



Suicide Clusters: A Review of Risk Factors and Mechanisms

CAMILLA HAW, MRCPsych, KEITH HAWTON, DSc, CLAIRE NIEDZWIEDZ, MSc, AND
STEVE PLATT, PhD

Suicide clusters, although uncommon, cause great concern in the communities in which they occur. We searched the world literature on suicide clusters and describe the risk factors and proposed psychological mechanisms underlying the spatio-temporal clustering of suicides (point clusters). Potential risk factors include male gender, being an adolescent or young adult, drug or alcohol abuse, and past history of self-harm. However, the majority of studies lack methodological rigor. Many different psychological mechanisms are described, including contagion, imitation, suggestion, learning, and assortative relating, but supporting empirical evidence is generally lacking. More scientifically rigorous studies are needed to improve understanding of suicide clusters.

Clustering of suicides has been described in many reports in the research literature (see, e.g., the review by Gould, Wallenstein, and Davidson, 1989), although the precise definition of what constitutes a suicide cluster varies; for example, the minimum number of deaths and their proximity in time (see the discussion by Niedzwiedz, 2009). In some reports, statistical verification that a cluster of suicides has occurred has been attempted (Gould, Wallenstein, & Kleinman, 1990; Gould, Wallenstein, Kleinman, O'Carroll, & Mercy, 1990; Haw, 1994; McKenzie et al., 2005). Suicide clusters, although uncommon, cause great concern

in the communities where they occur because of the unusually high number of deaths and worry about additional suicides.

Clusters are of two main types: mass clusters, which are media-related phenomena where suicides occur during a restricted time period following, and linked to, the broadcasting or publishing of actual or fictional suicides; and point clusters, also known as space-time clusters, where an unusually high number of suicides occur in a small geographical area or institution and over a relatively brief period of time (Joiner, 1999). Our review concentrates on point clusters. A third type of cluster has been identified, where there is geographical but not temporal clustering of suicides. Examples are suicides on the London Underground system and suicides at or near railway stations which are adjacent to psychiatric units (where an unusually high proportion of suicides are psychiatric inpatients; Erazo, Baumert, & Ladwig, 2004; Farmer, O'Donnell, & Trahan, 1991). This type of cluster is not discussed further here.

There are a large number of anecdotal reports of individual point suicide

CAMILLA HAW, Centre for Suicide Research, University of Oxford, Oxford, UK, and St Andrew's Healthcare, Northampton, UK; KEITH HAWTON, Centre for Suicide Research, University of Oxford, Oxford, UK; CLAIRE NIEDZWIEDZ, Institute of Health and Wellbeing, College of Medical, Veterinary and Life Sciences, University of Glasgow, Glasgow, UK; and STEVE PLATT, Centre for Population Health Sciences, University of Edinburgh, Edinburgh, UK.

Address correspondence to Camilla Haw, St Andrew's Healthcare, Billing Road, Northampton NN1 5DG, UK; E-mail: chaw@standrew.co.uk

clusters in the literature. These have occurred in a variety of settings where there are vulnerable individuals, for example, among psychiatric hospital or service patients (Haw, 1994), school children and students at college (Askland, Sonnenfeld, & Crosby, 2003), people in police custody and prisons (Cox & Skegg, 1993), members of the armed forces (Grigg, 1988), and members of isolated rural communities (Wilkie, Macdonald, & Hildahl, 1998). The relative risk of suicide following exposure to another individual's suicide is two to four times higher among 15- to 19-year-olds than among other age groups (Gould, Wallenstein, Kleinman, O'Carroll et al., 1990). Attempted suicides also tend to cluster, again particularly among adolescents (Gould, Petrie, Kleinman, & Wallenstein, 1994).

We searched the world literature on suicide clusters in order to describe the risk factors and proposed psychological mechanisms underlying the spatio-temporal clustering of suicides (point clusters). Where relevant, we have included information about the clustering of nonfatal suicidal behavior ("attempted suicide").

METHOD

A search of Medline, Psycinfo, ASIA, Sociological Abstracts, IBSS, and Social Services Abstracts from their inception to October 2011 was made using a broad search strategy in order to capture as many relevant publications as possible. The search terms used included {suicide OR self-harm\$ OR parasuicide} AND {cluster\$ OR imitate\$ OR epidemic OR copycat OR modeling OR werther effect OR imitation OR priming OR assort\$ OR learning}. No language restrictions were imposed. The abstracts of all references thus generated were screened for relevance by two authors (CH and CN). The full texts of selected papers were read by the lead author. The reference lists of these selected papers were scrutinized for further relevant papers.

Niedzwiedz's (2009) thesis on the temporal and spatial clustering of completed and attempted suicide was also scrutinized for relevant references.

