adoption, implementation and evaluation of some of these measures when applied for suicide prevention reasons.

Legal and related issues. There are an increasing number of studies which show that barriers, safety nets and muted media reporting are effective in reducing and preventing suicides by jumping from specific sites, and further, that there is no evidence of transfer to other sites and some evidence of a decrease in suicides by jumping in the surrounding area. These findings suggest that these approaches are now moving towards becoming best practice in suicide prevention. In turn, the development of best practice guidelines for preventing suicide by jumping raises important issues about the accountability and liability of authorities with responsibility for bridges, structures and sites from which people jump. Recent years have seen an increased awareness of patient rights and increasing litigation over failure to protect the public from risk. Growing awareness of the fact that suicide mortality and morbidity may be reduced by appropriate barriers could well, in the future, become further grounds for consumer-led litigation.

Table 1. Measures to Prevent Suicide from Jumping Sites.

PREVENTIVE MEASURE	ARGUMENTS IN FAVOR	ARGUMENTS AGAINST
Physical safety barriers	▪ Good evidence of effectiveness, well evaluated ▪ May delay or avert suicide attempt ▪ Recommended by people who survived suicides by jumping ▪ Reduces access for impulsive attempters ▪ Shows that someone cares ▪ Appears to reduce suicides by jumping in surrounding area ▪ Reduces media reports of suicide by jumping	▪ Costly ▪ Aesthetically unappealing ▪ Engineering challenges to add barriers to existing structures ▪ Have to address public opposition
Restricting pedestrian access to sites	▪ Restricts access yet avoids all arguments associated with barriers ▪ Improves capacity for surveillance (no pedestrians anywhere on bridge) ▪ Low cost	▪ No evidence of effectiveness ▪ Thwarted by taking cars or taxis onto bridge
Signage and telephone access to crisis lines	▪ Some good evidence of effectiveness ▪ Low cost	▪ May alert others to idea of suicide ▪ Rely on suicidal individual to make the call ▪ Rely on crisis line to respond appropriately
Surveillance measures	▪ Human contact may be important in persuading not to jump, show-ing care	▪ Weak evidence of effectiveness ▪ Paid patrols expensive ▪ Rely on patrol intervening efficiently and effectively
Training gatekeepers	▪ Low cost ▪ Increased chance of appropriately alerting emergency services	▪ Likely low cost- effectiveness ▪ Likelihood of encountering suicidal individual is low ▪ No evidence of effectiveness

Muted media reporting	▪ Good evidence of effectiveness ▪ Low or no cost	▪ Poor compliance by journalists
Improved rescue and response efforts	▪ Might save some who survive fall but drown	▪ No evidence of effectiveness
Prudent building codes	▪ Good evidence of effectiveness ▪ Easier to incorporate safety measures when planning buildings, structures	▪ Gaining regulatory authority, acceptance as industry standards problematic

After Aitken et al. 2005[88]

Summary. **Table 1** provides a summary of the preceding section, including the arguments in favor and against each of the range of proposed measures. The single most effective measure involves the installation of physical safety barriers. Evidence of effectiveness for other measures is either lacking or weak.

Evaluation of the Impact of Barriers for Preventing Suicide. A small number of studies have formally evaluated the impact of installing barriers at suicide sites. All studies show barriers are effective in reducing suicides from that site, without displacement to neighboring sites, and sometimes accompanied by a reduction in suicides by jumping in the surrounding region. These studies are described in more detail below:

Clifton Suspension Bridge, Bristol, England. Bennewith and colleagues[84] examined the effect of installation of barriers on the Clifton suspension bridge, Bristol, England in 1998 on local suicides by jumping. Bridge deaths halved from 8.2 per year (1994 - 1998) to 4.0 per year (1999 - 2003; $P<0.008$). (Note: Only the main arches were fenced; suicides migrated to the unfenced edges of the bridge). Although 90% of the suicides from the bridge were by males, there was no evidence of an increase in male suicide by jumping from other sites in the Bristol area after erection of barriers. The authors claim this study provides evidence for the effectiveness of barriers on bridges in preventing site-specific suicides and suicides by jumping overall in the surrounding area.

Bern Munster Terrace, Bern, Switzerland. Reisch and Michel (2005) [89]reported that the city of Bern has a high percentage of suicides by jumping (28.6%). The highest number of deaths (mean 2.5 per year) occurred at the Muenster Terrace. In 1998, after a series of suicides, a safety net was built to prevent people leaping from the terrace and to avoid traumatization of people living in the street below. After the installation of the net no suicides occurred from the terrace. The number of people jumping from all high places in Bern was significantly lower compared to the years before, indicating that no immediate shift to other nearby jumping sites took place. Furthermore, they found a moderate correlation between the number of media reports and the number of persons resident outside Bern committing suicide by jumping from high places in the city.

Ellington Bridge, Washington, D.C. O'Carroll et al. (1994) [138]reported the effect of the construction of barriers on the Ellington Bridge in Washington D.C.– Prior to installation of barriers, an average of four people a year died by jumping from the bridge. In the five years following installation of barriers, there was only one suicide from the Ellington Bridge. The number of suicides from nearby Taft Bridge, only one block away, where no barriers had been installed, remained the same.

Grafton Bridge, Auckland, New Zealand. The experience in New Zealand served as something of a "natural experiment," with a so-called "A-B-A" design – a determined effort to remove barriers against best advice followed by the clear demonstration of the potent effects of barriers and a powerful demonstration of the impact of their absence. Beautrais examined suicide patterns before and after removal of protective barriers from Grafton Bridge in Auckland, New Zealand. [90] There were three suicides during the four years immediately before the barriers were removed (1992 – 1995); there were 15 suicides in the ensuing four years following their removal (1996 – 2002). Beautrais and colleagues [139] published a further paper in 2009, after barriers had been *reinstalled* on Grafton Bridge, noting that with the new barriers in place there had been no suicides from the bridge.

Memorial Bridge, Augusta, Maine. Pelletier [140] reported that during the 22 years after barriers were installed at the Memorial Bridge in Augusta, Maine, in 1983, there were no suicides. Prior to the barrier installation there had been a total of 14 suicides. The conclusion from this CDC study was that the safety fence installed in 1983 was effective in preventing further suicides from the Memorial Bridge. The number of suicides related to jumping from other structures in Augusta remained unchanged following installation of the fence, suggesting that suicidal individuals did not seek alternative sites.

Table 2. Summary of formal studies evaluating impact of bridge barriers

SITE	INTERVENTION and OUTCOME	REFERENCE
Ellington Street Bridge, Washington, DC	Barriers reduced number of suicides from 25 in the previous 7 years to 1 in the 5 years after the installation of barriers.	O'Carroll and Silverman, 1994 [138, 140]
Clifton Suspension Bridge, Bristol, UK	Barriers halved the number of suicides from 8 to 4 per year.	Bennewith et al, 2007 [84]
Bern Muenster Terrace, Switzerland	Safety net reduced suicides from 2.5 per year to 0.	Reisch & Michel, 2005 [89]
Memorial bridge, Augusta, Maine	14 suicides prior to installation of barriers; after barriers in place no suicides in 22 years.	Pelletier, 2007 [140]
Grafton Bridge New Zealand	3 suicides in the 4 years prior to the barriers being removed. After removal, 15 suicides in 4 years, since reinstallation of the barriers, there have been no suicides.	Beautrais et al, 2009 [139]

Informal Reports regarding the Impact of Bridge Barriers on Preventing Suicide. Apparently many suicide researchers and communities have come to view as a foregone conclusion that installing barriers on bridge or promontories will reduce suicides. Therefore, they either do not conduct formal evaluations of the impact of such installation or do not seek to publish the results. For example, it appears that the recent installation of barriers at the Jacques Cartier Bridge in Montreal has not resulted in a publication about the subsequent reduction in suicides from the bridge, although this finding is informally well-known (personal communication). **Table 3** summarizes some of the many anecdotal, informal reports of the impact of installing bridge barriers at sites of suicide by jumping.

Taken together the formal evaluations and the informal reports suggest that barriers reduce suicides by jumping at the site at which they were installed and, perhaps, in the surrounding area. However, the low base rate of suicide, and particularly of suicide by jumping, makes small changes in *total* suicide rates (by all methods) difficult to detect. For this reason it is usually not

possible to determine if the installation of barriers (or other safety measures) at a particular site reduces the *overall* rate of suicide.

Physical safety barriers may exert their effect by averting impulsive attempts, by 'buying' time for reconsideration or rescue, by preventing access to sites which have symbolic significance for suicide (for which other less attractive sites are not substituted), by forcing attempters to substitute less lethal methods or by providing suicidal people with evidence that people care enough to try to prevent suicide.