RESULTS

As a result of screening the abstracts generated by the literature search, a total of 104 potentially relevant papers were identified. Five of these were unobtainable, leaving 99 papers for which the full text was obtained and read. Fifty-three of these papers were excluded for the following reasons: did not contain empirical data on risk factors or mechanisms ($n = 12$), described mass clusters (11), contained information described in other studies (10), were concerned with statistical evaluation of suicide clusters (7), focused on prevention of suicide clusters (5), described clusters of attempted suicide (5), were review articles (3).

Of the 46 included papers, country of origin was as follows: North America 29, Europe 13, Australasia 3, and Middle East (Israel) 1. Thus, the available literature was dominated by reports from the United States and Canada; there were no articles from the developing world. Decade of publication was as follows: 1970–1979, $n = 3$; 1980–1989, $n = 12$; 1990–1999, $n = 16$; 2000–2009, $n = 15$. Twenty-five studies either focused on risk factors or were investigations of individual suicide clusters. They described the characteristics of members of the cluster, and in some instances, they also discussed environmental risk factors. Eighteen papers were primarily concerned with the psychological mechanisms involved in suicide clusters. Most of these articles described theories of suicide cluster formation but in only a limited number of cases were data from a cluster or clusters provided to support a particular theory. The remaining articles ($n = 3$) were general or review articles on, or mentioning, suicide or attempted suicide clusters. Many articles contained some information about

both risk factors and purported mechanisms.

RISK FACTORS FOR POINT SUICIDE CLUSTERS

Methodological Issues

There are reports in the literature of individual point clusters of relatively small numbers of suicides occurring among diverse populations; for example, psychiatric inpatients (Anon, 1977; Haw, 1994) and adolescents and young adults in community settings (Brent et al., 1989; Poijula, Wahlberg, & Dyregrov, 2001). Some of these reports describe the demographic and clinical features of suicide cluster victims. Only studies by Davidson, Rosenberg, Mercy, Franklin, and Simmons (1989) and Chotai (2005), however, adopt a more methodologically robust design, such as case-control study, which permit comparison of the characteristics of suicides in a cluster with “singleton” suicides or some other relevant control group(s). Chotai (2005) compared suicide cluster victims with singleton cases of suicide in northern Sweden. Unfortunately, only a small number of possible risk factors for suicide were examined—gender, age group, marital status, area of residence, season of birth, and method of suicide. In the case-control study of Davidson et al., 14 suicides among teenagers in two clusters in Texas were compared with living controls (three living controls for each suicide) matched for school district, grade, race, and gender. Many of the variables studied related to direct or indirect exposure to suicide (e.g., “subject ever knew anyone who committed suicide” and “subject was aware of suicide cluster”), and thus, focused on providing evidence for contagion effects (see below). Other variables, such as history of hospitalization for mental illness and past history of attempted suicide, helped define the characteristics of suicides, although not specifically of cluster victims because living controls as opposed to non-

cluster suicides were used for the control group.

Possible Risk Factors for Point Clusters

There is a general consensus that adolescents and young adults are most at risk of being part of a suicide cluster, although in Chotai’s (2005) study, middle-aged and older people (males) were most at risk. However, the author acknowledged that there was a lack of teenage suicides in the total sample. Clusters are thought to account for 1% to 2% of all suicides occurring during adolescence (Gould, Wallenstein, & Kleinman, 1990). Given the generally held view that clusters are caused by contagion, it is unsurprising that direct or indirect exposure to another suicide in the cluster has been shown to be a prerequisite of cluster membership (Bechtold, 1988; Brent et al., 1989; Zemishlany, Weinberger, Ben-Bassat, & Mell, 1987). This may take the form of having witnessed the suicide, having known the victim personally, or having heard about their suicide through word of mouth or via the media. However, it is not always possible to determine retrospectively whether or not a person in a suicide cluster knew about the suicide of another cluster member (McKenzie et al., 2005).

In most studies, suicide cluster deaths are reported to be more common among males, as is the finding for suicides in general (see Table 1). In a review article of point clusters occurring among adolescents, females were noted to be at greater risk of attempted suicide, while males were at greater risk of completing suicide (Insel & Gould, 2008), as is the case for noncluster suicidal behavior.

Hazell (1993) suggested that individuals involved in imitative suicidal behavior have a high prevalence of suicide risk factors. Those who die in suicide clusters appear to be at particularly high risk. For example, Ward and Fox (1977) described a suicide epidemic among adolescents and young adults on an Indian reservation in Canada. As a group the victims were

TABLE 1
Reported Risk Factors for Individuals Involved in Suicide Clusters

Risk Factor	Studies Reporting Presence of the Risk Factor
Demographic	
Male gender	Ward and Fox (1977), Bechtold (1988), Grigg (1988), Davies and Wilkes (1993), Wissow, Walkup, Barlow, Reid, and Kane (2001), Chotai (2005)
Adolescent or young adult	Ward and Fox (1977), Bechtold (1988), Grigg (1988), Tower (1989), Gould, Wallenstein, Kleinman, O'Carroll et al. (1990), Davies and Wilkes (1993), Wilkie et al. (1998), Wissow et al. (2001), Poijula et al. (2001), Johansson et al. (2006)
Family History	
Family history of suicide	Bechtold (1988), Tower (1989), Haw (1994), Laliberté and Tousignant (2009)
Family history of alcohol abuse	Ward and Fox (1977)
Personal History	
Unstable family or home life	Ward and Fox (1977), Bechtold (1988), Reser (1989), Davies and Wilkes (1993)
Poor educational experience	Davies and Wilkes (1993)
Employment problems	Ward and Fox (1977), Grigg (1988), Bechtold (1988), Haw (1994)
Loss of traditional ways	Ward and Fox (1977), Bechtold (1988), Tower (1989)
Victim or witness of abuse	Davies and Wilkes (1993)
Experienced violence	Davidson et al. (1989), Davies and Wilkes (1993)
Violence toward others	Bechtold (1988), Tower (1989), Davidson et al. (1989)
History of arrest/antisocial behavior	Reser (1989), Davidson et al. (1989), Davies and Wilkes (1993), Ward and Fox (1977), Bechtold (1988), Davidson et al. (1989)
Experienced death of close friend or relative	Davidson et al. (1989)
Psychiatric history	
Past history of self-harm or threats of self-harm/suicide	Ward and Fox (1977), Bechtold (1988), Davidson et al. (1989), Davies and Wilkes (1993), Wissow et al. (2001)
Previous psychiatric hospitalization	Davidson et al. (1989)
Drug and/or alcohol abuse	Ward and Fox (1977), Bechtold (1988), Tower (1989), Davidson et al. (1989), Davies and Wilkes (1993), Wilkie et al. (1998), Wissow et al. (2001)
Depression	Ward and Fox (1977), Davies and Wilkes (1993)
Life events and Psychological Factors	
Recent relationship breakup or threat of breakup	Davidson et al. (1989)
Social isolation	Ward and Fox (1977), Haw (1994)
Inability to express feelings	Ward and Fox (1977)
Easily emotionally hurt or offended	Davidson et al. (1989)
Poor self-esteem	Ward and Fox (1977)
Direct involvement with another cluster victim	Bechtold (1988), Grigg (1988), Taiminen et al. (1992), Davies and Wilkes (1993), Haw (1994), Wilkie et al. (1998), Poijula et al. (2001), Johansson et al. (2006)

described as “vulnerable individuals who had negative self-esteem, were socially isolated, tended to internalize feelings and conflicts and thus were overdependent on their families.” Davies and Wilkes (1993) investigated a suicide cluster involving a series of adolescents in rural western Canada. Cluster victims were described as vulnerable and alienated from other adolescents in the community, although overall, the risk factors for cluster suicide did not appear to differ from those associated with individual adolescent suicide. Descriptive studies of suicide clusters have indicated a variety of risk factors for suicide (see Table 1). These include drug and alcohol abuse, employment problems, and a past history of self-harm. However, most of these variables are well-known risk factors for suicide in general and do not aid in the identification of those most at risk of becoming part of a suicide cluster (and even less of those who will be first [“index”] cases in a cluster). Additionally, most of the information on risk factors has been derived from descriptive studies of suicide clusters, which lack methodological rigor.

RISK FACTORS FOR SUICIDE AMONG PSYCHIATRIC PATIENTS

Of the studies of suicide clusters among psychiatric inpatients, one organizational risk factor highlighted by several studies is the departure of, or changes to, senior clinical staff (Anon, 1977; Coser, 1976; Haw, 1994; Rissmiller & Rissmiller, 1990; Taiminen, Salmenperä, & Lehtinen, 1992). Other risk factors relating to the institution cited by individual studies are as follows: an influx of new staff, including new junior doctors (Anon, 1977; Coser, 1976; Taiminen et al., 1992); weak leadership (Anon, 1977; Rissmiller & Rissmiller, 1990); problems with the therapy program (Anon, 1977); staff demoralization (Haw, 1994; Rissmiller & Rissmiller, 1990); and uncertainty about the future of the hospital (Haw, 1994; Taiminen et al., 1992). Patient risk factors mentioned

in some reports are as follows: severe chronic illness, especially depression and schizophrenia (Haw, 1994; Rissmiller & Rissmiller, 1990); loneliness (Haw, 1994); and having similar personal and clinical features to the person most recently dying in a cluster (Sachs & Eth, 1981).

PSYCHOLOGICAL MECHANISMS INVOLVED IN SUICIDE CLUSTERS

Much of the literature on the mechanisms involved in suicide cluster formation has been formulated with respect to mass suicide clusters; for example, where the suicide of a celebrity has been reported in the media and results in a spate of copycat suicides in the population exposed to the media report (e.g., Chen et al., 2012; Yip et al., 2006). There is evidence that the copycat effect is more prominent where media coverage is extensive and the suicide glamorized or reported upon in detail (Pirkis & Blood, 2010). A dose-response relationship has also been demonstrated between regional newspaper distribution and the size of the imitative suicide effect (Etzersdorfer, Voracek, & Sonneck, 2001). The role of the media in causing point clusters through imitation or modeling of reported suicides must be considered alongside other modes of transmission, such as direct contact or word of mouth. Several interrelated psychological mechanisms underlying point clusters have been postulated. It is not known which actually operate, although multiple mechanisms are likely.