While barriers may take various forms (railings, glass screens, mesh screens), to be effective they need to include the typical features of effective public safety barriers installed in a number of bridges around the world:

- Height in excess of 2.5 meters;
- Gaps between members of less than 150 mm, but ideally less than this;
- No foot or hand holds which might assist in climbing;
- Curved at the top of the barrier towards the pedestrian side;
- Predominantly smooth vertical members;
- Provide the impression of a daunting visible deterrent.

Table 3. Reductions in suicides following installation of barriers

Site	Outcome	Reference
Sydney Harbor Bridge	Barriers reduced the incidence of suicides to 1% of the original level	Harvey and Solomons (1983) [87]
Empire State Building	Fenced the 86th floor observation platform after 16 suicides between 1931 and 1947; number of suicides reduced since. The nearby Chrysler Building and Rockefeller Centre had no increases in suicides as possible alternative sites.	Seiden and Spence (1982) [92]
Adelaide multistory car park - prominent jumping site	Safety grilles reduced incidence of jumping suicides to 0; no other car parks became alternative sites.	Pounder, 1985 [141] Goldney, 1986 [142]
Gateway Bridge, Brisbane	Barriers reduced number of suicides. No increases in jumping suicides from nearby Storey Bridge (possible alternative site).	Cantor and Hill, 1990 [143]
Mt Muhara, Japan	Barriers reduced number of suicides.	Ellis and Allen, 1961 [144]
Eiffel Tower, Paris	Barriers reduced the number of suicides.	Derobert et al, 1965 [145]
Arroya Seco Bridge, Pasadena, California	Barriers reduced the number of suicides.	McWilliams, 1936 [146]

Arguments against installing barriers to prevent suicide. Despite the preponderance of formal and informal evidence that bridge barriers reduce suicide by jumping, people invariably raise a series of public objections. *These objections show a remarkable similarity across sites and societies*. Common themes include:

- Suicide is inevitable in suicidal individuals and barriers at one site will not prevent their deaths.

- If barriers are installed at one site, suicidal individuals will substitute another site or another method.
- Barriers will decrease the aesthetic appeal of a site.
- The cost of barriers is poor value in order to save a small number of lives.
- The engineering challenges posed by adding barriers to existing structures are substantial and expensive to overcome.
- Money would be better spent on some other aspect of mental health care or suicide prevention than on barriers to prevent suicides in a few individuals in whom suicide was inevitable.
- The preservation of the historic and aesthetic values of sites is more important than attempting to save the lives of unhappy individuals who are going to kill themselves anyway.

None of these objections withstands critical scrutiny. *Firs*t, as shown above, there is now strong evidence that installing safety barriers does reduce risks of suicide at known jumping sites.

While the *second argument*, that suicidal individuals substitute another method or site if barriers are installed at the favoured site, is commonly expressed, it flies in the face of a large body of objective evidence that informs understanding about the relationships between the accessibility of a specific method or site of suicide and suicidal behavior:

- As a general rule, restricting access to a specific method or site will result in reduced rates of mortality and morbidity by that method.
- However, if the method or site that is restricted is substituted by another method ("means substitution") or site, reductions in method-specific or site-specific rates of suicide may not translate to reductions in overall rates of morbidity and mortality. In populations, such means substitution occurs over a period of time – years – rather than days or months. This underscores that individuals often tend not to find a second method at the immediate time when they are obstructed from using the first. Thousands of lives may be saved in the interim between the initiation of means restriction and the full emergence of means substitution. [147]
- Method restriction *at a particular site* may still be justifiable even as substitution may evolve over the course of time. When assessing the safety standards of any structure, it is important to ascertain the level of risk to public safety that a structure poses and to impose appropriate safeguards if the risk is substantial. If it becomes apparent that some specific feature of the social or physical environment facilitates or encourages suicidal behavior, we would argue the ethical imperative of removing access to that feature even when it is not possible to guarantee that substitution will not occur.
- Because of the complex relationships between access to methods (and sites) and suicidal behaviors, it is important that policies aimed at means restriction are thoroughly monitored and evaluated, *especially if restricting the method imposes unwanted burdens on the majority of the population that is not "at-risk" for suicide.* [148, 149]

Third, strenuous efforts have been made to construct esthetically pleasing designs in places in which suicide safety barriers have been installed; these can preserve much of the majestic view or natural surrounding beauty, and preserve of enhance the original design of the structure. At Grafton Bridge in Auckland, for example, clear, curved glass barriers on the pedestrian thoroughfare across the bridge preserve views, shelter pedestrians from the weather and prevent suicides. This design later was adapted for a bridge in Norway.