Contagion

Contagion is a concept derived from the study of infectious diseases. The underlying assumption is that suicidal behavior may facilitate the occurrence of subsequent suicidal behavior, either directly (via contact or friendship with the index suicide) or indirectly (via the media). Several components of the infectious disease model can usefully

be applied to suicide contagion. They include (1) *host susceptibility* (e.g., a genetic predisposition to mental illness); (2) *modes of transmission*, which may be direct person-to-person or indirect (via a friend or newspaper); (3) *degree of virulence* – the suicide of a popular celebrity would be expected to exert more of an effect than that of a criminal; (4) *susceptibility to contagion* – persons with poor psychological health (e.g., mental illness or low self-esteem) would be expected to be particularly vulnerable to contagion and; (5) *dose dependency* – the amount of media exposure producing a spectrum of disease (Gould, 1990). Davis and Hardy (1986) have presented a mathematical model of how a suicide epidemic may occur based on the concept of cultural contagion (spread by television, newspapers, and word of mouth). Thus, a suicide cluster can be seen as behaving like an epidemic. Zenere (2009) states that individuals who are at greatest risk of contagion are those who have geographical proximity to a suicide (those who witness the suicide or who were exposed to the immediate aftermath), have psychosocial proximity (a high level of identification with the victim), and are part of an at risk population (possess preexisting vulnerabilities; e.g., mental illness, substance misuse, or family conflict).

Imitation and Suggestion

Imitation has been defined as engagement in behavior after observation of a similar behavior in others (Akers, 1994). In relation to suicidal behavior, this is often referred to less precisely as copycat suicidal acts. Phillips (1974) coined the term “Werther effect” to explain the occurrence of suicides following a publicized suicide. In 1774, Goethe’s novel, *The Sorrows of Young Werther*, was published. In the book, the hero suffers unrequited love and as a result dies by suicide. The book led to a wave of suicides among young men in Germany, England, France, Holland, and Scandinavia. Victims imitated Werther’s characteristic dress (blue tailcoat and yellow waistcoat) and method of suicide (gunshot). Phillips

observed that there was a rise in suicides in both the U.K. and U.S. general population after newspaper reports of suicides. He hypothesized that suicide stories have a suggestive effect on vulnerable people who then imitate the publicized suicide. Phillips used data from the United Kingdom and United States to show that the number of suicides increased following publication of a story about a suicide in the press (Phillips, 1974).

Subsequent studies have shown adolescents to be particularly vulnerable to the Werther effect (Gould & Shaffer, 1987; Phillips & Carstensen, 1986). The process of imitation relies on the existence of similarities between the stimulus (index person dying by suicide) and the potential imitators (those vulnerable to suicide). It would be expected that, in a suicide cluster, individual suicides would have similar characteristics with respect to sociodemographic factors such as age, gender, ethnicity, social class, and employment status. It would also be expected that, if the index person dying by suicide is praised or glorified, there will be an increased tendency for others to identify with the victim and to judge suicide as an appropriate solution to their problems (Sonneck, Etzersdorfer, & Nagel-Kuess, 1994), thus increasing the likelihood of a copying response.

However, the Werther effect is not easily testable as it is not possible to determine with certainty why people end their lives (Jonas, 1992). Interviewing survivors of serious suicide attempts related to such clusters would be one way of gaining further insight (Beautrais, Joyce, & Mulder, 1997; Hawton, 2002). McKenzie et al. (2005) used data collected by the National Confidential Inquiry into Suicide and Homicide by People with Mental Illness (Department of Health, 1999) to look for clustering of suicides among people with mental illness in the United Kingdom using Knox tests, a statistical method for examining space-time interaction. They found significant space-time and space-time-method clustering of suicides and estimated that imitative suicides accounted for approxi-

mately 10% of suicides involving current and recent psychiatric patients.

Projective Identification

Taiminen (1992) has suggested that Melanie Klein's psychoanalytic concept of projective identification can be applied to explain the intrapsychic mechanism of suicide contagion, particularly in respect of the behavior of psychiatric inpatients. In projective identification, part of the self is projected onto the suicide. This process is facilitated by feelings of empathy toward the suicide. There is blurring of the self and the suicide followed by reinternalization of the projection, which leads to suicidal behavior. Taiminen presents a case study to illustrate the mechanism and suggests that the concept of projective identification may be useful in the psychotherapy of suicidal patients. While conceptually helpful, there is no empirical evidence that this is a key mechanism in the development of suicide clusters.

Pathological Identification

Sachs and Eth (1981) described a small cluster of suicidal behavior among psychiatric inpatients in which the index suicide shared many similar personal and clinical features, especially a suicidal or abandoning parent, with subsequent members of the cluster. The authors claim that pathological identification is the cause of suicidal behavior in their sample, all of whom were suffering from psychosis, and suggest that staff may underestimate the risk of further suicidal behavior among such patients following the suicide of a fellow inpatient.

Learning

The highly influential social learning theory proposed by Bandura (1977) starts from a critique of the behaviorist theory of direct reinforcement, which cannot account for all types of learning. Rather, Bandura argued that people can learn new informa-

tion and behaviors by watching others. This type of observational learning, also known as modeling, is used to explain a wide variety of behaviors, including the occurrence of suicide clusters. Thus, in a suicide cluster, transmission of modeling cues would occur by personal acquaintance, community exposure, and exposure to media coverage. Jonas (1992) suggested that, in addition to social learning, there is disinhibition of suicidal tendencies. Insel and Gould (2008) postulated that adolescents are particularly vulnerable to modeling of suicidal behavior because they have less cognitive inhibitory control than adults: neurobiologically, this type of control is developing throughout adolescence.

Priming

Priming, or activation hypothesis, is a cognitive psychology theory in which the activation of one thought may trigger related, preprogrammed thoughts (Berkowitz, 1984). According to priming theory, media images stimulate related thoughts in the minds of audience members. For example, if a person were to read an account of someone dying by suicide, it could activate a preprogrammed set of behaviors and lead to imitation of the suicide. In their discussion of the suicide of Gaetan Girouard, a well-known Quebec reporter, which led to a local rise in suicides using the same method soon after his death, Tousignant, Mishara, Caillaud, Fortin, and St-Laurent (2005) postulated that priming may have occurred because some of the cluster victims were reported to have been in a high state of vulnerability at the time of the index suicide and needed little incentive to end their lives.

Social Integration and Regulation

Durkheim (1897/1951) insisted that no phenomenon was more affected by imitation or contagion as suicide. Nevertheless, he did not accept that this contagious quality necessarily affected the suicide rate – a social fact – because its genesis was psychological

and its consequences merely individual and random; nor did he hold that geographical clustering of suicide was caused by imitation. Rather, the key determinants were social integration and regulation. Durkheim stated that where there is a lack of social ties in a community, social integration will be low, leading to individualism and egoistic suicide. On the other hand, where social integration is excessive and the interests of the group dominate those of the individual, high rates of altruistic suicide will result. The other important social cause of suicide he postulated is inadequate regulation, otherwise known as anomie. In a study of suicides in American counties using spatial analysis, Baller and Richardson (2002) found some support for Durkheim's theory in that suicides clustered geographically only because the structural predictors of suicide, such as social integration, also clustered in space. However, they also found evidence that imitation shaped the geographic patterning of suicide.

Complicated Bereavement

Johansson, Lindqvist, and Eriksson (2006) postulated that the formation of point suicide clusters involves not only contagion but an additional mechanism called complicated bereavement. Exposure to a suicide may cause or exacerbate depression in vulnerable individuals as a result of the inability to deal with feelings of loss and grief, thereby leading to suicidal behavior. They describe case studies of the victims in two small point clusters of teenage suicides in Sweden in which the teenagers who died knew one another. Some were clearly distressed by the suicide of others and there were many similarities between the deaths; for example, they lived near each other and used the same violent method. The authors conclude that their findings support theories of contagion and complicated bereavement.

Assortative Relating or Homophily

Joiner (1999) challenged the assumption that point suicide clusters are caused

by social learning. He postulated that clusters are caused by homophily (also known as assortative relating), the tendency of individuals with certain characteristics to preferentially associate with one another. Thus, if people associate on the basis of having high-risk factors for suicide, then spatial clusters of people at high risk for suicide will occur. Joiner states that many point clusters in schools and psychiatric hospitals are independent suicides within homophilous groups (groups sharing certain characteristics) of high-risk individuals. However, there is no direct evidence for homophily operating in suicide, although Joiner (2003) described an analog study of college roommates that supported his theory. Mesoudi (2009) used agent-based modeling techniques and statistical cluster detection analyses to assess homophily and social learning in suicide clusters. He found support for social learning theory but only limited support for homophily.

Assortative Susceptibility

Assortative susceptibility is a concept related to homophily in which individuals vulnerable to suicide belong to particular strata in society (Chotai, 2005). These strata are defined in terms of sociodemographic, personality related, and biological susceptibility. A stressful event occurring in a local community will affect several vulnerable individuals independently of each other, thereby giving rise to a point cluster of suicides. Chotai studied suicides in the county of Vasterbotten in northern Sweden. Aggregated (clustered in time and place) cases were compared with the remaining cases. Aggregated cases included significantly more middle-aged and older males living in rural forested areas and who used firearms to end their lives. Chotai suggests that more people dying by suicide with the above characteristics of the aggregated cases are likely to belong to the sociodemographic stratum susceptible to the process that gives rise to suicide clusters.