The vast majority of people who survive suicide attempts by jumping, or who are removed from bridges before they could jump, do not subsequently die by suicide although they tend to have higher

rates of mental ill-health and associated suicide than the general population. [150] Seiden studied, with a median follow-up period of 26 years, a series of 515 individuals who had been restrained from jumping from the Golden Gate Bridge in San Francisco. [151] Among those who died subsequently, violent death (by suicide, homicide, or accident) composed a greater proportion (5%) – compared to the *general population*. However, the vast majority (95%) did not die by suicide or any other violent means.

In a further study of people who were prevented from jumping, Rosen [152] interviewed people who had survived jumps from the Golden Gate and Bay Bridges in San Francisco. Four of the six interviewed said they would not have used any other method if the Golden Gate Bridge had not been available. All six favored the construction of a suicide barrier. They also suggested that newspapers cease coverage of suicides.

***Summary*.** The population of people who jump from bridges are individuals who typically have severe mental illnesses (including psychotic disorders), which contribute to their vulnerability to suicide in a persisting fashion, or severe life stresses that recently or suddenly have greatly added to their vulnerable status. They may live near sites that have acquired reputations for suicide. Alternatively, they may be attracted to these sites and travel considerable distances to implement well-developed plans for death. The specific "iconic status" of sites and their attractions for jumping arise for various reasons, including past media reporting, a desire for publicity, the reputation of the site as a place for suicide, and the very beauty or grandeur that makes these settings attractive to all who are there. Often, these suicides appear sudden – "impulsive" – and it is certain that many have not been "well planned." In the context of severe life stresses, they frequently are made by ambivalent people with uncertain feelings about their future; once stopped, their plans to die by suicide subside and they do not seek to kill themselves ever again.

The imposition of barriers and other measures to impede access to jump-sites may reduce a fraction of suicides. The clear majority of those who are restrained from jumping do not go on to make further attempts using other methods or sites. However, the low base rate of suicide, and especially of suicide by jumping, makes small changes difficult to detect. For this reason it can be difficult to detect a decrease in overall suicide rates following the installation of barriers or other safety measures. Nevertheless, there is clear evidence that barriers decrease site-specific suicide rates, and no clear evidence that substitution of other sites in the surrounding region occurs. In fact, the available evidence suggests that suicide rates by jumping tend to decrease in the surrounding area.

Prevention efforts have now been strengthened by five recent studies which provide clear evidence for the effectiveness of safety barriers and a safety net at jumping sites. [84, 89, 138 Beautrais, in progress, 139, 140] Taken together with anecdotal accounts of reductions in suicides after the installation of barriers, this evidence now provides the basis for best practice to prevent suicides by jumping at popular sites. Best practice suggests that barriers should be added to sites which become popular for suicide by jumping, and should be a consideration in designing new structures.

Suggestions that barriers should be installed to prevent suicides have often met substantial public opposition on the grounds of cost, aesthetics, substitution of method and the inevitability of suicide. The increasing volume of evidence suggesting barriers prevent suicide implies that these challenges will be more difficult to mount and defend in the future.

SUICIDE IS PREVENTABLE

During the middle years of this past decade Gannett Health Services adapted to the Cornell Campus many of the features of the US Air Force program to prevent suicide. The work of the

US Air Force since 1996 has shown that an organization can pull its resources together to prevent suicide, with a sustained demonstration of reduced rates. [93, 153] Faced with a daunting increase in rates during the early-1990s, the Vice Chief of Staff of the US Air Force ordered his Surgeon General and all other component members of the service's leadership to work together to develop a sweeping and comprehensive program. Rather than view it as medically based, they developed a *community-oriented approach*, one that ultimately created an initiative involving 11 core elements. Included were attention to individual and family needs; workplace performance; education for command and non-commissioned officers, for all personnel and for members of the broader community; attention to mental health and inordinate alcohol use; reformulation of confidentiality policies; continuing surveillance; and perhaps most central to any programmatic effort, defined accountability.