DISCUSSION

Our review of the worldwide literature on the risk factors and mechanisms of point suicide clusters revealed a considerable body of articles, which originated exclusively from the developed world, in particular North America, and many had been published some years ago. Two main types of paper were identified: first, reports of individual suicide clusters, often describing the characteristics of cluster victims and, less commonly, environmental risk factors; second, papers hypothesizing the mechanisms underlying cluster formation and, in a minority of cases, providing empirical data to test a specific hypothesis. Almost all studies of clusters were uncontrolled and involved relatively small numbers of suicides. None conducted a synthesized analysis of cluster victims from several different suicide clusters, although Davidson et al. (1989) reported on the characteristics of teenagers involved in two clusters in a case-control study.

From the studies identified, there was evidence that adolescents and young adults are at greatest risk of being involved in clusters of suicides. Other risk factors identified include male gender, direct involvement with another cluster victim, and many of the known factors for suicide in general, including past history of self-harm and current drug and/or alcohol abuse. Little information was reported about environmental risk factors, except for those clusters occurring in psychiatric inpatient facilities where changes in staff, weak leadership, and uncertainty about the future of the service emerged as frequent themes. No clear environmental factors emerged for clusters occurring in other settings, except the tendency to occur in isolated or closed communities; for example, Indian reservations and schools, and in some communities where unemployment and economic hardship were common.

The main purported method of point cluster formation is that of contagion by direct contact with a suicide, by word of

mouth, or via the media. Several different contagion mechanisms have been described, including modeling, suggestion, imitation, and priming, although there is very limited scientific evidence to support the operation of any of these mechanisms in cluster formation. The main alternative hypotheses to contagion are assortative relating (homophily) and the related concept of assortative susceptibility. According to these theories, clusters are thought to occur as those who are at high risk of suicide tend to associate socially or occupy a particular social stratum. It is proposed that when an apparent cluster of suicides occurs, it is merely a collection of independent suicides formed from people who are at high risk. Again, there is no firm evidence that these mechanisms operate in cluster formation. It would seem reasonable to infer that multiple mechanisms operate together, and that the main mechanism is different for different settings and populations. Which mechanism, if any, is dominant in any particular cluster is unknown; however, a study of survivors of near-lethal suicide attempts associated with a suicide cluster would help elucidate which mechanism(s) was (were) in operation.

Further research to develop our understanding of the mechanisms involved in clusters of suicidal behavior is clearly required. We recommend the involvement of patients who have survived a suicide attempt, especially where this is a serious attempt (medically and/or psychiatrically). Interviews with people who attempted suicide and were part of a cluster of suicidal behavior could inform if and how subjects were influenced by the suicidal behavior of earlier members of the cluster. If homophily was the main mechanism in operation, then cluster members would be expected to share sociodemographic and/or clinical characteristics but not to report having been influenced by the suicide or attempted suicide of other members. In contrast, if contagion was in operation, then cluster members would be expected to report being influenced by the suicidal behavior of earlier members of the cluster. Studies using

multilevel methodology to examine the extent to which individual (e.g., susceptibility) or contextual (e.g., shared social or economic) factors contribute to clustering of suicidal behavior could also be valuable. It is important to improve understanding of the role of the media in suicide clusters, including the changes that may occur in the nature of suicide reporting over time during a possible cluster, as such knowledge has

implications for the prevention and containment of clusters. Further understanding could be provided by longitudinal studies including people previously involved in known suicide clusters combined with information on environmental factors. Finally, studies on suicide clusters from low- and middle-income countries should be encouraged.

REFERENCES

- AKERS, R. L. (1994). *Criminological theories: Introduction and evaluation*. Los Angeles, CA: Roxbury.
- Anon. (1977). A suicide epidemic in a psychiatric hospital. *Diseases of the Nervous System*, 38, 327–331.
- ASKLAND, K. D., SONNENFELD, N., & CROSBY, A. (2003). A public health response to a cluster of suicidal behaviors: Clinical psychiatry, prevention, and community health. *Journal of Psychiatric Practice*, 9, 219–227.
- BALLER, R. D., & RICHARDSON, K. K. (2002). Social integration, imitation, and the geographic patterning of suicide. *American Sociological Review*, 67, 873–888.
- BANDURA, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215.
- BEAUTRAIS, A., JOYCE, P. R., & MULDER, R. T. (1997). Precipitating factors and life events in serious suicide attempts among youths aged 13 through 24 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, 36, 1543–1551.
- BECHTOLD, D. W. (1988). Cluster suicide in American Indian adolescents. *American Indian and Alaska Native Mental Health Research*, 1, 26–35.
- BERKOWITZ, L. (1984). Some effects of thoughts on anti- and pro-social influences of media effects. *Psychological Bulletin*, 95, 410–427.
- BRENT, D. A., KERR, M. M., GOLDSTEIN, C., BOZIGAR, J., WARTELLA, M., & ALLAN, M. J. (1989). An outbreak of suicide and suicidal behavior in a high school. *Journal of the American Academy of Child and Adolescent Psychiatry*, 28, 918–924.
- CHEN, Y. Y., LIAO, S. F., TENG, P. R., TSAI, C. W., FAN, H. F., & LEE, W. C. (2012). The impact of media reporting of the suicide of a singer on suicide rates in Taiwan. *Social Psychiatry and Psychiatric Epidemiology*, 47, 215–221.
- CHOTAI, J. (2005). Suicide aggregation in relation to socio-demographic variables and the suicide method in a general population: Assortative susceptibility. *Nordic Journal of Psychiatry*, 59, 325–330.
- COSER, R. L. (1976). Suicide and the relational system: A case study in a mental hospital. *Journal of Health and Social Behavior*, 17, 318–327.
- COX, B., & SKEGG, K. (1993). Contagious suicide in prisons and police cells. *Journal of Epidemiology and Community Health*, 47, 69–72.
- DAVIDSON, L. E., ROSENBERG, M. L., MERCY, J. A., FRANKLIN, J., & SIMMONS, J. T. (1989). An epidemiologic study of risk factors in two teenage suicide clusters. *Journal of the American Medical Association*, 262, 2687–2692.
- DAVIES, D., & WILKES, T. C. R. (1993). Cluster suicide in rural western Canada. *Canadian Journal of Psychiatry*, 38, 515–519.
- DAVIS, B. R., & HARDY, R. J. (1986). A suicide epidemic model. *Social Biology*, 33, 291–300.
- Department of Health. (1999). *Safer services; Report of the national confidential inquiry into suicide and homicide by people with mental illness*. London, England: The Stationary Office.
- DURKHEIM, E. (1951). *Suicide*. London, England: Routledge. (Original work published 1897).
- ERAZO, N., BAUMERT, J., & LADWIG, K.-H. (2004). Regionale und örtliche Verteilungsmuster von Bahnsuiziden. *Nervenarzt*, 75, 1099–1106.
- ETZERSDORFER, E., VORACEK, M., & SONNECK, G. (2001). A dose-response relationship of imitational suicides with newspaper distribution. *Australian and New Zealand Journal of Psychiatry*, 35, 251.
- FARMER, R., O'DONNELL, I., & TRANAH, T. (1991). Suicide on the London underground system. *International Journal of Epidemiology*, 20, 707–711.