In its version, Cornell developed a broadly based community health effort, a mental health advisory committee, and a combination of anonymous, student run, and campus-supported clinical services to greatly enhance access to care or support for those in need. It designed and implemented an array of educational programs for faculty, staff, and RAs, and consistently sought to destigmatize mental health concerns or service use, while also continuing to implement programs to reduce binge drinking and alcohol use across the entire University community. Of note, suicide on the Cornell Campus fell to zero during the three consecutive years following full implementation of the augmented programs, giving hope that they had in fact addressed many of the core issues leading to lethal suicidal behaviors.

Evaluation of the USAF Suicide Prevention Program made it evident that the whole was greater than the sum of its parts. [93, 153] At the heart of the program was an unequivocal change in culture that espoused and implemented programs that offered help while seeking to remove the stigma of accepting help ("strong men can ask for help"). It was clear that the cohesive nature of the service, long-standing values affirming "the Air Force family," and a sustained commitment that transcended the rotation of top leadership, all contributed to the capability of effectively implementing such a radical undertaking. The program led to a sustained decline in suicides, and just as important, in violent deaths and violence behaviors. Of note, the rates 'spiked' upward in 2004 at a time when implementation was lagging; leadership reapplied the program and enhanced monitoring, and since then rates have again fallen to prior levels. [153] It was evident that, what had been deployed as a suicide prevention program was, in fact, a program that broadly promoted social health and violence prevention.

In comparing the Cornell program with that of the Air Force, it is clear that there are important differences. The latter is a tightly organized, hierarchical community with a potent top-down command structure. One cannot say the same for universities. The USAF has many complementary measures of job performance and personal functioning, and seeks to maintain readiness on a war footing. Thus it can command data and access information sources not available to a university. Given the nature of a military organization, it did not seek to specifically control its most prevalent means of suicide – firearms – but imposed other safety measures in its ability to restrict personnel at risk.

Past community discussions in Ithaca over the course of decades have rejected any suggestion of bridge barriers. Thus, Cornell has until recently experienced what in hindsight can be seen as "a hole" in what could be viewed as a suicide prevention safety net. In light of the unique qualities and history of Ithaca and the University, no one would have chosen barriers pre-emptively were it not for the events of this year. Moreover, the three-year success of new initiatives gave rise reasonably to a sense that the University has been on the right track. However, mental health promotion and its linked suicide prevention efforts reflect a multilayered approach, where no one initiative or effort will 'catch' all potential deaths. While Cornell has developed and implemented what many would describe as "best practices" for

university campuses, these ultimately were not enough in this particular community, one dotted with iconic sites for jumping. This must be placed for future consideration within the large body of evidence that suggests that restricting access to a range of methods of suicide may prevent suicides and save lives, and not immediately lead to method substitution. [154] [37] [155]

UNIQUE CIRCUMSTANCES: WHAT MAKES THIS SITUATION DIFFERENT?

Ithaca is the 'iconic' site: A unique physical environment. Ithaca's gorges and parks are famous, and in particular, it is the bridges across the gorges that make Ithaca an iconic suicide site. Most suicide hotspots are single sites. No single bridge in Ithaca has emerged as *the* favored site for suicide. Over the course of years, suicides have occurred from multiple bridges that cross the two main gorges that bound much of the Campus, as well as settings such as Taughannock Falls. (While mindful that it is located in Ulysses, most people associate it with Ithaca). No doubt, Cornell has become identified as an iconic suicide campus by implication – most of the suicides are students because they constitute a large proportion of the population and live near the bridges – but we also noted that *people have come from out of town in order to die in Ithaca*. The latter will not be 'susceptible' to the community and mental health promotion efforts that Cornell initiated during the middle of the last decade.

Thus, restricting access to community-recognized, accessible jumping sites has a substantial probability of reducing deaths by this means. [156] This does not guarantee that no one will die using these sites, assuming very high levels of determination, nor does it inherently protect against other methods. Yet the literature is replete with studies that show both a short-term lack of substitution and clearly evidenced reductions in rates when means controls are widely applied across communities, or a nation.

We are extremely sensitive to the fact that many students and faculty chose Cornell because of its surroundings and in light of Ithaca's beauty. Viewing natural scenes, being in natural settings, and walking amongst trees together constitute a restorative environment, which has psychological, cognitive, and physical benefits. All decisions about making bridges safer must respect these important abiding concerns and values. If barriers are installed, they need to be minimally intrusive on the bridges and in keeping with the landscape. One cannot understate the importance of this issue, for Ithaca, for Cornell, and for generations yet to come.

Campus-community relationships and ownership. As noted, the ownership of the bridges is mixed; Cornell owns more, Ithaca owns those most frequently chosen. In essence, Cornell and Ithaca are handcuffed one-to-the-other, if the intent is to create a safe environment, where barriers serve to enhance protection for those who are missed by other approaches to suicide prevention.

Applicability of research to this set of problems. This is a *unique situation*, in geographic terms, without clear-cut precedent. Thus, one must glean from available research: Data on means restriction, knowledge regarding iconic sites, recent (some unpublished) findings on clusters, and an understanding of contagion as a social phenomenon. In such situations, decisions must make sense to the majority of involved parties, build on collective wisdom, and seek to create collective action. In light of the challenges noted earlier, tied to the great difficulty to recognize or intervene with the specific person who is about to die, suicide prevention depends on layered approaches that each 'capture' a small number of people, while enhancing the health of many. Barriers in Ithaca truly are the 'backstops' or community safety nets. If it is not possible to create a collective response, it is highly likely that people will continue to fall to their deaths.

Temporary barriers – putting them up and removing them. Immediately placing barriers on bridges owned by the City of Ithaca and by Cornell University was one component, and

certainly the most visible, of a collective effort to urgently respond to suicides occurring this year in the proximity of the Cornell campus. *It was an essential demonstration of the University's commitment to safety above all else*, and it engendered a wave of negative comments and controversy on campus, in the City, among alumni, and in multiple media outlets. Moreover, these temporary barriers are an "eyesore." As we will discuss further, it is our opinion that removing them will, in effect, invite further suicides and expose both the University and the City of Ithaca to speculation about motives and relative values, and questions that they will be hard pressed to answer. Should Ithaca become the site of the next "A-B-A" experiment for the suicidology literature to document?

Does the summer break (allowing the barrier removal to occur when most students are gone) change the risk of barrier removal? Removing barriers during the summer break has been suggested as one solution. However, the bridges and barriers will remain a newsworthy topic, and the risk of suicides will persist. Community and student interest may reignite when students come back in the fall, negating any gain hoped for by removing barriers in the summer. "Gorging out," however much we may dislike that term, is not far from the lips of many on campus and in town, and among alumni, faculty, and staff as well as students. Even if undergraduate students are largely absent during the summer, graduate students and the entire Ithaca population, and those from afar, are still at risk. As noted in the report, clusters can continue or reignite later; summer breaks do not staunch memories.

Would lower temporary barriers deter deaths or carry the same risk as no barriers? This question confronts one with the problem of 'proving the negative.' While we cannot say with precision about the specific risk-reducing properties of lower barriers, which are somewhat harder to scale but not near the protective standards of permanent emplacements, we see a significant pitfall. Substituting temporary lower barriers risks criticism for not putting up higher ones (per recommendations); that is, for encouraging suicides by putting up lower, less formidable barriers that might prove a challenge to be overcome as a dare. Choosing barriers lower than a recommended height in order to preserve the view at the expense of a student life would be difficult to defend.

SUMMARY, RECOMMENDATIONS, AND CONCLUSION

Given the data available in the literature – about jumping, contagion and clusters, and youth suicide – together with the rapid unfolding of a major media event *locally and nationally*, the urgent decision and implementation of a program of protection initiatives on the Cornell campus and for the Ithaca community was an essential and prudent effort to staunch the likelihood of any further suicides from the local bridges. Immediately placing barriers on the bridges was one component and certainly the most visible. *It was an essential demonstration of the University's commitment to safety above all else*, and it was entirely in keeping with what has been shown to work in other settings. It is important to underscore that this was not the only aspect of the University's response, which has included bringing together diverse elements of the Campus and Ithaca communities, engaging in frank discussion, offering crisis support as well as augmented educational and counseling services, and working collaboratively with outside consultants to rapidly and deliberatively define future potential courses of action.