- GOULD, M. S. (1990). Suicide clusters and media exposure. In S. J. Blumenthal & D. G. Kupfer (Eds.), *Suicide over the life cycle: Risk factors, assessment and treatment of suicidal patients* (pp. 517–532). Washington, DC: American Psychiatric Press.
- GOULD, M. S., PETRIE, K., KLEINMAN, M. H., & WALLENSTEIN, S. (1994). Clustering of attempted suicide: New Zealand national data. *International Journal of Epidemiology*, *23*, 1185–1189.
- GOULD, M. S., & SHAFFER, D. J. (1987). The impact of televised movies about suicide: A replicative study. *New England Journal of Medicine*, *317*, 809–811.
- GOULD, M. S., WALLENSTEIN, S., & DAVIDSON, L. (1989). Suicide clusters: A critical review. *Suicide and Life-Threatening Behavior*, *19*, 17–27.
- GOULD, M. S., WALLENSTEIN, S., & KLEINMAN, M. (1990). Time-space clustering of teenage suicide. *American Journal of Epidemiology*, *131*, 71–78.
- GOULD, M. S., WALLENSTEIN, S., KLEINMAN, M. H., O'CARROLL, P., & MERCY, J. (1990). Suicide clusters: An examination of age-specific effects. *American Journal of Public Health*, *80*, 211–212.
- GRIGG, J. R. (1988). Imitative suicides in an active duty military population. *Military Medicine*, *153*, 79–81.
- HAW, C. M. (1994). A cluster of suicides at a London psychiatric unit. *Suicide and Life-Threatening Behavior*, *24*, 256–266.
- HAWTON, K. (2002). Studying the survivors of nearly lethal suicide attempts: An important strategy in suicide research. *Suicide and Life-Threatening Behavior*, *32*(Suppl 1), 76–84.
- HAZELL, P. (1993). Adolescent suicide clusters: Evidence, mechanisms and prevention. *Australian and New Zealand Journal of Psychiatry*, *27*, 653–665.
- INSEL, B. J., & GOULD, M. S. (2008). Impact of modelling on adolescent suicidal behavior. *Psychiatric Clinics of North America*, *31*, 293–316.
- JOHANSSON, L., LINDQVIST, P., & ERIKSSON, A. (2006). Teenage suicide cluster formation and contagion: Implications for primary care. *BMC Family Practice*, *7*, 32.
- JOINER, T. E. (1999). The clustering and contagion of suicide. *Current Directions in Psychological Science*, *8*, 89–92.
- JOINER, T. E. (2003). Contagion of suicidal symptoms as a function of assortative relating and shared relationship stress in college roommates. *Journal of Adolescence*, *26*, 495–504.
- JONAS, K. (1992). Modelling and suicide: A test of the Werther effect. *British Journal of Social Psychology*, *31*, 295–306.
- LALIBERTÉ, A., & TOUSIGNANT, M. (2009). Alcohol and other contextual factors of suicide in four Aboriginal communities of Quebec, Canada. *Crisis*, *30*, 215–221.
- MCKENZIE, N., LANDAU, S., KAPUR, N., MEEHAN, J., ROBINSON, J., BICKLEY, H., et al. (2005). Clustering of suicides among people with mental illness. *British Journal of Psychiatry*, *187*, 476–480.
- MESOUDI, A. (2009). The cultural dynamics of copycat suicide. *PLoS One*, *4*, e7252.
- NIEDZWIEDZ, C. (2009). *The temporal and spatial clustering of completed and attempted suicide: A systematic review*. Unpublished MSc dissertation, Edinburgh University.
- PHILLIPS, D. P. (1974). The influence of suggestion on suicide: Substantive and theoretical implications of the Werther effect. *American Sociological Review*, *39*, 340–354.
- PHILLIPS, D. P., & CARSTENSEN, L. L. (1986). Clustering of teenage suicide after television news stories about suicide. *New England Journal of Medicine*, *315*, 685–689.
- PIRKIS, J., & BLOOD, W. (2010). *Suicide and the news and information media: A critical review*. Retrieved May 20, 2012, from <http://www.mindframe-media.info/site/index.cfm?display=84378>.
- POIJULA, S., WAHLBERG, K. E., & DYREGROV, A. (2001). Adolescent suicide and suicide contagion in three secondary schools. *International Journal of Emergency Mental Health*, *3*, 163–168.
- RESER, J. (1989). Australian aboriginal suicide deaths in custody: Cultural context and cluster evidence. *Australian Psychologist*, *24*, 325–342.
- RISSMILLER, D. J., & RISSMILLER, F. (1990). Inpatient suicide epidemics and suggestions for prevention. *Hospital and Community Psychiatry*, *41*, 922–924.
- SACHS, M., & ETH, S. (1981). Pathological identification as a cause of suicide on an inpatient unit. *Hospital and Community Psychiatry*, *32*, 36–40.
- SONNECK, G., ETZERSDORFER, E., & NAGEL-KUESS, S. (1994). Imitative suicide on the Viennese subway. *Social Science and Medicine*, *38*, 453–457.
- TAIMINEN, T. (1992). Projective identification and suicide contagion. *Acta Psychiatrica Scandinavica*, *85*, 449–452.
- TAIMINEN, T., SALMENPERÄ, T., & LEHTINEN, K. (1992). A suicide epidemic in a psychiatric hospital. *Suicide and Life-Threatening Behavior*, *22*, 350–363.

TOUSIGNANT, M., MISHARA, B. L., CAILLAUD, A., FORTIN, V., & ST-LAURENT, D. (2005). The impact of media coverage of the suicide of a well-known Quebec reporter: The case of Gaetan Girouard. *Social Science and Medicine*, *60*, 1919–1926.

TOWER, M. (1989). A suicide epidemic in an American Indian community. *American Indian and Alaska Native Mental Health Research*, *3*, 34–44.

WARD, J. A., & FOX, J. (1977). A suicide epidemic on an Indian reserve. *Canadian Psychiatric Association Journal*, *22*, 423–426.

WILKIE, C., MACDONALD, S., & HILDAHL, K. (1998). Community case study: Suicide cluster in a small Manitoba community. *Canadian Journal of Psychiatry*, *43*, 823–828.

WISSOW, L. S., WALKUP, J., BARLOW, A., REID, R., & KANE, S. (2001). Cluster and regio-

nal influences on suicide in a southwestern American Indian tribe. *Social Science and Medicine*, *53*, 1115–1124.

YIP, P. S., FU, K. W., YANG, K. C., IP, B. Y., CHAN, C. L., CHEN, E. Y., *et al.* (2006). The effects of a celebrity suicide on suicide rates in Hong Kong. *Journal of Affective Disorders*, *93*, 245–252.

ZEMISHLANY, Z., WEINBERGER, A., BEN-BASSAT, M., & MELL, H. (1987). An epidemic of suicide attempts by burning in a psychiatric hospital. *British Journal of Psychiatry*, *150*, 704–706.

ZENERE, F. J. (2009). Suicide clusters and contagion. *Principal Leadership*, *10*, 12–16.

Manuscript Received: August 20, 2012

Revision Accepted: August 20, 2012