The current temporary barriers are an "eyesore." *And, as in all human communities, there will be suicides in Ithaca and on the Cornell campus in the future. The issue for all to consider is this: How much do you want these to be associated with your bridges and your gorges?*

Our summary of the scientific literature underscores that the available scientific data regarding suicide deaths and attempts related to jumping from bridges strongly suggests that *most individuals who jump from iconic sites are ambivalent, act impulsively, choose a specific site, and if*

thwarted from an attempt at that site at a particular time, will survive. The decision to attempt suicide may be a transient response to a particular set of emotional circumstances that resolve with time. If access to a lethal means of suicide is denied during this time, the individual may make a suicide attempt with a less lethal method or make no attempt at all. These observations are consistent with evidence that many of those who make suicide attempts are impulsive and suggest that measures to prevent suicides by jumping may be worthwhile by delaying or averting some fraction of impulsive suicide attempts. They are also consistent with a large body of evidence that suggests that restricting access to a range of methods of suicide may prevent suicides, and not immediately lead to method substitution.

Inevitably, given both the history of suicide in Ithaca and the recent publicity (notoriety) that surely increased Ithaca's reputation as a suicide site, there will be more suicides and some will come from farther away to end their lives. When the next suicide occurs, it will be deemed even more newsworthy than in the past. If the barriers are removed, it will generate especially adverse news coverage. There will be speculation regarding why barriers were taken down, when 'experts' now point to 'best evidence' suggesting they should be installed permanently. There will be media-led speculation (and assignment of responsibility) about who estimated the risk and assessed the value of the life (lives) lost versus the cost or esthetics of barriers. In turn, this type of news coverage may render the sites even more risky.

As we discussed when visiting the campus and speaking with many individuals, we recognize the deep need to preserve the beauty that is so much a part of living in Ithaca and attending Cornell University. No one would ever choose to obstruct the views of the gorges or waterfalls, or impede access to the natural surroundings that truly are special for residents, students, and visitors. We also recognized that this problem of dying by throwing oneself into the gorges is long-standing, and it is apparently contagious. It certainly has become a lightening rod in the community and in the print and Internet media.

We see no alternative but to promote safety and caring for vulnerable persons as the central driving elements of this discussion. *It is our recommendation that temporary barriers that meet standards of effectiveness remain in place, until permanent safety measures can be built.* There are many approaches to such measures, and the expertise regarding what will work best for the different bridges – in a fashion that is respectful of the glorious beauty of the settings – is beyond our skills.

It is one thing for us to make a recommendation; it is another for Ithaca and Cornell to create an effective community discussion that can forge a common approach to saving lives. Truly, everyone is 'in this together.' The longer term success of any comprehensive prevention agenda – of which barriers are but one part – depends on building coalitions for collective actions.

Acknowledging the glare from widespread coverage in the national media and the unfortunate notoriety of this year's deaths, permanent barriers must be in place to address heightened suicide risk and perceptions that will not be undone, or at a minimum, will not change for many years. The contagion risk that arose this year will not soon abate!

A central lesson from the US Air Force related to the power of leaders to set dramatic change into motion, and to use their institutional authority to develop both a culture and infrastructure needed to save lives and to create a healthier community, and ultimately, to sustain the needed self-scrutiny to foster continuous improvement. It has been difficult nationally to transport this lesson to other settings, and for communities to come together to build the array of interwoven efforts needed to prevent suicide. Cornell and Ithaca together, by necessity, are now confronted with such an opportunity. It is our recommendation that the involved leaders use their positions to create the collective movement needed. We recognize the potential costs – in

dollars, social capital, and political futures. At the same time we see this as a potentially galvanizing cause, one that builds towards a national model of health and community-academic collaboration.

APPENDIX

Probable Suicides and Non-fatal Suicidal Jumps from Bridges and Gorge Edges* on East Hill in Ithaca, NY

1990 – 2010

Affiliation	**21 - Year Total**	
College Students		**15**
Cornell University	14	
Ithaca College	1	
Community		**14**
Ithaca residents (1 IHS student)	10	
Non-Ithaca residents	4	
TOTAL		**29**

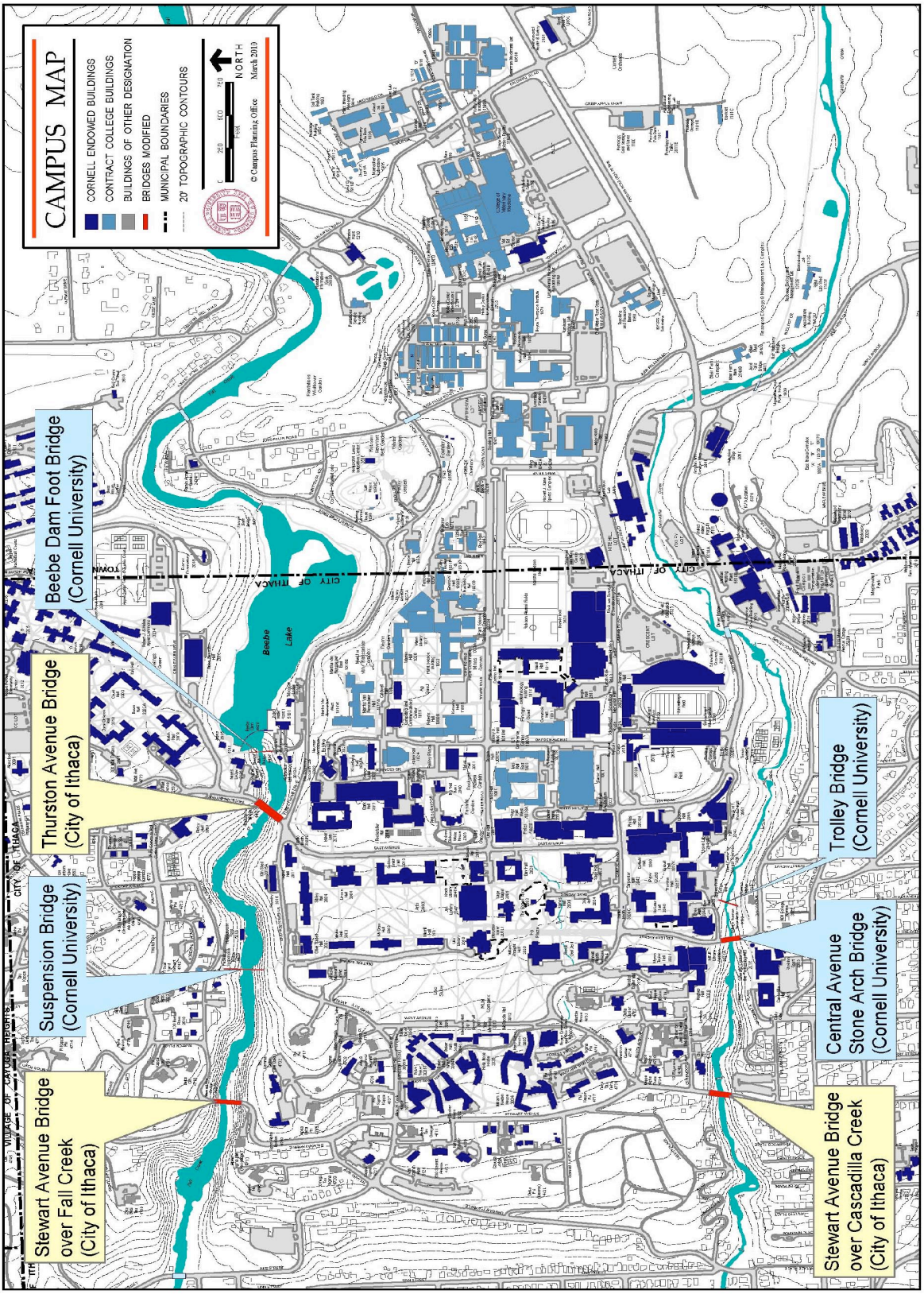
* Only one jump was from a gorge edge distant from a bridge

Compiled by Gannett Health Services at Cornell University, this record incorporates information available as of June 29, 2010 from the following sources:

Suicide Prevention and Crisis Service; Ithaca Fire Department

Ithaca Journal, *Cornell Daily Sun*

Cornell University Police, Counsel's Office, Public Affairs, and Office of Community Relations


CAMPUS MAP
CORNELL ENDOWED BUILDINGS
CONTRACT COLLEGE BUILDINGS
BUILDINGS OF OTHER DESIGNATION
BRIDGES MODIFIED
MUNICIPAL BOUNDARIES
20' TOPOGRAPHIC CONTOURS
NORTH
© Campus Planning Office March 2010
Beebe Dam Foot Bridge (Cornell University)
Thurston Avenue Bridge (City of Ithaca)
Suspension Bridge (Cornell University)
Stewart Avenue Bridge over Fall Creek (City of Ithaca)
Trolley Bridge (Cornell University)
Central Avenue Stone Arch Bridge (Cornell University)
Stewart Avenue Bridge over Cascadilla Creek (City of Ithaca)
Beebe Lake
CITY OF ITHACA
VILLAGE OF CAYUGA HEIGHTS

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